Liquidity and Exchange Rates: An Empirical Investigation

Charles Engel and Steve Pak Yeung Wu
February 25, 2022

Supplementary Appendix A

1. Uncovered Interest Parity regression (Fama regression) over the sample

UIP regression: $\Delta s_t = \alpha + \beta(i_t^m - i_t^{m*}) + \varepsilon_t$

where the change of exchange rate and interest rates (1m-LIBOR) are rate at monthly rates

Currency pair	beta	upper 95% CI	lower 95% CI	Currency pair	beta	upper 95% CI	lower 95% CI
AUD-USD	-0.8	2.9	-4.6	JPY-NZD	3.4	7.2	-0.3
CAD-USD	0.6	5.8	-4.7	NOK-NZD	1.1	3.8	-1.6
CHF-USD	-1.5	2.1	-5.1	AUD-NOK	0.0	2.6	-2.6
EUR-USD	-1.1	2.5	-4.7	CAD-NOK	-1.1	2.0	-4.1
GBP-USD	0.9	4.5	-2.7	CHF-NOK	0.5	3.4	-2.4
JPY-USD	0.4	2.6	-1.8	EUR-NOK	0.1	3.1	-2.8
NOK-USD	0.2	3.1	-2.7	GBP-NOK	0.2	2.9	-2.6
NZD-USD	0.6	4.7	-3.6	JPY-NOK	1.1	4.0	-1.9
SEK-USD	-0.8	2.3	-3.8	AUD-JPY	3.9	8.9	-1.1
AUD-SEK	0.9	5.4	-3.6	CAD-JPY	0.2	4.0	-3.6
CAD-SEK	-2.1	1.9	-6.0	CHF-JPY	-0.3	4.7	-5.3
CHF-SEK	0.6	4.8	-3.7	EUR-JPY	1.2	4.7	-2.4
EUR-SEK	-1.2	2.9	-5.2	GBP-JPY	1.4	4.1	-1.3
GBP-SEK	-0.5	2.7	-3.7	AUD-GBP	-0.3	3.6	-4.2
JPY-SEK	2.1	6.0	-1.8	CAD-GBP	3.6	7.9	-0.7
NOK-SEK	-0.6	2.1	-3.4	CHF-GBP	-0.3	2.9	-3.5
NZD-SEK	2.7	6.1	-0.7	EUR-GBP	-0.4	3.7	-4.6
AUD-NZD	1.2	4.6	-2.1	AUD-EUR	-1.2	3.8	-6.2
CAD-NZD	1.4	5.3	-2.5	CAD-EUR	-2.4	2.9	-7.7
CHF-NZD	3.0	6.8	-0.8	CHF-EUR	-1.6	2.4	-5.6
EUR-NZD	4.9	9.4	0.5	AUD-CHF	0.4	6.0	-5.2
GBP-NZD	1.1	6.5	-4.3	CAD-CHF	-3.3	2.5	-9.2
				AUD-CAD	-0.3	3.3	-3.9

Data period 1999M1-2018M1.

2. Correlation of central bank policy rate and 1-year government bond rate

In our model, the monetary authority controls the policy rate, which is the one-period government bond. In the data, we use 1-year government bond rate as the baseline measure. In the table below, we provide evidence that the central bank policy rates obtained from the IMF IFS dataset are highly correlated with the 1-year government bond rate.

Currency	Correlation
AUD	0.96
CAD	0.98
EUR	0.96
NOK	0.96
NZD	0.97
SEK	0.92
GBP	0.98
USD	0.99

Interest rates are end of period rates. JPY policy rate is not available in the IMF IFS dataset. The NOK data is directly obtained from the Norges Bank. Data period 1999M1-2018M1.

3. Baseline regression with survey-based exchange rate risk premium

In the baseline empirical regression, we regress the change of nominal exchange rate on lagged real exchange rate, change of liquidity return, change of government bond interest rate differential, lagged liquidity return and lagged government bond interest rate differential. r_t , which is the unmodelled stochastic deviation from uncovered interest party in the model, is left as the residual in the empirical regression. We remain agnostic about the source of this deviation and it can potentially include the foreign exchange risk premium. As we discussed in the main text, it is challenging for the existing exchange rate risk premium models to deliver a positive correlation between z_t and η_t , after controlling for interest rate differential. In this section, we address the concern about leaving out the foreign exchange risk premium by constructing a measure of it and control for it. We define a measure of foreign exchange risk premium, rp_t , as $rp_t \equiv s^e_{t,t+1} - f_{t,t+1}$ where $s^e_{t,t+1}$ is the exchange rate expectation. We make use of the Bloomberg exchange rate forecast function, which provides survey of commercial and investment banks exchange rate forecasts. These are collections of quarter-end exchange rate prediction which starts around 13 months before the target date. Depending on the currency, there are roughly 10-30 providers for each of these forecasts and we take the median forecast as a measure exchange rate expectation.[1]

The regression specification becomes:

$$\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \left(\Delta \tilde{\eta}_{j,t} \right) + \beta_3 \left(\Delta i^R_{j,t} \right) + \beta_4 \tilde{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + \beta_6 \left(\Delta rp_{j,t} \right) + \beta_7 rp_{j,t-1} + u_{j,t}$$

The regression results are presented in the table below. Controlling for the foreign exchange risk premium, the coefficient estimates on $\Delta \tilde{\eta}_{j,t}$ are still negatively significant, except for JPY, which is still estimated with the right sign but insignificant. Therefore, the main findings of the importance of treasury liquidity premium in explaining exchange rates is robust to this extension. The R-squared also improves. However, introducing foreign exchange risk premium put some restrictions to our analysis. First, the exchange rate forecast survey from Bloomberg are forecasts for quarter-end values. It limits our regression frequency to quarter. Second, the survey started since 2006Q1, which limits the start date of our regression. Finally, it is well-known that the forward rate at time t ($f_{t,t+1}$) is highly correlated with the spot exchange rate (0.9999 in our sample). In this case, if the exchange rate forecast survey is a noisy forecast, then the risk premium measure could be creating a serious endogeneity issue by explaining the exchange rates with exchange rates. We provide evidence here that our results are not affected inclusion of foreign exchange risk premium but conduct the main analysis without including it.

---

[1] These forecasts are all dollar – foreign currency exchange rates. We do a trilateral cross to get the non-US related exchange rates.

Regression with survey-based exchange rate risk premium:

$$\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2\left(\Delta\tilde{\eta}_{j,t}\right) + \beta_3\left(\Delta i_{j,t}^R\right) + \beta_4\tilde{\eta}_{j,t-1} + \beta_5 i_{j,t-1}^R + \beta_6\left(\Delta rp_{j,t}\right) + \beta_7 rp_{j,t-1} + u_{j,t}$$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	$\Delta rp_{j,t}$	$rp_{j,t-1}$	constant	N	R2 within	R2_within (without risk premium terms)
AUD	-0.0810***	-3.2019***	-7.2446***	1.9757**	-0.9909***	-0.7240***	-0.1381*	0.0321***	423	0.5841	0.3336
	(0.0017)	(1.1717)	(0.7584)	(0.9502)	(0.2404)	(0.0785)	(0.0728)	(0.0061)			
CAD	-0.0757***	-5.2150***	-6.8789***	2.3662***	-0.1648	-0.6541***	-0.2372***	0.0167***	423	0.5461	0.3520
	(0.0017)	(1.0421)	(0.7699)	(0.8088)	(0.2145)	(0.0752)	(0.0677)	(0.0046)			
EUR	-0.0711***	-3.8245***	-5.5451***	1.2964	-0.2829	-0.7112***	-0.2678***	-0.0073	423	0.5169	0.3235
	(0.0017)	(0.9630)	(0.7555)	(0.9012)	(0.2364)	(0.0729)	(0.0647)	(0.0050)			
JPY	-0.1294***	-1.0737	-7.3340***	5.6438***	-0.1854	-0.8431***	-0.3667***	0.6430***	423	0.6876	0.4810
	(0.0033)	(1.4832)	(0.9227)	(1.2031)	(0.2767)	(0.0937)	(0.0861)	(0.0176)			
NZD	-0.0818***	-4.1683***	-6.4873***	3.2502***	0.2991	-0.7201***	-0.3097***	0.0104	423	0.5810	0.3019
	(0.0017)	(1.2306)	(0.8348)	(0.9537)	(0.2605)	(0.0779)	(0.0685)	(0.0073)			
NOK	-0.0687***	-3.9244***	-6.5149***	2.5133**	-0.4699**	-0.6709***	-0.1742**	0.1401***	423	0.5699	0.3707
	(0.0018)	(1.1091)	(0.7903)	(0.9764)	(0.2384)	(0.0776)	(0.0682)	(0.0062)			
SEK	-0.0906***	-4.8318***	-6.1171***	0.7765	-0.2802	-0.5881***	-0.2216***	0.1805***	423	0.4535	0.2863
	(0.0019)	(1.1674)	(0.8301)	(1.0055)	(0.2424)	(0.0817)	(0.0725)	(0.0061)			
CHF	-0.0343***	-3.3066***	-3.9437***	1.9309*	0.2254	-0.8664***	-0.2494***	0.0231***	423	0.5202	0.2135
	(0.0019)	(1.1732)	(0.7775)	(1.0563)	(0.2140)	(0.0800)	(0.0761)	(0.0076)			
GBP	-0.0321***	-2.9451***	-6.6417***	1.8615**	0.1727	-0.7825***	-0.3663***	-0.0090**	423	0.6050	0.3765
	(0.0014)	(1.0694)	(0.7329)	(0.8766)	(0.2269)	(0.0732)	(0.0665)	(0.0043)			
USD	-0.0734***	-6.4576***	-5.9744***	-0.4047	0.0073	-0.6595***	-0.1193	-0.1457***	423	0.5482	0.3979
	(0.0018)	(1.2682)	(0.9046)	(1.1204)	(0.2800)	(0.0911)	(0.0798)	(0.0069)			

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the column (1) currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $rp_{j,t}$ is the measure of foreign exchange risk premium, $\tilde{\eta}_{j,t}$ is the measure of the government bond liquidity. $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2006Q1-2017Q4. Germany government interest rate is used for EUR case. Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test. *, **, and *** for $q_{j,t}$ is based on critical values from distribution for Augmented Dickey Fuller test with a constant.

4. Emerging market regressions

Emerging market regressions (foreign countries are all other emerging market countries):

$$\Delta s_{j,t} = \alpha_{j,t} + \beta_1 q_{,jt} + \beta_2 \Delta\eta_{j,t} + \beta_3 \Delta i_t + \beta_4 \Delta i^*_{j,t} + \beta_5 \Delta CDS_t + \beta_6 \Delta CDS^*_{j,t} + \beta_7 \eta_{j,t-1} + \beta_8 i_{t-1} + \beta_9 i^*_{j,t-1} + \beta_{10} CDS_{t-1} + \beta_{11} CDS^*_{j,t-1} + \beta_{12} \pi_{t-1} + \beta_{13} \pi^*_{t-1} + \epsilon_{j,t}$$

	q_{t-1}	$\Delta\eta_t$	Δi_t	Δi^*_t	ΔCDS_t	ΔCDS^*_t	η_{t-1}	i_{t-1}	i^*_{t-1}	CDS_{t-1}	CDS^*_{t-1}	π_{t-1}	π^*_{t-1}	N	Within R^2
BRL	-0.08***	-0.5	-0.8	-0.6*	10.6***	-4.0***	0.1	-0.2*	-0.21*	2.5***	-0.5	0.0005	0.0012***	1298	0.33
	(0.02)	(0.3)	(0.6)	(0.3)	(1.3)	(0.8)	(0.2)	(0.1)	(0.11)	(0.8)	(0.5)	(0.0024)	(0.0004)		
CLP	-0.07***	-0.2	0.6	-0.8***	3.9*	-1.4***	-0.1	0.2	0.13*	-0.1	-0.7***	-0.0008	0.0003	1468	0.10
	(0.01)	(0.2)	(0.4)	(0.2)	(2.1)	(0.5)	(0.1)	(0.2)	(0.07)	(1.2)	(0.3)	(0.0011)	(0.0003)		
CNY	-0.03***	-0.5***	-0.6	-1.1***	-3.3***	-3.4***	-0.14***	-0.7***	0.06	-0.3	-0.8***	-0.0003	0.0001	1936	0.36
	(0.01)	(0.1)	(0.5)	(0.2)	(0.9)	(0.3)	(0.05)	(0.2)	(0.04)	(0.5)	(0.2)	(0.0003)	(0.0003)		
COP	-0.05***	-0.7***	0.8	-0.2	5.6***	-4.0***	-0.2**	0.01	0.06	1.0**	-1.1***	0.0027	0.0004	1779	0.17
	(0.01)	(0.2)	(0.6)	(0.2)	(1.0)	(0.5)	(0.1)	(0.00)	(0.05)	(0.5)	(0.2)	(0.0020)	(0.0003)		
HUF	-0.07***	-0.6***	1.6**	-1.2***	2.9***	-5.1***	-0.01	0.1	-0.06	0.03	-1.3**	-0.0014**	0.0003	1066	0.34
	(0.02)	(0.2)	(0.8)	(0.3)	(0.7)	(0.7)	(0.12)	(0.1)	(0.08)	(0.37)	(0.6)	(0.0007)	(0.0003)		
IDR	-0.04***	0.2**	0.4**	-1.2***	2.0***	-3.2***	0.07	-0.07	0.09**	0.4**	-0.9***	-0.0001	0.0002	2005	0.17
	(0.01)	(0.1)	(0.2)	(0.2)	(0.5)	(0.4)	(0.06)	(0.08)	(0.04)	(0.2)	(0.2)	(0.0003)	(0.0003)		
ILS	-0.04***	-0.4**	-2.5***	-1.2***	2.1	-6.1***	-0.04	0.12	0.13***	1.2**	-1.2***	-0.0001	0.0002	1309	0.34
	(0.01)	(0.2)	(0.8)	(0.2)	(1.4)	(0.5)	(0.08)	(0.10)	(0.05)	(0.5)	(0.3)	(0.0005)	(0.0003)		
INR	-0.04***	-0.1	0.2	-1.4***	0.5	-2.4***	-0.2***	0.6***	0.01	0.9**	-0.6***	-0.0006	0.0000	763	0.23
	(0.01)	(0.1)	(0.4)	(0.2)	(0.4)	(0.3)	(0.1)	(0.1)	(0.07)	(0.4)	(0.2)	(0.0006)	(0.0003)		
KRW	-0.04***	-0.6***	2.3***	-1.0***	5.2***	-3.7***	-0.14*	0.3***	0.03	1.1***	-0.8***	-0.0013*	0.0003	2035	0.25
	(0.01)	(0.1)	(0.8)	(0.2)	(0.6)	(0.4)	(0.07)	(0.1)	(0.04)	(0.3)	(0.2)	(0.0007)	(0.0002)		
MXN	-0.04***	0.07	0.8	-1.3***	4.2***	-3.3***	-0.02	-0.2*	0.06	1.1***	-0.8***	0.0010	0.0007**	1648	0.15
	(0.01)	(0.2)	(0.6)	(0.2)	(0.9)	(0.5)	(0.07)	(0.1)	(0.04)	(0.4)	(0.2)	(0.0010)	(0.0003)		
MYR	-0.04***	-0.5***	1.8***	-0.8***	0.6	-3.3***	-0.1*	-0.002	0.03	0.4	-0.6***	-0.0009**	0.0002	1518	0.20
	(0.01)	(0.1)	(0.7)	(0.2)	(0.7)	(0.4)	(0.1)	(0.3)	(0.04)	(0.4)	(0.2)	(0.0005)	(0.0003)		
PEN	-0.04***	-0.4***	0.02	-0.9***	0.7	-3.5***	-0.14**	0.1	-0.01	-0.2	-0.6***	-0.0007	0.0004	1571	0.23
	(0.01)	(0.1)	(0.46)	(0.2)	(0.8)	(0.4)	(0.07)	(0.1)	(0.05)	(0.4)	(0.2)	(0.0009)	(0.0003)		
PHP	-0.05***	-0.3***	0.3	-0.8***	0.8*	-3.4***	-0.1	0.1	0.06	0.6***	-0.8***	0.0006	-0.0000	1564	0.21
	(0.01)	(0.1)	(0.3)	(0.2)	(0.5)	(0.4)	(0.1)	(0.1)	(0.04)	(0.2)	(0.2)	(0.0008)	(0.0002)		
PLN	-0.05***	-0.6***	-1.0	-1.3***	9.6***	-2.5***	-0.1	-0.3**	0.00	1.8***	-0.9***	-0.0005	0.0002	1467	0.28
	(0.01)	(0.2)	(1.0)	(0.2)	(1.1)	(0.5)	(0.1)	(0.2)	(0.06)	(0.5)	(0.2)	(0.0012)	(0.0003)		
RUB	-0.07***	-0.8***	1.8***	-1.1***	3.0***	-3.7***	-0.5***	0.1	-0.07	1.1***	-0.8**	0.0004	-0.0002	1918	0.33
	(0.01)	(0.1)	(0.4)	(0.2)	(0.5)	(0.5)	(0.1)	(0.1)	(0.07)	(0.3)	(0.3)	(0.0010)	(0.0003)		
THB	-0.04***	-0.6***	0.6	-0.9***	-0.8	-3.5***	-0.1***	0.3*	0.04	1.3***	-0.8***	0.0004	0.0003	1705	0.26
	(0.01)	(0.1)	(0.7)	(0.2)	(0.7)	(0.3)	(0.04)	(0.1)	(0.04)	(0.4)	(0.2)	(0.0003)	(0.0003)		
TRY	-0.02*	-0.1	1.2***	-1.1***	3.6***	-2.4***	-0.03	-0.1*	-0.03	1.1***	-0.7***	-0.0001	0.0003	1849	0.46
	(0.01)	(0.1)	(0.2)	(0.2)	(0.3)	(0.4)	(0.07)	(0.04)	(0.05)	(0.2)	(0.2)	(0.0004)	(0.0003)		
ZAR	-0.04***	-0.2	2.8***	-1.0***	8.6***	-2.9***	-0.05	-0.2	0.08	0.9**	-1.1***	-0.0001	0.0000	1957	0.37
	(0.01)	(0.1)	(0.5)	(0.2)	(0.7)	(0.3)	(0.07)	(0.1)	(0.05)	(0.3)	(0.2)	(0.0008)	(0.0002)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 18 home currencies used are Brazilian Real (BRL), Chilean Peso (CLP), Chinese Yuan (CNY), Colombian Peso (COP), Hungarian Forint (HUF), Indonesian Rupiah (IDR), Israeli New Shekel (ILS), Indian Rupee (INR), Korean Won (KRW), Mexican Peso (MXN), Malaysian Ringgit (MYR), Peruvian Sol (PEN), Philippine Peso (PHP), Polish Zloty (PLN), Russian Ruble (RUB), South African Rand (ZAR), Thai Baht (THB), Turkish Lira (TRY). Each of the regression is one home country with 17 (emerging markets) foreign countries. The sample period is 1999M1-2018M1. Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Emerging market regressions (foreign countries are all emerging market countries and G10 countries):

$$\Delta s_{j,t} = \alpha_{j,t} + \beta_1 q_{,jt} + \beta_2 \Delta\eta_{j,t} + \beta_3 \Delta i_t + \beta_4 \Delta i^*_{j,t} + \beta_5 \Delta CDS_t + \beta_6 \Delta CDS^*_{j,t} + \beta_7 \eta_{j,t-1} + \beta_8 i_{t-1} + \beta_9 i^*_{j,t-1} + \beta_{10} CDS_{t-1} + \beta_{11} CDS^*_{j,t-1} + \beta_{12}\pi_{t-1} + \beta_{13}\pi^*_{t-1} + \epsilon_{j,t}$$

	q_{t-1}	$\Delta\eta_t$	Δi_t	Δi^*_t	ΔCDS_t	ΔCDS^*_t	η_{t-1}	i_{t-1}	i^*_{t-1}	CDS_{t-1}	CDS^*_{t-1}	π_{t-1}	π^*_{t-1}	N	Within R^2
BRL	-0.09***	-0.6*	-0.7	-0.4**	10.0***	-4.0***	0.03	-0.2**	-0.2***	2.6***	-0.7***	0.0001	0.0008***	2008	0.31
	(0.02)	(0.3)	(0.5)	(0.2)	(1.2)	(0.6)	(0.17)	(0.1)	(0.05)	(0.71)	(0.3)	(0.0022)	(0.0003)		
CLP	-0.07***	-0.2	0.6*	-0.4**	3.4**	-1.56***	-0.08	0.16	0.1**	-0.27	-0.7***	-0.0012	0.0004**	2285	0.09
	(0.01)	(0.1)	(0.3)	(0.2)	(1.5)	(0.3)	(0.05)	(0.1)	(0.05)	(0.80)	(0.1)	(0.0008)	(0.0002)		
CNY	-0.03***	-0.7***	-0.5	-0.7***	-3.9***	-3.6***	-0.1***	-0.7***	0.04	-0.49	-0.7***	-0.0001	0.0003	2987	0.32
	(0.00)	(0.1)	(0.3)	(0.1)	(0.5)	(0.2)	(0.03)	(0.1)	(0.02)	(0.33)	(0.1)	(0.0002)	(0.0002)		
COP	-0.06***	-0.8***	0.9**	0.14	4.6***	-3.8***	-0.2**	0.02	0.02	0.8**	-1.0***	0.0025*	0.0001	2745	0.15
	(0.01)	(0.1)	(0.4)	(0.12)	(0.7)	(0.3)	(0.08)	(0.09)	(0.05)	(0.4)	(0.2)	(0.0015)	(0.0002)		
HUF	-0.07***	-0.7***	1.5**	-1.1***	2.8***	-5.2***	-0.04	0.1	-0.03	0.062	-1.4***	-0.0007	-0.0000	1637	0.30
	(0.01)	(0.2)	(0.7)	(0.2)	(0.5)	(0.2)	(0.12)	(0.07)	(0.06)	(0.29)	(0.2)	(0.0006)	(0.0002)		
IDR	-0.04***	0.3***	0.4***	-0.7***	1.5***	-3.1***	0.1***	-0.1**	0.1***	0.4***	-0.8***	-0.0001	0.0002	3093	0.15
	(0.01)	(0.1)	(0.1)	(0.1)	(0.3)	(0.1)	(0.05)	(0.05)	(0.04)	(0.1)	(0.1)	(0.0002)	(0.0002)		
ILS	-0.05***	-0.4***	-2.5***	-0.9***	1.8*	-6.3***	-0.00	0.11	0.1***	1.4***	-1.3***	-0.0005	0.0002	1993	0.28
	(0.01)	(0.1)	(0.6)	(0.1)	(1.1)	(0.2)	(0.07)	(0.08)	(0.03)	(0.4)	(0.1)	(0.0004)	(0.0002)		
INR	-0.03***	-0.2*	0.3	-0.9***	0.2	-2.4***	-0.2***	0.3**	0.02	0.6**	-0.5***	-0.0006	0.0003	1110	0.15
	(0.01)	(0.1)	(0.4)	(0.2)	(0.3)	(0.2)	(0.04)	(0.1)	(0.05)	(0.3)	(0.1)	(0.0005)	(0.0003)		
KRW	-0.04***	-0.7***	2.8***	-0.6***	4.1***	-3.5***	-0.1***	0.3***	0.01	1.0***	-0.7***	-0.0016***	0.0003	3182	0.22
	(0.01)	(0.1)	(0.5)	(0.1)	(0.4)	(0.2)	(0.05)	(0.1)	(0.03)	(0.2)	(0.1)	(0.0005)	(0.0002)		
MXN	-0.04***	0.05	0.9*	-1.1***	3.4***	-3.1***	0.01	-0.15*	0.00	1.0***	-0.8***	0.0008	0.0005***	2532	0.12
	(0.01)	(0.13)	(0.5)	(0.2)	(0.7)	(0.3)	(0.06)	(0.09)	(0.04)	(0.3)	(0.1)	(0.0008)	(0.0002)		
MYR	-0.05***	-0.5***	2.2***	-0.3***	-0.15	-3.3***	-0.1**	-0.13	0.02	0.4*	-0.6***	-0.0003	0.0002	2345	0.15
	(0.01)	(0.1)	(0.5)	(0.1)	(0.51)	(0.2)	(0.04)	(0.22)	(0.03)	(0.24)	(0.1)	(0.0003)	(0.0002)		
PEN	-0.05***	-0.3***	-0.0	-0.3***	-0.12	-3.5***	-0.2***	0.05	-0.02	-0.06	-0.6***	-0.0011*	0.0003**	2413	0.16
	(0.01)	(0.1)	(0.3)	(0.1)	(0.46)	(0.2)	(0.05)	(0.10)	(0.03)	(0.27)	(0.1)	(0.0006)	(0.0001)		
PHP	-0.04***	-0.3***	0.1	-0.3***	0.30	-3.4***	0.00	0.14**	0.02	0.4***	-0.6***	0.0013**	-0.0001	2414	0.16
	(0.01)	(0.1)	(0.2)	(0.1)	(0.27)	(0.2)	(0.05)	(0.06)	(0.03)	(0.2)	(0.1)	(0.0006)	(0.0002)		
PLN	-0.05***	-0.7***	-0.7	-1.0***	8.4***	-2.5***	-0.07	-0.3***	-0.04	1.6***	-0.7***	-0.0005	-0.0000	2281	0.27
	(0.01)	(0.1)	(0.7)	(0.1)	(0.80)	(0.2)	(0.07)	(0.1)	(0.04)	(0.3)	(0.1)	(0.0009)	(0.0002)		
RUB	-0.07***	-0.9***	1.6***	-0.6***	2.9***	-3.7***	-0.5***	0.12	-0.1**	1.1***	-0.7***	0.0001	-0.0002	2949	0.29
	(0.01)	(0.1)	(0.4)	(0.2)	(0.41)	(0.4)	(0.1)	(0.11)	(0.05)	(0.2)	(0.2)	(0.0008)	(0.0002)		
THB	-0.04***	-0.7***	1.4***	-0.4***	-0.94**	-3.7***	-0.1***	0.2**	0.01	1.3***	-0.7***	0.0002	0.0004**	2594	0.20
	(0.00)	(0.1)	(0.4)	(0.1)	(0.40)	(0.2)	(0.04)	(0.09)	(0.03)	(0.2)	(0.1)	(0.0002)	(0.0001)		
TRY	-0.02***	-0.00	1.2***	-0.7***	3.5***	-2.5***	0.00	-0.1***	-0.1***	0.9***	-0.5***	-0.0002	0.0003	2852	0.39
	(0.01)	(0.1)	(0.1)	(0.2)	(0.27)	(0.3)	(0.06)	(0.03)	(0.04)	(0.2)	(0.1)	(0.0004)	(0.0002)		
ZAR	-0.05***	-0.3**	3.0***	-0.8***	7.7***	-2.7***	-0.03	-0.23	0.07*	0.7***	-1.0***	0.0002	0.0000	3056	0.36
	(0.01)	(0.1)	(0.4)	(0.1)	(0.5)	(0.3)	(0.06)	(0.00)	(0.04)	(0.2)	(0.1)	(0.0006)	(0.0002)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 18 home currencies used are Brazilian Real (BRL), Chilean Peso (CLP), Chinese Yuan (CNY), Colombian Peso (COP), Hungarian Forint (HUF), Indonesian Rupiah (IDR), Israeli New Shekel (ILS), Indian Rupee (INR), Korean Won (KRW), Mexican Peso (MXN), Malaysian Ringgit (MYR), Peruvian Sol (PEN), Philippine Peso (PHP), Polish Zloty (PLN), Russian Ruble (RUB), South African Rand (ZAR), Thai Baht (THB), Turkish Lira (TRY). Each of the regression is one home country with 17 (emerging markets) + 10 (G10) foreign countries. The sample period is 1999M1-2018M1. Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

5. Regression tables in the main text with all coefficients reported

Full table of Table 1A

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \hat{\eta}_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \hat{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\hat{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0280***	-5.8403***	-5.6436***	0.3729	-0.2797**	0.0118***	2028	0.1925
	(0.0071)	(0.7792)	(0.5336)	(0.4037)	(0.1104)	(0.0041)		
CAD	-0.0292***	-3.6792***	-6.2239***	0.6596*	-0.2702**	0.0063**	1836	0.1780
	(0.0068)	(0.7446)	(0.5409)	(0.3722)	(0.1123)	(0.0025)		
EUR	-0.0208***	-3.5247***	-5.0296***	0.1062	-0.1604*	-0.0041*	2028	0.1199
	(0.0059)	(0.5774)	(0.4158)	(0.2963)	(0.0941)	(0.0021)		
JPY	-0.0379***	-4.1970***	-6.1899***	1.7952***	-0.2840**	0.1792***	2028	0.1433
	(0.0102)	(1.0210)	(0.7619)	(0.5391)	(0.1352)	(0.0473)		
NZD	-0.0286***	-6.0615***	-5.8825***	0.2684	-0.1196	0.0130**	2028	0.1689
	(0.0086)	(0.8071)	(0.6286)	(0.4018)	(0.1295)	(0.0061)		
NOK	-0.0177***	-2.8878***	-4.3967***	0.4004	-0.1699*	0.0358**	2028	0.1213
	(0.0069)	(0.6514)	(0.4989)	(0.3779)	(0.1021)	(0.0139)		
SEK	-0.0235***	-4.2018***	-4.4555***	-0.2478	-0.0883	0.0484***	2028	0.1128
	(0.0063)	(0.6442)	(0.4750)	(0.3446)	(0.1043)	(0.0130)		
CHF	-0.0101*	-3.1277***	-3.0788***	0.5760	-0.2172**	-0.0003	2028	0.0509
	(0.0061)	(0.7759)	(0.5552)	(0.3918)	(0.1080)	(0.0025)		
GBP	-0.0204***	-4.0860***	-5.3545***	0.5586	-0.3377***	-0.0075**	2028	0.1336
	(0.0067)	(0.7353)	(0.5244)	(0.3895)	(0.1054)	(0.0033)		
USD	-0.0139*	-6.0432***	-4.7403***	-1.1631***	-0.0296	-0.0289*	2028	0.1341
	(0.0071)	(0.8433)	(0.5988)	(0.4303)	(0.1141)	(0.0148)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1B

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0284***	-5.2710***	-5.7441***	0.2859	-0.2746***	0.0117***	2052	0.1891
	(0.0071)	(0.7181)	(0.5356)	(0.4313)	(0.1047)	(0.0040)		
CAD	-0.0267***	-4.6086***	-5.4603***	0.5648	-0.2635***	0.0070***	2052	0.1723
	(0.0062)	(0.6238)	(0.4910)	(0.3827)	(0.0968)	(0.0025)		
EUR	-0.0203***	-4.6406***	-5.0187***	-0.0199	-0.1843**	-0.0043**	2052	0.1434
	(0.0059)	(0.5179)	(0.4103)	(0.3109)	(0.0891)	(0.0021)		
JPY	-0.0400***	-4.3863***	-6.3171***	2.1844***	-0.1223	0.1973***	2052	0.1692
	(0.0102)	(0.9532)	(0.7367)	(0.5770)	(0.1220)	(0.0476)		
NZD	-0.0276***	-6.2906***	-6.0200***	0.1755	-0.1178	0.0127**	2052	0.1955
	(0.0082)	(0.7275)	(0.6082)	(0.4340)	(0.1216)	(0.0059)		
NOK	-0.0190***	-4.0106***	-4.8711***	0.6109	-0.1815*	0.0395***	2052	0.1537
	(0.0068)	(0.6138)	(0.4877)	(0.3915)	(0.0940)	(0.0139)		
SEK	-0.0226***	-4.5193***	-4.5991***	-0.3225	-0.1193	0.0460***	2052	0.1315
	(0.0062)	(0.5796)	(0.4631)	(0.3558)	(0.0968)	(0.0131)		
CHF	-0.0129**	-2.3197***	-2.7587***	0.6843	-0.2153**	0.0016	2052	0.0509
	(0.0065)	(0.7129)	(0.5557)	(0.4265)	(0.1006)	(0.0032)		
GBP	-0.0227***	-3.3495***	-5.2385***	0.8066**	-0.3468***	-0.0076**	2052	0.1283
	(0.0067)	(0.6655)	(0.5212)	(0.4103)	(0.0986)	(0.0033)		
USD	-0.0113*	-6.4388***	-4.7717***	-1.1849***	-0.0761	-0.0212	2052	0.1689
	(0.0068)	(0.7198)	(0.5691)	(0.4373)	(0.1045)	(0.0143)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1C

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta i^R_{j,t}) + \beta_3(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta i^R_{j,t}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0316***	-4.0715***	-0.2823***	0.0128***	2052	0.1134
	(0.0074)	(0.5134)	(0.1087)	(0.0042)		
CAD	-0.0276***	-4.5353***	-0.2493**	0.0058**	2052	0.1166
	(0.0064)	(0.4682)	(0.0985)	(0.0023)		
EUR	-0.0226***	-3.8297***	-0.1958**	-0.0046**	2052	0.0895
	(0.0060)	(0.3850)	(0.0909)	(0.0021)		
JPY	-0.0340***	-5.3243***	-0.1493	0.1581***	2052	0.1000
	(0.0105)	(0.7255)	(0.1294)	(0.0486)		
NZD	-0.0308***	-2.6695***	-0.0946	0.0135**	2052	0.0563
	(0.0093)	(0.5950)	(0.1333)	(0.0065)		
NOK	-0.0177**	-3.4970***	-0.1255	0.0353**	2052	0.0820
	(0.0070)	(0.4693)	(0.0951)	(0.0141)		
SEK	-0.0267***	-3.2092***	-0.1359	0.0548***	2052	0.0711
	(0.0063)	(0.4350)	(0.0983)	(0.0132)		
CHF	-0.0097	-2.0012***	-0.2245**	-0.0026	2052	0.0239
	(0.0061)	(0.5164)	(0.1026)	(0.0023)		
GBP	-0.0225***	-3.7205***	-0.3344***	-0.0081**	2052	0.0856
	(0.0068)	(0.4902)	(0.0994)	(0.0033)		
USD	-0.0141*	-3.6842***	-0.1376	-0.0288*	2052	0.0684
	(0.0075)	(0.5813)	(0.1122)	(0.0157)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1D 1999M1-2007M12

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0442**	-3.7828***	-3.3832***	-0.2771	-0.1394	0.0169**	972	0.0860
	(0.0172)	(1.2048)	(0.7835)	(0.7478)	(0.1697)	(0.0070)		
CAD	-0.0343**	-2.7138**	-3.2586***	-0.1023	-0.3389**	0.0083	972	0.0899
	(0.0157)	(1.0860)	(0.7449)	(0.6405)	(0.1582)	(0.0053)		
EUR	-0.0220	-2.8935***	-2.1521***	-0.3512	-0.2072	-0.0046	972	0.0463
	(0.0137)	(0.8520)	(0.5495)	(0.5668)	(0.1302)	(0.0030)		
JPY	-0.0477**	-1.1698	-1.6902*	0.7050	0.1013	0.2400**	972	0.0413
	(0.0198)	(1.3160)	(0.8907)	(0.8468)	(0.1821)	(0.0980)		
NZD	-0.0515***	-4.4680***	-3.5879***	-0.9822	-0.1811	0.0320***	972	0.0987
	(0.0173)	(1.1189)	(0.8693)	(0.6770)	(0.1675)	(0.0103)		
NOK	-0.0260*	-3.5820***	-2.7345***	-0.0776	-0.0880	0.0502*	972	0.0890
	(0.0154)	(0.9969)	(0.6348)	(0.6635)	(0.1318)	(0.0303)		
SEK	-0.0418***	-2.9760***	-2.3355***	-1.9765***	-0.0035	0.0849***	972	0.0743
	(0.0140)	(0.9147)	(0.6098)	(0.5870)	(0.1375)	(0.0301)		
CHF	-0.0265*	-1.1317	-1.1283*	-0.2191	-0.2178	0.0047	972	0.0262
	(0.0148)	(1.0144)	(0.6531)	(0.6819)	(0.1401)	(0.0071)		
GBP	-0.0356***	-4.1039***	-3.0239***	0.0960	-0.2111*	-0.0169**	972	0.0988
	(0.0130)	(0.8843)	(0.5724)	(0.5987)	(0.1252)	(0.0075)		
USD	-0.0017	-3.9766***	-2.0088***	-1.3819*	-0.1937	0.0013	972	0.0791
	(0.0121)	(1.1134)	(0.7022)	(0.7433)	(0.1497)	(0.0258)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2007M12.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1D 2008M1-2018M1

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0479***	-6.0254***	-7.4325***	0.1386	-0.4157**	0.0154**	1080	0.2958
	(0.0135)	(0.8766)	(0.7380)	(0.6054)	(0.2106)	(0.0071)		
CAD	-0.0421***	-5.7275***	-7.6665***	0.0651	0.1196	0.0049*	1080	0.2921
	(0.0108)	(0.7300)	(0.6477)	(0.4992)	(0.1707)	(0.0030)		
EUR	-0.0379***	-5.2961***	-7.3637***	-0.2554	-0.1148	-0.0116***	1080	0.2587
	(0.0103)	(0.6488)	(0.6024)	(0.4536)	(0.1839)	(0.0038)		
JPY	-0.0594***	-5.7308***	-11.1782***	2.0933**	-0.1388	0.2808***	1080	0.3300
	(0.0176)	(1.2351)	(1.1239)	(0.8886)	(0.2941)	(0.0798)		
NZD	-0.0538***	-6.9225***	-8.0179***	0.3942	0.1117	0.0093	1080	0.3205
	(0.0139)	(0.9474)	(0.8704)	(0.6478)	(0.2404)	(0.0092)		
NOK	-0.0331***	-4.8783***	-8.0136***	0.8544	-0.1418	0.0652***	1080	0.2584
	(0.0111)	(0.7696)	(0.7390)	(0.5510)	(0.1948)	(0.0220)		
SEK	-0.0493***	-5.6023***	-6.5534***	-0.0884	-0.0153	0.0962***	1080	0.2276
	(0.0112)	(0.7307)	(0.6968)	(0.4909)	(0.1970)	(0.0222)		
CHF	-0.0252**	-2.8630***	-4.0887***	0.3166	0.1736	-0.0015	1080	0.0918
	(0.0128)	(1.0104)	(0.9266)	(0.7260)	(0.2240)	(0.0057)		
GBP	-0.0461***	-3.4219***	-7.8212***	0.7905	-0.2768	-0.0182***	1080	0.2086
	(0.0144)	(0.9195)	(0.8551)	(0.6344)	(0.2411)	(0.0064)		
USD	-0.0470***	-7.1136***	-9.5402***	-0.8047	0.0188	-0.0901***	1080	0.3262
	(0.0127)	(0.8594)	(0.8147)	(0.5847)	(0.2209)	(0.0253)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1E (excluding 2007-2009)

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i_{j,t}^R) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i_{j,t-1}^R) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0229***	-5.0274***	-4.9028***	0.1657	-0.2888***	0.0104***	1719	0.1274
	(0.0070)	(0.9224)	(0.6239)	(0.4966)	(0.1066)	(0.0040)		
CAD	-0.0225***	-4.7266***	-4.6251***	0.3536	-0.3178***	0.0064***	1719	0.1266
	(0.0060)	(0.7771)	(0.5477)	(0.4220)	(0.0941)	(0.0025)		
EUR	-0.0173***	-5.1489***	-3.7518***	-0.4207	-0.1907**	-0.0046**	1719	0.0899
	(0.0059)	(0.7045)	(0.4968)	(0.3700)	(0.0949)	(0.0022)		
JPY	-0.0350***	-2.2265*	-3.4653***	1.9718***	-0.1089	0.1732***	1719	0.0576
	(0.0101)	(1.2139)	(0.8794)	(0.6179)	(0.1219)	(0.0472)		
NZD	-0.0226***	-5.8416***	-4.4753***	-0.4604	-0.1456	0.0116**	1719	0.1083
	(0.0082)	(0.9511)	(0.7274)	(0.5488)	(0.1246)	(0.0058)		
NOK	-0.0146**	-4.1858***	-4.1295***	0.4507	-0.2002**	0.0307**	1719	0.1068
	(0.0070)	(0.8479)	(0.5888)	(0.4758)	(0.1011)	(0.0147)		
SEK	-0.0179***	-4.1802***	-3.3752***	-0.4311	-0.1521	0.0359***	1719	0.0782
	(0.0061)	(0.7760)	(0.5545)	(0.4102)	(0.1013)	(0.0130)		
CHF	-0.0081	-2.1892**	-0.8891	0.0452	-0.2529**	-0.0029	1719	0.0207
	(0.0063)	(0.8846)	(0.6284)	(0.4648)	(0.0996)	(0.0034)		
GBP	-0.0161**	-4.7377***	-3.9819***	0.1791	-0.2829***	-0.0060**	1719	0.0820
	(0.0065)	(0.8639)	(0.5979)	(0.4671)	(0.0972)	(0.0031)		
USD	-0.0080	-7.1290***	-4.3299***	-1.3807***	-0.1094	-0.0138	1719	0.1254
	(0.0069)	(0.9607)	(0.6697)	(0.4872)	(0.1061)	(0.0146)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1 but excludes data from 2007-2009.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1F (excluding U.S. dollar)

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0322***	-4.7984***	-5.6396***	0.5626	-0.2767**	-0.0544***	1824	0.1843
	(0.0077)	(0.7149)	(0.5278)	(0.4410)	(0.1079)	(0.0132)		
CAD	-0.0325***	-4.3134***	-5.4166***	0.9654**	-0.3029***	-0.0590***	1824	0.1779
	(0.0072)	(0.6501)	(0.5027)	(0.4068)	(0.1032)	(0.0132)		
EUR	-0.0261***	-4.3161***	-4.9467***	0.3973	-0.2206**	-0.0582***	1824	0.1413
	(0.0063)	(0.5333)	(0.4095)	(0.3276)	(0.0916)	(0.0139)		
JPY	-0.0441***	-4.7844***	-6.6379***	2.4014***	-0.0940	0.1236***	1824	0.1801
	(0.0113)	(1.0061)	(0.7713)	(0.6233)	(0.1287)	(0.0297)		
NZD	-0.0333***	-5.9481***	-5.9658***	0.3598	-0.1308	-0.0538***	1824	0.1942
	(0.0087)	(0.7216)	(0.6017)	(0.4318)	(0.1252)	(0.0134)		
NOK	-0.0230***	-3.4899***	-4.9305***	0.8936**	-0.2366**	-0.0001	1824	0.1533
	(0.0072)	(0.6049)	(0.4810)	(0.3868)	(0.0954)	(0.0016)		
SEK	-0.0292***	-4.0158***	-4.5171***	0.1306	-0.1701*	0.0455***	1824	0.1249
	(0.0064)	(0.5704)	(0.4522)	(0.3508)	(0.0977)	(0.0099)		
CHF	-0.0153**	-1.8779***	-2.7105***	0.9696**	-0.2059*	-0.0294	1824	0.0491
	(0.0073)	(0.7056)	(0.5466)	(0.4380)	(0.1085)	(0.0182)		
GBP	-0.0243***	-3.4335***	-5.4040***	1.1084***	-0.3789***	-0.0592***	1824	0.1358
	(0.0073)	(0.7056)	(0.5466)	(0.4380)	(0.1085)	(0.0182)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 9 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF) and British Pound (GBP). We exclude United States Dollar (USD) from all the regressions. Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1G

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i_{j,t}^R) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i_{j,t-1}^R) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0543**	-7.2292	-22.9042	-11.0936	-2.9609	0.0104	360	0.0535
	(0.0259)	(10.5997)	(14.9001)	(12.0581)	(3.0581)	(0.0100)		
CAD	-0.0299***	-12.7346***	-29.1263***	-9.5571**	0.2082	0.0033	1228	0.0564
	(0.0099)	(4.6383)	(7.2838)	(4.8155)	(1.8784)	(0.0031)		
EUR	-0.0826***	-18.6085**	-20.0382**	-18.8645***	2.2468	-0.0213***	609	0.0870
	(0.0167)	(7.4739)	(9.0270)	(7.3184)	(2.7402)	(0.0050)		
JPY	-0.1023***	-23.3412**	-11.6606	-1.2668	-6.9507**	0.4741***	462	0.1397
	(0.0237)	(10.1332)	(11.6918)	(12.1462)	(3.4989)	(0.1084)		
NZD	-0.0331***	-18.7123***	-28.5861***	-11.9830**	0.9539	0.0072	1228	0.0632
	(0.0103)	(4.8520)	(6.9774)	(5.2982)	(1.5912)	(0.0070)		
SEK	-0.0332***	-14.9686***	-17.2230***	-11.1691***	-0.0599	0.0645***	1228	0.0460
	(0.0085)	(3.8834)	(5.6090)	(4.1247)	(1.2472)	(0.0177)		
CHF	-0.0572***	-10.8859	9.7523	-15.8180*	12.1774***	-0.0080*	731	0.0631
	(0.0138)	(8.9118)	(8.5222)	(9.0595)	(3.4159)	(0.0045)		
GBP	-0.0221*	-8.1728*	-19.2894***	-8.4952*	-1.0091	-0.0118**	1228	0.0305
	(0.0115)	(4.9056)	(7.0342)	(4.9864)	(1.6876)	(0.0055)		
USD	-0.0254***	-17.1716***	-15.1574**	-16.5361***	1.1967	-0.0464**	1228	0.0617
	(0.0088)	(3.9433)	(6.1518)	(3.9614)	(1.4326)	(0.0182)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2A, full sample, no default risk

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \lambda_{j,t} + \beta_3 \Delta \tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0274***	-6.1475***	-2.9797**	-5.8688***	0.3472	-0.1402	-0.2849**	0.0118***	2028	0.1995
	(0.0072)	(0.7910)	(1.2262)	(0.5366)	(0.4285)	(0.7619)	(0.1109)	(0.0041)		
CAD	-0.0286***	-4.6021***	-5.2004***	-6.1767***	0.6082	-0.0500	-0.2890***	0.0061**	1836	0.2065
	(0.0068)	(0.7235)	(1.1252)	(0.5272)	(0.4023)	(0.7135)	(0.1105)	(0.0025)		
EUR	-0.0190***	-4.6613***	-4.9050***	-5.0429***	-0.0460	-0.3667	-0.1720*	-0.0047**	2028	0.1471
	(0.0059)	(0.5684)	(0.8672)	(0.4086)	(0.3126)	(0.5340)	(0.0911)	(0.0022)		
JPY	-0.0399***	-4.1648***	-4.9939***	-6.4133***	2.1716***	2.0497**	-0.1430	0.1959***	2028	0.1731
	(0.0101)	(1.0016)	(1.5866)	(0.7452)	(0.5782)	(0.9608)	(0.1340)	(0.0476)		
NZD	-0.0288***	-6.6165***	-5.7714***	-6.2660***	0.2044	-0.5417	-0.1606	0.0144**	2028	0.2014
	(0.0078)	(0.7968)	(1.2968)	(0.6124)	(0.4329)	(0.7811)	(0.1266)	(0.0057)		
NOK	-0.0190***	-3.8436***	-5.0816***	-4.9048***	0.5818	0.7234	-0.1754*	0.0397***	2028	0.1574
	(0.0068)	(0.6526)	(1.0437)	(0.4876)	(0.3978)	(0.6896)	(0.0987)	(0.0142)		
SEK	-0.0215***	-4.4583***	-5.0234***	-4.5856***	-0.2974	-0.6584	-0.1246	0.0430***	2028	0.1328
	(0.0063)	(0.6435)	(0.9849)	(0.4676)	(0.3630)	(0.6360)	(0.1030)	(0.0135)		
CHF	-0.0126*	-3.0442***	-1.1689	-3.0433***	0.6559	0.6751	-0.1920*	0.0017	2028	0.0545
	(0.0065)	(0.7725)	(1.1966)	(0.5521)	(0.4222)	(0.7477)	(0.1075)	(0.0034)		
GBP	-0.0218***	-4.1890***	-1.4009	-5.5283***	0.7676*	0.6448	-0.3340***	-0.0074**	2028	0.1373
	(0.0068)	(0.7457)	(1.1224)	(0.5252)	(0.4169)	(0.6977)	(0.1065)	(0.0033)		
USD	-0.0119*	-6.3166***	-6.7369***	-4.7912***	-1.2687***	-0.8782	-0.0583	-0.0231	2028	0.1708
	(0.0070)	(0.8213)	(1.1889)	(0.5794)	(0.4454)	(0.7188)	(0.1109)	(0.0148)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2A, post 2008, with default risk

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l_{j,t}^R + \beta_5 \Delta i_{j,t}^R + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l_{j,t-1}^R + \beta_9 i_{j,t-1}^R + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta l_{j,t}^R$	$\Delta i_{j,t}^R$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$l_{j,t-1}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0509***	-7.0027***	-3.1133**	14.3663***	-7.1490***	-0.3463	-0.4152	0.0981	-0.3792*	0.0155**	955	0.2878
	(0.0156)	(1.1219)	(1.5396)	(2.3547)	(0.8016)	(0.6623)	(1.1959)	(1.4170)	(0.2130)	(0.0074)		
CAD	-0.0313***	-8.8567***	-6.8906***	8.3213***	-8.9747***	-0.6043	-3.5155***	-0.6392	0.3944	-0.0009	399	0.3046
	(0.0118)	(1.5154)	(1.7969)	(2.5681)	(1.1122)	(0.8526)	(1.0528)	(1.5427)	(0.2489)	(0.0035)		
EUR	-0.0475***	-6.0993***	-3.9164***	8.2139***	-7.8031***	-0.0617	-0.6728	2.1319**	-0.0555	-0.0159***	966	0.2593
	(0.0108)	(0.7990)	(0.9455)	(1.6760)	(0.6197)	(0.4729)	(0.7124)	(1.0462)	(0.1759)	(0.0042)		
JPY	-0.0638***	-6.7890***	-4.4253**	10.1977***	-11.2335***	2.1124***	2.9840**	-0.2255	-0.0562	0.3035***	966	0.3391
	(0.0177)	(1.3763)	(1.8491)	(3.1745)	(1.1307)	(0.8119)	(1.4166)	(1.9881)	(0.2783)	(0.0799)		
NZD	-0.0548***	-7.7871***	-5.8429***	12.2542***	-7.9726***	0.7042	0.4257	0.0068	0.2191	0.0068	943	0.3138
	(0.0137)	(1.1415)	(1.4849)	(2.5075)	(0.9040)	(0.6976)	(1.2209)	(1.4197)	(0.2471)	(0.0091)		
NOK	-0.0419***	-5.1123***	-5.7420***	4.0843**	-7.8885***	0.6108	0.6935	1.4966	-0.1149	0.0821***	966	0.2600
	(0.0112)	(0.8095)	(1.2013)	(1.9590)	(0.7317)	(0.5327)	(0.8996)	(1.2677)	(0.1930)	(0.0224)		
SEK	-0.0490***	-5.5565***	-4.1789***	7.4308***	-6.1245***	0.0541	-1.0151	0.0312	-0.0316	0.0931***	966	0.2049
	(0.0113)	(0.8854)	(1.1469)	(1.9029)	(0.7209)	(0.5102)	(0.8522)	(1.1411)	(0.1903)	(0.0228)		
CHF	-0.0237*	-3.2384**	-1.1997	5.6024**	-0.9718	-0.4007	0.1134	1.7805	0.1994	-0.0042	888	0.0310
	(0.0124)	(1.4895)	(1.8080)	(2.6065)	(1.0721)	(0.7699)	(1.1614)	(1.4636)	(0.2318)	(0.0055)		
GBP	-0.0493***	-6.1288***	-0.4453	5.6119**	-8.9524***	0.4706	2.0941**	0.9179	-0.0648	-0.0190***	966	0.2294
	(0.0137)	(1.1158)	(1.4105)	(2.3529)	(0.8780)	(0.6577)	(1.0347)	(1.4854)	(0.2365)	(0.0063)		
USD	-0.0560***	-8.9086***	-3.2019**	12.5574***	-10.1507***	-0.9368	0.4045	1.0582	0.1366	-0.1104***	813	0.3756
	(0.0138)	(1.1126)	(1.2482)	(2.1570)	(0.8834)	(0.6296)	(0.9356)	(1.3704)	(0.2270)	(0.0275)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2B for $\lambda_{j,t}$

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \lambda_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0543***	-4.3320***	-6.2922***	0.0266	-0.3915*	0.0162**	955	0.2080
	(0.0159)	(1.0848)	(0.8438)	(0.5792)	(0.2295)	(0.0077)		
CAD	-0.0359***	-3.6265***	-7.9490***	0.9625	0.4427*	0.0038	399	0.2396
	(0.0125)	(1.3326)	(1.1357)	(0.7107)	(0.2646)	(0.0035)		
EUR	-0.0422***	-3.1217***	-7.5554***	0.6824*	-0.0301	-0.0131***	966	0.2146
	(0.0106)	(0.7396)	(0.6290)	(0.4144)	(0.1847)	(0.0037)		
JPY	-0.0688***	-4.8998***	-10.7149***	1.7353***	-0.3464	0.3143***	966	0.2779
	(0.0182)	(1.3625)	(1.1784)	(0.6549)	(0.2943)	(0.0823)		
NZD	-0.0543***	-4.9252***	-6.8331***	0.9805	0.2785	0.0059	943	0.2225
	(0.0160)	(1.1290)	(0.9642)	(0.6664)	(0.2692)	(0.0100)		
NOK	-0.0355***	-4.1387***	-7.1490***	0.8489*	-0.0853	0.0668***	966	0.2111
	(0.0112)	(0.7748)	(0.7501)	(0.4503)	(0.2030)	(0.0220)		
SEK	-0.0514***	-4.0382***	-5.8983***	0.1242	0.0492	0.1002***	966	0.1613
	(0.0112)	(0.8195)	(0.7262)	(0.4638)	(0.1975)	(0.0223)		
CHF	-0.0212*	-1.7916	-0.7941	-0.0116	0.1872	-0.0033	888	0.0180
	(0.0118)	(1.3227)	(1.0637)	(0.6511)	(0.2334)	(0.0037)		
GBP	-0.0454***	-5.0370***	-8.1277***	0.1534	-0.1255	-0.0196***	966	0.2098
	(0.0134)	(1.0264)	(0.8637)	(0.5511)	(0.2391)	(0.0062)		
USD	-0.0595***	-5.1253***	-9.8593***	-0.7254	0.1777	-0.1159***	813	0.2804
	(0.0163)	(1.1080)	(0.9587)	(0.6271)	(0.2570)	(0.0322)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2B for $\tau_{j,t}$

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\tau_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \tau_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0312***	-1.4191	-4.1932***	-0.2277	-0.2925**	0.0130***	2028	0.1160
	(0.0075)	(1.2782)	(0.5169)	(0.7500)	(0.1146)	(0.0043)		
CAD	-0.0286***	-4.3619***	-5.3167***	-0.6401	-0.2864***	0.0049**	1836	0.1703
	(0.0068)	(1.1244)	(0.4978)	(0.6464)	(0.1095)	(0.0024)		
EUR	-0.0207***	-3.1629***	-3.6498***	-0.3955	-0.1949**	-0.0051**	2028	0.1036
	(0.0059)	(0.8745)	(0.3745)	(0.4824)	(0.0911)	(0.0022)		
JPY	-0.0339***	-5.8142***	-5.5937***	0.6695	-0.1067	0.1598***	2028	0.1283
	(0.0103)	(1.6352)	(0.7067)	(0.9127)	(0.1352)	(0.0482)		
NZD	-0.0307***	-4.0584***	-2.8848***	-0.3508	-0.1083	0.0139**	2028	0.0762
	(0.0088)	(1.4135)	(0.5836)	(0.7794)	(0.1357)	(0.0063)		
NOK	-0.0176**	-3.0231***	-3.6394***	0.1943	-0.1224	0.0355**	2028	0.0958
	(0.0070)	(1.0557)	(0.4664)	(0.6613)	(0.0976)	(0.0144)		
SEK	-0.0244***	-4.3694***	-3.2657***	-0.5796	-0.1616	0.0491***	2028	0.0859
	(0.0064)	(0.9940)	(0.4275)	(0.6035)	(0.1013)	(0.0136)		
CHF	-0.0112*	-1.4794	-2.0211***	0.4119	-0.1921*	-0.0015	2028	0.0279
	(0.0063)	(1.2040)	(0.5085)	(0.7012)	(0.1057)	(0.0028)		
GBP	-0.0219***	-0.6742	-3.7763***	-0.2472	-0.3444***	-0.0081**	2028	0.0877
	(0.0070)	(1.1406)	(0.4907)	(0.6729)	(0.1063)	(0.0033)		
USD	-0.0126*	-6.1304***	-3.7428***	-0.6531	-0.1663	-0.0246	2028	0.1006
	(0.0075)	(1.2345)	(0.5663)	(0.6949)	(0.1139)	(0.0160)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2B for $l_{j,t}^R$

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta l_{j,t}^R + \beta_3 \Delta i_{j,t}^R + \beta_4 l_{j,t-1}^R + \beta_5 i_{j,t-1}^R + u_{j,t}$

	$q_{j,t-1}$	$\Delta l_{j,t}^R$	$\Delta i_{j,t}^R$	$l_{j,t-1}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0566***	9.9450***	-5.6511***	0.5019	-0.4507**	0.0186**	955	0.2100
	(0.0161)	(2.2182)	(0.7588)	(1.3146)	(0.2186)	(0.0074)		
CAD	-0.0308**	0.7547	-6.9329***	1.2790	0.5283**	0.0017	399	0.2018
	(0.0127)	(2.2708)	(1.0802)	(1.3620)	(0.2442)	(0.0036)		
EUR	-0.0510***	2.0777	-6.0427***	2.3713**	-0.0532	-0.0140***	966	0.1866
	(0.0110)	(1.5476)	(0.5769)	(0.9485)	(0.1851)	(0.0037)		
JPY	-0.0607***	4.5740	-9.7475***	1.7616	-0.0490	0.2752***	966	0.2393
	(0.0193)	(3.1035)	(1.1419)	(1.8748)	(0.3082)	(0.0868)		
NZD	-0.0667***	4.5388*	-5.7954***	1.9098	0.3233	0.0071	943	0.1607
	(0.0159)	(2.5778)	(0.9641)	(1.4399)	(0.2727)	(0.0101)		
NOK	-0.0446***	-1.2069	-5.1485***	2.8596**	-0.0820	0.0868***	966	0.1373
	(0.0121)	(1.9480)	(0.7167)	(1.1771)	(0.2171)	(0.0241)		
SEK	-0.0559***	3.0840*	-4.1609***	1.2861	0.0484	0.1100***	966	0.1216
	(0.0119)	(1.8008)	(0.6657)	(1.0883)	(0.1960)	(0.0235)		
CHF	-0.0230*	2.4456	-0.1148	1.4120	0.1551	-0.0033	888	0.0166
	(0.0123)	(2.2902)	(0.9815)	(1.3110)	(0.2270)	(0.0032)		
GBP	-0.0491***	0.7847	-5.8242***	1.3991	-0.1526	-0.0206***	966	0.1601
	(0.0145)	(2.2277)	(0.8310)	(1.2958)	(0.2467)	(0.0066)		
USD	-0.0570***	5.1429**	-8.6497***	-0.2386	0.1627	-0.1103***	813	0.2553
	(0.0167)	(2.1134)	(0.9081)	(1.3630)	(0.2547)	(0.0330)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}_{j,t}^R$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2B for $(\eta + l^R)_{j,t}$

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\eta + l^R)_{j,t} + \beta_3 \Delta i_{j,t}^R + \beta_4(\eta + l^R)_{j,t-1} + \beta_5 i_{j,t-1}^R + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\eta + l^R)_{j,t}$	$\Delta i_{j,t}^R$	$(\eta + l^R)_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0520***	-4.2517***	-6.5840***	-0.1630	-0.3693	0.0156**	955	0.2171
	(0.0159)	(0.9598)	(0.8561)	(0.6479)	(0.2268)	(0.0076)		
CAD	-0.0273**	-5.2887***	-8.2070***	-0.5082	0.6036**	0.0016	399	0.2497
	(0.0120)	(1.2257)	(1.1374)	(0.7763)	(0.2526)	(0.0037)		
EUR	-0.0403***	-3.7550***	-7.3184***	0.3729	-0.0271	-0.0111***	966	0.2288
	(0.0106)	(0.6173)	(0.6016)	(0.4193)	(0.1788)	(0.0038)		
JPY	-0.0676***	-4.5229***	-11.0401***	2.3472***	-0.1759	0.3184***	966	0.3137
	(0.0179)	(1.1374)	(1.1185)	(0.7884)	(0.2913)	(0.0811)		
NZD	-0.0520***	-5.1871***	-7.4018***	1.0370	0.3329	0.0026	943	0.2651
	(0.0151)	(0.9127)	(0.9236)	(0.6564)	(0.2539)	(0.0095)		
NOK	-0.0380***	-4.7337***	-7.7252***	0.9777**	-0.0995	0.0743***	966	0.2531
	(0.0108)	(0.6652)	(0.7121)	(0.4369)	(0.1914)	(0.0214)		
SEK	-0.0489***	-4.1673***	-6.0427***	-0.0709	0.0455	0.0954***	966	0.1779
	(0.0112)	(0.6806)	(0.7060)	(0.4590)	(0.1925)	(0.0223)		
CHF	-0.0216*	-1.5402	-0.5613	0.0418	0.1710	-0.0030	888	0.0211
	(0.0119)	(1.0703)	(1.0174)	(0.6249)	(0.2307)	(0.0047)		
GBP	-0.0450***	-3.3605***	-7.7774***	0.9221	-0.1745	-0.0186***	966	0.2025
	(0.0139)	(0.8669)	(0.8604)	(0.5699)	(0.2380)	(0.0063)		
USD	-0.0596***	-4.5722***	-9.3961***	-0.8059	0.1448	-0.1144***	813	0.2957
	(0.0157)	(0.8519)	(0.9154)	(0.5794)	(0.2493)	(0.0311)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}_{j,t}^R$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 2B for $(\tau - l^R)_{j,t}$

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\tau - l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\tau - l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\tau-l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\tau-l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0554***	-4.6466***	-5.8645***	-0.9218	-0.5139**	0.0205**	955	0.2018
	(0.0161)	(1.3055)	(0.7957)	(0.8636)	(0.2356)	(0.0081)		
CAD	-0.0357***	-1.8207	-6.8766***	-1.6425**	0.3688	0.0005	399	0.2204
	(0.0127)	(1.4376)	(1.0686)	(0.7696)	(0.2464)	(0.0036)		
EUR	-0.0476***	-2.3862***	-5.6532***	-1.3870***	-0.1266	-0.0179***	966	0.1949
	(0.0107)	(0.8126)	(0.5736)	(0.5330)	(0.1827)	(0.0042)		
JPY	-0.0552***	-6.1640***	-9.9686***	0.2269	0.0108	0.2516***	966	0.2720
	(0.0185)	(1.6355)	(1.1145)	(1.0797)	(0.3084)	(0.0831)		
NZD	-0.0568***	-5.2129***	-6.2394***	-0.6536	0.2681	0.0075	943	0.1935
	(0.0160)	(1.3696)	(0.9465)	(0.9252)	(0.2689)	(0.0100)		
NOK	-0.0347***	-3.3848***	-5.1050***	-1.3151*	-0.0892	0.0643***	966	0.1393
	(0.0118)	(1.0826)	(0.7299)	(0.7213)	(0.2193)	(0.0230)		
SEK	-0.0547***	-3.7094***	-4.1018***	-1.1317*	-0.0230	0.1047***	966	0.1379
	(0.0115)	(0.9927)	(0.6640)	(0.6387)	(0.1950)	(0.0227)		
CHF	-0.0206*	-2.0616	0.1087	-0.3677	0.1478	-0.0041	888	0.0191
	(0.0117)	(1.4542)	(0.9897)	(0.8475)	(0.2270)	(0.0042)		
GBP	-0.0497***	-0.4514	-5.8717***	-0.0245	-0.1813	-0.0202***	966	0.1580
	(0.0141)	(1.2028)	(0.8406)	(0.7513)	(0.2525)	(0.0066)		
USD	-0.0587***	-4.6762***	-8.4757***	-0.4799	0.0907	-0.1125***	813	0.2729
	(0.0161)	(1.1607)	(0.9006)	(0.8272)	(0.2501)	(0.0316)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 4A

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \tau_{j,t} + \beta_3 \Delta \gamma_t + \beta_4 \Delta \gamma^*_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \gamma_{t-1} + \beta_7 \gamma^*_{j,t-1} + \beta_8 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\gamma^*_{j,t}$	$\Delta\gamma_t$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\gamma^*_{j,t-1}$	γ_{t-1}	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2 within
AUD	-0.0272***	5.4814***	-6.7622***	-2.7406**	-5.8418***	-0.2247	0.4527	-0.1678	-0.2806**	0.0108**	2028	0.2016
	(0.0071)	(0.6856)	(1.2114)	(1.2096)	(0.5369)	(0.3710)	(0.6009)	(0.7650)	(0.1108)	(0.0046)		
CAD	-0.0285***	4.4218***	-5.9115***	-5.2253***	-6.1901***	-0.6357	0.0032	-0.1439	-0.2838**	0.0075**	1836	0.2078
	(0.0068)	(0.6851)	(1.9789)	(1.1260)	(0.5258)	(0.4004)	(1.2475)	(0.7275)	(0.1104)	(0.0035)		
EUR	-0.0191***	4.5771***	-4.9551***	-5.0824***	-5.0469***	0.0468	-0.0906	-0.3875	-0.1728*	-0.0046*	2028	0.1472
	(0.0059)	(0.5595)	(1.0948)	(0.9051)	(0.4093)	(0.3149)	(0.5339)	(0.5724)	(0.0927)	(0.0025)		
JPY	-0.0398***	4.2658***	-2.0942	-4.8186***	-6.3971***	-2.1632***	1.9088	2.0555**	-0.1397	0.1959***	2028	0.1737
	(0.0101)	(0.9865)	(5.1736)	(1.5829)	(0.7460)	(0.5728)	(2.4805)	(0.9609)	(0.1342)	(0.0473)		
NZD	-0.0317***	6.1084***	-6.7754***	-5.5521***	-6.2849***	0.9282*	0.2146	-0.7658	-0.1587	0.0109*	2028	0.2082
	(0.0076)	(0.8609)	(0.8970)	(1.2860)	(0.6118)	(0.5158)	(0.4289)	(0.7728)	(0.1261)	(0.0062)		
NOK	-0.0171**	5.5907***	-3.3078***	-5.0194***	-5.0964***	-0.2142	0.6633	0.6195	-0.1656*	0.0338**	2028	0.1640
	(0.0067)	(0.7336)	(0.7600)	(1.0395)	(0.4911)	(0.4142)	(0.4849)	(0.6848)	(0.0988)	(0.0141)		
SEK	-0.0214***	4.7890***	-4.0441***	-5.0347***	-4.6315***	0.5089	-0.0434	-0.7194	-0.1318	0.0407***	2028	0.1342
	(0.0063)	(0.6331)	(1.2212)	(0.9868)	(0.4665)	(0.3814)	(0.4909)	(0.6404)	(0.1028)	(0.0135)		
CHF	-0.0157**	3.0852***	-2.7329	-1.2225	-3.0622***	-0.5456	1.5494	0.5750	-0.1902*	0.0012	2028	0.0562
	(0.0071)	(0.7469)	(1.8882)	(1.1921)	(0.5525)	(0.4340)	(1.1054)	(0.7591)	(0.1073)	(0.0035)		
GBP	-0.0211***	4.7472***	-3.6829***	-1.1670	-5.4951***	-0.6923*	0.8916	0.6820	-0.3330***	-0.0079**	2028	0.1385
	(0.0070)	(0.7047)	(1.0823)	(1.1121)	(0.5266)	(0.4049)	(0.5855)	(0.6975)	(0.1069)	(0.0037)		
USD	-0.0129*	6.2173***	-5.8436***	-6.4704***	-5.0417***	0.0764	-1.9569***	0.0655	-0.0249	-0.0187	2028	0.1875
	(0.0069)	(0.8044)	(1.3712)	(1.2023)	(0.5772)	(0.4537)	(0.5732)	(0.7334)	(0.1111)	(0.0146)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $\gamma^*_{j,t}$ is a measure of foreign treasury liquidity, $\gamma_{j,t}$ is a measure of the home treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

6. Regression tables of country by country regressions (full sample and post-2008)

$$\Delta s_t = \alpha + \beta_1 q_{t-1} + \beta_2 \Delta \tilde{\eta}_t + \beta_3 \Delta i_t^R + \beta_4 \tilde{\eta}_{t-1} + \beta_5 i_{t-1}^R + u_t$$

The first country is the foreign country and the second country is the home country

Full sample regressions

	q_{t-1}	$\Delta \tilde{\eta}_t$	Δi_t^R	$\tilde{\eta}_{t-1}$	i_{t-1}^R	constant	N	R2_adjusted
AUDCAD	-0.0674***	-5.1977***	-4.9839***	0.4442	-0.2702*	0.0060*	228	0.2304
	(0.0238)	(1.2719)	(0.6967)	(0.9489)	(0.1546)	(0.0035)		
AUDEUR	-0.0368*	-6.4516***	-5.1513***	-1.2369	-0.3213	0.0261**	228	0.1682
	(0.0200)	(1.3697)	(0.8765)	(1.0437)	(0.2176)	(0.0112)		
AUDJPY	-0.1160***	-5.2592***	-9.2078***	3.0900***	-0.3998*	-0.5208***	228	0.3342
	(0.0245)	(1.5062)	(1.0226)	(1.0712)	(0.2296)	(0.1046)		
AUDNZD	-0.0249	-6.7055***	-6.1856***	-0.0832	-0.1128	-0.0041	228	0.3011
	(0.0171)	(0.8065)	(0.6610)	(0.4691)	(0.1944)	(0.0033)		
AUDNOK	-0.0252	-3.6025***	-5.1689***	-0.0226	-0.1652	-0.0413	228	0.1637
	(0.0193)	(1.1561)	(0.7851)	(0.7725)	(0.1461)	(0.0325)		
AUDSEK	-0.0818***	-3.6198***	-3.8200***	0.6062	-0.2086	-0.1458***	228	0.1219
	(0.0286)	(1.2070)	(0.8353)	(0.8106)	(0.1886)	(0.0517)		
AUDCHF	-0.0182	-2.5989**	-3.7065***	1.0778	-0.3547	0.0074	228	0.0726
	(0.0116)	(1.1996)	(0.9659)	(0.7426)	(0.2637)	(0.0098)		
AUDGBP	-0.0442***	-5.5490***	-6.3352***	-0.6464	-0.7150***	0.0419***	228	0.1711
	(0.0168)	(1.4200)	(0.9958)	(1.3513)	(0.2557)	(0.0155)		
AUDUSD	-0.0252*	-9.9847***	-5.8320***	-2.7425**	-0.0893	0.0085	228	0.2408
	(0.0135)	(1.6060)	(0.9048)	(1.3378)	(0.2039)	(0.0064)		
CADEUR	-0.0554**	-4.7185**	-5.4935***	-1.4692	-0.2847	0.0227**	228	0.1816
	(0.0243)	(2.0046)	(0.9231)	(1.6883)	(0.2189)	(0.0096)		
CADJPY	-0.0884***	-1.8407	-7.4392***	4.6344***	-0.1505	-0.4081***	228	0.2255
	(0.0238)	(1.7781)	(1.1304)	(1.5441)	(0.1903)	(0.1078)		
CADNZD	-0.0333*	-6.6695***	-6.5682***	0.5065	-0.2106	-0.0089	228	0.2620
	(0.0175)	(0.9707)	(0.8387)	(0.6097)	(0.1956)	(0.0056)		
CADNOK	-0.0432**	-2.1132	-4.9494***	1.5138*	-0.4172**	-0.0775**	228	0.1703
	(0.0194)	(1.3576)	(0.7859)	(0.8993)	(0.1633)	(0.0337)		

CADSEK	-0.0610**	-5.3958***	-4.5688***	-0.0125	-0.2260	-0.1127**	228	0.1655
	(0.0281)	(1.3538)	(0.9582)	(0.9541)	(0.1955)	(0.0520)		
CADCHF	-0.0180	-2.9179*	-4.2925***	1.1647	-0.4738*	0.0051	228	0.0803
	(0.0142)	(1.5198)	(1.1389)	(1.1590)	(0.2860)	(0.0064)		
CADGBP	-0.0397**	-2.2840*	-4.9910***	0.7890	-0.5634	0.0255**	228	0.1180
	(0.0171)	(1.3243)	(0.8928)	(1.2594)	(0.3653)	(0.0113)		
CADUSD	-0.0188**	-7.2535***	-5.7732***	-2.0422***	0.3217	-0.0028	228	0.1652
	(0.0095)	(1.5955)	(1.0768)	(0.7669)	(0.2592)	(0.0032)		
EURJPY	-0.0679***	-1.4288	-5.3472***	8.3397***	0.2322	-0.3514***	228	0.1715
	(0.0181)	(2.3679)	(1.2447)	(2.0207)	(0.1826)	(0.0888)		
EURNZD	-0.0553***	-6.5903***	-5.9472***	-0.0517	-0.0476	-0.0322**	228	0.2048
	(0.0202)	(1.0196)	(0.9165)	(0.5902)	(0.2632)	(0.0156)		
EURNOK	-0.0121	-3.2592***	-5.3253***	0.2405	-0.1437	-0.0271	228	0.2005
	(0.0142)	(0.8626)	(0.7220)	(0.6360)	(0.1751)	(0.0302)		
EURSEK	-0.0413**	-4.8647***	-3.2700***	-1.0986*	-0.2233	-0.0939**	228	0.1664
	(0.0197)	(0.9449)	(0.6662)	(0.5785)	(0.2234)	(0.0439)		
EURGBP	-0.0167	-2.9368**	-6.6960***	0.8921	-0.4995**	0.0019	228	0.2008
	(0.0119)	(1.3973)	(0.8990)	(1.0902)	(0.2445)	(0.0036)		
EURUSD	-0.0118	-6.9337***	-5.6550***	-3.0634***	-0.0151	-0.0109***	228	0.1955
	(0.0102)	(1.4722)	(0.9898)	(0.9267)	(0.1598)	(0.0037)		
JPYNZD	-0.0728***	-8.0616***	-8.0591***	-0.0026	-0.1162	0.3111***	228	0.2104
	(0.0231)	(1.3456)	(1.2117)	(0.9449)	(0.1938)	(0.0930)		
JPYNOK	-0.0549***	-4.1603***	-6.1797***	2.8019***	-0.2494*	0.1543***	228	0.1785
	(0.0171)	(1.2717)	(1.1279)	(0.9330)	(0.1461)	(0.0468)		
JPYSEK	-0.0798***	-3.7436*	-7.6177***	2.8282**	-0.0307	0.2214***	228	0.1768
	(0.0209)	(2.0226)	(1.2391)	(1.1132)	(0.1637)	(0.0566)		
JPYUSD	-0.0283**	-1.2824	-4.1577***	1.5302**	-0.2779*	0.1359**	228	0.0986
	(0.0124)	(1.1764)	(0.9553)	(0.7623)	(0.1477)	(0.0580)		
NZDSEK	-0.0917***	-5.0676***	-5.3837***	-0.2202	-0.0685	-0.1503***	228	0.2019
	(0.0260)	(0.8964)	(0.8259)	(0.5114)	(0.2047)	(0.0414)		
NZDUSD	-0.0146	-8.6432***	-6.3106***	-0.7943	-0.1607	0.0095	228	0.2207
	(0.0129)	(1.1345)	(1.0909)	(0.7669)	(0.2005)	(0.0082)		

25

NOKNZD	-0.0243	-5.7511***	-6.2049***	0.4553	-0.1695	0.0369	228	0.2056
	(0.0159)	(1.0825)	(0.8605)	(0.8251)	(0.1980)	(0.0239)		
NOKSEK	-0.0053	-3.4732***	-4.2796***	-0.2574	-0.2272	0.0017	228	0.1393
	(0.0139)	(0.7597)	(0.7201)	(0.5326)	(0.1953)	(0.0029)		
NOKUSD	-0.0130	-8.5785***	-4.1838***	-0.7852	-0.0085	0.0233	228	0.2086
	(0.0103)	(1.2337)	(0.8558)	(0.7067)	(0.1315)	(0.0200)		
SEKUSD	-0.0313***	-7.6365***	-4.5536***	-3.4799***	0.1946	0.0590**	228	0.2333
	(0.0122)	(1.1943)	(0.9418)	(0.7708)	(0.1486)	(0.0246)		
CHFEUR	-0.0292***	1.7140	0.2499	2.1966**	-0.2625	0.0111**	228	0.0276
	(0.0106)	(1.1573)	(0.8086)	(0.9039)	(0.3270)	(0.0050)		
CHFJPY	-0.0369**	-7.2543***	-0.2721	-0.1446	0.3794	-0.1730**	228	0.0593
	(0.0182)	(2.1122)	(1.3765)	(1.9150)	(0.2803)	(0.0846)		
CHFNZD	-0.0314*	-2.8115***	-3.0886***	0.7583	-0.1848	-0.0099	228	0.0458
	(0.0172)	(1.0188)	(1.0260)	(0.6085)	(0.2728)	(0.0130)		
CHFNOK	-0.0098	-1.1624	-2.6851***	0.8401	-0.1825	-0.0202	228	0.0302
	(0.0097)	(0.9128)	(0.8734)	(0.6177)	(0.2065)	(0.0195)		
CHFSEK	-0.0127	-2.0541*	-1.4801	0.0020	-0.2275	-0.0283	228	0.0027
	(0.0117)	(1.2289)	(0.9061)	(0.5572)	(0.2540)	(0.0231)		
CHFGBP	-0.0257**	1.6141	-3.1949***	1.6639*	-0.5666**	0.0117	228	0.0859
	(0.0100)	(1.3582)	(1.0628)	(0.9342)	(0.2581)	(0.0077)		
CHFUSD	-0.0029	-5.2363***	-2.8313***	-1.0467	-0.2540	-0.0095**	228	0.0938
	(0.0076)	(1.1068)	(1.0503)	(0.6928)	(0.1849)	(0.0048)		
GBPJPY	-0.0551***	-1.7169	-6.1662***	4.7555***	-0.4196*	-0.2940***	228	0.1631
	(0.0192)	(1.8059)	(1.1681)	(1.3580)	(0.2437)	(0.0955)		
GBPNZD	-0.0188	-7.7192***	-7.3608***	0.3127	-0.5196*	-0.0239*	228	0.1977
	(0.0123)	(1.1931)	(1.0396)	(0.7078)	(0.2877)	(0.0145)		
GBPNOK	-0.0310**	-3.0595***	-4.1840***	1.3742*	-0.3652**	-0.0770**	228	0.1267
	(0.0132)	(0.9710)	(0.8283)	(0.7310)	(0.1662)	(0.0323)		
GBPSEK	-0.0180	-2.5245**	-4.8259***	0.5421	-0.3664*	-0.0431	228	0.0876
	(0.0127)	(1.1666)	(1.0023)	(0.8697)	(0.2091)	(0.0315)		
GBPUSD	-0.0299**	-3.1475***	-3.5440***	-2.5393***	0.0395	-0.0159**	228	0.1121
	(0.0137)	(1.0500)	(0.8787)	(0.8441)	(0.1854)	(0.0065)		

Post 2008 regressions

	q_{t-1}	$\Delta\tilde{\eta}_t$	Δi_t^R	$\tilde{\eta}_{t-1}$	i_{t-1}^R	constant	N	R2_adjusted
AUDCAD	-0.0855**	-6.4235***	-6.2099***	0.2782	-0.1615	0.0030	120	0.3193
	(0.0404)	(1.9104)	(0.9486)	(1.4404)	(0.2800)	(0.0051)		
AUDEUR	-0.0589**	-6.3257***	-5.6310***	-1.1293	-1.1834***	0.0582***	120	0.2632
	(0.0260)	(1.7232)	(1.0688)	(1.1520)	(0.4251)	(0.0197)		
AUDJPY	-0.1236***	-7.3666***	-11.8359***	2.1110	-0.5612	-0.5446***	120	0.4868
	(0.0361)	(2.0447)	(1.3431)	(1.8356)	(0.3507)	(0.1557)		
AUDNZD	-0.0431	-7.3726***	-6.7146***	-0.0737	-0.4074	-0.0053	120	0.3825
	(0.0281)	(1.0914)	(0.8830)	(0.8790)	(0.3042)	(0.0044)		
AUDNOK	-0.0479	-3.2616**	-5.9159***	-0.0203	-0.3932	-0.0797	120	0.1995
	(0.0307)	(1.4731)	(1.0822)	(1.0849)	(0.4133)	(0.0536)		
AUDSEK	-0.0949**	-3.8477**	-4.5070***	1.4597	-0.7684**	-0.1581**	120	0.1769
	(0.0374)	(1.5100)	(1.0704)	(0.9548)	(0.3756)	(0.0661)		
AUDCHF	-0.0340	-3.1074**	-4.7070***	0.9027	-0.7972	0.0258	120	0.1131
	(0.0233)	(1.5233)	(1.3802)	(1.3104)	(0.5483)	(0.0225)		
AUDGBP	-0.0550**	-4.2889**	-7.8210***	-0.1258	-0.7163*	0.0458**	120	0.2421
	(0.0270)	(1.9330)	(1.3603)	(1.8885)	(0.3894)	(0.0215)		
AUDUSD	-0.0582*	-11.8603***	-9.0333***	-2.4785	-0.2666	0.0150	120	0.4067
	(0.0306)	(2.4188)	(1.3422)	(1.7510)	(0.3408)	(0.0126)		
CADEUR	-0.0617*	-7.5273***	-7.3512***	-4.9137***	0.2804	0.0269*	120	0.3675
	(0.0345)	(2.1995)	(1.0826)	(1.9003)	(0.2832)	(0.0139)		
CADJPY	-0.0965***	-2.5057	-14.3361***	4.1998**	-0.4204	-0.4397***	120	0.3835
	(0.0359)	(2.0276)	(2.0929)	(1.8563)	(0.7761)	(0.1588)		
CADNZD	-0.0645**	-7.7645***	-6.9932***	0.1637	0.4252	0.0010	120	0.4127
	(0.0263)	(1.4393)	(1.1445)	(1.0129)	(0.3567)	(0.0065)		
CADNOK	-0.1158***	-3.1091**	-6.9945***	0.8923	-0.7379*	-0.2086***	120	0.2609
	(0.0442)	(1.5634)	(1.1005)	(1.1486)	(0.4233)	(0.0803)		
CADSEK	-0.0758*	-7.4166***	-6.3493***	0.1045	0.2299	-0.1400*	120	0.2877
	(0.0407)	(1.5027)	(1.2323)	(1.0254)	(0.2826)	(0.0752)		
CADCHF	-0.0778***	-4.4524**	-5.8910***	-0.0593	2.6786**	-0.0061	120	0.1932

	(0.0293)	(1.7865)	(1.8629)	(1.4386)	(1.1063)	(0.0087)		
CADGBP	-0.0899**	-2.4709	-5.8980***	0.0522	-0.6337	0.0503**	120	0.1485
	(0.0393)	(1.6590)	(1.3717)	(1.7186)	(0.6110)	(0.0227)		
CADUSD	-0.0382	-9.0991***	-13.6492***	-1.2651	-0.0326	0.0023	120	0.3985
	(0.0371)	(1.8750)	(1.8205)	(0.9476)	(0.9531)	(0.0091)		
EURJPY	-0.0698**	-6.3237**	-11.1725***	4.0414	-0.1078	-0.3486**	120	0.3186
	(0.0288)	(2.8254)	(1.8895)	(2.5226)	(0.3923)	(0.1395)		
EURNZD	-0.0433*	-6.4686***	-7.3175***	0.1479	0.0414	-0.0203	120	0.2813
	(0.0226)	(1.4511)	(1.3045)	(0.9342)	(0.5434)	(0.0222)		
EURNOK	-0.0148	-3.9931***	-8.4577***	0.5119	-0.1793	-0.0349	120	0.3062
	(0.0218)	(1.1211)	(1.2485)	(0.9143)	(0.9532)	(0.0553)		
EURSEK	-0.0368	-6.7133***	-5.9829***	-0.8495	-0.2773	-0.0843	120	0.3352
	(0.0302)	(1.1542)	(0.9398)	(0.7199)	(0.5015)	(0.0679)		
EURGBP	-0.0773*	-5.1340**	-9.6338***	-1.7363	-0.3035	0.0072	120	0.3169
	(0.0433)	(2.0691)	(1.4275)	(2.0862)	(0.5338)	(0.0060)		
EURUSD	-0.0743	-5.6210***	-10.2522***	-1.1514	-0.2247	-0.0244	120	0.3821
	(0.0461)	(1.8650)	(1.5379)	(1.5833)	(0.4732)	(0.0151)		
JPYNZD	-0.1011***	-9.3097***	-14.2991***	-0.0275	-0.1974	0.4302***	120	0.3973
	(0.0316)	(1.7516)	(2.1181)	(1.4227)	(0.4194)	(0.1282)		
JPYNOK	-0.1143***	-5.2508***	-12.7072***	3.8050***	-0.8701*	0.3071***	120	0.3916
	(0.0341)	(1.3733)	(1.7281)	(1.2054)	(0.5042)	(0.0860)		
JPYSEK	-0.1131***	-3.7223	-11.1959***	3.3314**	-0.3100	0.3079***	120	0.2742
	(0.0354)	(2.6713)	(1.9155)	(1.6972)	(0.3929)	(0.0953)		
JPYUSD	-0.0231	-3.0391**	-11.0678***	0.5434	0.4707	0.1098	120	0.2026
	(0.0209)	(1.4804)	(2.2242)	(1.2352)	(0.6002)	(0.0939)		
NZDSEK	-0.0953***	-5.7602***	-6.3097***	0.4668	-0.3328	-0.1542***	120	0.2944
	(0.0338)	(1.1911)	(1.1803)	(0.7337)	(0.3740)	(0.0553)		
NZDUSD	-0.1669***	-11.3702***	-10.7088***	-3.4592**	0.3404	0.0381**	120	0.4358
	(0.0391)	(1.6871)	(1.7379)	(1.4547)	(0.3041)	(0.0150)		
NOKNZD	-0.0323	-6.6913***	-8.5086***	0.8029	-0.5474	0.0492*	120	0.3234
	(0.0199)	(1.4720)	(1.3262)	(1.3022)	(0.6471)	(0.0285)		
NOKSEK	-0.0248	-3.7390***	-6.3523***	0.8128	-0.0332	-0.0001	120	0.1455

	(0.0203)	(1.0424)	(1.3454)	(0.7462)	(0.4024)	(0.0050)		
NOKUSD	-0.0251	-10.9204***	-12.3308***	0.7353	0.0318	0.0465	120	0.4697
	(0.0332)	(1.3766)	(1.4648)	(1.0388)	(0.5756)	(0.0676)		
SEKUSD	-0.1147***	-9.3184***	-9.7011***	-2.5207**	-0.2633	0.2221***	120	0.4491
	(0.0423)	(1.3431)	(1.5183)	(0.9810)	(0.3408)	(0.0831)		
CHFEUR	-0.0330**	1.5830	0.7669	2.4355*	0.0117	0.0129*	120	0.0121
	(0.0164)	(1.7645)	(1.3927)	(1.4287)	(0.5895)	(0.0075)		
CHFJPY	-0.0384	-8.6597***	-2.5390	-0.4711	0.7347	-0.1805	120	0.0916
	(0.0251)	(2.9666)	(2.5015)	(3.1030)	(0.6081)	(0.1183)		
CHFNZD	-0.0694**	-2.5187*	-3.1960*	0.7673	0.6308	-0.0028	120	0.1126
	(0.0330)	(1.3175)	(1.7418)	(0.9610)	(0.5549)	(0.0244)		
CHFNOK	-0.0111	-1.7563	-4.7434***	0.3976	0.2802	-0.0189	120	0.0521
	(0.0179)	(1.2235)	(1.7035)	(0.9765)	(0.9060)	(0.0469)		
CHFSEK	-0.0255	-4.1005**	-2.2072	-1.0538	0.4236	-0.0588	120	0.0521
	(0.0238)	(1.7582)	(1.4665)	(0.8594)	(0.6446)	(0.0507)		
CHFGBP	-0.0312*	2.9053	-4.3979**	1.5692	-0.1327	0.0154	120	0.1105
	(0.0170)	(2.0488)	(1.9337)	(1.4981)	(0.5813)	(0.0118)		
CHFUSD	-0.0692**	-5.6639***	-2.3016	-1.7140	0.5264	-0.0168*	120	0.1488
	(0.0287)	(1.4035)	(2.1029)	(1.1428)	(0.4186)	(0.0087)		
GBPJPY	-0.0694**	-3.4898	-10.6606***	4.7323**	-0.7556	-0.3632**	120	0.2721
	(0.0289)	(2.5125)	(1.8751)	(2.2340)	(0.5665)	(0.1435)		
GBPNZD	-0.0573**	-8.4851***	-10.0156***	1.2284	0.7641	-0.0181	120	0.3266
	(0.0234)	(1.8882)	(1.5111)	(1.3280)	(0.6526)	(0.0202)		
GBPNOK	-0.1160***	-4.1037***	-6.3600***	-0.5632	-2.1592**	-0.2873***	120	0.1552
	(0.0414)	(1.4124)	(1.6223)	(1.3983)	(0.9107)	(0.1020)		
GBPSEK	-0.0686**	-2.9876*	-5.9169***	-0.1121	-0.1582	-0.1628**	120	0.1168
	(0.0347)	(1.6026)	(1.6839)	(1.2211)	(0.4100)	(0.0829)		
GBPUSD	-0.1976***	-3.8274***	-5.3212***	-5.6947***	-1.9616**	-0.0826***	120	0.2118
	(0.0646)	(1.4690)	(1.8988)	(2.0484)	(0.9306)	(0.0265)		

Standard errors in parentheses are simple OLS standard error. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

7. Robustness: Baseline result (Table 1B) with simple average of foreign country variables

Estimation result of $\Delta \bar{s}_{j,t} = \alpha_j + \beta_1 \bar{q}_{j,t-1} + \beta_2 (\Delta \bar{\eta}_{j,t}) + \beta_3 (\Delta \bar{i}_{j,t}^R) + \beta_4 (\bar{\eta}_{j,t-1}) + \beta_5 (\bar{i}_{j,t-1}^R) + u_{j,t}$

	$\bar{q}_{j,t-1}$	$\Delta \bar{\eta}_{j,t}$	$\Delta \bar{i}_{j,t}^R$	$\bar{\eta}_{j,t-1}$	$\bar{i}_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0614***	-6.0687***	-6.1722***	-0.1867	-0.4425**	-0.0365**	228	0.2469
	(0.0236)	(1.3435)	(0.8179)	(1.0228)	(0.2129)	(0.0157)		
CAD	-0.0543**	-3.9156**	-5.6876***	1.3545	-0.3353	-0.0419**	228	0.2191
	(0.0249)	(1.6968)	(0.9024)	(1.1010)	(0.2197)	(0.0193)		
EUR	-0.0336*	-4.9391***	-4.9768***	-2.2041*	-0.4549*	-0.0454**	228	0.1651
	(0.0173)	(1.5917)	(0.8307)	(1.1837)	(0.2532)	(0.0214)		
JPY	-0.0710***	-2.7778	-7.5821***	6.1937***	-0.0513	0.3204***	228	0.2401
	(0.0186)	(1.8555)	(1.3114)	(1.4237)	(0.1703)	(0.0777)		
NZD	-0.0542***	-7.4661***	-6.8127***	-0.3037	-0.0143	-0.0297***	228	0.2530
	(0.0206)	(1.0041)	(0.9543)	(0.6242)	(0.2301)	(0.0110)		
NOK	-0.0197	-3.4964***	-4.7118***	0.8816	-0.2086	0.0245	228	0.1728
	(0.0133)	(0.9300)	(0.7642)	(0.6754)	(0.1388)	(0.0157)		
SEK	-0.0744***	-3.8231***	-3.6216***	-0.9291*	0.0694	0.0959***	228	0.1489
	(0.0257)	(1.0630)	(0.8572)	(0.5328)	(0.1746)	(0.0329)		
CHF	-0.0138	-0.4446	0.0071	0.7538	-0.3945	-0.0163	228	0.0204
	(0.0089)	(1.1473)	(1.0584)	(0.8195)	(0.3437)	(0.0113)		
GBP	-0.0461***	-1.6355	-5.1666***	1.7416	-0.8758***	-0.0688***	228	0.1423
	(0.0160)	(1.3084)	(1.0045)	(1.0702)	(0.3078)	(0.0238)		
USD	-0.0130	-8.4175***	-3.9179***	-2.6690***	0.0359	-0.0072	228	0.2299
	(0.0089)	(1.2562)	(0.9780)	(0.7743)	(0.1498)	(0.0091)		

The table reports the OLS estimates of the coefficient of the regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\eta_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are simple OLS standard errors. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-side test

8. Robustness: Baseline result (Table 1B) in quarterly frequency and quarterly change of variables

Robustness of table 1B – full table of table 1B

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0921***	-3.6750**	-5.4546***	1.9039	-0.9960***	0.0409***	675	0.2379
	(0.0210)	(1.4998)	(0.8259)	(1.3393)	(0.3109)	(0.0119)		
CAD	-0.0839***	-4.8972***	-5.1905***	2.8934***	-0.9549***	0.0255***	675	0.2541
	(0.0173)	(1.2404)	(0.7038)	(1.1110)	(0.2770)	(0.0072)		
EUR	-0.0669***	-5.2973***	-5.0077***	1.0649	-0.7177***	-0.0106	675	0.2147
	(0.0176)	(1.0584)	(0.6500)	(0.9884)	(0.2736)	(0.0065)		
JPY	-0.1212***	-0.9803	-5.4163***	6.7560***	-0.4215	0.5973***	675	0.2675
	(0.0298)	(1.9772)	(1.0659)	(1.7511)	(0.3545)	(0.1397)		
NZD	-0.0823***	-5.1755***	-4.8781***	1.8512	-0.6467*	0.0437***	675	0.2165
	(0.0237)	(1.4958)	(0.9104)	(1.2685)	(0.3502)	(0.0169)		
NOK	-0.0614***	-3.7301***	-4.5606***	3.4978***	-0.6833***	0.1331***	675	0.2530
	(0.0187)	(1.1997)	(0.6912)	(1.1292)	(0.2614)	(0.0385)		
SEK	-0.0690***	-4.9423***	-4.1352***	-0.1468	-0.4995*	0.1417***	675	0.1749
	(0.0181)	(1.1676)	(0.7171)	(1.0509)	(0.2855)	(0.0381)		
CHF	-0.0489***	-3.5282**	-3.1226***	3.4211***	-0.7530***	0.0129	675	0.1479
	(0.0173)	(1.3768)	(0.7827)	(1.2062)	(0.2785)	(0.0090)		
GBP	-0.0669***	-1.7355	-5.9619***	3.2529***	-1.0102***	-0.0207**	675	0.2305
	(0.0183)	(1.2479)	(0.7239)	(1.1803)	(0.2798)	(0.0091)		
USD	-0.0364*	-7.5254***	-4.0988***	-3.5052***	-0.3311	-0.0689*	675	0.2170
	(0.0198)	(1.4844)	(0.8492)	(1.3283)	(0.3093)	(0.0416)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999Q1-2017Q4.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

9. Analysis of differential non-dollar results between Engel and Wu and Jiang et al (2021)

In this section, we show how our results are different from Jiang et al (2021). Besides the difference in the empirical regression model, the regression setups are different in at least two dimensions: 1) panel fixed effect regression (Engel and Wu) vs simple average of the exchange rate (Jiang et al), 2) regression frequency (Monthly in Engel and Wu and quarterly in Jiang et al)

The first panel below reproduces Table 1F in the main text, where we have seen all the non-dollar regressions indicate a strong non-USD convenience yield comovement with the exchange rates. The regression is a panel fixed effect regression with controls of real exchange rate, change of liquidity measure and interest rate and lagged level of liquidity measure of interest rate (we called it the Engel and Wu specification). These control variables are derived from our general equilibrium model but some are absent in Jiang et al's specification.

We check our non-dollar results using publicly available dataset. The second panel employs the same regression specification (panel fixed effect, monthly frequency) but uses the dataset from Du and Schreger for the measure of liquidity and government bond yield. The advantage of the dataset is that it is public and readily available for use. The disadvantage is the coverage is mostly starting from 2002, which is less than our start date of 1999. In the second panel with Du and Schreger data, all our key findings remain unchanged.

The third panel is the Engel and Wu specification but in quarterly frequency. That is, we run the same panel regression but only at quarter-end. The significance of the change of liquidity measures is slightly weakened. JPY and GBP are insignificant (in bold).

The fourth panel is the Engel and Wu specification in quarterly frequency and for each home currency, we take the simple average of foreign currency exchange rates rather than running a panel fixed effect regression (the sample size is substantially reduced from 600 in the third panel to 75 in the fourth panel). The significance of the change of liquidity measures is further weakened. In additional to JPY and GBP which are insignificant above, AUD, NOK, CHF (in bold) also lose the significance in this panel. Only four of the currencies are still significant, they are CAD, EUR, NZD and SEK. This specification is the closest to Jiang et al's specification.

Overall, each of the different regression setups (additional controls, panel vs simple average and monthly vs quarterly) contributes partially to the different results we obtained.

Panel A: Reproduction of Table 1F - Original Engel Wu specification (monthly + panel regression)

	AUD	CAD	EUR	JPY	NZD	NOK	SEK	CHF	GBP
q_{t-1}	-0.032***	-0.033***	-0.026***	-0.044***	-0.033***	-0.023***	-0.029***	-0.015***	-0.024***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.004)	(0.004)
$\Delta\eta_{t-1}$	-4.798***	-4.313***	-4.316***	-4.784***	-5.948***	-3.490***	-4.016***	-1.878***	-3.433***
	(0.436)	(0.468)	(0.453)	(0.556)	(0.371)	(0.367)	(0.403)	(0.425)	(0.450)
Δi_{t-1}	-5.640***	-5.417***	-4.947***	-6.638***	-5.966***	-4.931***	-4.517***	-2.711***	-5.404***
	(0.306)	(0.316)	(0.317)	(0.410)	(0.329)	(0.298)	(0.320)	(0.353)	(0.347)
η_{t-1}	0.563*	0.965***	0.397	2.401***	0.360	0.894***	0.131	0.970***	1.108***
	(0.287)	(0.315)	(0.288)	(0.381)	(0.221)	(0.252)	(0.230)	(0.265)	(0.311)
i_{t-1}	-0.277***	-0.303***	-0.221***	-0.094	-0.131*	-0.237***	-0.170***	-0.206***	-0.379***
	(0.068)	(0.065)	(0.070)	(0.060)	(0.072)	(0.057)	(0.066)	(0.079)	(0.076)
Obs.	1824	1824	1824	1824	1824	1824	1824	1824	1824

Panel B: Reproduction of Table 1F using Du and Schreger public CIP deviation dataset (monthly + panel regression)

	AUD	CAD	EUR	JPY	NZD	NOK	SEK	CHF	GBP
q_{t-1}	-0.013	-0.034***	-0.027***	-0.023***	-0.028***	-0.030***	-0.036***	-0.036***	-0.030***
	(0.009)	(0.010)	(0.010)	(0.008)	(0.010)	(0.012)	(0.012)	(0.010)	(0.009)
$\Delta\eta_{t-1}$	-5.977***	-5.034***	-3.728***	-4.580***	-3.606***	-5.730***	-5.331***	-3.784***	-4.698***
	(0.791)	(0.911)	(1.102)	(0.731)	(1.212)	(1.831)	(0.921)	(0.642)	(0.750)
Δi_{t-1}	-5.956***	-6.370***	-3.697***	-5.611***	-6.423***	-7.912***	-7.302***	-5.012***	-5.229***
	(0.702)	(0.657)	(0.929)	(0.703)	(0.944)	(1.179)	(0.819)	(0.656)	(0.645)
η_{t-1}	-0.429	0.578	0.196	0.182	0.872	1.534*	0.682	0.665	0.354
	(0.523)	(0.525)	(0.472)	(0.402)	(0.691)	(0.903)	(0.457)	(0.723)	(0.414)
i_{t-1}	-0.069	-0.175	-0.018	-0.077	-0.235**	0.162	0.119	-0.110	-0.085
	(0.113)	(0.126)	(0.110)	(0.097)	(0.113)	(0.133)	(0.139)	(0.109)	(0.109)
Obs.	1379	1314	1339	1389	1269	1260	1197	1157	1238

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Panel C: Quarterly panel regression (losing significance of JPY and GBP)

	AUD	CAD	EUR	JPY	NZD	NOK	SEK	CHF	GBP
q_{t-1}	-0.105***	-0.106***	-0.086***	-0.130***	-0.102***	-0.075***	-0.091***	-0.059***	-0.072***
	(0.017)	(0.016)	(0.015)	(0.017)	(0.017)	(0.014)	(0.016)	(0.011)	(0.013)
$\Delta\eta_{t-1}$	-3.182***	-4.250***	-4.419***	-1.073	-4.854***	-2.746***	-3.910***	-2.771***	-1.383
	(0.947)	(1.002)	(0.987)	(1.159)	(0.779)	(0.790)	(0.781)	(0.872)	(0.858)
Δi_{t-1}	-5.406***	-5.178***	-5.098***	-5.619***	-5.030***	-4.762***	-4.247***	-3.008***	-6.008***
	(0.504)	(0.467)	(0.496)	(0.568)	(0.543)	(0.431)	(0.488)	(0.558)	(0.497)
η_{t-1}	2.865***	4.336***	2.559***	7.584***	2.415***	4.492***	1.347**	4.595***	4.163***
	(0.900)	(0.946)	(0.899)	(1.121)	(0.654)	(0.795)	(0.675)	(0.784)	(0.910)
i_{t-1}	-0.982***	-1.090***	-0.834***	-0.317*	-0.689***	-0.868***	-0.653***	-0.727***	-1.084***
	(0.198)	(0.191)	(0.210)	(0.175)	(0.213)	(0.163)	(0.190)	(0.225)	(0.217)
Obs.	600	600	600	600	600	600	600	600	600

Panel D: Quarterly simple average regression (losing significance of AUD, JPY, NOK, CHF and GBP)

	AUD	CAD	EUR	JPY	NZD	NOK	SEK	CHF	GBP
q_{t-1}	-0.193***	-0.145**	-0.096*	-0.188***	-0.134**	-0.069*	-0.201**	-0.055**	-0.114**
	(0.071)	(0.070)	(0.054)	(0.054)	(0.059)	(0.038)	(0.077)	(0.025)	(0.045)
$\Delta\eta_{t-1}$	-3.536	-6.900*	-11.972***	3.388	-6.244***	-3.058	-4.157**	-1.912	0.420
	(3.055)	(3.734)	(4.165)	(3.685)	(2.205)	(2.207)	(1.957)	(2.378)	(2.364)
Δi_{t-1}	-5.539***	-5.396***	-5.495***	-4.991***	-4.905***	-4.358***	-2.351*	0.251	-7.066***
	(1.464)	(1.371)	(1.399)	(1.781)	(1.725)	(1.063)	(1.297)	(1.820)	(1.404)
η_{t-1}	0.682	5.909*	-5.475	15.151***	0.937	5.749**	-1.821	4.657*	6.275**
	(3.320)	(3.316)	(3.999)	(4.033)	(1.922)	(2.387)	(1.522)	(2.400)	(3.030)
i_{t-1}	-1.548**	-1.379**	-1.724**	-0.188	-0.487	-0.912**	0.011	-0.951	-2.072**
	(0.617)	(0.658)	(0.840)	(0.507)	(0.720)	(0.411)	(0.505)	(1.000)	(0.857)
Obs.	75	75	75	75	75	75	75	75	75

Panel regression standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test. Simple average regression standard error are OLS simple standard erros.

10.Robustness: Baseline result (Table 1B) with year 2000-2001, 2007-2013 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0213***	-5.0093***	-5.0754***	0.1502	-0.1602	0.0041	1170	0.1341
	(0.0082)	(1.0554)	(0.7315)	(0.5824)	(0.1252)	(0.0044)		
CAD	-0.0328***	-4.8710***	-4.8821***	0.3258	-0.4009***	0.0073**	1170	0.1395
	(0.0075)	(0.9787)	(0.7029)	(0.5707)	(0.1163)	(0.0032)		
EUR	-0.0225***	-4.7918***	-3.8285***	-0.4899	-0.2358**	-0.0090***	1170	0.0758
	(0.0069)	(0.8575)	(0.5966)	(0.4583)	(0.1096)	(0.0024)		
JPY	-0.0472***	-2.3421*	-3.4197***	2.2679***	-0.1051	0.2312***	1170	0.0722
	(0.0115)	(1.4019)	(1.0239)	(0.7011)	(0.1401)	(0.0548)		
NZD	-0.0278***	-5.9969***	-4.7987***	-0.6220	-0.1183	0.0104	1170	0.1143
	(0.0100)	(1.1803)	(0.9412)	(0.6838)	(0.1530)	(0.0067)		
NOK	-0.0163*	-4.8726***	-4.9077***	0.6076	-0.2862**	0.0304	1170	0.1296
	(0.0089)	(1.0912)	(0.7615)	(0.5974)	(0.1269)	(0.0186)		
SEK	-0.0258***	-4.3226***	-4.2231***	-0.7681	-0.1964	0.0477***	1170	0.0893
	(0.0076)	(0.9918)	(0.7086)	(0.5479)	(0.1253)	(0.0160)		
CHF	-0.0064	-1.8559*	-0.7679	0.2396	-0.1948*	-0.0026	1170	0.0139
	(0.0075)	(1.0853)	(0.7671)	(0.5765)	(0.1115)	(0.0038)		
GBP	-0.0184**	-5.0543***	-4.2766***	0.3514	-0.2763**	-0.0091**	1170	0.0884
	(0.0081)	(1.0838)	(0.7647)	(0.6008)	(0.1208)	(0.0038)		
USD	-0.0247***	-5.8187***	-4.7231***	-0.6957	-0.1320	-0.0454**	1170	0.1253
	(0.0083)	(1.1141)	(0.8008)	(0.5801)	(0.1168)	(0.0177)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-1999M12, 2002M1-2006M12, 2014M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

11.Robustness: Regressions tables in the main text with extreme outliner of CHF at 2015M1 excluded

Robustness of table 1A – full table of table 1G, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \hat{\eta}_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \hat{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\hat{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0290***	-5.9108***	-5.7064***	0.3593	-0.2795**	0.0121***	2027	0.1985
	(0.0070)	(0.7769)	(0.5328)	(0.4024)	(0.1102)	(0.0041)		
CAD	-0.0300***	-3.7373***	-6.2502***	0.6129*	-0.2651**	0.0064***	1835	0.1833
	(0.0067)	(0.7409)	(0.5376)	(0.3694)	(0.1113)	(0.0025)		
EUR	-0.0217***	-3.7149***	-5.2196***	0.0865	-0.1582*	-0.0043**	2027	0.1305
	(0.0058)	(0.5711)	(0.4126)	(0.2903)	(0.0937)	(0.0021)		
JPY	-0.0387***	-4.2481***	-6.2795***	1.7813***	-0.2904**	0.1831***	2027	0.1462
	(0.0102)	(1.0223)	(0.7654)	(0.5386)	(0.1357)	(0.0474)		
NZD	-0.0291***	-6.1113***	-6.0012***	0.2823	-0.1273	0.0134**	2027	0.1755
	(0.0086)	(0.8027)	(0.6266)	(0.3997)	(0.1288)	(0.0061)		
NOK	-0.0186***	-2.9316***	-4.4539***	0.3986	-0.1694*	0.0375***	2027	0.1256
	(0.0069)	(0.6522)	(0.5001)	(0.3778)	(0.1021)	(0.0139)		
SEK	-0.0245***	-4.2249***	-4.5719***	-0.2349	-0.0887	0.0504***	2027	0.1192
	(0.0062)	(0.6417)	(0.4739)	(0.3424)	(0.1039)	(0.0129)		
CHF	-0.0123**	-3.7831***	-4.0124***	0.5170	-0.2152**	0.0003	2019	0.0826
	(0.0057)	(0.7129)	(0.5127)	(0.3574)	(0.1009)	(0.0024)		
GBP	-0.0209***	-4.1934***	-5.4897***	0.5308	-0.3363***	-0.0077**	2027	0.1401
	(0.0067)	(0.7345)	(0.5249)	(0.3884)	(0.1054)	(0.0033)		
USD	-0.0142**	-6.0996***	-4.8139***	-1.1734***	-0.0284	-0.0294**	2027	0.1376
	(0.0071)	(0.8458)	(0.6020)	(0.4310)	(0.1144)	(0.0148)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1B – full table of table 1A, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0292***	-5.3880***	-5.8176***	0.2180	-0.2725***	0.0119***	2051	0.1955
	(0.0071)	(0.7154)	(0.5350)	(0.4276)	(0.1045)	(0.0040)		
CAD	-0.0275***	-4.7062***	-5.4869***	0.4856	-0.2617***	0.0069***	2051	0.1779
	(0.0061)	(0.6171)	(0.4871)	(0.3762)	(0.0960)	(0.0025)		
EUR	-0.0212***	-4.8187***	-5.1872***	-0.0804	-0.1829**	-0.0046**	2051	0.1547
	(0.0058)	(0.5144)	(0.4066)	(0.3056)	(0.0887)	(0.0021)		
JPY	-0.0408***	-4.4306***	-6.4025***	2.1611***	-0.1296	0.2008***	2051	0.1721
	(0.0102)	(0.9546)	(0.7401)	(0.5765)	(0.1225)	(0.0477)		
NZD	-0.0282***	-6.3713***	-6.1451***	0.1570	-0.1225	0.0131**	2051	0.2033
	(0.0082)	(0.7227)	(0.6056)	(0.4305)	(0.1208)	(0.0059)		
NOK	-0.0198***	-4.0788***	-4.9352***	0.5975	-0.1802*	0.0411***	2051	0.1590
	(0.0068)	(0.6140)	(0.4888)	(0.3908)	(0.0939)	(0.0139)		
SEK	-0.0236***	-4.5616***	-4.7207***	-0.3232	-0.1185	0.0479***	2051	0.1386
	(0.0062)	(0.5772)	(0.4619)	(0.3527)	(0.0964)	(0.0130)		
CHF	-0.0143**	-2.9085***	-3.6290***	0.5095	-0.2187**	0.0013	2043	0.0806
	(0.0060)	(0.6577)	(0.5162)	(0.3919)	(0.0948)	(0.0030)		
GBP	-0.0231***	-3.4784***	-5.3741***	0.7444*	-0.3459***	-0.0078**	2051	0.1346
	(0.0067)	(0.6649)	(0.5219)	(0.4080)	(0.0986)	(0.0033)		
USD	-0.0116*	-6.5121***	-4.8512***	-1.2066***	-0.0747	-0.0217	2051	0.1734
	(0.0069)	(0.7224)	(0.5720)	(0.4380)	(0.1048)	(0.0144)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1C – full table of table 1B, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 (\Delta i^R_{j,t}) + \beta_3 (i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta i^R_{j,t}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0326***	-4.1144***	-0.2835***	0.0130***	2051	0.1171
	(0.0073)	(0.5130)	(0.1086)	(0.0042)		
CAD	-0.0286***	-4.5534***	-0.2500**	0.0060***	2051	0.1203
	(0.0063)	(0.4644)	(0.0978)	(0.0023)		
EUR	-0.0236***	-3.9506***	-0.1952**	-0.0047**	2051	0.0966
	(0.0059)	(0.3816)	(0.0906)	(0.0021)		
JPY	-0.0348***	-5.4004***	-0.1559	0.1618***	2051	0.1025
	(0.0105)	(0.7281)	(0.1298)	(0.0487)		
NZD	-0.0313***	-2.7495***	-0.0997	0.0138**	2051	0.0597
	(0.0094)	(0.5935)	(0.1328)	(0.0066)		
NOK	-0.0185***	-3.5397***	-0.1251	0.0370***	2051	0.0850
	(0.0070)	(0.4703)	(0.0951)	(0.0141)		
SEK	-0.0276***	-3.3136***	-0.1351	0.0567***	2051	0.0764
	(0.0063)	(0.4335)	(0.0980)	(0.0131)		
CHF	-0.0119**	-2.6838***	-0.2266**	-0.0019	2043	0.0428
	(0.0057)	(0.4814)	(0.0972)	(0.0022)		
GBP	-0.0229***	-3.8122***	-0.3354***	-0.0083**	2051	0.0901
	(0.0068)	(0.4907)	(0.0994)	(0.0033)		
USD	-0.0143*	-3.7412***	-0.1374	-0.0293*	2051	0.0705
	(0.0076)	(0.5839)	(0.1126)	(0.0157)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1D – full table of table 1C 2008M1-2018M1, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0485***	-6.2052***	-7.5654***	0.0529	-0.4063*	0.0152**	1079	0.3094
	(0.0133)	(0.8686)	(0.7367)	(0.5997)	(0.2100)	(0.0071)		
CAD	-0.0426***	-5.8707***	-7.7187***	-0.0304	0.1215	0.0048	1079	0.3057
	(0.0103)	(0.7112)	(0.6393)	(0.4858)	(0.1695)	(0.0029)		
EUR	-0.0387***	-5.5505***	-7.7025***	-0.3161	-0.1215	-0.0121***	1079	0.2854
	(0.0098)	(0.6383)	(0.5873)	(0.4413)	(0.1818)	(0.0036)		
JPY	-0.0612***	-5.8055***	-11.4309***	2.0497**	-0.1628	0.2886***	1079	0.3384
	(0.0177)	(1.2356)	(1.1326)	(0.8865)	(0.2957)	(0.0801)		
NZD	-0.0539***	-7.0047***	-8.3443***	0.3830	0.0770	0.0101	1079	0.3376
	(0.0139)	(0.9307)	(0.8652)	(0.6360)	(0.2375)	(0.0091)		
NOK	-0.0341***	-4.9972***	-8.1996***	0.8581	-0.1442	0.0671***	1079	0.2719
	(0.0111)	(0.7699)	(0.7428)	(0.5492)	(0.1942)	(0.0220)		
SEK	-0.0505***	-5.6572***	-6.8427***	-0.0305	-0.0254	0.0985***	1079	0.2445
	(0.0109)	(0.7249)	(0.6930)	(0.4848)	(0.1963)	(0.0218)		
CHF	-0.0271**	-3.6505***	-6.2321***	0.0309	0.1284	-0.0033	1071	0.1718
	(0.0110)	(0.8720)	(0.8105)	(0.6213)	(0.2014)	(0.0050)		
GBP	-0.0459***	-3.6709***	-8.1564***	0.6928	-0.2781	-0.0183***	1079	0.2229
	(0.0143)	(0.9157)	(0.8565)	(0.6265)	(0.2404)	(0.0064)		
USD	-0.0471***	-7.2161***	-9.7982***	-0.7930	0.0168	-0.0902***	1079	0.3381
	(0.0126)	(0.8648)	(0.8216)	(0.5839)	(0.2226)	(0.0251)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1E – full table of table 1E, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0238***	-5.2222***	-5.0224***	0.0677	-0.2866***	0.0106***	1718	0.1349
	(0.0070)	(0.9187)	(0.6232)	(0.4899)	(0.1064)	(0.0040)		
CAD	-0.0231***	-4.8977***	-4.6715***	0.2366	-0.3151***	0.0063**	1718	0.1331
	(0.0059)	(0.7657)	(0.5404)	(0.4080)	(0.0932)	(0.0024)		
EUR	-0.0180***	-5.4512***	-4.0075***	-0.5071	-0.1871**	-0.0049**	1718	0.1022
	(0.0058)	(0.6975)	(0.4924)	(0.3590)	(0.0943)	(0.0021)		
JPY	-0.0357***	-2.3091*	-3.5781***	1.9500***	-0.1147	0.1761***	1718	0.0597
	(0.0101)	(1.2182)	(0.8857)	(0.6175)	(0.1225)	(0.0474)		
NZD	-0.0230***	-5.9985***	-4.6631***	-0.4991	-0.1503	0.0119**	1718	0.1162
	(0.0083)	(0.9440)	(0.7236)	(0.5432)	(0.1236)	(0.0058)		
NOK	-0.0153**	-4.3305***	-4.2204***	0.4245	-0.1970*	0.0320**	1718	0.1126
	(0.0070)	(0.8487)	(0.5907)	(0.4741)	(0.1009)	(0.0147)		
SEK	-0.0188***	-4.2505***	-3.5450***	-0.4321	-0.1498	0.0376***	1718	0.0848
	(0.0061)	(0.7722)	(0.5534)	(0.4053)	(0.1008)	(0.0129)		
CHF	-0.0088	-3.1338***	-2.0560***	-0.1702	-0.2525***	-0.0035	1710	0.0427
	(0.0058)	(0.8000)	(0.5738)	(0.4172)	(0.0928)	(0.0031)		
GBP	-0.0163**	-4.9478***	-4.1812***	0.0931	-0.2794***	-0.0062**	1718	0.0892
	(0.0065)	(0.8632)	(0.5995)	(0.4629)	(0.0972)	(0.0031)		
USD	-0.0081	-7.2973***	-4.4700***	-1.4375***	-0.1034	-0.0141	1718	0.1312
	(0.0069)	(0.9643)	(0.6742)	(0.4860)	(0.1063)	(0.0146)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1F – full table of table 1F (excluding U.S. dollar), extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0333***	-4.9296***	-5.7267***	0.4936	-0.2753**	-0.0563***	1823	0.1917
	(0.0076)	(0.7119)	(0.5274)	(0.4374)	(0.1078)	(0.0131)		
CAD	-0.0334***	-4.4184***	-5.4444***	0.8785**	-0.3018***	-0.0607***	1823	0.1839
	(0.0071)	(0.6428)	(0.4987)	(0.4002)	(0.1024)	(0.0129)		
EUR	-0.0273***	-4.5233***	-5.1418***	0.3354	-0.2210**	-0.0609***	1823	0.1543
	(0.0062)	(0.5283)	(0.4055)	(0.3219)	(0.0913)	(0.0138)		
JPY	-0.0450***	-4.8388***	-6.7360***	2.3729***	-0.1024	0.1259***	1823	0.1833
	(0.0114)	(1.0079)	(0.7755)	(0.6226)	(0.1293)	(0.0298)		
NZD	-0.0341***	-6.0421***	-6.1096***	0.3387	-0.1369	-0.0549***	1823	0.2032
	(0.0087)	(0.7160)	(0.5988)	(0.4279)	(0.1244)	(0.0134)		
NOK	-0.0241***	-3.5660***	-5.0053***	0.8823**	-0.2363**	-0.0002	1823	0.1595
	(0.0072)	(0.6054)	(0.4826)	(0.3861)	(0.0954)	(0.0016)		
SEK	-0.0306***	-4.0666***	-4.6601***	0.1372	-0.1709*	0.0478***	1823	0.1334
	(0.0063)	(0.5674)	(0.4508)	(0.3475)	(0.0973)	(0.0098)		
CHF	-0.0171***	-2.4898***	-3.6023***	0.7928*	-0.2133**	-0.0329***	1816	0.0790
	(0.0064)	(0.6746)	(0.5250)	(0.4117)	(0.0998)	(0.0124)		
GBP	-0.0246***	-3.5844***	-5.5589***	1.0375**	-0.3782***	-0.0601***	1823	0.1427
	(0.0073)	(0.7051)	(0.5477)	(0.4356)	(0.1085)	(0.0182)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 9 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF) and British Pound (GBP). We exclude United States Dollar (USD) from all the regressions. Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1G – full table of table 1G, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0543**	-7.2292	-22.9042	-11.0936	-2.9609	0.0104	360	0.0535
	(0.0259)	(10.5997)	(14.9001)	(12.0581)	(3.0581)	(0.0100)		
CAD	-0.0301***	-13.5169***	-32.2577***	-9.3470*	0.0662	0.0035	1227	0.0654
	(0.0098)	(4.5978)	(7.3181)	(4.7782)	(1.8729)	(0.0031)		
EUR	-0.0810***	-21.2172***	-31.9704***	-16.3791**	1.5667	-0.0210***	608	0.1129
	(0.0151)	(7.2536)	(8.7744)	(6.6045)	(2.6306)	(0.0047)		
JPY	-0.1040***	-24.4186**	-25.1094**	-1.5197	-7.2904**	0.4815***	461	0.1468
	(0.0239)	(10.2002)	(11.9099)	(12.2109)	(3.5545)	(0.1094)		
NZD	-0.0331***	-18.5507***	-31.9789***	-12.1508**	0.7339	0.0077	1227	0.0688
	(0.0103)	(4.7909)	(7.0020)	(5.2317)	(1.5859)	(0.0070)		
SEK	-0.0334***	-15.4295***	-20.2601***	-10.8591***	-0.1253	0.0651***	1227	0.0515
	(0.0084)	(3.8630)	(5.6202)	(4.0993)	(1.2450)	(0.0175)		
CHF	-0.0547***	-9.9728	-17.2902**	-13.6131*	8.4830***	-0.0084**	724	0.0818
	(0.0116)	(7.8673)	(7.6782)	(7.9137)	(3.0055)	(0.0040)		
GBP	-0.0222*	-8.5766*	-22.3137***	-8.5154*	-1.1037	-0.0118**	1227	0.0351
	(0.0115)	(4.8987)	(7.1081)	(4.9745)	(1.6846)	(0.0055)		
USD	-0.0253***	-17.6015***	-16.6230***	-16.4997***	1.1772	-0.0464**	1227	0.0637
	(0.0088)	(3.9543)	(6.2174)	(3.9658)	(1.4349)	(0.0182)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, full sample, no default risk, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0282***	-6.2536***	-3.1378**	-5.9436***	0.2952	-0.2568	-0.2859***	0.0121***	2027	0.2061
	(0.0072)	(0.7880)	(1.2199)	(0.5357)	(0.4251)	(0.7571)	(0.1106)	(0.0041)		
CAD	-0.0292***	-4.6936***	-5.3454***	-6.2016***	0.5250	-0.1580	-0.2890***	0.0061**	1835	0.2135
	(0.0067)	(0.7183)	(1.1114)	(0.5232)	(0.3956)	(0.7041)	(0.1096)	(0.0025)		
EUR	-0.0199***	-4.8871***	-5.0036***	-5.2334***	-0.1073	-0.4550	-0.1705*	-0.0051**	2027	0.1589
	(0.0058)	(0.5625)	(0.8598)	(0.4049)	(0.3066)	(0.5330)	(0.0907)	(0.0022)		
JPY	-0.0407***	-4.2165***	-5.0290***	-6.5016***	2.1511***	2.0178**	-0.1516	0.1994***	2027	0.1761
	(0.0102)	(1.0032)	(1.5890)	(0.7488)	(0.5775)	(0.9618)	(0.1345)	(0.0478)		
NZD	-0.0296***	-6.6971***	-5.9202***	-6.4014***	0.1906	-0.6582	-0.1745	0.0151***	2027	0.2098
	(0.0078)	(0.7912)	(1.2847)	(0.6095)	(0.4292)	(0.7716)	(0.1258)	(0.0057)		
NOK	-0.0198***	-3.9084***	-5.1820***	-4.9689***	0.5705	0.6795	-0.1754*	0.0412***	2027	0.1629
	(0.0068)	(0.6531)	(1.0430)	(0.4885)	(0.3971)	(0.6885)	(0.0987)	(0.0141)		
SEK	-0.0224***	-4.4885***	-5.1247***	-4.7033***	-0.2920	-0.7150	-0.1268	0.0447***	2027	0.1402
	(0.0063)	(0.6409)	(0.9782)	(0.4662)	(0.3599)	(0.6317)	(0.1026)	(0.0134)		
CHF	-0.0131**	-3.7132***	-1.7331	-3.9686***	0.5469	0.1939	-0.2120**	0.0009	2019	0.0868
	(0.0060)	(0.7116)	(1.0979)	(0.5105)	(0.3855)	(0.6935)	(0.1005)	(0.0032)		
GBP	-0.0221***	-4.3195***	-1.5450	-5.6633***	0.7081*	0.5368	-0.3349***	-0.0076**	2027	0.1438
	(0.0068)	(0.7451)	(1.1210)	(0.5258)	(0.4147)	(0.6941)	(0.1065)	(0.0033)		
USD	-0.0121*	-6.3814***	-6.8336***	-4.8691***	-1.2849***	-0.9221	-0.0582	-0.0235	2027	0.1753
	(0.0070)	(0.8238)	(1.1928)	(0.5822)	(0.4460)	(0.7207)	(0.1113)	(0.0149)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, post 2008, with default risk, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l_{j,t}^R + \beta_5 \Delta i_{j,t}^R + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l_{j,t-1}^R + \beta_9 i_{j,t-1}^R + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta l_{j,t}^R$	$\Delta i_{j,t}^R$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$l_{j,t-1}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0513***	-7.2053***	-3.3530**	14.5092***	-7.3038***	-0.4305	-0.5560	0.1797	-0.3734*	0.0155**	954	0.3029
	(0.0152)	(1.1091)	(1.5116)	(2.3297)	(0.7981)	(0.6495)	(1.1709)	(1.4068)	(0.2101)	(0.0073)		
CAD	-0.0313***	-8.8567***	-6.8906***	8.3213***	-8.9747***	-0.6043	-3.5155***	-0.6392	0.3944	-0.0009	399	0.3046
	(0.0118)	(1.5154)	(1.7969)	(2.5681)	(1.1122)	(0.8526)	(1.0528)	(1.5427)	(0.2489)	(0.0035)		
EUR	-0.0477***	-6.5882***	-4.0138***	8.6759***	-8.3319***	-0.1026	-0.7853	2.1128**	-0.0665	-0.0165***	965	0.2919
	(0.0104)	(0.7780)	(0.9240)	(1.6170)	(0.6126)	(0.4515)	(0.6943)	(1.0123)	(0.1726)	(0.0040)		
JPY	-0.0654***	-6.9260***	-4.4754**	10.4870***	-11.5341***	2.0343**	2.9395**	-0.2503	-0.0736	0.3104***	965	0.3486
	(0.0178)	(1.3761)	(1.8480)	(3.1817)	(1.1389)	(0.8053)	(1.4171)	(1.9958)	(0.2788)	(0.0804)		
NZD	-0.0544***	-7.8269***	-6.0864***	12.3531***	-8.3548***	0.6825	0.2931	-0.0311	0.1621	0.0081	942	0.3321
	(0.0137)	(1.1326)	(1.4691)	(2.4818)	(0.9011)	(0.6844)	(1.1942)	(1.4007)	(0.2444)	(0.0090)		
NOK	-0.0426***	-5.2487***	-5.8965***	4.2135**	-8.1066***	0.6287	0.6719	1.4380	-0.1173	0.0832***	965	0.2752
	(0.0111)	(0.8105)	(1.1987)	(1.9603)	(0.7364)	(0.5300)	(0.8958)	(1.2685)	(0.1921)	(0.0223)		
SEK	-0.0497***	-5.6003***	-4.3565***	7.3048***	-6.4572***	0.1517	-1.0694	-0.1471	-0.0534	0.0941***	965	0.2228
	(0.0111)	(0.8805)	(1.1318)	(1.8924)	(0.7211)	(0.5018)	(0.8421)	(1.1388)	(0.1894)	(0.0226)		
CHF	-0.0249**	-5.8228***	-1.0930	7.9530***	-4.9992***	-0.5818	-0.5845	2.0607	0.1926	-0.0076	881	0.0880
	(0.0111)	(1.3117)	(1.5992)	(2.3441)	(0.9353)	(0.6809)	(1.0374)	(1.3520)	(0.2040)	(0.0051)		
GBP	-0.0486***	-6.4730***	-0.6533	5.8833**	-9.3742***	0.3684	1.9781*	0.9996	-0.0670	-0.0189***	965	0.2468
	(0.0136)	(1.1133)	(1.4022)	(2.3437)	(0.8828)	(0.6481)	(1.0200)	(1.4796)	(0.2350)	(0.0063)		
USD	-0.0560***	-8.9086***	-3.2019**	12.5574***	-10.1507***	-0.9368	0.4045	1.0582	0.1366	-0.1104***	813	0.3756
	(0.0138)	(1.1126)	(1.2482)	(2.1570)	(0.8834)	(0.6296)	(0.9356)	(1.3704)	(0.2270)	(0.0275)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\lambda_{j,t}$, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \lambda_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0548***	-4.4892***	-6.4274***	-0.0210	-0.3793*	0.0159**	954	0.2194
	(0.0157)	(1.0744)	(0.8423)	(0.5668)	(0.2274)	(0.0076)		
CAD	-0.0359***	-3.6265***	-7.9490***	0.9625	0.4427*	0.0038	399	0.2396
	(0.0125)	(1.3326)	(1.1357)	(0.7107)	(0.2646)	(0.0035)		
EUR	-0.0426***	-3.4544***	-8.0497***	0.6814*	-0.0377	-0.0134***	965	0.2424
	(0.0103)	(0.7207)	(0.6233)	(0.3932)	(0.1825)	(0.0036)		
JPY	-0.0704***	-4.9658***	-10.9949***	1.6701**	-0.3591	0.3213***	965	0.2858
	(0.0184)	(1.3638)	(1.1874)	(0.6485)	(0.2952)	(0.0829)		
NZD	-0.0542***	-4.9241***	-7.1773***	0.9769	0.2323	0.0069	942	0.2358
	(0.0160)	(1.1240)	(0.9658)	(0.6579)	(0.2672)	(0.0100)		
NOK	-0.0364***	-4.2428***	-7.3424***	0.8598*	-0.0874	0.0683***	965	0.2237
	(0.0112)	(0.7759)	(0.7554)	(0.4492)	(0.2025)	(0.0221)		
SEK	-0.0525***	-4.0889***	-6.2107***	0.2019	0.0339	0.1021***	965	0.1773
	(0.0111)	(0.8147)	(0.7272)	(0.4550)	(0.1968)	(0.0220)		
CHF	-0.0235**	-3.5106***	-4.5120***	-0.1109	0.1738	-0.0046	881	0.0633
	(0.0106)	(1.1842)	(0.9489)	(0.5623)	(0.2077)	(0.0035)		
GBP	-0.0448***	-5.2950***	-8.5265***	0.1084	-0.1244	-0.0194***	965	0.2259
	(0.0133)	(1.0231)	(0.8687)	(0.5483)	(0.2379)	(0.0061)		
USD	-0.0595***	-5.1253***	-9.8593***	-0.7254	0.1777	-0.1159***	813	0.2804
	(0.0163)	(1.1080)	(0.9587)	(0.6271)	(0.2570)	(0.0322)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\tau_{j,t}$, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\tau_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \tau_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0320***	-1.5353	-4.2424***	-0.3062	-0.2969***	0.0133***	2027	0.1201
	(0.0075)	(1.2740)	(0.5164)	(0.7480)	(0.1144)	(0.0043)		
CAD	-0.0296***	-4.4586***	-5.3357***	-0.6788	-0.2922***	0.0051**	1835	0.1763
	(0.0067)	(1.1111)	(0.4934)	(0.6416)	(0.1086)	(0.0023)		
EUR	-0.0216***	-3.1621***	-3.7711***	-0.4263	-0.1949**	-0.0053**	2027	0.1111
	(0.0059)	(0.8675)	(0.3712)	(0.4797)	(0.0907)	(0.0022)		
JPY	-0.0347***	-5.8441***	-5.6721***	0.6453	-0.1159	0.1634***	2027	0.1310
	(0.0103)	(1.6373)	(0.7093)	(0.9138)	(0.1357)	(0.0483)		
NZD	-0.0314***	-4.1731***	-2.9760***	-0.4427	-0.1216	0.0146**	2027	0.0807
	(0.0088)	(1.4047)	(0.5814)	(0.7741)	(0.1351)	(0.0063)		
NOK	-0.0184***	-3.0822***	-3.6837***	0.1610	-0.1232	0.0370**	2027	0.0993
	(0.0070)	(1.0560)	(0.4673)	(0.6614)	(0.0977)	(0.0144)		
SEK	-0.0253***	-4.4653***	-3.3708***	-0.6392	-0.1635	0.0508***	2027	0.0921
	(0.0063)	(0.9870)	(0.4258)	(0.6007)	(0.1009)	(0.0135)		
CHF	-0.0119**	-2.0420*	-2.7135***	-0.0208	-0.2162**	-0.0018	2019	0.0492
	(0.0059)	(1.1117)	(0.4725)	(0.6566)	(0.0996)	(0.0027)		
GBP	-0.0223***	-0.7693	-3.8679***	-0.3056	-0.3479***	-0.0083**	2027	0.0924
	(0.0070)	(1.1399)	(0.4911)	(0.6717)	(0.1063)	(0.0033)		
USD	-0.0129*	-6.2108***	-3.8031***	-0.6893	-0.1674	-0.0249	2027	0.1036
	(0.0076)	(1.2382)	(0.5687)	(0.6968)	(0.1143)	(0.0160)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $l_{j,t}^R$, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta l_{j,t}^R + \beta_3 \Delta i_{j,t}^R + \beta_4 l_{j,t-1}^R + \beta_5 i_{j,t-1}^R + u_{j,t}$

	$q_{j,t-1}$	$\Delta l_{j,t}^R$	$\Delta i_{j,t}^R$	$l_{j,t-1}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0572***	9.9471***	-5.7573***	0.5040	-0.4473**	0.0185**	954	0.2194
	(0.0159)	(2.1987)	(0.7584)	(1.3025)	(0.2176)	(0.0074)		
CAD	-0.0308**	0.7547	-6.9329***	1.2790	0.5283**	0.0017	399	0.2018
	(0.0127)	(2.2708)	(1.0802)	(1.3620)	(0.2442)	(0.0036)		
EUR	-0.0512***	2.0137	-6.3724***	2.3257**	-0.0624	-0.0142***	965	0.2069
	(0.0108)	(1.5065)	(0.5710)	(0.9197)	(0.1832)	(0.0037)		
JPY	-0.0623***	4.7482	-10.0143***	1.6921	-0.0719	0.2825***	965	0.2477
	(0.0194)	(3.1077)	(1.1494)	(1.8797)	(0.3087)	(0.0872)		
NZD	-0.0664***	4.5846*	-6.1433***	1.8722	0.2763	0.0081	942	0.1730
	(0.0158)	(2.5575)	(0.9643)	(1.4215)	(0.2708)	(0.0100)		
NOK	-0.0452***	-1.2134	-5.2769***	2.8374**	-0.0823	0.0880***	965	0.1447
	(0.0121)	(1.9512)	(0.7214)	(1.1799)	(0.2170)	(0.0241)		
SEK	-0.0565***	2.9482	-4.4351***	1.2175	0.0452	0.1109***	965	0.1340
	(0.0118)	(1.7924)	(0.6650)	(1.0864)	(0.1952)	(0.0234)		
CHF	-0.0247**	2.2263	-3.1002***	1.3974	0.1175	-0.0042	881	0.0456
	(0.0110)	(2.0983)	(0.8766)	(1.1801)	(0.2053)	(0.0032)		
GBP	-0.0484***	0.7863	-6.0860***	1.4121	-0.1539	-0.0204***	965	0.1712
	(0.0144)	(2.2231)	(0.8362)	(1.2948)	(0.2463)	(0.0066)		
USD	-0.0570***	5.1429**	-8.6497***	-0.2386	0.1627	-0.1103***	813	0.2553
	(0.0167)	(2.1134)	(0.9081)	(1.3630)	(0.2547)	(0.0330)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}_{j,t}^R$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\eta + l^R)_{j,t}$, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\eta + l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\eta + l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\eta + l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\eta + l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0522***	-4.4479***	-6.7364***	-0.2415	-0.3564	0.0153**	954	0.2299
	(0.0157)	(0.9424)	(0.8535)	(0.6316)	(0.2251)	(0.0075)		
CAD	-0.0273**	-5.2887***	-8.2070***	-0.5082	0.6036**	0.0016	399	0.2497
	(0.0120)	(1.2257)	(1.1374)	(0.7763)	(0.2526)	(0.0037)		
EUR	-0.0406***	-4.0124***	-7.7359***	0.3185	-0.0381	-0.0115***	965	0.2564
	(0.0103)	(0.6037)	(0.5951)	(0.3991)	(0.1764)	(0.0037)		
JPY	-0.0692***	-4.5828***	-11.3109***	2.2805***	-0.1964	0.3253***	965	0.3217
	(0.0181)	(1.1377)	(1.1269)	(0.7851)	(0.2926)	(0.0818)		
NZD	-0.0519***	-5.2704***	-7.7770***	0.9965	0.2855	0.0037	942	0.2814
	(0.0151)	(0.9046)	(0.9226)	(0.6417)	(0.2518)	(0.0094)		
NOK	-0.0389***	-4.8577***	-7.9348***	0.9800**	-0.1026	0.0759***	965	0.2678
	(0.0107)	(0.6646)	(0.7161)	(0.4346)	(0.1908)	(0.0214)		
SEK	-0.0499***	-4.2427***	-6.3769***	-0.0080	0.0342	0.0973***	965	0.1952
	(0.0111)	(0.6756)	(0.7062)	(0.4504)	(0.1919)	(0.0221)		
CHF	-0.0233**	-2.4752**	-3.8496***	-0.1723	0.1487	-0.0052	881	0.0632
	(0.0106)	(0.9612)	(0.9103)	(0.5461)	(0.2060)	(0.0044)		
GBP	-0.0444***	-3.6011***	-8.1602***	0.8494	-0.1785	-0.0185***	965	0.2179
	(0.0138)	(0.8638)	(0.8653)	(0.5628)	(0.2370)	(0.0063)		
USD	-0.0596***	-4.5722***	-9.3961***	-0.8059	0.1448	-0.1144***	813	0.2957
	(0.0157)	(0.8519)	(0.9154)	(0.5794)	(0.2493)	(0.0311)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\tau - l^R)_{j,t}$, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\tau - l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\tau - l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\tau - l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\tau - l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0561***	-4.7837***	-5.9795***	-1.0041	-0.5195**	0.0207***	954	0.2127
	(0.0159)	(1.2895)	(0.7940)	(0.8484)	(0.2337)	(0.0080)		
CAD	-0.0357***	-1.8207	-6.8766***	-1.6425**	0.3688	0.0005	399	0.2204
	(0.0127)	(1.4376)	(1.0686)	(0.7696)	(0.2464)	(0.0036)		
EUR	-0.0484***	-2.3497***	-5.9865***	-1.4418***	-0.1389	-0.0184***	965	0.2161
	(0.0104)	(0.7944)	(0.5670)	(0.5189)	(0.1804)	(0.0041)		
JPY	-0.0570***	-6.2547***	-10.2499***	0.2292	-0.0145	0.2597***	965	0.2813
	(0.0186)	(1.6331)	(1.1204)	(1.0798)	(0.3086)	(0.0834)		
NZD	-0.0570***	-5.3858***	-6.6085***	-0.7078	0.2140	0.0088	942	0.2089
	(0.0159)	(1.3571)	(0.9433)	(0.9077)	(0.2660)	(0.0099)		
NOK	-0.0355***	-3.4656***	-5.2402***	-1.3365*	-0.0909	0.0657***	965	0.1477
	(0.0118)	(1.0828)	(0.7346)	(0.7222)	(0.2190)	(0.0231)		
SEK	-0.0554***	-3.7487***	-4.3686***	-1.1369*	-0.0270	0.1060***	965	0.1515
	(0.0114)	(0.9855)	(0.6629)	(0.6368)	(0.1942)	(0.0226)		
CHF	-0.0225**	-2.2309*	-2.8585***	-0.7918	0.1033	-0.0063	881	0.0502
	(0.0105)	(1.3036)	(0.8806)	(0.7633)	(0.2048)	(0.0039)		
GBP	-0.0489***	-0.5402	-6.1315***	-0.0555	-0.1844	-0.0199***	965	0.1691
	(0.0140)	(1.2007)	(0.8462)	(0.7509)	(0.2522)	(0.0066)		
USD	-0.0587***	-4.6762***	-8.4757***	-0.4799	0.0907	-0.1125***	813	0.2729
	(0.0161)	(1.1607)	(0.9006)	(0.8272)	(0.2501)	(0.0316)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 3A – full table of table 4A, extreme outliner of CHF at 2015M1 excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \tau_{j,t} + \beta_3 \Delta \gamma_t + \beta_4 \Delta \gamma^*_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \gamma_{t-1} + \beta_7 \gamma^*_{j,t-1} + \beta_8 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\gamma^*_{j,t}$	$\Delta\gamma_t$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\gamma^*_{j,t-1}$	γ_{t-1}	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2 within
AUD	-0.0280***	5.5961***	-6.8581***	-2.9017**	-5.9156***	-0.1666	0.4068	-0.2829	-0.2816**	0.0110**	2027	0.2082
	(0.0071)	(0.6832)	(1.2076)	(1.2032)	(0.5360)	(0.3671)	(0.5979)	(0.7601)	(0.1105)	(0.0046)		
CAD	-0.0291***	4.5341***	-5.9784***	-5.3881***	-6.2179***	-0.5539	-0.2016	-0.2669	-0.2838***	0.0077**	1835	0.2149
	(0.0067)	(0.6815)	(1.9588)	(1.1120)	(0.5219)	(0.3941)	(1.2300)	(0.7169)	(0.1095)	(0.0035)		
EUR	-0.0199***	4.7862***	-5.2400***	-5.2134***	-5.2391***	0.1091	-0.1477	-0.4698	-0.1712*	-0.0050**	2027	0.1591
	(0.0058)	(0.5569)	(1.0692)	(0.8926)	(0.4055)	(0.3093)	(0.5161)	(0.5679)	(0.0923)	(0.0025)		
JPY	-0.0407***	4.3243***	-1.9827	-4.8411***	-6.4875***	-2.1454***	1.9348	2.0260**	-0.1486	0.1997***	2027	0.1767
	(0.0101)	(0.9876)	(5.1896)	(1.5851)	(0.7495)	(0.5721)	(2.4880)	(0.9619)	(0.1347)	(0.0474)		
NZD	-0.0326***	6.2598***	-6.8412***	-5.7259***	-6.4160***	0.9929*	0.1996	-0.8909	-0.1721	0.0114*	2027	0.2171
	(0.0076)	(0.8569)	(0.8899)	(1.2724)	(0.6085)	(0.5100)	(0.4249)	(0.7619)	(0.1252)	(0.0062)		
NOK	-0.0178***	5.6901***	-3.3614***	-5.1197***	-5.1663***	-0.1887	0.6584	0.5733	-0.1657*	0.0351**	2027	0.1698
	(0.0067)	(0.7323)	(0.7606)	(1.0386)	(0.4921)	(0.4132)	(0.4846)	(0.6837)	(0.0988)	(0.0141)		
SEK	-0.0223***	4.9061***	-3.9380***	-5.1512***	-4.7600***	0.5291	-0.0031	-0.7903	-0.1351	0.0421***	2027	0.1421
	(0.0063)	(0.6320)	(1.2143)	(0.9801)	(0.4649)	(0.3791)	(0.4870)	(0.6361)	(0.1024)	(0.0134)		
CHF	-0.0152**	3.5183***	-4.1800**	-1.8215*	-3.9956***	-0.4722	1.1342	0.1253	-0.2127**	0.0006	2019	0.0882
	(0.0066)	(0.6924)	(1.7224)	(1.0940)	(0.5113)	(0.3965)	(1.0083)	(0.7031)	(0.1002)	(0.0033)		
GBP	-0.0215***	4.8877***	-3.8070***	-1.3110	-5.6315***	-0.6401	0.8236	0.5672	-0.3345***	-0.0081**	2027	0.1451
	(0.0069)	(0.7036)	(1.0815)	(1.1103)	(0.5273)	(0.4029)	(0.5838)	(0.6936)	(0.1069)	(0.0037)		
USD	-0.0131*	6.3062***	-5.8798***	-6.5810***	-5.1169***	0.1079	-1.9605***	0.0112	-0.0255	-0.0192	2027	0.1917
	(0.0070)	(0.8049)	(1.3767)	(1.2061)	(0.5802)	(0.4530)	(0.5751)	(0.7353)	(0.1115)	(0.0147)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $\gamma^*_{j,t}$ is a measure of foreign treasury liquidity, $\gamma_{j,t}$ is a measure of the home treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

12. Robustness: Regressions tables in the main text with CHF excluded

Robustness of table 1A – full table of table 1A, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \hat{\eta}_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \hat{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\hat{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0348***	-5.8705***	-5.7773***	0.3781	-0.3013***	0.0140***	1800	0.2081
	(0.0088)	(0.7577)	(0.5208)	(0.4054)	(0.1082)	(0.0044)		
CAD	-0.0353***	-3.7929***	-6.2774***	0.4883	-0.2594**	0.0072***	1632	0.1934
	(0.0078)	(0.7288)	(0.5167)	(0.3696)	(0.1091)	(0.0026)		
EUR	-0.0245***	-3.8766***	-5.4469***	-0.0556	-0.1406	-0.0048**	1800	0.1373
	(0.0073)	(0.6064)	(0.4362)	(0.3270)	(0.0967)	(0.0022)		
JPY	-0.0457***	-4.1483***	-6.6419***	1.7671***	-0.3665***	0.2148***	1800	0.1627
	(0.0118)	(1.0339)	(0.7602)	(0.5540)	(0.1409)	(0.0547)		
NZD	-0.0285***	-6.2101***	-6.0964***	0.2783	-0.1113	0.0128*	1800	0.1829
	(0.0101)	(0.8036)	(0.6243)	(0.4007)	(0.1278)	(0.0066)		
NOK	-0.0236***	-3.1411***	-4.5956***	0.3131	-0.1633	0.0471***	1800	0.1344
	(0.0082)	(0.6638)	(0.5065)	(0.3872)	(0.1025)	(0.0165)		
SEK	-0.0286***	-4.3899***	-4.7373***	-0.3903	-0.0683	0.0590***	1800	0.1278
	(0.0078)	(0.6509)	(0.4843)	(0.3567)	(0.1054)	(0.0161)		
GBP	-0.0251***	-4.4752***	-5.4642***	0.4355	-0.3362***	-0.0096**	1800	0.1435
	(0.0079)	(0.7348)	(0.5253)	(0.3950)	(0.1070)	(0.0037)		
USD	-0.0176**	-5.8134***	-4.8570***	-1.1732***	-0.0193	-0.0364**	1800	0.1395
	(0.0081)	(0.8484)	(0.6031)	(0.4405)	(0.1147)	(0.0168)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1B – full table of table 1B, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 (\Delta \tilde{\eta}_{j,t}) + \beta_3 (\Delta i^R_{j,t}) + \beta_4 (\tilde{\eta}_{j,t-1}) + \beta_5 (i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0339***	-5.7707***	-5.9978***	0.0364	-0.2777***	0.0133***	1824	0.2087
	(0.0087)	(0.7140)	(0.5286)	(0.4316)	(0.1024)	(0.0042)		
CAD	-0.0334***	-4.9720***	-5.5980***	0.2538	-0.2460***	0.0076***	1824	0.1895
	(0.0072)	(0.6130)	(0.4751)	(0.3835)	(0.0922)	(0.0026)		
EUR	-0.0234***	-5.2314***	-5.4526***	-0.2984	-0.1668*	-0.0055**	1824	0.1663
	(0.0071)	(0.5501)	(0.4330)	(0.3393)	(0.0909)	(0.0023)		
JPY	-0.0471***	-4.4000***	-6.7706***	2.1643***	-0.1937	0.2293***	1824	0.1893
	(0.0117)	(0.9758)	(0.7389)	(0.5998)	(0.1269)	(0.0542)		
NZD	-0.0270***	-6.8214***	-6.3993***	0.0840	-0.1050	0.0122*	1824	0.2184
	(0.0097)	(0.7382)	(0.6065)	(0.4481)	(0.1184)	(0.0063)		
NOK	-0.0236***	-4.5295***	-5.1565***	0.5006	-0.1757*	0.0480***	1824	0.1730
	(0.0079)	(0.6353)	(0.4965)	(0.4113)	(0.0939)	(0.0160)		
SEK	-0.0276***	-4.8590***	-4.9335***	-0.4927	-0.1038	0.0559***	1824	0.1508
	(0.0075)	(0.5996)	(0.4748)	(0.3795)	(0.0970)	(0.0157)		
GBP	-0.0261***	-3.9282***	-5.4146***	0.5725	-0.3411***	-0.0093**	1824	0.1402
	(0.0078)	(0.6841)	(0.5271)	(0.4345)	(0.0984)	(0.0037)		
USD	-0.0158**	-6.6931***	-4.9629***	-1.3677***	-0.0583	-0.0302*	1824	0.1809
	(0.0077)	(0.7426)	(0.5750)	(0.4654)	(0.1039)	(0.0160)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1C – full table of table 1C, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta i_{j,t}^R) + \beta_3(i_{j,t-1}^R) + u_{j,t}$

	$q_{j,t-1}$	$\Delta i_{j,t}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0394***	-4.1914***	-0.3012***	0.0151***	1824	0.1262
	(0.0092)	(0.5036)	(0.1065)	(0.0045)		
CAD	-0.0364***	-4.5876***	-0.2409**	0.0076***	1824	0.1297
	(0.0074)	(0.4500)	(0.0936)	(0.0024)		
EUR	-0.0265***	-4.1544***	-0.1822**	-0.0052**	1824	0.1030
	(0.0073)	(0.4070)	(0.0926)	(0.0022)		
JPY	-0.0406***	-5.7467***	-0.2204	0.1882***	1824	0.1177
	(0.0122)	(0.7265)	(0.1345)	(0.0561)		
NZD	-0.0316***	-2.8511***	-0.0892	0.0137*	1824	0.0631
	(0.0111)	(0.5977)	(0.1311)	(0.0071)		
NOK	-0.0247***	-3.6090***	-0.1299	0.0489***	1824	0.0915
	(0.0084)	(0.4751)	(0.0947)	(0.0168)		
SEK	-0.0323***	-3.4127***	-0.1306	0.0664***	1824	0.0820
	(0.0079)	(0.4435)	(0.0986)	(0.0164)		
GBP	-0.0275***	-3.7175***	-0.3363***	-0.0104***	1824	0.0887
	(0.0080)	(0.4934)	(0.0997)	(0.0038)		
USD	-0.0169**	-3.8682***	-0.1297	-0.0346**	1824	0.0768
	(0.0085)	(0.5832)	(0.1109)	(0.0175)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1D – full table of table 1D 1999M1-2007M12, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0433***	-4.0743***	-3.5553***	-0.2706	-0.1409	0.0166**	864	0.0943
	(0.0167)	(1.1485)	(0.7484)	(0.7041)	(0.1599)	(0.0067)		
CAD	-0.0318**	-3.1122***	-3.4772***	-0.1338	-0.3094**	0.0073	864	0.0983
	(0.0148)	(1.0582)	(0.7152)	(0.6571)	(0.1509)	(0.0051)		
EUR	-0.0216	-3.1517***	-2.2988***	-0.3934	-0.1997	-0.0047	864	0.0491
	(0.0139)	(0.9009)	(0.5882)	(0.5896)	(0.1335)	(0.0031)		
JPY	-0.0493**	-1.2176	-1.9986**	0.6790	0.0858	0.2475**	864	0.0475
	(0.0199)	(1.3346)	(0.8917)	(0.8786)	(0.1795)	(0.0980)		
NZD	-0.0482***	-4.7768***	-3.8331***	-1.0448	-0.1660	0.0301***	864	0.1073
	(0.0169)	(1.1017)	(0.8496)	(0.6734)	(0.1623)	(0.0100)		
NOK	-0.0231	-3.8077***	-2.9528***	-0.0982	-0.0923	0.0443	864	0.0957
	(0.0155)	(1.0349)	(0.6648)	(0.6981)	(0.1370)	(0.0306)		
SEK	-0.0407***	-3.3855***	-2.6788***	-2.0091***	0.0058	0.0824***	864	0.0833
	(0.0145)	(0.9508)	(0.6368)	(0.6090)	(0.1425)	(0.0312)		
GBP	-0.0382***	-4.3386***	-3.0487***	-0.0971	-0.1709	-0.0189**	864	0.1009
	(0.0133)	(0.9140)	(0.5919)	(0.6238)	(0.1275)	(0.0076)		
USD	-0.0030	-4.0533***	-1.9258***	-1.4997**	-0.1651	-0.0013	864	0.0800
	(0.0121)	(1.1060)	(0.6965)	(0.7453)	(0.1482)	(0.0260)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1D – full table of table 1D 2008M1-2018M1, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0551***	-6.5375***	-7.7810***	0.1772	-0.4210*	0.0152**	960	0.3235
	(0.0161)	(0.8951)	(0.7416)	(0.6108)	(0.2158)	(0.0071)		
CAD	-0.0537***	-5.9988***	-7.7935***	0.0505	0.0134	0.0048	960	0.3131
	(0.0118)	(0.7276)	(0.6331)	(0.5010)	(0.1712)	(0.0029)		
EUR	-0.0436***	-5.9758***	-8.1407***	-0.4740	-0.1342	-0.0121***	960	0.3085
	(0.0123)	(0.6861)	(0.6129)	(0.4693)	(0.1898)	(0.0036)		
JPY	-0.0726***	-5.6558***	-11.8075***	2.2534**	-0.3162	0.2886***	960	0.3631
	(0.0200)	(1.2600)	(1.1183)	(0.9095)	(0.3021)	(0.0801)		
NZD	-0.0526***	-7.7335***	-8.5373***	0.3425	0.0747	0.0101	960	0.3549
	(0.0153)	(0.9770)	(0.8670)	(0.6626)	(0.2342)	(0.0091)		
NOK	-0.0428***	-5.5701***	-8.5901***	0.9560*	-0.2428	0.0671***	960	0.2962
	(0.0125)	(0.7802)	(0.7295)	(0.5491)	(0.1966)	(0.0220)		
SEK	-0.0542***	-5.8241***	-7.1465***	0.0956	-0.0489	0.0985***	960	0.2557
	(0.0133)	(0.7554)	(0.7063)	(0.5067)	(0.2007)	(0.0218)		
GBP	-0.0545***	-4.1554***	-8.1722***	0.6418	-0.3541	-0.0183***	960	0.2308
	(0.0165)	(0.9519)	(0.8591)	(0.6440)	(0.2391)	(0.0064)		
USD	-0.0507***	-7.5754***	-10.2740***	-0.7230	-0.0625	-0.0902***	960	0.3574
	(0.0146)	(0.8951)	(0.8249)	(0.6000)	(0.2299)	(0.0251)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1E – full table of table 1E, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0286***	-5.5617***	-5.2162***	0.0176	-0.3012***	0.0122***	1528	0.1466
	(0.0088)	(0.9275)	(0.6171)	(0.5136)	(0.1036)	(0.0043)		
CAD	-0.0290***	-5.1630***	-4.8499***	-0.0341	-0.2985***	0.0071***	1528	0.1437
	(0.0071)	(0.7797)	(0.5344)	(0.4319)	(0.0908)	(0.0026)		
EUR	-0.0210***	-6.1378***	-4.2496***	-0.8571**	-0.1624*	-0.0061***	1528	0.1157
	(0.0071)	(0.7527)	(0.5202)	(0.4077)	(0.0962)	(0.0023)		
JPY	-0.0420***	-1.9631	-3.9142***	1.9980***	-0.1678	0.2051***	1528	0.0681
	(0.0118)	(1.2780)	(0.8905)	(0.6505)	(0.1266)	(0.0546)		
NZD	-0.0226**	-6.4827***	-5.0164***	-0.5729	-0.1281	0.0113*	1528	0.1273
	(0.0101)	(0.9716)	(0.7316)	(0.5802)	(0.1215)	(0.0064)		
NOK	-0.0183**	-4.9083***	-4.5088***	0.3426	-0.1907*	0.0377**	1528	0.1266
	(0.0085)	(0.8965)	(0.6104)	(0.5216)	(0.1024)	(0.0174)		
SEK	-0.0225***	-4.7594***	-3.9331***	-0.6268	-0.1270	0.0451***	1528	0.1008
	(0.0076)	(0.8138)	(0.5745)	(0.4531)	(0.1015)	(0.0159)		
GBP	-0.0196**	-5.3764***	-4.3250***	0.0088	-0.2798***	-0.0078**	1528	0.0966
	(0.0077)	(0.9077)	(0.6147)	(0.5156)	(0.0984)	(0.0036)		
USD	-0.0123	-7.3617***	-4.6206***	-1.6579***	-0.0814	-0.0224	1528	0.1343
	(0.0079)	(1.0012)	(0.6833)	(0.5399)	(0.1056)	(0.0165)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1F – full table of table 1F (excluding U.S. dollar), with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0417***	-5.2704***	-5.9295***	0.3636	-0.2945***	-0.0708***	1596	0.2073
	(0.0095)	(0.7031)	(0.5164)	(0.4384)	(0.1059)	(0.0163)		
CAD	-0.0432***	-4.6639***	-5.5561***	0.6765*	-0.3043***	-0.0789***	1596	0.1984
	(0.0086)	(0.6395)	(0.4875)	(0.4096)	(0.0994)	(0.0158)		
EUR	-0.0314***	-4.9848***	-5.4520***	0.1149	-0.2119**	-0.0702***	1596	0.1674
	(0.0079)	(0.5684)	(0.4360)	(0.3566)	(0.0948)	(0.0177)		
JPY	-0.0532***	-4.8625***	-7.1865***	2.3748***	-0.1796	0.1464***	1596	0.2040
	(0.0134)	(1.0352)	(0.7780)	(0.6527)	(0.1366)	(0.0348)		
NZD	-0.0335***	-6.5109***	-6.3905***	0.2658	-0.1162	-0.0542***	1596	0.2203
	(0.0106)	(0.7305)	(0.5986)	(0.4426)	(0.1222)	(0.0164)		
NOK	-0.0304***	-3.9795***	-5.2641***	0.8377**	-0.2447**	-0.0010	1596	0.1755
	(0.0088)	(0.6261)	(0.4907)	(0.4052)	(0.0962)	(0.0017)		
SEK	-0.0374***	-4.3404***	-4.9082***	0.0494	-0.1689*	0.0589***	1596	0.1470
	(0.0081)	(0.5907)	(0.4647)	(0.3750)	(0.0997)	(0.0125)		
GBP	-0.0276***	-4.1047***	-5.6502***	0.9126**	-0.3790***	-0.0675***	1596	0.1501
	(0.0086)	(0.7301)	(0.5560)	(0.4656)	(0.1100)	(0.0214)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 9 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK) and British Pound (GBP). We exclude Swiss Franc (CHF) and United States Dollar (USD) from all the regressions. Each row represents a regression estimation using the first column currency as the home currency and the other 7 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1G – full table of table 1G, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i_{j,t}^R) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i_{j,t-1}^R) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0517**	-6.8823	-20.7537	-7.8786	-3.5718	0.0119	320	0.0460
	(0.0202)	(10.9945)	(13.9123)	(12.3911)	(2.7578)	(0.0089)		
CAD	-0.0322***	-13.9490***	-32.7070***	-9.3565*	-0.3054	0.0041	1120	0.0655
	(0.0090)	(4.2981)	(6.9136)	(4.9935)	(1.6557)	(0.0029)		
EUR	-0.0905***	-25.4278***	-44.1946***	-17.0089**	0.6397	-0.0239***	523	0.1384
	(0.0143)	(6.4942)	(9.2660)	(6.8064)	(2.3221)	(0.0042)		
JPY	-0.1070***	-22.8305**	-24.7507	-1.0194	-8.0759**	0.4955***	397	0.1336
	(0.0236)	(10.2244)	(19.5927)	(11.5514)	(3.6969)	(0.1077)		
NZD	-0.0323**	-20.2957***	-33.2623***	-12.7645*	0.7103	0.0073	1120	0.0724
	(0.0143)	(6.6694)	(9.7585)	(6.6508)	(2.1103)	(0.0093)		
SEK	-0.0332***	-16.5632***	-20.3370**	-10.7233**	-0.1962	0.0648***	1120	0.0526
	(0.0110)	(5.5384)	(8.2876)	(5.2088)	(1.6714)	(0.0228)		
GBP	-0.0228**	-8.4952**	-22.6602***	-8.3824*	-1.2993	-0.0119**	1120	0.0352
	(0.0100)	(4.0540)	(7.0246)	(4.4440)	(1.6564)	(0.0050)		
USD	-0.0235*	-16.9230***	-16.3964*	-16.4460***	1.1472	-0.0428	1120	0.0616
	(0.0136)	(6.0231)	(9.9272)	(6.1601)	(2.1943)	(0.0284)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, full sample, no default risk, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \lambda_{j,t} + \beta_3 \Delta \tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \lambda_{j,t}$	$\Delta \tau_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0346***	-6.4515***	-3.9071***	-6.0862***	0.1370	-0.7074	-0.3135***	0.0145***	1800	0.2191
	(0.0086)	(0.7720)	(1.2067)	(0.5250)	(0.4322)	(0.7555)	(0.1088)	(0.0043)		
CAD	-0.0344***	-4.9467***	-5.6085***	-6.2997***	0.3365	-0.3453	-0.2897***	0.0067***	1632	0.2244
	(0.0076)	(0.7116)	(1.0905)	(0.5056)	(0.4043)	(0.6865)	(0.1070)	(0.0026)		
EUR	-0.0220***	-5.2205***	-5.5812***	-5.4720***	-0.3186	-0.6202	-0.1542*	-0.0059**	1800	0.1711
	(0.0071)	(0.5985)	(0.9141)	(0.4283)	(0.3446)	(0.5440)	(0.0934)	(0.0024)		
JPY	-0.0473***	-4.1142***	-5.1573***	-6.8808***	2.1386***	2.0529**	-0.2182	0.2297***	1800	0.1945
	(0.0116)	(1.0137)	(1.6054)	(0.7443)	(0.6014)	(0.9654)	(0.1400)	(0.0540)		
NZD	-0.0316***	-7.0363***	-6.9714***	-6.6004***	0.0617	-1.1214	-0.1784	0.0162***	1800	0.2263
	(0.0092)	(0.7909)	(1.3167)	(0.6051)	(0.4403)	(0.8066)	(0.1249)	(0.0063)		
NOK	-0.0234***	-4.3438***	-5.8921***	-5.1996***	0.4728	0.5472	-0.1727*	0.0477***	1800	0.1781
	(0.0079)	(0.6680)	(1.0751)	(0.4951)	(0.4150)	(0.7104)	(0.0986)	(0.0161)		
SEK	-0.0265***	-4.7234***	-5.6800***	-4.9144***	-0.4683	-0.8071	-0.1090	0.0530***	1800	0.1528
	(0.0076)	(0.6535)	(1.0287)	(0.4775)	(0.3843)	(0.6625)	(0.1039)	(0.0159)		
GBP	-0.0252***	-4.7037***	-2.2087*	-5.6704***	0.5393	0.2393	-0.3404***	-0.0094**	1800	0.1491
	(0.0079)	(0.7517)	(1.1500)	(0.5290)	(0.4369)	(0.7212)	(0.1080)	(0.0038)		
USD	-0.0159**	-6.3490***	-7.6474***	-4.9476***	-1.3808***	-1.3348*	-0.0570	-0.0305*	1800	0.1837
	(0.0078)	(0.8291)	(1.2164)	(0.5827)	(0.4705)	(0.7342)	(0.1108)	(0.0163)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, post 2008, with default risk, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \lambda_{j,t} + \beta_3 \Delta \tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \lambda_{j,t}$	$\Delta \tau_{j,t}$	$\Delta l^R_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$l^R_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0617***	-7.3246***	-3.8874**	14.7095***	-7.5579***	-0.2044	-0.3545	0.2423	-0.4382*	0.0181**	847	0.3262
	(0.0178)	(1.1654)	(1.6683)	(2.4208)	(0.8274)	(0.7369)	(1.2455)	(1.4865)	(0.2287)	(0.0080)		
CAD	-0.0455***	-8.4448***	-6.9717***	7.1595***	-8.8556***	-0.5355	-3.3505***	-1.0804	0.3126	0.0017	354	0.3039
	(0.0160)	(1.5224)	(2.1366)	(2.5463)	(1.0602)	(0.9366)	(1.1584)	(1.5500)	(0.2427)	(0.0038)		
EUR	-0.0511***	-6.8363***	-4.5878***	9.0551***	-8.5559***	-0.0906	-1.0481	1.9918*	-0.1184	-0.0185***	858	0.3157
	(0.0127)	(0.7946)	(0.9673)	(1.6522)	(0.6143)	(0.4771)	(0.7207)	(1.0554)	(0.1834)	(0.0047)		
JPY	-0.0796***	-6.3816***	-4.6534**	10.6119***	-11.6876***	2.3505***	3.3847**	0.1648	-0.2154	0.3761***	858	0.3766
	(0.0198)	(1.3792)	(1.8841)	(3.1280)	(1.1240)	(0.8395)	(1.4156)	(1.9424)	(0.2884)	(0.0895)		
NZD	-0.0520***	-8.1048***	-6.8952***	12.9479***	-8.6530***	0.7225	0.5779	-0.0485	0.1744	0.0067	835	0.3556
	(0.0157)	(1.1336)	(1.5240)	(2.4700)	(0.8896)	(0.7156)	(1.2405)	(1.3882)	(0.2432)	(0.0095)		
NOK	-0.0515***	-5.4895***	-6.4144***	4.6641**	-8.4870***	0.8235	0.6662	1.2043	-0.2236	0.1008***	858	0.3044
	(0.0129)	(0.8189)	(1.2288)	(1.9507)	(0.7275)	(0.5414)	(0.9147)	(1.2657)	(0.2024)	(0.0257)		
SEK	-0.0551***	-5.5748***	-4.8080***	7.4730***	-6.7519***	0.4073	-0.9178	-0.1588	-0.1047	0.1045***	858	0.2444
	(0.0132)	(0.8773)	(1.1882)	(1.9070)	(0.7165)	(0.5129)	(0.8747)	(1.1399)	(0.1964)	(0.0266)		
GBP	-0.0551***	-6.4945***	-1.0137	5.8926**	-9.4345***	0.4629	1.9710*	0.8890	-0.1608	-0.0216***	858	0.2605
	(0.0159)	(1.1199)	(1.4748)	(2.3784)	(0.8822)	(0.6763)	(1.0792)	(1.4716)	(0.2456)	(0.0072)		
USD	-0.0642***	-8.7478***	-3.5078***	11.9301***	-10.3989***	-1.0270	0.2283	0.6063	0.0416	-0.1264***	726	0.3903
	(0.0157)	(1.1105)	(1.2754)	(2.1573)	(0.8679)	(0.6560)	(0.9512)	(1.3786)	(0.2374)	(0.0310)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\lambda_{j,t}$, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \lambda_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0672***	-4.4248***	-6.5808***	0.2408	-0.4653*	0.0196**	847	0.2382
	(0.0193)	(1.1619)	(0.8799)	(0.6757)	(0.2495)	(0.0085)		
CAD	-0.0511***	-3.7008***	-7.9366***	0.8493	0.3676	0.0061	354	0.2519
	(0.0163)	(1.2409)	(1.0451)	(0.6358)	(0.2538)	(0.0038)		
EUR	-0.0455***	-3.5153***	-8.3289***	0.7925*	-0.0712	-0.0144***	858	0.2600
	(0.0126)	(0.7374)	(0.6268)	(0.4199)	(0.1932)	(0.0042)		
JPY	-0.0835***	-4.5211***	-11.0772***	2.0122***	-0.5438*	0.3806***	858	0.3066
	(0.0209)	(1.3730)	(1.1801)	(0.6918)	(0.3071)	(0.0940)		
NZD	-0.0521***	-4.9385***	-7.2324***	0.9889	0.2351	0.0062	835	0.2419
	(0.0173)	(1.1435)	(0.9663)	(0.6927)	(0.2691)	(0.0104)		
NOK	-0.0469***	-4.3751***	-7.6026***	0.9921**	-0.2045	0.0893***	858	0.2465
	(0.0130)	(0.7815)	(0.7458)	(0.4602)	(0.2141)	(0.0257)		
SEK	-0.0590***	-3.9851***	-6.3983***	0.4719	-0.0228	0.1144***	858	0.1925
	(0.0134)	(0.8146)	(0.7220)	(0.4667)	(0.2042)	(0.0264)		
GBP	-0.0531***	-5.3176***	-8.5520***	0.1501	-0.2299	-0.0228***	858	0.2389
	(0.0157)	(1.0253)	(0.8639)	(0.5670)	(0.2484)	(0.0070)		
USD	-0.0675***	-5.2872***	-10.1467***	-0.9025	0.0807	-0.1320***	726	0.3021
	(0.0181)	(1.0916)	(0.9333)	(0.6373)	(0.2665)	(0.0358)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\tau_{j,t}$, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \tau_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \tau_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0405***	-1.7697	-4.3301***	-0.7707	-0.3418***	0.0166***	1800	0.1309
	(0.0091)	(1.2550)	(0.5044)	(0.7354)	(0.1125)	(0.0046)		
CAD	-0.0370***	-4.3257***	-5.4073***	-0.7635	-0.3095***	0.0065***	1632	0.1841
	(0.0077)	(1.0847)	(0.4755)	(0.6156)	(0.1051)	(0.0025)		
EUR	-0.0241***	-3.5327***	-3.9699***	-0.3876	-0.1817*	-0.0056**	1800	0.1205
	(0.0072)	(0.9232)	(0.3950)	(0.4956)	(0.0928)	(0.0023)		
JPY	-0.0407***	-6.0205***	-6.0569***	0.6457	-0.1827	0.1903***	1800	0.1488
	(0.0119)	(1.6544)	(0.7067)	(0.9043)	(0.1416)	(0.0549)		
NZD	-0.0342***	-4.7384***	-3.1233***	-0.8494	-0.1438	0.0163**	1800	0.0882
	(0.0105)	(1.4436)	(0.5833)	(0.7968)	(0.1354)	(0.0070)		
NOK	-0.0240***	-3.3622***	-3.7628***	0.0667	-0.1315	0.0477***	1800	0.1075
	(0.0083)	(1.0822)	(0.4721)	(0.6669)	(0.0975)	(0.0168)		
SEK	-0.0300***	-4.8452***	-3.5053***	-0.5631	-0.1562	0.0605***	1800	0.1003
	(0.0078)	(1.0346)	(0.4356)	(0.6148)	(0.1022)	(0.0164)		
GBP	-0.0272***	-1.2267	-3.7831***	-0.4812	-0.3616***	-0.0107***	1800	0.0921
	(0.0081)	(1.1635)	(0.4942)	(0.6761)	(0.1083)	(0.0039)		
USD	-0.0158*	-6.5410***	-3.9408***	-0.9311	-0.1696	-0.0305*	1800	0.1115
	(0.0083)	(1.2465)	(0.5685)	(0.6747)	(0.1131)	(0.0174)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $l^R_{j,t}$, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta l^R_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 l^R_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta l^R_{j,t}$	$\Delta i^R_{j,t}$	$l^R_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0709***	10.2422***	-5.8959***	0.7815	-0.5038**	0.0217***	847	0.2379
	(0.0190)	(2.3201)	(0.7922)	(1.4180)	(0.2329)	(0.0081)		
CAD	-0.0483***	0.1008	-6.8726***	0.7753	0.4390*	0.0046	354	0.2127
	(0.0169)	(2.1774)	(0.9851)	(1.2343)	(0.2329)	(0.0040)		
EUR	-0.0551***	2.1824	-6.6515***	2.3728**	-0.0966	-0.0153***	858	0.2218
	(0.0134)	(1.5534)	(0.5770)	(0.9814)	(0.1934)	(0.0043)		
JPY	-0.0721***	5.4482*	-10.1721***	2.0152	-0.1757	0.3261***	858	0.2702
	(0.0220)	(3.0734)	(1.1441)	(1.8770)	(0.3204)	(0.0991)		
NZD	-0.0668***	4.9577*	-6.1932***	2.0583	0.2756	0.0081	835	0.1789
	(0.0179)	(2.6064)	(0.9647)	(1.4513)	(0.2740)	(0.0105)		
NOK	-0.0569***	-1.0191	-5.4385***	2.7889**	-0.1983	0.1110***	858	0.1554
	(0.0146)	(1.9705)	(0.7216)	(1.2065)	(0.2295)	(0.0290)		
SEK	-0.0616***	3.2781*	-4.6074***	1.3203	0.0276	0.1208***	858	0.1470
	(0.0142)	(1.8187)	(0.6598)	(1.1054)	(0.1994)	(0.0280)		
GBP	-0.0578***	1.0074	-6.1628***	1.3975	-0.2703	-0.0241***	858	0.1834
	(0.0169)	(2.2452)	(0.8340)	(1.2906)	(0.2572)	(0.0076)		
USD	-0.0623***	4.5951**	-8.9423***	-0.7163	0.0935	-0.1206***	726	0.2711
	(0.0187)	(2.1035)	(0.8860)	(1.3652)	(0.2679)	(0.0369)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\eta + l^R)_{j,t}$, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\eta + l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\eta + l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\eta + l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\eta + l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0630***	-4.7002***	-7.0058***	0.0107	-0.4190*	0.0179**	847	0.2519
	(0.0192)	(0.9771)	(0.8899)	(0.6951)	(0.2385)	(0.0083)		
CAD	-0.0417***	-5.4191***	-8.2019***	-0.4889	0.5181**	0.0038	354	0.2589
	(0.0157)	(1.2842)	(1.0569)	(0.7942)	(0.2442)	(0.0040)		
EUR	-0.0414***	-4.3067***	-8.0713***	0.2874	-0.0551	-0.0120***	858	0.2770
	(0.0126)	(0.6303)	(0.6024)	(0.4333)	(0.1858)	(0.0043)		
JPY	-0.0837***	-4.3901***	-11.5411***	2.7494***	-0.3579	0.3926***	858	0.3493
	(0.0202)	(1.1684)	(1.1203)	(0.8290)	(0.3012)	(0.0915)		
NZD	-0.0494***	-5.6105***	-8.0163***	1.1609*	0.2846	0.0027	835	0.2995
	(0.0163)	(0.9354)	(0.9160)	(0.6846)	(0.2499)	(0.0098)		
NOK	-0.0483***	-5.0881***	-8.2944***	1.1234**	-0.1994	0.0948***	858	0.2954
	(0.0124)	(0.6828)	(0.7082)	(0.4519)	(0.2010)	(0.0247)		
SEK	-0.0544***	-4.3539***	-6.7184***	0.2382	-0.0056	0.1064***	858	0.2141
	(0.0135)	(0.6926)	(0.7071)	(0.4719)	(0.1984)	(0.0267)		
GBP	-0.0514***	-3.8162***	-8.3340***	0.8929	-0.2739	-0.0213***	858	0.2336
	(0.0160)	(0.8934)	(0.8693)	(0.6071)	(0.2450)	(0.0072)		
USD	-0.0689***	-4.7561***	-9.7078***	-0.9760	0.0265	-0.1325***	726	0.3179
	(0.0175)	(0.8636)	(0.8951)	(0.6069)	(0.2589)	(0.0346)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\tau - l^R)_{j,t}$, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\tau - l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\tau - l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\tau - l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\tau - l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0692***	-5.1221***	-6.1511***	-1.1610	-0.5801**	0.0241***	847	0.2325
	(0.0198)	(1.4415)	(0.8318)	(0.8906)	(0.2558)	(0.0090)		
CAD	-0.0546***	-0.9734	-6.8016***	-1.4092**	0.2937	0.0038	354	0.2260
	(0.0173)	(1.4441)	(0.9776)	(0.7024)	(0.2374)	(0.0040)		
EUR	-0.0551***	-2.6557***	-6.2226***	-1.6343***	-0.2007	-0.0210***	858	0.2349
	(0.0129)	(0.8257)	(0.5716)	(0.5352)	(0.1913)	(0.0048)		
JPY	-0.0649***	-6.5977***	-10.5294***	0.3689	-0.0817	0.2959***	858	0.3075
	(0.0210)	(1.6615)	(1.1122)	(1.0688)	(0.3203)	(0.0942)		
NZD	-0.0555***	-5.8720***	-6.7651***	-0.7393	0.2174	0.0082	835	0.2212
	(0.0178)	(1.4145)	(0.9388)	(0.9304)	(0.2702)	(0.0105)		
NOK	-0.0482***	-3.7168***	-5.4454***	-1.4094*	-0.2222	0.0908***	858	0.1622
	(0.0143)	(1.1084)	(0.7334)	(0.7277)	(0.2322)	(0.0278)		
SEK	-0.0602***	-4.0482***	-4.5861***	-1.1476*	-0.0488	0.1152***	858	0.1671
	(0.0138)	(1.0247)	(0.6569)	(0.6490)	(0.1981)	(0.0272)		
GBP	-0.0578***	-0.7623	-6.2034***	-0.1776	-0.3052	-0.0237***	858	0.1816
	(0.0166)	(1.2445)	(0.8440)	(0.7551)	(0.2644)	(0.0076)		
USD	-0.0638***	-4.4516***	-8.8626***	-0.2944	0.0152	-0.1229***	726	0.2877
	(0.0183)	(1.1720)	(0.8814)	(0.8251)	(0.2657)	(0.0359)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 3A – full table of table 4A, with CHF excluded

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\tau_{j,t} + \beta_3 \Delta\gamma_t + \beta_4 \Delta\gamma^*_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \gamma_{t-1} + \beta_7 \gamma^*_{j,t-1} + \beta_8 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\gamma^*_{j,t}$	$\Delta\gamma_t$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\gamma^*_{j,t-1}$	γ_{t-1}	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2 within
AUD	-0.0350***	5.8589***	-7.0284***	-3.6892***	-6.0529***	0.0257	0.2929	-0.7461	-0.3123***	0.0133***	1800	0.2214
	(0.0086)	(0.6965)	(1.1868)	(1.1887)	(0.5251)	(0.3915)	(0.5988)	(0.7569)	(0.1086)	(0.0048)		
CAD	-0.0350***	4.7716***	-6.8209***	-5.7245***	-6.3034***	-0.3241	-0.7176	-0.5701	-0.2840***	0.0090**	1632	0.2272
	(0.0075)	(0.6896)	(1.8915)	(1.0908)	(0.5034)	(0.4036)	(1.2114)	(0.6971)	(0.1068)	(0.0035)		
EUR	-0.0223***	5.0912***	-5.8180***	-5.9629***	-5.4758***	0.3331	-0.5077	-0.7386	-0.1571*	-0.0056**	1800	0.1716
	(0.0071)	(0.5832)	(1.2075)	(0.9695)	(0.4297)	(0.3431)	(0.6132)	(0.5940)	(0.0946)	(0.0026)		
JPY	-0.0476***	4.1854***	-2.1277	-4.9911***	-6.8761***	-2.1503***	2.2418	2.0686**	-0.2179	0.2309***	1800	0.1949
	(0.0116)	(1.0017)	(5.2443)	(1.6051)	(0.7454)	(0.5973)	(2.5278)	(0.9658)	(0.1402)	(0.0537)		
NZD	-0.0390***	6.9813***	-7.1412***	-7.0202***	-6.5786***	1.5545***	0.0019	-1.7482**	-0.1799	0.0131**	1800	0.2370
	(0.0090)	(0.8955)	(0.8813)	(1.3052)	(0.6015)	(0.5505)	(0.4272)	(0.7919)	(0.1237)	(0.0064)		
NOK	-0.0213***	6.1246***	-3.7375***	-5.7582***	-5.4035***	-0.0845	0.5692	0.4329	-0.1623*	0.0415***	1800	0.1857
	(0.0078)	(0.7600)	(0.7780)	(1.0707)	(0.4969)	(0.4322)	(0.5044)	(0.7036)	(0.0986)	(0.0159)		
SEK	-0.0267***	5.2214***	-3.9404***	-5.7279***	-4.9794***	0.6904*	-0.1504	-0.8924	-0.1195	0.0511***	1800	0.1553
	(0.0076)	(0.6509)	(1.2496)	(1.0323)	(0.4760)	(0.4018)	(0.5142)	(0.6672)	(0.1039)	(0.0158)		
GBP	-0.0246***	5.0267***	-4.3648***	-2.0374*	-5.6439***	-0.4826	0.6602	0.2947	-0.3380***	-0.0098**	1800	0.1496
	(0.0080)	(0.7264)	(1.0991)	(1.1396)	(0.5305)	(0.4312)	(0.6117)	(0.7194)	(0.1085)	(0.0041)		
USD	-0.0143*	6.2431***	-5.8393***	-7.3036***	-5.2097***	0.2077	-1.9940***	-0.1971	-0.0193	-0.0216	1800	0.1985
	(0.0077)	(0.8328)	(1.3850)	(1.2344)	(0.5817)	(0.4860)	(0.5866)	(0.7459)	(0.1114)	(0.0162)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $\gamma^*_{j,t}$ is a measure of foreign treasury liquidity, $\gamma_{j,t}$ is a measure of the home treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

13. Meese Rogoff 1983 out-of-sample-fit exercise robustness

Table 4: Out-of-sample fit comparison of different models with extreme outliner of CHF at 2015M1 excluded

Rolling window prediction error of regression model (21) with liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta \tilde{\eta}_{j,t} + \hat{\beta}_3 \Delta i_{j,t}^R + \hat{\beta}_4 \tilde{\eta}_{j,t-1} + \hat{\beta}_5 i_{j,t-1}^R$$

Rolling window prediction error of regression model (22) without liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta i_{j,t}^R + \hat{\beta}_3 i_{j,t-1}^R$$

and random walk (RW) model: $\Delta \hat{s}_{j,t}^{RW} = 0$

Home Currency	RMSE of RW	RMSE of model (22)	RMSE of model (21)	DMW statistics of (22) vs RW	DMW statistics of (21) vs RW	DMW statistics of (21) vs (22)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
AUD	0.0331	0.0307	0.0291	3.372	3.393	2.066
CAD	0.0301	0.0276	0.0263	4.110	4.375	3.080
EUR	0.0309	0.0305	0.0301	3.672	4.600	3.870
JPY	0.0282	0.0263	0.0252	2.839	3.370	2.185
NZD	0.0331	0.0313	0.0309	2.208	3.021	2.810
NOK	0.0428	0.0402	0.0393	3.030	3.789	2.249
SEK	0.0309	0.0295	0.0279	2.061	3.351	2.457
CHF	0.0361	0.0345	0.0310	0.899	0.997	0.691
GBP	0.0294	0.0282	0.0271	2.513	3.779	0.886
USD	0.0348	0.0335	0.0309	2.986	4.318	3.632

Home Currency	CW statistics of (22) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs (22)	p-value of CW test (21) vs (22)
	(8)	(9)	(10)	(11)	(12)	(13)
AUD	6.098	0.000***	5.348	0.000***	3.083	0.001***
CAD	6.376	0.000***	6.050	0.000***	3.921	0.000***
EUR	6.012	0.000***	6.684	0.000***	4.941	0.000***
JPY	4.863	0.000***	5.244	0.000***	4.097	0.000***
NZD	4.336	0.000***	4.232	0.000***	3.467	0.006***
NOK	5.496	0.000***	5.098	0.000***	2.536	0.000***
SEK	4.749	0.000***	5.719	0.000***	3.737	0.000***
CHF	3.485	0.000***	3.155	0.001***	1.780	0.038**
GBP	4.124	0.000***	5.691	0.000***	2.122	0.017**
USD	5.579	0.000***	5.626	0.000***	4.349	0.000***

The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krone (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a rolling window predictive regression using the column (1) currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is the measure of government bond liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The rolling window is 108 months. The first estimated coefficient uses sample from 1999M1 to 2007M12. Germany government interest rate is used for EUR case. DMW stands for Diebold and Mariano (1995) and West (1996) and CW stands for Clark and West (2007)

The null hypotheses are that the models MSE are equal. The alternative hypotheses are that the larger models MSE are smaller than the nested models. *, **, and *** indicate that the alternative model significantly outperforms the smaller nested model at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the one-sided test. Standard errors adjusted for cross-sectional correlation.

Table 4: Out-of-sample fit comparison of different models with CHF excluded

Rolling window prediction error of regression model (21) with liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta \tilde{\eta}_{j,t} + \hat{\beta}_3 \Delta i^R_{j,t} + \hat{\beta}_4 \tilde{\eta}_{j,t-1} + \hat{\beta}_5 i^R_{j,t-1}$$

Rolling window prediction error of regression model (22) without liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta i^R_{j,t} + \hat{\beta}_3 i^R_{j,t-1}$$

and random walk (RW) model: $\Delta \hat{s}^{RW}_{j,t} = 0$

Home Currency	RMSE of RW	RMSE of model (22)	RMSE of model (21)	DMW statistics of (22) vs RW	DMW statistics of (21) vs RW	DMW statistics of (21) vs (22)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
AUD	0.0333	0.0307	0.0289	3.540	3.777	2.219
CAD	0.0300	0.0273	0.0259	4.328	4.550	2.993
EUR	0.0290	0.0269	0.0256	3.831	4.735	4.030
JPY	0.0330	0.0312	0.0306	3.100	3.483	1.914
NZD	0.0434	0.0403	0.0393	2.219	3.134	2.974
NOK	0.0310	0.0295	0.0274	3.424	4.278	2.707
SEK	0.0366	0.0349	0.0310	2.496	3.578	2.422
GBP	0.0297	0.0284	0.0270	2.780	3.963	1.148
USD	0.0350	0.0335	0.0309	3.491	4.153	3.233

Home Currency	CW statistics of (22) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs (22)	p-value of CW test (21) vs (22)
	(8)	(9)	(10)	(11)	(12)	(13)
AUD	5.959	0.000***	5.664	0.000***	3.208	0.000***
CAD	6.408	0.000***	6.047	0.000***	3.773	0.000***
EUR	6.097	0.000***	6.832	0.000***	5.013	0.000***
JPY	4.973	0.000***	5.159	0.000***	3.657	0.000***
NZD	4.262	0.000***	4.230	0.000***	3.562	0.000***
NOK	6.060	0.000***	5.510	0.000***	2.808	0.000***
SEK	5.299	0.000***	5.934	0.000***	3.662	0.000***
GBP	4.349	0.000***	5.711	0.000***	2.313	0.017**
USD	6.011	0.000***	5.407	0.000***	4.007	0.000***

The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krone (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a rolling window predictive regression using the column (1) currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{n}_{j,t}$ is the measure of government bond liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The rolling window is 108 months. The first estimated coefficient uses sample from 1999M1 to 2007M12. Germany government interest rate is used for EUR case. DMW stands for Diebold and Mariano (1995) and West (1996) and CW stands for Clark and West (2007). Standard errors are clustered by time.

The null hypotheses are that the models MSE are equal. The alternative hypotheses are that the larger models MSE are smaller than the nested models. *, **, and *** indicate that the alternative model significantly outperforms the smaller nested model at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the one-sided test. Standard errors adjusted for cross-sectional correlation.

Table 4: Recursive window prediction error of regression model with liquidity return

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta \tilde{\eta}_{j,t} + \hat{\beta}_3 \Delta i^R_{j,t} + \hat{\beta}_4 \tilde{\eta}_{j,t-1} + \hat{\beta}_5 i^R_{j,t-1} \text{ and random walk model: } \Delta \hat{s}^{RW}_{j,t} = 0$$

Home Currency	RMSE of the model (20)	RMSE of random walk	RMSE of the model (20)	RMSE of random walk	RMSE of the model (20)	RMSE of random walk
			CHF 2015M1 excluded	CHF 2015M1 excluded	CHF excluded	CHF excluded
(1)	(2)	(3)	(4)	(5)	(6)	(7)
AUD	0.0268	0.0294	0.0263	0.0291	0.0287	0.0333
CAD	0.0250	0.0275	0.0243	0.0270	0.0262	0.0300
EUR	0.0295	0.0291	0.0262	0.0266	0.0325	0.0328
JPY	0.0241	0.0259	0.0233	0.0255	0.0257	0.0290
NOK	0.0285	0.0300	0.0281	0.0297	0.0309	0.0330
NZD	0.0361	0.0382	0.0359	0.0382	0.0398	0.0434
SEK	0.0264	0.0285	0.0260	0.0283	0.0276	0.0310
CHF	0.0306	0.0335	0.0300	0.0332	0.0313	0.0366
GBP	0.0261	0.0277	0.0256	0.0274	0.0270	0.0297
USD	0.0291	0.0320	0.0289	0.0319	0.0311	0.0350

The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a recursive window predictive regression using the column (1) currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. η_t is the measure of treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The first estimated coefficient uses sample from 1999M1 to 2007M12. The first prediction is 2008M1 and last prediction is 2018M1. Germany government interest rate is used for EUR case.

Table 4: Out-of-sample fit comparison of different models with first prediction starts from 2006M1

Rolling window prediction error of regression model (21) with liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta \tilde{\eta}_{j,t} + \hat{\beta}_3 \Delta i^R_{j,t} + \hat{\beta}_4 \tilde{\eta}_{j,t-1} + \hat{\beta}_5 i^R_{j,t-1}$$

Rolling window prediction error of regression model (22) without liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta i^R_{j,t} + \hat{\beta}_3 i^R_{j,t-1}$$

and random walk (RW) model: $\Delta \hat{s}^{RW}_{j,t} = 0$

Home Currency	RMSE of RW	RMSE of model (22)	RMSE of model (21)	DMW statistics of (22) vs RW	DMW statistics of (21) vs RW	DMW statistics of (21) vs (22)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
AUD	0.0325	0.0313	0.0298	3.022	3.073	1.838
CAD	0.0304	0.0293	0.0281	3.638	4.131	2.992
EUR	0.0274	0.0265	0.0255	3.210	3.703	2.941
JPY	0.0410	0.0393	0.0383	2.793	2.762	1.571
NZD	0.0363	0.0361	0.0323	1.871	3.167	2.832
NOK	0.0304	0.0302	0.0284	2.158	3.282	2.109
SEK	0.0288	0.0287	0.0274	1.432	2.621	2.162
GBP	0.0314	0.0336	0.0335	-0.566	-0.335	0.167
USD	0.0317	0.0293	0.0286	2.202	3.709	1.166

Home Currency	CW statistics of (22) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs (22)	p-value of CW test (21) vs (22)
	(8)	(9)	(10)	(11)	(12)	(13)
AUD	5.161	0.000***	5.705	0.000***	2.985	0.001***
CAD	6.108	0.000***	6.103	0.000***	4.006	0.000***
EUR	5.816	0.000***	5.226	0.000***	4.183	0.000***
JPY	4.484	0.000***	4.883	0.000***	2.864	0.002***
NZD	4.462	0.000***	3.947	0.000***	3.578	0.000***
NOK	5.236	0.000***	4.948	0.000***	2.549	0.005***
SEK	5.192	0.000***	4.371	0.000***	3.536	0.000***
GBP	1.073	0.138	0.657	0.252	1.196	0.113
USD	5.943	0.000***	4.007	0.000***	2.531	0.005***

The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a rolling window predictive regression using the column (1) currency as the home currency and the other 9 currencies as foreign currency j. $s_{(j,t)}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{(j,t)}$ is the real exchange rate.   is the measure of government bond liquidity, $i_{(j,t)}^R$ is the home minus foreign interest rates.   is a difference operator. The rolling window is 108 months. The first estimated coefficient uses sample from 1999M1 to 2005M12. Germany government interest rate is used for EUR case. DMW stands for Diebold and Mariano (1995) and West (1996) and CW stands for Clark and West (2007).

The null hypotheses are that the models MSE are equal. The alternative hypotheses are that the larger models MSE are smaller than the nested models. *, **, and *** indicate that the alternative model significantly outperforms the smaller nested model at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the one-sided test. Standard errors adjusted for cross-sectional correlation.

Table 4: Out-of-sample fit comparison of different models with first prediction starts from 2010M1

Rolling window prediction error of regression model (21) with liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta \tilde{\eta}_{j,t} + \hat{\beta}_3 \Delta i^R_{j,t} + \hat{\beta}_4 \tilde{\eta}_{j,t-1} + \hat{\beta}_5 i^R_{j,t-1}$$

Rolling window prediction error of regression model (22) without liquidity return:

$$\Delta \hat{s}_{j,t} = \hat{\alpha}_j + \hat{\beta}_1 q_{j,t-1} + \hat{\beta}_2 \Delta i^R_{j,t} + \hat{\beta}_3 i^R_{j,t-1}$$

and random walk (RW) model: $\Delta \hat{s}^{RW}_{j,t} = 0$

Home Currency	RMSE of RW	RMSE of model (22)	RMSE of model (21)	DMW statistics of (22) vs RW	DMW statistics of (21) vs RW	DMW statistics of (21) vs (22)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
AUD	0.0286	0.0274	0.0265	2.091	3.124	2.233
CAD	0.0258	0.0241	0.0232	3.902	4.867	3.720
EUR	0.0254	0.0246	0.0237	1.944	2.824	3.321
JPY	0.0372	0.0360	0.0353	1.630	2.527	1.598
NZD	0.0315	0.0311	0.0298	0.574	1.834	2.361
NOK	0.0284	0.0276	0.0265	2.077	3.556	3.123
SEK	0.0264	0.0261	0.0252	0.656	2.207	2.122
GBP	0.0291	0.0304	0.0307	-1.052	-0.940	-0.403
USD	0.0291	0.0285	0.0278	1.131	2.243	3.063

Home Currency	CW statistics of (22) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs RW	p-value of CW test (21) vs RW	CW statistics of (21) vs (22)	p-value of CW test (21) vs (22)
	(8)	(9)	(10)	(11)	(12)	(13)
AUD	5.425	0.000***	4.822	0.000***	3.644	0.000***
CAD	6.651	0.000***	5.850	0.000***	5.115	0.000***
EUR	5.523	0.000***	4.782	0.000***	4.595	0.000***
JPY	4.848	0.000***	3.853	0.000***	3.297	0.000***
NZD	4.205	0.000***	2.778	0.003***	4.098	0.000***
NOK	5.849	0.000***	4.285	0.000***	4.263	0.000***
SEK	5.135	0.000***	3.509	0.000***	3.294	0.000***
GBP	-0.203	0.581	-0.605	0.729	0.455	0.324
USD	4.704	0.000***	3.221	0.001***	4.384	0.000***

The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a rolling window predictive regression using the column (1) currency as the home currency and the other 9 currencies as foreign currency j. $s_{(j,t)}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{(j,t)}$ is the real exchange rate. is the measure of government bond liquidity, $i_{(j,t)}^R$ is the home minus foreign interest rates. is a difference operator. The rolling window is 108 months. The first estimated coefficient uses sample from 1999M1 to 2009M12. Germany government interest rate is used for EUR case. DMW stands for Diebold and Mariano (1995) and West (1996) and CW stands for Clark and West (2007).

The null hypotheses are that the models MSE are equal. The alternative hypotheses are that the larger models MSE are smaller than the nested models. *, **, and *** indicate that the alternative model significantly outperforms the smaller nested model at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the one-sided test. Standard errors adjusted for cross-sectional correlation.

14. Robustness: Regressions in the main text with real exchange rates only or nominal exchange rates only on both sides of the regression estimations

Robustness of table 1A – full table of table 1A with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \hat{\eta}_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \hat{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\hat{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0277***	-5.7751***	-5.6699***	0.4402	-0.2934***	0.0127***	2019	0.1883
	(0.0072)	(0.7965)	(0.5457)	(0.4127)	(0.1131)	(0.0042)		
CAD	-0.0271***	-3.8495***	-6.2294***	0.6398*	-0.2601**	0.0057**	1834	0.1714
	(0.0069)	(0.7614)	(0.5544)	(0.3810)	(0.1146)	(0.0025)		
EUR	-0.0191***	-3.6097***	-5.0646***	0.1470	-0.1441	-0.0044**	2026	0.1187
	(0.0059)	(0.5813)	(0.4181)	(0.2974)	(0.0939)	(0.0021)		
JPY	-0.0347***	-4.1654***	-6.2198***	1.7668***	-0.2332*	0.1635***	2026	0.1410
	(0.0103)	(1.0244)	(0.7643)	(0.5412)	(0.1356)	(0.0474)		
NZD	-0.0264***	-6.1882***	-5.9097***	0.2401	-0.0913	0.0117*	2019	0.1672
	(0.0087)	(0.8175)	(0.6368)	(0.4070)	(0.1315)	(0.0062)		
NOK	-0.0157**	-3.0530***	-4.5264***	0.4380	-0.1567	0.0316**	2026	0.1226
	(0.0070)	(0.6696)	(0.5129)	(0.3882)	(0.1048)	(0.0143)		
SEK	-0.0215***	-4.2228***	-4.4396***	-0.2548	-0.0638	0.0434***	2026	0.1084
	(0.0063)	(0.6532)	(0.4820)	(0.3490)	(0.1058)	(0.0132)		
CHF	-0.0085	-2.9705***	-3.0542***	0.5812	-0.2002*	-0.0018	2026	0.0469
	(0.0062)	(0.7853)	(0.5617)	(0.3960)	(0.1093)	(0.0025)		
GBP	-0.0180***	-3.9696***	-5.4704***	0.5693	-0.3275***	-0.0066**	2026	0.1321
	(0.0067)	(0.7452)	(0.5315)	(0.3946)	(0.1066)	(0.0033)		
USD	-0.0134*	-6.2974***	-4.9367***	-1.2904***	0.0006	-0.0269*	2026	0.1398
	(0.0072)	(0.8529)	(0.6062)	(0.4349)	(0.1152)	(0.0149)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1A – full table of table 1A with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta\hat{\eta}_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta\hat{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\hat{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0257***	-5.6745***	-5.5987***	0.6116	-0.2746**	0.0116***	2028	0.1909
	(0.0089)	(0.7806)	(0.5354)	(0.4041)	(0.1068)	(0.0044)		
CAD	-0.0344***	-3.6676***	-6.2024***	0.6432*	-0.2459**	0.0069***	1836	0.1793
	(0.0081)	(0.7464)	(0.5413)	(0.3780)	(0.1083)	(0.0026)		
EUR	-0.0238***	-3.4722***	-4.9982***	0.1845	-0.1411	-0.0049**	2028	0.1207
	(0.0069)	(0.5779)	(0.4158)	(0.2977)	(0.0904)	(0.0022)		
JPY	-0.0320***	-4.2433***	-6.0675***	1.6479***	-0.0801	0.1527***	2028	0.1383
	(0.0110)	(1.0243)	(0.7676)	(0.5408)	(0.1202)	(0.0510)		
NZD	-0.0223**	-6.0083***	-5.8285***	0.3361	-0.0618	0.0094	2028	0.1650
	(0.0099)	(0.8126)	(0.6323)	(0.4059)	(0.1244)	(0.0064)		
NOK	-0.0220***	-2.8769***	-4.3672***	0.3995	-0.1573	0.0438***	2028	0.1223
	(0.0080)	(0.6512)	(0.4988)	(0.3790)	(0.0995)	(0.0160)		
SEK	-0.0278***	-4.1445***	-4.4416***	-0.1737	-0.0930	0.0567***	2028	0.1139
	(0.0075)	(0.6445)	(0.4752)	(0.3468)	(0.1014)	(0.0153)		
CHF	-0.0170**	-3.0973***	-3.0510***	0.5991	-0.2264**	0.0005	2028	0.0538
	(0.0076)	(0.7749)	(0.5543)	(0.3922)	(0.1044)	(0.0026)		
GBP	-0.0233***	-4.0538***	-5.3340***	0.6145	-0.3150***	-0.0091**	2028	0.1337
	(0.0076)	(0.7357)	(0.5245)	(0.3912)	(0.1005)	(0.0037)		
USD	-0.0163*	-6.0164***	-4.7338***	-1.1285***	-0.0252	-0.0334*	2028	0.1342
	(0.0085)	(0.8445)	(0.5995)	(0.4304)	(0.1122)	(0.0174)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1B – full table of table 1B with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0280***	-5.2808***	-5.7719***	0.2796	-0.2817***	0.0124***	2043	0.1850
	(0.0073)	(0.7342)	(0.5483)	(0.4404)	(0.1074)	(0.0041)		
CAD	-0.0244***	-4.6322***	-5.4419***	0.4694	-0.2444**	0.0060**	2050	0.1633
	(0.0063)	(0.6411)	(0.5059)	(0.3920)	(0.0995)	(0.0025)		
EUR	-0.0187***	-4.7080***	-5.0380***	-0.0553	-0.1667*	-0.0047**	2050	0.1412
	(0.0059)	(0.5218)	(0.4116)	(0.3131)	(0.0889)	(0.0021)		
JPY	-0.0369***	-4.3784***	-6.3494***	2.1603***	-0.0740	0.1816***	2050	0.1668
	(0.0102)	(0.9564)	(0.7390)	(0.5790)	(0.1224)	(0.0477)		
NZD	-0.0254***	-6.4265***	-6.0499***	0.1261	-0.0877	0.0113*	2043	0.1944
	(0.0083)	(0.7362)	(0.6158)	(0.4390)	(0.1234)	(0.0059)		
NOK	-0.0169**	-4.2863***	-5.0364***	0.6300	-0.1657*	0.0351**	2050	0.1582
	(0.0069)	(0.6275)	(0.4992)	(0.4000)	(0.0961)	(0.0142)		
SEK	-0.0205***	-4.5858***	-4.6016***	-0.3178	-0.0947	0.0408***	2050	0.1281
	(0.0063)	(0.5866)	(0.4690)	(0.3595)	(0.0980)	(0.0132)		
CHF	-0.0113*	-2.2507***	-2.7679***	0.6901	-0.1981*	0.0001	2050	0.0480
	(0.0065)	(0.7200)	(0.5613)	(0.4305)	(0.1018)	(0.0032)		
GBP	-0.0200***	-3.3262***	-5.3780***	0.7598*	-0.3324***	-0.0066**	2050	0.1275
	(0.0068)	(0.6743)	(0.5278)	(0.4151)	(0.0996)	(0.0033)		
USD	-0.0106	-6.7341***	-4.9568***	-1.3935***	-0.0467	-0.0187	2050	0.1773
	(0.0069)	(0.7250)	(0.5736)	(0.4399)	(0.1051)	(0.0144)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1B – full table of table 1B with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i_{j,t}^R) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i_{j,t-1}^R) + u_{j,t}$

	$s_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0237***	-5.3633***	-5.7211***	0.0786	-0.2335**	0.0102**	2052	0.1858
	(0.0089)	(0.7197)	(0.5390)	(0.4200)	(0.1018)	(0.0043)		
CAD	-0.0288***	-4.6938***	-5.4336***	0.3836	-0.2166**	0.0065***	2052	0.1721
	(0.0072)	(0.6237)	(0.4915)	(0.3814)	(0.0915)	(0.0025)		
EUR	-0.0232***	-4.6716***	-4.9958***	-0.1015	-0.1615*	-0.0054**	2052	0.1441
	(0.0067)	(0.5160)	(0.4100)	(0.3063)	(0.0841)	(0.0023)		
JPY	-0.0305***	-4.5475***	-6.1840***	1.8056***	0.0757	0.1523***	2052	0.1608
	(0.0108)	(0.9595)	(0.7449)	(0.5726)	(0.1078)	(0.0501)		
NZD	-0.0201**	-6.3074***	-5.9606***	0.1187	-0.0467	0.0083	2052	0.1909
	(0.0095)	(0.7317)	(0.6122)	(0.4359)	(0.1154)	(0.0061)		
NOK	-0.0220***	-4.0410***	-4.8326***	0.5207	-0.1588*	0.0448***	2052	0.1539
	(0.0077)	(0.6121)	(0.4879)	(0.3851)	(0.0902)	(0.0155)		
SEK	-0.0274***	-4.5156***	-4.5788***	-0.3614	-0.1164	0.0552***	2052	0.1333
	(0.0072)	(0.5772)	(0.4627)	(0.3518)	(0.0923)	(0.0149)		
CHF	-0.0198**	-2.3232***	-2.7311***	0.6513	-0.2142**	0.0022	2052	0.0537
	(0.0077)	(0.7090)	(0.5544)	(0.4133)	(0.0954)	(0.0032)		
GBP	-0.0242***	-3.4007***	-5.2168***	0.7013*	-0.3016***	-0.0088**	2052	0.1271
	(0.0075)	(0.6652)	(0.5219)	(0.4052)	(0.0917)	(0.0037)		
USD	-0.0149*	-6.4486***	-4.7487***	-1.2456***	-0.0737	-0.0283*	2052	0.1701
	(0.0081)	(0.7181)	(0.5691)	(0.4352)	(0.1011)	(0.0167)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1C – full table of table 1C with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta i^R_{j,t}) + \beta_3(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta i^R_{j,t}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0312***	-4.0999***	-0.2896***	0.0134***	2043	0.1111
	(0.0075)	(0.5238)	(0.1113)	(0.0043)		
CAD	-0.0255***	-4.5241***	-0.2327**	0.0051**	2050	0.1102
	(0.0065)	(0.4809)	(0.1012)	(0.0023)		
EUR	-0.0210***	-3.8378***	-0.1785**	-0.0049**	2050	0.0870
	(0.0060)	(0.3867)	(0.0908)	(0.0021)		
JPY	-0.0309***	-5.3606***	-0.1008	0.1429***	2050	0.0988
	(0.0105)	(0.7272)	(0.1297)	(0.0487)		
NZD	-0.0284***	-2.6422***	-0.0654	0.0119*	2043	0.0529
	(0.0095)	(0.6027)	(0.1355)	(0.0067)		
NOK	-0.0156**	-3.5742***	-0.1077	0.0309**	2050	0.0801
	(0.0072)	(0.4840)	(0.0981)	(0.0145)		
SEK	-0.0246***	-3.1896***	-0.1109	0.0497***	2050	0.0670
	(0.0064)	(0.4408)	(0.0999)	(0.0133)		
CHF	-0.0081	-2.0299***	-0.2073**	-0.0041*	2050	0.0226
	(0.0062)	(0.5213)	(0.1038)	(0.0023)		
GBP	-0.0198***	-3.8803***	-0.3213***	-0.0071**	2050	0.0872
	(0.0068)	(0.4952)	(0.1004)	(0.0034)		
USD	-0.0134*	-3.8489***	-0.1179	-0.0265*	2050	0.0706
	(0.0076)	(0.5911)	(0.1141)	(0.0159)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1C – full table of table 1C with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2(\Delta i_{j,t}^R) + \beta_3(i_{j,t-1}^R) + u_{j,t}$

	$s_{j,t-1}$	$\Delta i_{j,t}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0286***	-4.0396***	-0.2565**	0.0120***	2052	0.1111
	(0.0095)	(0.5155)	(0.1062)	(0.0046)		
CAD	-0.0312***	-4.5105***	-0.2077**	0.0060**	2052	0.1173
	(0.0074)	(0.4683)	(0.0936)	(0.0023)		
EUR	-0.0259***	-3.8068***	-0.1708**	-0.0056**	2052	0.0905
	(0.0070)	(0.3847)	(0.0862)	(0.0023)		
JPY	-0.0298***	-5.2081***	0.0252	0.1393***	2052	0.0969
	(0.0113)	(0.7291)	(0.1139)	(0.0522)		
NZD	-0.0245**	-2.6140***	-0.0272	0.0097	2052	0.0525
	(0.0108)	(0.5979)	(0.1273)	(0.0068)		
NOK	-0.0223***	-3.4701***	-0.1141	0.0441***	2052	0.0834
	(0.0081)	(0.4690)	(0.0922)	(0.0161)		
SEK	-0.0320***	-3.1980***	-0.1334	0.0651***	2052	0.0733
	(0.0075)	(0.4342)	(0.0944)	(0.0154)		
CHF	-0.0169**	-1.9801***	-0.2356**	-0.0019	2052	0.0270
	(0.0076)	(0.5153)	(0.0991)	(0.0023)		
GBP	-0.0249***	-3.7020***	-0.2996***	-0.0096**	2052	0.0852
	(0.0077)	(0.4905)	(0.0933)	(0.0038)		
USD	-0.0172*	-3.6744***	-0.1330	-0.0350*	2052	0.0691
	(0.0090)	(0.5814)	(0.1090)	(0.0184)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test

Robustness of table 1D – full table of table 1D 1999M1-2007M12 with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0446**	-3.6947***	-3.2181***	-0.2731	-0.1467	0.0173**	972	0.0990
	(0.0176)	(1.2306)	(0.8008)	(0.7622)	(0.1732)	(0.0071)		
CAD	-0.0309*	-2.7151**	-3.0882***	-0.1167	-0.3193*	0.0066	972	0.0915
	(0.0161)	(1.1173)	(0.7691)	(0.6574)	(0.1631)	(0.0053)		
EUR	-0.0236*	-2.9133***	-2.0719***	-0.4467	-0.1770	-0.0058*	972	0.0447
	(0.0135)	(0.8537)	(0.5482)	(0.5675)	(0.1302)	(0.0030)		
JPY	-0.0450**	-1.2690	-1.7333*	0.7925	0.1156	0.2250**	972	0.0411
	(0.0199)	(1.3233)	(0.8956)	(0.8524)	(0.1835)	(0.0982)		
NZD	-0.0498***	-4.4889***	-3.5506***	-0.9927	-0.1421	0.0299***	972	0.0980
	(0.0174)	(1.1293)	(0.8775)	(0.6827)	(0.1694)	(0.0103)		
NOK	-0.0262*	-3.7653***	-2.8374***	0.1317	-0.0953	0.0504	972	0.0906
	(0.0157)	(1.0260)	(0.6549)	(0.6835)	(0.1357)	(0.0309)		
SEK	-0.0388***	-3.2415***	-2.3670***	-1.8654***	0.0115	0.0776**	972	0.0744
	(0.0140)	(0.9280)	(0.6193)	(0.5927)	(0.1395)	(0.0302)		
CHF	-0.0262*	-1.0109	-0.9998	-0.2636	-0.2114	0.0030	972	0.0281
	(0.0149)	(1.0324)	(0.6645)	(0.6929)	(0.1421)	(0.0071)		
GBP	-0.0353***	-4.0676***	-3.0539***	0.0276	-0.1883	-0.0181**	972	0.0998
	(0.0132)	(0.9125)	(0.5918)	(0.6173)	(0.1289)	(0.0076)		
USD	-0.0006	-4.1116***	-2.0521***	-1.4413*	-0.1698	0.0048	972	0.0808
	(0.0121)	(1.1183)	(0.7050)	(0.7448)	(0.1502)	(0.0259)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2007M12.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1D – full table of table 1D 1999M1-2007M12 with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$s_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0398**	-3.6570***	-3.4492***	0.0056	-0.2361	0.0186**	972	0.0845
	(0.0166)	(1.2070)	(0.7825)	(0.7460)	(0.1605)	(0.0074)		
CAD	-0.0284*	-2.7650**	-3.3029***	-0.1085	-0.3363**	0.0054	972	0.0867
	(0.0153)	(1.0901)	(0.7478)	(0.6428)	(0.1583)	(0.0048)		
EUR	-0.0235*	-2.8941***	-2.1413***	-0.3580	-0.2126	-0.0060*	972	0.0473
	(0.0131)	(0.8497)	(0.5483)	(0.5562)	(0.1297)	(0.0033)		
JPY	-0.0158	-0.7731	-1.6623*	1.3044	0.0027	0.0794	972	0.0235
	(0.0167)	(1.3451)	(0.9048)	(0.8650)	(0.1843)	(0.0801)		
NZD	-0.0459***	-4.5199***	-3.5901***	-1.0688	-0.2135	0.0311***	972	0.0954
	(0.0163)	(1.1210)	(0.8711)	(0.6808)	(0.1623)	(0.0101)		
NOK	-0.0222	-3.5589***	-2.7512***	0.0004	-0.1040	0.0425	972	0.0876
	(0.0147)	(0.9971)	(0.6344)	(0.6567)	(0.1312)	(0.0288)		
SEK	-0.0381***	-2.9543***	-2.3417***	-1.9087***	-0.0461	0.0744***	972	0.0724
	(0.0135)	(0.9139)	(0.6087)	(0.5759)	(0.1379)	(0.0283)		
CHF	-0.0321**	-1.1660	-1.1067*	-0.2910	-0.2211	0.0036	972	0.0285
	(0.0137)	(1.0100)	(0.6504)	(0.6643)	(0.1398)	(0.0056)		
GBP	-0.0300**	-4.0928***	-3.0436***	0.1676	-0.2343*	-0.0140*	972	0.0963
	(0.0129)	(0.8862)	(0.5737)	(0.5945)	(0.1247)	(0.0075)		
USD	-0.0033	-3.9845***	-1.9965***	-1.4203*	-0.1879	-0.0019	972	0.0793
	(0.0132)	(1.1128)	(0.7043)	(0.7341)	(0.1482)	(0.0274)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2007M12.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1D – full table of table 1D 2008M1-2018M1 with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0470***	-6.0352***	-7.6226***	0.1786	-0.4299**	0.0165**	1071	0.3002
	(0.0138)	(0.8927)	(0.7531)	(0.6182)	(0.2169)	(0.0073)		
CAD	-0.0402***	-5.7126***	-7.8492***	-0.0596	0.1273	0.0044	1078	0.2913
	(0.0110)	(0.7458)	(0.6660)	(0.5077)	(0.1766)	(0.0030)		
EUR	-0.0346***	-5.3779***	-7.4541***	-0.2743	-0.0978	-0.0111***	1078	0.2595
	(0.0104)	(0.6571)	(0.6077)	(0.4598)	(0.1845)	(0.0038)		
JPY	-0.0542***	-5.6465***	-11.2605***	2.0872**	-0.0793	0.2563***	1078	0.3308
	(0.0177)	(1.2394)	(1.1294)	(0.8921)	(0.2962)	(0.0803)		
NZD	-0.0512***	-7.1671***	-8.0791***	0.2807	0.1149	0.0090	1071	0.3220
	(0.0142)	(0.9642)	(0.8866)	(0.6598)	(0.2472)	(0.0094)		
NOK	-0.0293***	-5.2234***	-8.2771***	0.7820	-0.1070	0.0579***	1078	0.2618
	(0.0112)	(0.7781)	(0.7493)	(0.5585)	(0.1982)	(0.0223)		
SEK	-0.0471***	-5.5394***	-6.5734***	-0.0853	0.0028	0.0914***	1078	0.2377
	(0.0113)	(0.7432)	(0.7081)	(0.4987)	(0.2008)	(0.0225)		
CHF	-0.0239*	-2.8031***	-4.2448***	0.3146	0.2226	-0.0027	1078	0.1761
	(0.0128)	(1.0134)	(0.9299)	(0.7273)	(0.2267)	(0.0057)		
GBP	-0.0442***	-3.4178***	-8.0737***	0.7458	-0.2589	-0.0170***	1078	0.2089
	(0.0144)	(0.9215)	(0.8559)	(0.6355)	(0.2419)	(0.0064)		
USD	-0.0459***	-7.4838***	-9.8596***	-1.1229*	0.0316	-0.0869***	1078	0.3256
	(0.0128)	(0.8681)	(0.8195)	(0.5909)	(0.2214)	(0.0254)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1D – full table of table 1D 2008M1-2018M1 with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$s_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0492***	-5.9909***	-7.4202***	0.2291	-0.3337	0.0131*	1080	0.2959
	(0.0156)	(0.8779)	(0.7400)	(0.6052)	(0.2095)	(0.0072)		
CAD	-0.0521***	-5.7511***	-7.6897***	0.0112	0.1015	0.0062**	1080	0.2953
	(0.0119)	(0.7265)	(0.6457)	(0.4996)	(0.1702)	(0.0031)		
EUR	-0.0413***	-5.3178***	-7.3974***	-0.2630	-0.1253	-0.0121***	1080	0.2591
	(0.0117)	(0.6482)	(0.6033)	(0.4547)	(0.1857)	(0.0040)		
JPY	-0.0586***	-5.8506***	-11.2549***	1.8963**	0.0145	0.2787***	1080	0.3286
	(0.0188)	(1.2388)	(1.1283)	(0.8933)	(0.2861)	(0.0860)		
NZD	-0.0556***	-6.9970***	-8.0703***	0.3636	0.1691	0.0089	1080	0.3218
	(0.0154)	(0.9483)	(0.8712)	(0.6509)	(0.2351)	(0.0094)		
NOK	-0.0434***	-4.9075***	-8.0550***	0.8204	-0.1823	0.0853***	1080	0.2617
	(0.0127)	(0.7663)	(0.7375)	(0.5484)	(0.1963)	(0.0251)		
SEK	-0.0600***	-5.6607***	-6.6391***	-0.1650	-0.1090	0.1188***	1080	0.2313
	(0.0129)	(0.7264)	(0.6946)	(0.4896)	(0.1972)	(0.0259)		
CHF	-0.0407**	-2.8807***	-4.1192***	0.2668	0.1272	-0.0010	1080	0.0985
	(0.0160)	(1.0049)	(0.9224)	(0.7229)	(0.2266)	(0.0056)		
GBP	-0.0556***	-3.5000***	-7.9158***	0.7427	-0.3191	-0.0226***	1080	0.2104
	(0.0161)	(0.9183)	(0.8555)	(0.6337)	(0.2368)	(0.0072)		
USD	-0.0517***	-7.1658***	-9.6362***	-0.8298	-0.0262	-0.1006***	1080	0.3266
	(0.0142)	(0.8602)	(0.8173)	(0.5846)	(0.2257)	(0.0285)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1E – full table of table 1E with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0229***	-5.0522***	-4.8797***	0.1741	-0.3015***	0.0113***	1710	0.1236
	(0.0072)	(0.9443)	(0.6388)	(0.5073)	(0.1094)	(0.0041)		
CAD	-0.0208***	-4.8367***	-4.5880***	0.2761	-0.3080***	0.0056**	1717	0.1188
	(0.0061)	(0.8026)	(0.5692)	(0.4355)	(0.0972)	(0.0025)		
EUR	-0.0158***	-5.3561***	-3.8352***	-0.4470	-0.1758*	-0.0050**	1717	0.0909
	(0.0059)	(0.7110)	(0.5009)	(0.3724)	(0.0952)	(0.0022)		
JPY	-0.0324***	-2.3328*	-3.5115***	2.0169***	-0.0577	0.1603***	1717	0.0560
	(0.0102)	(1.2231)	(0.8861)	(0.6228)	(0.1228)	(0.0475)		
NZD	-0.0204**	-5.9190***	-4.4553***	-0.4956	-0.1198	0.0103*	1710	0.1057
	(0.0083)	(0.9612)	(0.7356)	(0.5542)	(0.1263)	(0.0059)		
NOK	-0.0123*	-4.5710***	-4.2430***	0.4987	-0.1920*	0.0260*	1717	0.1103
	(0.0071)	(0.8557)	(0.5944)	(0.4792)	(0.1019)	(0.0148)		
SEK	-0.0154**	-4.3551***	-3.3927***	-0.3887	-0.1323	0.0299**	1717	0.0759
	(0.0062)	(0.7868)	(0.5623)	(0.4149)	(0.1026)	(0.0131)		
CHF	-0.0071	-2.2652**	-0.8951	0.1187	-0.2441**	-0.0041	1717	0.0207
	(0.0064)	(0.8948)	(0.6355)	(0.4694)	(0.1008)	(0.0034)		
GBP	-0.0134**	-4.6233***	-4.0156***	0.1198	-0.2669***	-0.0052*	1717	0.0773
	(0.0066)	(0.8747)	(0.6057)	(0.4723)	(0.0983)	(0.0031)		
USD	-0.0076	-7.2607***	-4.3986***	-1.3723***	-0.1022	-0.0124	1717	0.1256
	(0.0069)	(0.9681)	(0.6759)	(0.4899)	(0.1068)	(0.0147)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1 but excludes 2007-2009.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1E – full table of table 1E with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i_{j,t}^R) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i_{j,t-1}^R) + u_{j,t}$

	$s_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0189**	-5.1127***	-4.8669***	-0.0612	-0.2541**	0.0090**	1719	0.1245
	(0.0087)	(0.9233)	(0.6278)	(0.4760)	(0.1018)	(0.0042)		
CAD	-0.0236***	-4.8339***	-4.6051***	0.1296	-0.2716***	0.0057**	1719	0.1258
	(0.0069)	(0.7771)	(0.5489)	(0.4178)	(0.0882)	(0.0025)		
EUR	-0.0208***	-5.1822***	-3.7190***	-0.5389	-0.1662*	-0.0057**	1719	0.0910
	(0.0068)	(0.7010)	(0.4964)	(0.3602)	(0.0885)	(0.0023)		
JPY	-0.0253**	-2.3721*	-3.3384***	1.5299**	0.0649	0.1266**	1719	0.0471
	(0.0107)	(1.2211)	(0.8911)	(0.6098)	(0.1045)	(0.0493)		
NZD	-0.0162*	-5.8911***	-4.4334***	-0.5663	-0.0842	0.0079	1719	0.1046
	(0.0097)	(0.9535)	(0.7318)	(0.5461)	(0.1176)	(0.0061)		
NOK	-0.0161**	-4.2369***	-4.1005***	0.3273	-0.1756*	0.0331**	1719	0.1065
	(0.0079)	(0.8456)	(0.5898)	(0.4622)	(0.0956)	(0.0161)		
SEK	-0.0216***	-4.1729***	-3.3421***	-0.4857	-0.1447	0.0430***	1719	0.0793
	(0.0072)	(0.7731)	(0.5549)	(0.4037)	(0.0959)	(0.0149)		
CHF	-0.0133*	-2.1600**	-0.8602	0.0490	-0.2522***	-0.0022	1719	0.0227
	(0.0075)	(0.8807)	(0.6279)	(0.4437)	(0.0932)	(0.0033)		
GBP	-0.0169**	-4.7814***	-3.9481***	0.0519	-0.2429***	-0.0069**	1719	0.0811
	(0.0072)	(0.8624)	(0.5991)	(0.4578)	(0.0901)	(0.0035)		
USD	-0.0106	-7.1340***	-4.2981***	-1.4504***	-0.1036	-0.0191	1719	0.1262
	(0.0082)	(0.9572)	(0.6707)	(0.4813)	(0.1017)	(0.0170)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1 but excludes 2007-2009.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1F – full table of table 1F with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0321***	-4.7731***	-5.6412***	0.5921	-0.2819**	-0.0529***	1816	0.1796
	(0.0079)	(0.7297)	(0.5391)	(0.4499)	(0.1105)	(0.0136)		
CAD	-0.0298***	-4.3079***	-5.3884***	0.8721**	-0.2842***	-0.0535***	1822	0.1670
	(0.0074)	(0.6691)	(0.5189)	(0.4181)	(0.1063)	(0.0135)		
EUR	-0.0239***	-4.3915***	-4.9432***	0.3868	-0.2005**	-0.0531***	1822	0.1380
	(0.0063)	(0.5383)	(0.4112)	(0.3307)	(0.0912)	(0.0140)		
JPY	-0.0405***	-4.7771***	-6.6848***	2.3985***	-0.0453	0.1141***	1822	0.1781
	(0.0114)	(1.0095)	(0.7736)	(0.6256)	(0.1291)	(0.0298)		
NZD	-0.0303***	-6.0543***	-5.9772***	0.3219	-0.0945	-0.0490***	1816	0.1912
	(0.0089)	(0.7311)	(0.6098)	(0.4373)	(0.1273)	(0.0137)		
NOK	-0.0209***	-3.6933***	-5.0691***	0.9499**	-0.2238**	0.0007	1822	0.1562
	(0.0073)	(0.6173)	(0.4912)	(0.3944)	(0.0973)	(0.0016)		
SEK	-0.0269***	-4.0112***	-4.4930***	0.1425	-0.1451	0.0417***	1822	0.1197
	(0.0065)	(0.5775)	(0.4580)	(0.3545)	(0.0990)	(0.0100)		
CHF	-0.0138*	-1.7683**	-2.6962***	1.0109**	-0.1906*	-0.0268**	1822	0.0464
	(0.0071)	(0.7424)	(0.5728)	(0.4544)	(0.1075)	(0.0135)		
GBP	-0.0214***	-3.3774***	-5.4686***	1.0772**	-0.3620***	-0.0515***	1822	0.1323
	(0.0074)	(0.7139)	(0.5526)	(0.4428)	(0.1096)	(0.0184)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 9 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF) and British Pound (GBP). We exclude United States Dollar (USD) from all the regressions. Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1F – full table of table 1F with nominal exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0271***	-4.9043***	-5.6080***	0.3072	-0.2301**	-0.0446***	1824	0.1803
	(0.0091)	(0.7164)	(0.5309)	(0.4293)	(0.1031)	(0.0156)		
CAD	-0.0336***	-4.4372***	-5.3892***	0.7112*	-0.2408**	-0.0612***	1824	0.1767
	(0.0079)	(0.6502)	(0.5034)	(0.4046)	(0.0965)	(0.0144)		
EUR	-0.0268***	-4.3696***	-4.9121***	0.2718	-0.1717**	-0.0599***	1824	0.1406
	(0.0070)	(0.5320)	(0.4094)	(0.3212)	(0.0860)	(0.0155)		
JPY	-0.0317***	-4.9460***	-6.4697***	1.9784***	0.1174	0.0918***	1824	0.1698
	(0.0113)	(1.0136)	(0.7801)	(0.6153)	(0.1149)	(0.0297)		
NZD	-0.0234**	-5.9704***	-5.8733***	0.2578	-0.0342	-0.0388**	1824	0.1879
	(0.0098)	(0.7268)	(0.6067)	(0.4310)	(0.1174)	(0.0153)		
NOK	-0.0257***	-3.5405***	-4.8812***	0.7592**	-0.1999**	-0.0005	1824	0.1531
	(0.0079)	(0.6027)	(0.4808)	(0.3779)	(0.0904)	(0.0016)		
SEK	-0.0321***	-4.0314***	-4.4846***	0.0550	-0.1471	0.0495***	1824	0.1258
	(0.0073)	(0.5682)	(0.4519)	(0.3452)	(0.0919)	(0.0114)		
CHF	-0.0222***	-1.8984***	-2.6791***	0.9076**	-0.1916*	-0.0425***	1824	0.0516
	(0.0082)	(0.7307)	(0.5656)	(0.4339)	(0.1004)	(0.0156)		
GBP	-0.0250***	-3.4953***	-5.3796***	0.9851**	-0.3202***	-0.0611***	1824	0.1338
	(0.0080)	(0.7053)	(0.5474)	(0.4307)	(0.0986)	(0.0199)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 9 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF) and British Pound (GBP). We exclude United States Dollar (USD) from all the regressions. Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1G – full table of table 1G with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta\tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0532**	-8.2425	-24.1151	-9.8448	-3.0785	0.0121	360	0.0513
	(0.0261)	(10.7255)	(15.0846)	(12.2280)	(3.1098)	(0.0119)		
CAD	-0.0277***	-13.9201***	-29.4273***	-10.8506**	0.4895	0.0035	1227	0.0545
	(0.0101)	(4.7626)	(7.4452)	(4.9374)	(1.9228)	(0.0032)		
EUR	-0.0817***	-20.9888***	-27.0912***	-21.2376***	2.4764	-0.0216***	608	0.0984
	(0.0169)	(7.5837)	(9.1983)	(7.4064)	(2.7841)	(0.0053)		
JPY	-0.0986***	-21.4511**	-13.6255	1.1911	-7.9017**	0.5160***	461	0.1295
	(0.0242)	(10.3551)	(11.9705)	(12.4120)	(3.5755)	(0.1192)		
NZD	-0.0314***	-19.5937***	-30.2513***	-12.2364**	1.1698	0.0058	1221	0.0659
	(0.0104)	(4.8945)	(7.0247)	(5.3484)	(1.6065)	(0.0072)		
SEK	-0.0305***	-16.6822***	-16.8925***	-12.1601***	0.2214	0.0767***	1227	0.0456
	(0.0085)	(3.9413)	(5.6739)	(4.1854)	(1.2648)	(0.0185)		
CHF	-0.0573***	-10.4051	8.3720	-13.9700	12.1927***	-0.0060	730	0.0594
	(0.0139)	(9.1014)	(8.6491)	(9.2527)	(3.4866)	(0.0042)		
GBP	-0.0194*	-8.9733*	-20.4977***	-9.3455*	-0.9275	-0.0133**	1227	0.0299
	(0.0116)	(5.0094)	(7.1602)	(5.1057)	(1.7048)	(0.0065)		
USD	-0.0247***	-18.5417***	-16.2520***	-17.6993***	1.5415	-0.0502**	1227	0.0664
	(0.0088)	(4.0163)	(6.2360)	(4.0169)	(1.4493)	(0.0196)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 1G – full table of table 1G with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 (\Delta \tilde{\eta}_{j,t}) + \beta_3 (\Delta i_{j,t}^R) + \beta_4 (\tilde{\eta}_{j,t-1}) + \beta_5 (i_{j,t-1}^R) + u_{j,t}$

	$s_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i_{j,t}^R$	$\tilde{\eta}_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0420*	-6.1255	-22.9702	-9.2576	-3.7846	-0.0050	360	0.0465
	(0.0249)	(10.6280)	(15.0457)	(11.9021)	(3.5309)	(0.0035)		
CAD	-0.0330***	-13.0088***	-29.0955***	-10.1306**	0.0577	-0.0136***	1228	0.0565
	(0.0111)	(4.6399)	(7.2932)	(4.7910)	(1.8971)	(0.0030)		
EUR	-0.0882***	-18.9649**	-21.2256**	-19.0896***	0.9455	-0.0860***	609	0.0845
	(0.0186)	(7.4816)	(9.0414)	(7.3569)	(2.8330)	(0.0159)		
JPY	-0.1100***	-22.9549**	-13.5040	-0.9211	-8.7010**	0.4847***	462	0.1394
	(0.0258)	(10.0978)	(11.7250)	(12.1154)	(3.6683)	(0.0669)		
NZD	-0.0290***	-18.9129***	-28.1859***	-12.3604**	1.0430	-0.0077***	1228	0.0605
	(0.0105)	(4.8701)	(6.9947)	(5.3371)	(1.5986)	(0.0023)		
SEK	-0.0395***	-15.2212***	-17.2152***	-11.8799***	-0.2303	0.0690***	1228	0.0493
	(0.0090)	(3.8734)	(5.5854)	(4.1150)	(1.2488)	(0.0131)		
CHF	-0.0831***	-10.3270	8.1529	-15.5219*	10.2469***	-0.0547***	731	0.0747
	(0.0161)	(8.8365)	(8.4713)	(8.9880)	(3.4494)	(0.0089)		
GBP	-0.0248*	-8.4546*	-19.3578***	-9.0781*	-1.2418	-0.0292***	1228	0.0308
	(0.0134)	(4.9111)	(7.0492)	(4.9918)	(1.6042)	(0.0080)		
USD	-0.0275***	-17.3643***	-15.3126**	-16.8933***	1.0161	-0.0119***	1228	0.0618
	(0.0095)	(3.9407)	(6.1502)	(3.9631)	(1.4429)	(0.0042)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, full sample, no default risk, with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0269***	-6.1125***	-3.1154**	-5.9027***	0.3805	-0.2541	-0.2998***	0.0127***	2019	0.1956
	(0.0074)	(0.8081)	(1.2520)	(0.5487)	(0.4370)	(0.7782)	(0.1135)	(0.0042)		
CAD	-0.0262***	-4.7578***	-5.0606***	-6.1798***	0.5135	-0.2924	-0.2885**	0.0053**	1834	0.1966
	(0.0069)	(0.7419)	(1.1586)	(0.5425)	(0.4118)	(0.7321)	(0.1132)	(0.0026)		
EUR	-0.0171***	-4.7713***	-4.9377***	-5.0710***	-0.0752	-0.5204	-0.1569*	-0.0053**	2026	0.1453
	(0.0059)	(0.5726)	(0.8733)	(0.4109)	(0.3147)	(0.5385)	(0.0908)	(0.0022)		
JPY	-0.0367***	-4.1337***	-5.0325***	-6.4433***	2.1405***	2.0365**	-0.0931	0.1800***	2026	0.1708
	(0.0102)	(1.0046)	(1.5941)	(0.7475)	(0.5800)	(0.9654)	(0.1343)	(0.0478)		
NZD	-0.0267***	-6.7612***	-5.9030***	-6.2988***	0.1569	-0.6276	-0.1350	0.0132**	2019	0.2004
	(0.0080)	(0.8064)	(1.3145)	(0.6201)	(0.4379)	(0.7935)	(0.1285)	(0.0058)		
NOK	-0.0168**	-4.0928***	-5.5236***	-5.0670***	0.6073	0.6625	-0.1637	0.0350**	2026	0.1624
	(0.0070)	(0.6672)	(1.0670)	(0.4988)	(0.4064)	(0.7048)	(0.1009)	(0.0145)		
SEK	-0.0195***	-4.4841***	-5.1720***	-4.5787***	-0.2946	-0.6172	-0.0998	0.0381***	2026	0.1292
	(0.0064)	(0.6520)	(0.9988)	(0.4740)	(0.3669)	(0.6449)	(0.1043)	(0.0136)		
CHF	-0.0111*	-2.8827***	-1.2675	-3.0160***	0.6630	0.6845	-0.1749	0.0002	2026	0.0508
	(0.0066)	(0.7813)	(1.2110)	(0.5584)	(0.4264)	(0.7576)	(0.1088)	(0.0035)		
GBP	-0.0190***	-4.1011***	-1.5710	-5.6397***	0.7323*	0.4878	-0.3269***	-0.0066**	2026	0.1357
	(0.0069)	(0.7560)	(1.1410)	(0.5325)	(0.4223)	(0.7082)	(0.1077)	(0.0033)		
USD	-0.0108	-6.5855***	-7.1197***	-4.9650***	-1.4400***	-1.2587*	-0.0382	-0.0194	2026	0.1789
	(0.0070)	(0.8278)	(1.2047)	(0.5845)	(0.4483)	(0.7295)	(0.1115)	(0.0149)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, full sample, no default risk, with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0293***	-6.1153***	-3.3934***	-5.8207***	0.3300	-1.0130	-0.3173***	0.0139***	2028	0.2002
	(0.0085)	(0.7901)	(1.2181)	(0.5373)	(0.4255)	(0.7283)	(0.1091)	(0.0044)		
CAD	-0.0340***	-4.6422***	-5.4011***	-6.1473***	0.4646	-0.4723	-0.2886***	0.0065**	1836	0.2083
	(0.0079)	(0.7234)	(1.1216)	(0.5273)	(0.4006)	(0.7003)	(0.1096)	(0.0026)		
EUR	-0.0227***	-4.6702***	-5.0325***	-4.9995***	-0.1083	-0.6544	-0.1630*	-0.0063***	2028	0.1486
	(0.0067)	(0.5670)	(0.8619)	(0.4083)	(0.3087)	(0.5186)	(0.0884)	(0.0024)		
JPY	-0.0308***	-4.2212***	-5.3680***	-6.2586***	1.8793***	1.3745	0.0210	0.1518***	2028	0.1652
	(0.0108)	(1.0079)	(1.5977)	(0.7535)	(0.5767)	(0.9537)	(0.1258)	(0.0497)		
NZD	-0.0279***	-6.6545***	-6.0965***	-6.2321***	0.1273	-1.1984	-0.1498	0.0145**	2028	0.2001
	(0.0090)	(0.7975)	(1.2964)	(0.6142)	(0.4312)	(0.7672)	(0.1242)	(0.0062)		
NOK	-0.0216***	-3.8634***	-5.2116***	-4.8596***	0.5095	0.4263	-0.1622*	0.0438***	2028	0.1575
	(0.0077)	(0.6519)	(1.0383)	(0.4880)	(0.3948)	(0.6645)	(0.0973)	(0.0154)		
SEK	-0.0275***	-4.4120***	-5.2121***	-4.5315***	-0.2852	-1.1030*	-0.1513	0.0539***	2028	0.1354
	(0.0072)	(0.6414)	(0.9796)	(0.4666)	(0.3611)	(0.6147)	(0.1021)	(0.0150)		
CHF	-0.0189**	-3.0251***	-1.2444	-3.0125***	0.6560	0.5159	-0.1998*	0.0021	2028	0.0570
	(0.0075)	(0.7705)	(1.1869)	(0.5511)	(0.4155)	(0.7024)	(0.1062)	(0.0033)		
GBP	-0.0234***	-4.2066***	-1.5885	-5.4765***	0.6976*	0.2243	-0.3141***	-0.0090**	2028	0.1367
	(0.0075)	(0.7460)	(1.1200)	(0.5259)	(0.4142)	(0.6801)	(0.1044)	(0.0038)		
USD	-0.0151*	-6.2921***	-6.8514***	-4.7590***	-1.2806***	-1.1215	-0.0658	-0.0288*	2028	0.1718
	(0.0082)	(0.8215)	(1.1837)	(0.5799)	(0.4466)	(0.7037)	(0.1109)	(0.0168)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, post 2008, with default risk, with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta l^R_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$l^R_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0500***	-6.9905***	-3.2537**	13.9603***	-7.3647***	-0.2514	-0.3967	0.0704	-0.4035*	0.0170**	946	0.2877
	(0.0161)	(1.1544)	(1.5895)	(2.4229)	(0.8265)	(0.6792)	(1.2372)	(1.4657)	(0.2212)	(0.0077)		
CAD	-0.0375***	-8.5976***	-6.4680***	7.5185***	-9.5496***	-0.4895	-3.8675***	-0.7664	0.3320	-0.0003	397	0.3046
	(0.0127)	(1.6347)	(2.0021)	(2.8412)	(1.2465)	(0.9194)	(1.1732)	(1.6863)	(0.2739)	(0.0036)		
EUR	-0.0441***	-6.3260***	-3.8591***	7.9316***	-7.9929***	-0.0368	-0.8180	2.0960**	-0.0394	-0.0157***	964	0.2592
	(0.0108)	(0.8082)	(0.9578)	(1.6943)	(0.6267)	(0.4774)	(0.7231)	(1.0633)	(0.1767)	(0.0042)		
JPY	-0.0591***	-6.8276***	-4.2662**	10.0638***	-11.3810***	2.0644**	3.1155**	0.1625	0.0191	0.2816***	964	0.3372
	(0.0178)	(1.3788)	(1.8635)	(3.1921)	(1.1352)	(0.8133)	(1.4265)	(2.0052)	(0.2798)	(0.0804)		
NZD	-0.0534***	-8.0860***	-5.9783***	12.5350***	-8.0470***	0.5891	0.3525	0.2115	0.2131	0.0072	934	0.3123
	(0.0140)	(1.1602)	(1.5135)	(2.5481)	(0.9202)	(0.7084)	(1.2478)	(1.4474)	(0.2537)	(0.0094)		
NOK	-0.0388***	-5.5007***	-5.9573***	4.2082**	-8.1254***	0.5270	0.6183	1.6778	-0.0826	0.0761***	964	0.2670
	(0.0112)	(0.8186)	(1.2155)	(1.9775)	(0.7404)	(0.5385)	(0.9116)	(1.2826)	(0.1960)	(0.0225)		
SEK	-0.0460***	-5.4898***	-4.2737***	7.3440***	-6.1670***	0.0279	-0.9114	-0.0626	-0.0083	0.0868***	964	0.1980
	(0.0115)	(0.9057)	(1.1731)	(1.9522)	(0.7384)	(0.5190)	(0.8715)	(1.1734)	(0.1950)	(0.0233)		
CHF	-0.0236*	-3.0688**	-1.4029	5.2727**	-1.1023	-0.3194	0.3271	1.8528	0.2218	-0.0047	886	0.0312
	(0.0126)	(1.5060)	(1.8328)	(2.6419)	(1.0836)	(0.7739)	(1.1767)	(1.4893)	(0.2359)	(0.0056)		
GBP	-0.0468***	-6.0848***	-0.5898	5.6774**	-9.1657***	0.4693	2.0281*	1.0813	-0.0513	-0.0176***	964	0.2330
	(0.0137)	(1.1178)	(1.4178)	(2.3574)	(0.8805)	(0.6587)	(1.0387)	(1.4895)	(0.2373)	(0.0064)		
USD	-0.0553***	-9.3364***	-3.5274***	13.0448***	-10.5412***	-1.2093*	0.0704	1.2208	0.1490	-0.1080***	811	0.3843
	(0.0140)	(1.1279)	(1.3005)	(2.1895)	(0.8953)	(0.6417)	(0.9708)	(1.3843)	(0.2284)	(0.0278)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2A – full table of table 2A, post 2008, with default risk, with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta\tau_{j,t} + \beta_4 \Delta l^R_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \lambda_{j,t-1} + \beta_7 \tau_{j,t-1} + \beta_8 l^R_{j,t-1} + \beta_9 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta\tau_{j,t}$	$\Delta l^R_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$\tau_{j,t-1}$	$l^R_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0561***	-6.9234***	-3.0928**	14.5433***	-7.0818***	-0.2219	-0.5739	0.4607	-0.3511	0.0153**	955	0.2905
	(0.0171)	(1.1179)	(1.5349)	(2.3556)	(0.7989)	(0.6625)	(1.1915)	(1.4263)	(0.2175)	(0.0076)		
CAD	-0.0452***	-8.7478***	-6.8539***	8.2598***	-8.9245***	-0.5903	-3.6899***	-0.5421	0.3553	0.0011	399	0.3095
	(0.0155)	(1.5103)	(1.7874)	(2.5604)	(1.1076)	(0.8476)	(1.0582)	(1.5414)	(0.2520)	(0.0037)		
EUR	-0.0561***	-6.1346***	-3.9516***	8.4379***	-7.8268***	-0.0649	-0.8720	2.4586**	-0.0988	-0.0182***	966	0.2626
	(0.0123)	(0.7976)	(0.9435)	(1.6765)	(0.6184)	(0.4718)	(0.7110)	(1.0576)	(0.1801)	(0.0045)		
JPY	-0.0650***	-6.8812***	-4.5365**	10.4251***	-11.2611***	2.0921**	2.5341*	0.2363	0.0396	0.3097***	966	0.3381
	(0.0192)	(1.3812)	(1.8549)	(3.1878)	(1.1344)	(0.8183)	(1.4283)	(2.0116)	(0.2789)	(0.0869)		
NZD	-0.0578***	-7.8690***	-5.9201***	12.5630***	-8.0042***	0.6155	0.2007	0.3171	0.2458	0.0075	943	0.3147
	(0.0159)	(1.1425)	(1.4861)	(2.5156)	(0.9045)	(0.6991)	(1.2257)	(1.4519)	(0.2459)	(0.0096)		
NOK	-0.0556***	-5.1392***	-5.8378***	4.2726**	-7.9138***	0.5503	0.3971	1.8382	-0.1758	0.1082***	966	0.2651
	(0.0130)	(0.8053)	(1.1951)	(1.9521)	(0.7288)	(0.5305)	(0.8934)	(1.2767)	(0.1976)	(0.0258)		
SEK	-0.0625***	-5.6128***	-4.1807***	7.6208***	-6.1712***	-0.0062	-1.2239	0.2801	-0.1383	0.1206***	966	0.2102
	(0.0134)	(0.8799)	(1.1420)	(1.8930)	(0.7177)	(0.5105)	(0.8454)	(1.1431)	(0.1939)	(0.0270)		
CHF	-0.0429***	-3.1797**	-1.2316	5.7305**	-0.9602	-0.5137	0.0141	2.3253	0.1572	-0.0042	888	0.0423
	(0.0156)	(1.4839)	(1.7978)	(2.5929)	(1.0661)	(0.7682)	(1.1504)	(1.4810)	(0.2330)	(0.0055)		
GBP	-0.0566***	-6.1559***	-0.6474	5.7833**	-8.9778***	0.4620	1.6963*	1.2768	-0.1226	-0.0232***	966	0.2306
	(0.0158)	(1.1167)	(1.4103)	(2.3582)	(0.8789)	(0.6578)	(1.0290)	(1.5065)	(0.2380)	(0.0074)		
USD	-0.0620***	-8.9441***	-3.3469***	12.5068***	-10.2297***	-0.9105	0.0934	0.8905	0.0817	-0.1227***	813	0.3760
	(0.0158)	(1.1130)	(1.2514)	(2.1606)	(0.8861)	(0.6266)	(0.9398)	(1.3678)	(0.2366)	(0.0314)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 2008M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\lambda_{j,t}$ with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\lambda_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \lambda_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta i^R_{j,t}$	$\lambda_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0534***	-4.3739***	-6.5096***	0.0997	-0.4144*	0.0177**	946	0.2127
	(0.0164)	(1.1082)	(0.8622)	(0.5894)	(0.2368)	(0.0080)		
CAD	-0.0417***	-3.7888***	-8.5852***	1.1051	0.4062	0.0047	397	0.2494
	(0.0134)	(1.4655)	(1.2578)	(0.7903)	(0.2887)	(0.0036)		
EUR	-0.0388***	-3.4389***	-7.7765***	0.7446*	-0.0085	-0.0125***	964	0.2181
	(0.0107)	(0.7464)	(0.6335)	(0.4171)	(0.1848)	(0.0037)		
JPY	-0.0636***	-4.9737***	-10.8616***	1.7369***	-0.2885	0.2901***	964	0.2780
	(0.0183)	(1.3654)	(1.1818)	(0.6563)	(0.2953)	(0.0828)		
NZD	-0.0515***	-5.1729***	-6.9011***	0.9073	0.2786	0.0059	934	0.2198
	(0.0163)	(1.1498)	(0.9819)	(0.6777)	(0.2765)	(0.0103)		
NOK	-0.0320***	-4.4965***	-7.3775***	0.8098*	-0.0473	0.0599***	964	0.2168
	(0.0113)	(0.7858)	(0.7615)	(0.4551)	(0.2065)	(0.0223)		
SEK	-0.0486***	-3.9759***	-5.9093***	0.0752	0.0733	0.0941***	964	0.1551
	(0.0114)	(0.8385)	(0.7441)	(0.4719)	(0.2026)	(0.0227)		
CHF	-0.0206*	-1.7830	-0.9819	0.0818	0.2107	-0.0043	886	0.0178
	(0.0120)	(1.3401)	(1.0761)	(0.6575)	(0.2374)	(0.0037)		
GBP	-0.0428***	-4.9667***	-8.3456***	0.2093	-0.1122	-0.0180***	964	0.2134
	(0.0135)	(1.0282)	(0.8663)	(0.5513)	(0.2399)	(0.0062)		
USD	-0.0573***	-5.4277***	-10.3205***	-0.9251	0.2120	-0.1111***	811	0.2864
	(0.0166)	(1.1358)	(0.9772)	(0.6452)	(0.2609)	(0.0327)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\tau_{j,t}$ with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\tau_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \tau_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0306***	-1.5580	-4.2340***	-0.3559	-0.3044***	0.0138***	2019	0.1146
	(0.0077)	(1.3011)	(0.5264)	(0.7647)	(0.1169)	(0.0044)		
CAD	-0.0266***	-4.1632***	-5.3026***	-0.8095	-0.2918***	0.0043*	1834	0.1604
	(0.0070)	(1.1573)	(0.5126)	(0.6645)	(0.1125)	(0.0024)		
EUR	-0.0188***	-3.1431***	-3.6503***	-0.5212	-0.1804**	-0.0056**	2026	0.1007
	(0.0059)	(0.8809)	(0.3771)	(0.4858)	(0.0909)	(0.0022)		
JPY	-0.0309***	-5.8410***	-5.6309***	0.6750	-0.0575	0.1444***	2026	0.1273
	(0.0103)	(1.6410)	(0.7081)	(0.9162)	(0.1354)	(0.0482)		
NZD	-0.0284***	-4.1545***	-2.8570***	-0.3922	-0.0823	0.0125*	2019	0.0730
	(0.0089)	(1.4344)	(0.5912)	(0.7932)	(0.1380)	(0.0064)		
NOK	-0.0153**	-3.3299***	-3.7231***	0.1104	-0.1082	0.0306**	2026	0.0956
	(0.0072)	(1.0869)	(0.4805)	(0.6810)	(0.1006)	(0.0148)		
SEK	-0.0224***	-4.5149***	-3.2503***	-0.5409	-0.1366	0.0442***	2026	0.0827
	(0.0065)	(1.0079)	(0.4331)	(0.6124)	(0.1027)	(0.0137)		
CHF	-0.0096	-1.5690	-2.0432***	0.4203	-0.1742	-0.0029	2026	0.0268
	(0.0063)	(1.2161)	(0.5133)	(0.7098)	(0.1069)	(0.0028)		
GBP	-0.0192***	-0.8562	-3.9284***	-0.3696	-0.3375***	-0.0072**	2026	0.0897
	(0.0070)	(1.1545)	(0.4956)	(0.6809)	(0.1073)	(0.0034)		
USD	-0.0114	-6.4723***	-3.8889***	-0.9843	-0.1586	-0.0206	2026	0.1045
	(0.0076)	(1.2571)	(0.5748)	(0.7087)	(0.1154)	(0.0162)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $l_{j,t}^{R}$ with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta l_{j,t}^{R} + \beta_3 \Delta i_{j,t}^{R} + \beta_4 l_{j,t-1}^{R} + \beta_5 i_{j,t-1}^{R} + u_{j,t}$

	$q_{j,t-1}$	$\Delta l_{j,t}^{R}$	$\Delta i_{j,t}^{R}$	$l_{j,t-1}^{R}$	$i_{j,t-1}^{R}$	constant	N	R2_within
AUD	-0.0557***	9.5842***	-5.8544***	0.5459	-0.4645**	0.0199***	946	0.2106
	(0.0167)	(2.2739)	(0.7789)	(1.3563)	(0.2265)	(0.0077)		
CAD	-0.0359***	0.1895	-7.5258***	1.4216	0.5160*	0.0024	397	0.2107
	(0.0135)	(2.5282)	(1.1956)	(1.5294)	(0.2702)	(0.0037)		
EUR	-0.0475***	1.5135	-6.1494***	2.3604**	-0.0327	-0.0132***	964	0.1828
	(0.0111)	(1.5723)	(0.5837)	(0.9697)	(0.1860)	(0.0038)		
JPY	-0.0562***	4.4139	-9.8760***	2.1216	0.0010	0.2537***	964	0.2392
	(0.0194)	(3.1174)	(1.1446)	(1.8890)	(0.3094)	(0.0873)		
NZD	-0.0648***	4.4994*	-5.7978***	2.0931	0.3272	0.0070	934	0.1550
	(0.0163)	(2.6259)	(0.9824)	(1.4705)	(0.2809)	(0.0104)		
NOK	-0.0415***	-1.5135	-5.2312***	2.9458**	-0.0437	0.0810***	964	0.1354
	(0.0123)	(1.9833)	(0.7324)	(1.1982)	(0.2222)	(0.0245)		
SEK	-0.0529***	3.0654*	-4.2163***	1.1342	0.0647	0.1033***	964	0.1180
	(0.0121)	(1.8408)	(0.6777)	(1.1156)	(0.2005)	(0.0240)		
CHF	-0.0228*	2.3077	-0.3057	1.6418	0.1830	-0.0047	886	0.0165
	(0.0125)	(2.3223)	(0.9909)	(1.3364)	(0.2311)	(0.0033)		
GBP	-0.0467***	0.8943	-6.0613***	1.5762	-0.1343	-0.0191***	964	0.1657
	(0.0145)	(2.2250)	(0.8301)	(1.2965)	(0.2472)	(0.0067)		
USD	-0.0539***	5.3278**	-9.0747***	-0.3014	0.1945	-0.1033***	811	0.2592
	(0.0170)	(2.1713)	(0.9298)	(1.3941)	(0.2596)	(0.0337)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^{R}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^{R}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}_{j,t}^{R}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\eta + l^R)_{j,t}$ with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\eta + l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\eta + l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\eta + l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\eta + l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0510***	-4.3330***	-6.8168***	-0.0988	-0.3855*	0.0168**	946	0.2224
	(0.0164)	(0.9813)	(0.8744)	(0.6628)	(0.2341)	(0.0078)		
CAD	-0.0320**	-5.3497***	-8.8092***	-0.5048	0.5908**	0.0022	397	0.2540
	(0.0128)	(1.3506)	(1.2660)	(0.8605)	(0.2785)	(0.0038)		
EUR	-0.0367***	-3.9413***	-7.4480***	0.3598	-0.0061	-0.0104***	964	0.2291
	(0.0107)	(0.6257)	(0.6064)	(0.4234)	(0.1794)	(0.0039)		
JPY	-0.0625***	-4.4920***	-11.1699***	2.4222***	-0.1201	0.2949***	964	0.3137
	(0.0180)	(1.1395)	(1.1205)	(0.7912)	(0.2922)	(0.0815)		
NZD	-0.0490***	-5.4003***	-7.4684***	0.9618	0.3324	0.0026	934	0.2631
	(0.0154)	(0.9280)	(0.9399)	(0.6675)	(0.2608)	(0.0097)		
NOK	-0.0344***	-5.0701***	-7.9508***	0.9347**	-0.0651	0.0673***	964	0.2599
	(0.0108)	(0.6722)	(0.7199)	(0.4411)	(0.1945)	(0.0216)		
SEK	-0.0462***	-4.1494***	-6.0740***	-0.0862	0.0640	0.0896***	964	0.1725
	(0.0115)	(0.6960)	(0.7218)	(0.4672)	(0.1972)	(0.0228)		
CHF	-0.0213*	-1.5999	-0.7741	0.1657	0.1943	-0.0036	886	0.0221
	(0.0120)	(1.0840)	(1.0277)	(0.6311)	(0.2346)	(0.0048)		
GBP	-0.0426***	-3.3640***	-8.0299***	0.9588*	-0.1576	-0.0171***	964	0.2075
	(0.0139)	(0.8676)	(0.8606)	(0.5704)	(0.2385)	(0.0064)		
USD	-0.0582***	-4.8651***	-9.7742***	-1.0721*	0.1731	-0.1106***	811	0.3030
	(0.0159)	(0.8745)	(0.9304)	(0.5963)	(0.2522)	(0.0315)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\tau - l^R)_{j,t}$ with real exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta(\tau - l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\tau - l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta(\tau - l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\tau - l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0544***	-4.6485***	-6.0675***	-0.9573	-0.5285**	0.0218***	946	0.2053
	(0.0165)	(1.3342)	(0.8128)	(0.8864)	(0.2430)	(0.0084)		
CAD	-0.0415***	-1.4134	-7.4779***	-1.8776**	0.3391	0.0010	397	0.2301
	(0.0135)	(1.5977)	(1.1781)	(0.8608)	(0.2726)	(0.0037)		
EUR	-0.0448***	-2.1385***	-5.7709***	-1.5086***	-0.1106	-0.0178***	964	0.1911
	(0.0108)	(0.8262)	(0.5806)	(0.5440)	(0.1836)	(0.0043)		
JPY	-0.0501***	-6.0067***	-10.0991***	0.2014	0.0658	0.2277***	964	0.2693
	(0.0187)	(1.6490)	(1.1207)	(1.0903)	(0.3108)	(0.0838)		
NZD	-0.0542***	-5.3081***	-6.2437***	-0.7509	0.2669	0.0075	934	0.1879
	(0.0163)	(1.3981)	(0.9651)	(0.9459)	(0.2771)	(0.0103)		
NOK	-0.0314***	-3.3808***	-5.1824***	-1.3813*	-0.0505	0.0578**	964	0.1360
	(0.0120)	(1.1076)	(0.7473)	(0.7373)	(0.2246)	(0.0234)		
SEK	-0.0517***	-3.7575***	-4.1713***	-1.0157	-0.0031	0.0984***	964	0.1343
	(0.0117)	(1.0152)	(0.6759)	(0.6546)	(0.1994)	(0.0232)		
CHF	-0.0198*	-2.1756	-0.0573	-0.3278	0.1774	-0.0052	886	0.0192
	(0.0119)	(1.4756)	(0.9995)	(0.8623)	(0.2311)	(0.0043)		
GBP	-0.0470***	-0.5878	-6.0992***	-0.1266	-0.1690	-0.0187***	964	0.1632
	(0.0141)	(1.2057)	(0.8406)	(0.7522)	(0.2530)	(0.0066)		
USD	-0.0566***	-4.9275***	-8.8790***	-0.6179	0.1045	-0.1072***	811	0.2777
	(0.0164)	(1.2004)	(0.9218)	(0.8523)	(0.2543)	(0.0322)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\lambda_{j,t}$ with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta \lambda_{j,t} + \beta_3 \Delta i_{j,t}^R + \beta_4 \lambda_{j,t-1} + \beta_5 i_{j,t-1}^R + u_{j,t}$

	$s_{j,t-1}$	$\Delta\lambda_{j,t}$	$\Delta i_{j,t}^R$	$\lambda_{j,t-1}$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0590***	-4.2368***	-6.2444***	0.2449	-0.3457	0.0154*	955	0.2109
	(0.0177)	(1.0806)	(0.8405)	(0.5866)	(0.2336)	(0.0079)		
CAD	-0.0490***	-3.5511***	-7.9123***	1.0562	0.4060	0.0059	399	0.2440
	(0.0161)	(1.3298)	(1.1303)	(0.7125)	(0.2670)	(0.0039)		
EUR	-0.0477***	-3.1006***	-7.5862***	0.7900*	-0.0539	-0.0142***	966	0.2164
	(0.0121)	(0.7402)	(0.6290)	(0.4149)	(0.1889)	(0.0039)		
JPY	-0.0729***	-4.9654***	-10.8168***	1.9380***	-0.2287	0.3363***	966	0.2810
	(0.0196)	(1.3595)	(1.1771)	(0.6566)	(0.2899)	(0.0893)		
NZD	-0.0546***	-4.9534***	-6.8799***	0.9760	0.3157	0.0056	943	0.2227
	(0.0173)	(1.1303)	(0.9666)	(0.6669)	(0.2668)	(0.0103)		
NOK	-0.0483***	-4.1381***	-7.2070***	0.8925**	-0.1439	0.0918***	966	0.2164
	(0.0130)	(0.7709)	(0.7477)	(0.4500)	(0.2064)	(0.0256)		
SEK	-0.0630***	-4.0957***	-6.0086***	0.1026	-0.0504	0.1244***	966	0.1657
	(0.0135)	(0.8153)	(0.7240)	(0.4651)	(0.2013)	(0.0270)		
CHF	-0.0384***	-1.7289	-0.7926	0.0104	0.1453	-0.0026	888	0.0282
	(0.0148)	(1.3206)	(1.0593)	(0.6496)	(0.2354)	(0.0035)		
GBP	-0.0536***	-4.9932***	-8.2041***	0.3304	-0.1841	-0.0236***	966	0.2121
	(0.0154)	(1.0261)	(0.8641)	(0.5606)	(0.2395)	(0.0071)		
USD	-0.0645***	-5.1997***	-10.0205***	-0.7124	0.1317	-0.1272***	813	0.2799
	(0.0184)	(1.1099)	(0.9636)	(0.6255)	(0.2667)	(0.0366)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}_{j,t}^R$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $\tau_{j,t}$ with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta \tau_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \tau_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0345***	-1.9094	-4.1470***	-1.2390*	-0.3375***	0.0158***	2028	0.1180
	(0.0090)	(1.2705)	(0.5166)	(0.7223)	(0.1131)	(0.0046)		
CAD	-0.0359***	-4.5162***	-5.2931***	-0.9604	-0.2998***	0.0059**	1836	0.1732
	(0.0080)	(1.1220)	(0.4975)	(0.6466)	(0.1090)	(0.0024)		
EUR	-0.0249***	-3.2810***	-3.6089***	-0.6452	-0.1861**	-0.0067***	2028	0.1055
	(0.0069)	(0.8708)	(0.3739)	(0.4749)	(0.0886)	(0.0024)		
JPY	-0.0289***	-6.0544***	-5.4636***	0.2067	0.0248	0.1358***	2028	0.1247
	(0.0110)	(1.6384)	(0.7110)	(0.9079)	(0.1274)	(0.0508)		
NZD	-0.0300***	-4.3844***	-2.8557***	-0.9886	-0.1053	0.0143**	2028	0.0751
	(0.0102)	(1.4156)	(0.5851)	(0.7793)	(0.1336)	(0.0068)		
NOK	-0.0216***	-3.1209***	-3.6053***	-0.0206	-0.1184	0.0426***	2028	0.0970
	(0.0080)	(1.0513)	(0.4663)	(0.6435)	(0.0968)	(0.0159)		
SEK	-0.0314***	-4.5926***	-3.2172***	-1.0937*	-0.1917*	0.0619***	2028	0.0896
	(0.0074)	(0.9890)	(0.4259)	(0.5867)	(0.1004)	(0.0152)		
CHF	-0.0176**	-1.5296	-1.9983***	0.3017	-0.2028*	-0.0010	2028	0.0307
	(0.0073)	(1.1968)	(0.5073)	(0.6710)	(0.1049)	(0.0027)		
GBP	-0.0247***	-0.8436	-3.7322***	-0.6089	-0.3355***	-0.0101***	2028	0.0881
	(0.0078)	(1.1388)	(0.4908)	(0.6617)	(0.1049)	(0.0039)		
USD	-0.0164*	-6.2485***	-3.7134***	-0.9035	-0.1768	-0.0316*	2028	0.1021
	(0.0088)	(1.2288)	(0.5663)	(0.6748)	(0.1137)	(0.0180)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $l_{j,t}^R$ with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta l_{j,t}^R + \beta_3 \Delta i_{j,t}^R + \beta_4 l_{j,t-1}^R + \beta_5 i_{j,t-1}^R + u_{j,t}$

	$s_{j,t-1}$	$\Delta l_{j,t}^R$	$\Delta i_{j,t}^R$	$l_{j,t-1}^R$	$i_{j,t-1}^R$	constant	N	R2_within
AUD	-0.0614***	10.1942***	-5.5983***	0.9575	-0.3848*	0.0172**	955	0.2125
	(0.0178)	(2.2184)	(0.7563)	(1.3342)	(0.2207)	(0.0075)		
CAD	-0.0430***	0.7942	-6.9043***	1.4441	0.5067**	0.0036	399	0.2058
	(0.0162)	(2.2663)	(1.0756)	(1.3637)	(0.2448)	(0.0040)		
EUR	-0.0574***	2.2288	-6.0698***	2.6641***	-0.0724	-0.0150***	966	0.1880
	(0.0129)	(1.5516)	(0.5769)	(0.9624)	(0.1899)	(0.0040)		
JPY	-0.0628***	4.7410	-9.8144***	2.2184	0.0849	0.2869***	966	0.2399
	(0.0207)	(3.1073)	(1.1420)	(1.8900)	(0.2967)	(0.0942)		
NZD	-0.0689***	4.7585*	-5.8371***	2.1691	0.3667	0.0071	943	0.1614
	(0.0183)	(2.5898)	(0.9655)	(1.4758)	(0.2705)	(0.0105)		
NOK	-0.0591***	-1.0564	-5.2035***	3.0798***	-0.1318	0.1150***	966	0.1428
	(0.0142)	(1.9423)	(0.7147)	(1.1881)	(0.2220)	(0.0283)		
SEK	-0.0686***	3.2242*	-4.2413***	1.5259	-0.0595	0.1363***	966	0.1259
	(0.0142)	(1.7932)	(0.6633)	(1.0912)	(0.2006)	(0.0284)		
CHF	-0.0425***	2.6141	-0.1369	1.8040	0.1082	-0.0028	888	0.0284
	(0.0155)	(2.2824)	(0.9769)	(1.3189)	(0.2288)	(0.0030)		
GBP	-0.0588***	1.0319	-5.8955***	1.8902	-0.2035	-0.0252***	966	0.1623
	(0.0168)	(2.2302)	(0.8311)	(1.3320)	(0.2462)	(0.0077)		
USD	-0.0601***	5.1038**	-8.7622***	-0.3906	0.1390	-0.1176***	813	0.2539
	(0.0189)	(2.1210)	(0.9109)	(1.3654)	(0.2646)	(0.0377)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l_{j,t}^R$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i_{j,t}^R$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}_{j,t}^R$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\eta + l^R)_{j,t}$ with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta(\eta + l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 (\eta + l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta(\eta + l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\eta + l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0551***	-4.1786***	-6.5414***	-0.0379	-0.2985	0.0139*	955	0.2188
	(0.0176)	(0.9546)	(0.8533)	(0.6497)	(0.2300)	(0.0077)		
CAD	-0.0372**	-5.2590***	-8.1842***	-0.4818	0.5854**	0.0032	399	0.2525
	(0.0153)	(1.2234)	(1.1341)	(0.7696)	(0.2540)	(0.0040)		
EUR	-0.0436***	-3.7517***	-7.3482***	0.4040	-0.0345	-0.0115***	966	0.2292
	(0.0121)	(0.6175)	(0.6022)	(0.4191)	(0.1828)	(0.0041)		
JPY	-0.0675***	-4.6016***	-11.1431***	2.2662***	-0.0091	0.3209***	966	0.3131
	(0.0191)	(1.1404)	(1.1224)	(0.7924)	(0.2804)	(0.0873)		
NZD	-0.0516***	-5.2227***	-7.4423***	0.9851	0.3715	0.0021	943	0.2646
	(0.0165)	(0.9141)	(0.9256)	(0.6567)	(0.2517)	(0.0098)		
NOK	-0.0495***	-4.7408***	-7.7634***	0.9719**	-0.1401	0.0965***	966	0.2571
	(0.0124)	(0.6618)	(0.7101)	(0.4345)	(0.1942)	(0.0246)		
SEK	-0.0596***	-4.2090***	-6.1225***	-0.1391	-0.0442	0.1178***	966	0.1819
	(0.0133)	(0.6766)	(0.7035)	(0.4571)	(0.1956)	(0.0267)		
CHF	-0.0388***	-1.5085	-0.5730	0.0520	0.1303	-0.0023	888	0.0312
	(0.0147)	(1.0673)	(1.0133)	(0.6200)	(0.2325)	(0.0047)		
GBP	-0.0536***	-3.3666***	-7.8781***	0.9942*	-0.2251	-0.0225***	966	0.2044
	(0.0157)	(0.8659)	(0.8614)	(0.5777)	(0.2359)	(0.0072)		
USD	-0.0658***	-4.6510***	-9.5203***	-0.8913	0.0951	-0.1279***	813	0.2957
	(0.0177)	(0.8523)	(0.9201)	(0.5739)	(0.2574)	(0.0353)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 2B – full table of table 2B for $(\tau - l^R)_{j,t}$ with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2 \Delta(\tau - l^R)_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4(\tau - l^R)_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta(\tau - l^R)_{j,t}$	$\Delta i^R_{j,t}$	$(\tau - l^R)_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0599***	-4.7368***	-5.7959***	-1.2388	-0.4624*	0.0197**	955	0.2044
	(0.0181)	(1.3034)	(0.7928)	(0.8795)	(0.2404)	(0.0083)		
CAD	-0.0515***	-1.8440	-6.8437***	-1.8067**	0.3296	0.0027	399	0.2268
	(0.0165)	(1.4316)	(1.0629)	(0.7791)	(0.2480)	(0.0039)		
EUR	-0.0550***	-2.4649***	-5.6618***	-1.6118***	-0.1652	-0.0201***	966	0.1974
	(0.0125)	(0.8134)	(0.5728)	(0.5410)	(0.1884)	(0.0046)		
JPY	-0.0551***	-6.2777***	-9.9786***	-0.1479	0.0977	0.2521***	966	0.2704
	(0.0202)	(1.6417)	(1.1176)	(1.1036)	(0.3042)	(0.0909)		
NZD	-0.0584***	-5.3074***	-6.2658***	-0.8499	0.2932	0.0079	943	0.1937
	(0.0180)	(1.3752)	(0.9475)	(0.9518)	(0.2697)	(0.0105)		
NOK	-0.0482***	-3.4671***	-5.1417***	-1.5500**	-0.1634	0.0904***	966	0.1448
	(0.0138)	(1.0796)	(0.7270)	(0.7325)	(0.2256)	(0.0269)		
SEK	-0.0679***	-3.7679***	-4.1573***	-1.3394**	-0.1408	0.1316***	966	0.1427
	(0.0138)	(0.9892)	(0.6611)	(0.6441)	(0.1999)	(0.0274)		
CHF	-0.0384***	-2.1231	0.1012	-0.5429	0.1039	-0.0041	888	0.0298
	(0.0148)	(1.4497)	(0.9858)	(0.8548)	(0.2290)	(0.0040)		
GBP	-0.0568***	-0.6345	-5.8886***	-0.4046	-0.2362	-0.0242***	966	0.1589
	(0.0163)	(1.2057)	(0.8416)	(0.7701)	(0.2549)	(0.0077)		
USD	-0.0631***	-4.7205***	-8.5966***	-0.5507	0.0471	-0.1224***	813	0.2715
	(0.0185)	(1.1673)	(0.9027)	(0.8431)	(0.2630)	(0.0367)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $l^R_{j,t}$ is a measure of home minus foreign default risk, $\lambda_{j,t}$ is a measure of the treasury liquidity after adjusting for derivative market friction and default risk, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1. Regressions involving default risk $\hat{l}^R_{j,t}$ are only estimated through 2008M1-2018M1 period.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 3A – full table of table 4A with real exchange rates on both sides of regressions

Estimation result of $\Delta q_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \tau_{j,t} + \beta_3 \Delta \gamma_t + \beta_4 \Delta \gamma^*_{j,t} + \beta_5 \Delta i^R_{j,t} + \beta_6 \gamma_{t-1} + \beta_7 \gamma^*_{j,t-1} + \beta_8 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta\gamma^*_{j,t}$	$\Delta\gamma_t$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\gamma^*_{j,t-1}$	γ_{t-1}	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2 within
AUD	-0.0267***	5.4282***	-6.7391***	-2.8717**	-5.8718***	-0.2414	0.5035	-0.2808	-0.2951***	0.0115**	2019	0.2134
	(0.0073)	(0.6989)	(1.2378)	(1.2348)	(0.5490)	(0.3771)	(0.6155)	(0.7812)	(0.1134)	(0.0047)		
CAD	-0.0261***	4.5638***	-6.3743***	-5.1167***	-6.2022***	-0.5507	-0.4400	-0.4321	-0.2823**	0.0074**	1834	0.1974
	(0.0069)	(0.7008)	(2.0361)	(1.1584)	(0.5404)	(0.4096)	(1.2821)	(0.7461)	(0.1130)	(0.0036)		
EUR	-0.0172***	4.6420***	-5.2236***	-5.2164***	-5.0760***	0.0752	-0.1639	-0.5683	-0.1587*	-0.0051**	2026	0.1453
	(0.0059)	(0.5655)	(1.0935)	(0.9110)	(0.4114)	(0.3168)	(0.5350)	(0.5786)	(0.0924)	(0.0025)		
JPY	-0.0365***	4.2326***	-2.2114	-4.8667***	-6.4200***	-2.1214***	1.6876	2.0357**	-0.0885	0.1794***	2026	0.1720
	(0.0101)	(0.9895)	(5.1846)	(1.5906)	(0.7483)	(0.5748)	(2.4872)	(0.9655)	(0.1345)	(0.0474)		
NZD	-0.0297***	6.1267***	-6.9512***	-5.6387***	-6.3253***	1.0141*	0.1682	-0.8634	-0.1330	0.0095	2019	0.2154
	(0.0077)	(0.8714)	(0.9067)	(1.3022)	(0.6189)	(0.5209)	(0.4333)	(0.7846)	(0.1280)	(0.0063)		
NOK	-0.0148**	5.7564***	-3.5732***	-5.4628***	-5.2565***	-0.2195	0.7117	0.5658	-0.1556	0.0289**	2026	0.1716
	(0.0069)	(0.7496)	(0.7776)	(1.0629)	(0.5025)	(0.4231)	(0.4956)	(0.7000)	(0.1010)	(0.0144)		
SEK	-0.0193***	5.0373***	-3.6774***	-5.2317***	-4.6433***	0.5315	0.0047	-0.7085	-0.1087	0.0352***	2026	0.1359
	(0.0064)	(0.6410)	(1.2354)	(0.9998)	(0.4724)	(0.3853)	(0.4961)	(0.6489)	(0.1041)	(0.0137)		
CHF	-0.0141**	2.9468***	-2.5001	-1.3164	-3.0334***	-0.5529	1.5591	0.5841	-0.1730	-0.0002	2026	0.0536
	(0.0072)	(0.7557)	(1.9085)	(1.2066)	(0.5588)	(0.4383)	(1.1170)	(0.7692)	(0.1085)	(0.0035)		
GBP	-0.0183***	4.9239***	-3.3655***	-1.2412	-5.5986***	-0.6562	0.8722	0.5135	-0.3281***	-0.0071*	2026	0.1398
	(0.0070)	(0.7148)	(1.0952)	(1.1286)	(0.5333)	(0.4099)	(0.5923)	(0.7070)	(0.1080)	(0.0037)		
USD	-0.0118*	6.4787***	-6.1135***	-6.8490***	-5.2149***	0.2363	-2.1369***	-0.3064	-0.0037	-0.0150	2026	0.1962
	(0.0070)	(0.8114)	(1.3825)	(1.2181)	(0.5828)	(0.4571)	(0.5777)	(0.7439)	(0.1118)	(0.0147)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $\gamma^*_{j,t}$ is a measure of foreign treasury liquidity, $\gamma_{j,t}$ is a measure of the home treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Robustness of table 3A – full table of table 4A with nominal exchange rates on both sides of regressions

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 s_{j,t-1} + \beta_2\Delta\tau_{j,t} + \beta_3\Delta\gamma_t + \beta_4\Delta\gamma^*_{j,t} + \beta_5\Delta i^R_{j,t} + \beta_6\gamma_{t-1} + \beta_7\gamma^*_{j,t-1} + \beta_8 i^R_{j,t-1} + u_{j,t}$

	$s_{j,t-1}$	$\Delta\gamma^*_{j,t}$	$\Delta\gamma_t$	$\Delta\tau_{j,t}$	$\Delta i^R_{j,t}$	$\gamma^*_{j,t-1}$	γ_{t-1}	$\tau_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2 within
AUD	-0.0299***	5.4375***	-6.7016***	-3.1545***	-5.7743***	-0.1259	0.5188	-1.0400	-0.3189***	0.0125***	2028	0.2030
	(0.0084)	(0.6838)	(1.2095)	(1.2018)	(0.5372)	(0.3661)	(0.6014)	(0.7299)	(0.1091)	(0.0048)		
CAD	-0.0351***	4.4677***	-6.0910***	-5.4676***	-6.1643***	-0.5081	-0.4865	-0.6167	-0.2873***	0.0088**	1836	0.2103
	(0.0079)	(0.6848)	(1.9728)	(1.1210)	(0.5256)	(0.3981)	(1.2421)	(0.7133)	(0.1094)	(0.0036)		
EUR	-0.0233***	4.5724***	-5.0079***	-5.2792***	-4.9931***	0.0997	-0.3333	-0.8159	-0.1699*	-0.0060**	2028	0.1489
	(0.0067)	(0.5578)	(1.0918)	(0.8994)	(0.4087)	(0.3111)	(0.5275)	(0.5534)	(0.0909)	(0.0026)		
JPY	-0.0312***	4.3278***	-1.8465	-5.1748***	-6.2563***	-1.8910***	2.0154	1.3894	0.0227	0.1539***	2028	0.1658
	(0.0110)	(0.9917)	(5.2345)	(1.5931)	(0.7537)	(0.5734)	(2.5487)	(0.9522)	(0.1263)	(0.0500)		
NZD	-0.0323***	6.1592***	-6.8200***	-5.9324***	-6.2455***	1.1145**	0.1224	-1.5591**	-0.1537	0.0115*	2028	0.2079
	(0.0088)	(0.8596)	(0.8971)	(1.2849)	(0.6129)	(0.5014)	(0.4244)	(0.7484)	(0.1233)	(0.0065)		
NOK	-0.0194**	5.6143***	-3.3276***	-5.1365***	-5.0536***	-0.1630	0.5877	0.3513	-0.1532	0.0377**	2028	0.1641
	(0.0076)	(0.7350)	(0.7594)	(1.0344)	(0.4915)	(0.4139)	(0.4826)	(0.6593)	(0.0974)	(0.0154)		
SEK	-0.0269***	4.7323***	-3.9786***	-5.2370***	-4.5729***	0.4500	-0.0859	-1.1534*	-0.1555	0.0512***	2028	0.1364
	(0.0072)	(0.6304)	(1.2187)	(0.9822)	(0.4657)	(0.3788)	(0.4877)	(0.6201)	(0.1021)	(0.0149)		
CHF	-0.0230***	3.0804***	-2.6574	-1.3391	-3.0266***	-0.5239	1.6395	0.3283	-0.1956*	0.0015	2028	0.0591
	(0.0080)	(0.7448)	(1.8807)	(1.1845)	(0.5513)	(0.4299)	(1.0763)	(0.7316)	(0.1059)	(0.0034)		
GBP	-0.0228***	4.7660***	-3.7016***	-1.3531	-5.4467***	-0.6326	0.8127	0.2650	-0.3138***	-0.0094**	2028	0.1379
	(0.0077)	(0.7056)	(1.0830)	(1.1105)	(0.5271)	(0.4016)	(0.5879)	(0.6854)	(0.1048)	(0.0041)		
USD	-0.0148*	6.2155***	-5.8200***	-6.6182***	-5.0111***	0.1152	-1.9332***	-0.2274	-0.0298	-0.0221	2028	0.1875
	(0.0081)	(0.8046)	(1.3724)	(1.1985)	(0.5778)	(0.4512)	(0.5733)	(0.7132)	(0.1114)	(0.0166)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tau_{j,t}$ is a measure of currency derivative friction, $\gamma^*_{j,t}$ is a measure of foreign treasury liquidity, $\gamma_{j,t}$ is a measure of the home treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

15.Baseline regression with Discroll-Kraay (1998) standard errors

Full table of Table 1A

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \hat{\eta}_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \hat{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\hat{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0280***	-5.8403***	-5.6436***	0.3729	-0.2797***	-0.0164***	2028	0.1925
	(0.0066)	(0.9428)	(0.8037)	(0.3554)	(0.0880)	(0.0043)		
CAD	-0.0292***	-3.6792***	-6.2239***	0.6596*	-0.2702**	-0.0218***	1836	0.1780
	(0.0076)	(0.9169)	(0.7725)	(0.3504)	(0.1130)	(0.0059)		
EUR	-0.0208***	-3.5247***	-5.0296***	0.1062	-0.1604	-0.0260***	2028	0.1199
	(0.0060)	(0.7586)	(1.0364)	(0.2950)	(0.1014)	(0.0079)		
JPY	-0.0379***	-4.1970***	-6.1899***	1.7952***	-0.2840**	0.1586***	2028	0.1433
	(0.0098)	(1.5458)	(1.5501)	(0.6474)	(0.1413)	(0.0410)		
NZD	-0.0286***	-6.0615***	-5.8825***	0.2684	-0.1196	-0.0150***	2028	0.1689
	(0.0087)	(0.8857)	(1.0152)	(0.3237)	(0.1112)	(0.0045)		
NOK	-0.0177***	-2.8878***	-4.3967***	0.4004	-0.1699*	0.0212***	2028	0.1213
	(0.0058)	(0.6370)	(0.7642)	(0.3188)	(0.0894)	(0.0068)		
SEK	-0.0235***	-4.2018***	-4.4555***	-0.2478	-0.0883	0.0301***	2028	0.1128
	(0.0064)	(0.8688)	(0.8511)	(0.3253)	(0.1016)	(0.0076)		
CHF	-0.0101**	-3.1277***	-3.0788**	0.5760	-0.2172**	-0.0115**	2028	0.0509
	(0.0049)	(1.1177)	(1.3772)	(0.4560)	(0.0851)	(0.0048)		
GBP	-0.0204***	-4.0860***	-5.3545***	0.5586	-0.3377***	-0.0304***	2028	0.1336
	(0.0063)	(0.8720)	(1.0067)	(0.4210)	(0.1003)	(0.0098)		
USD	-0.0139**	-6.0432***	-4.7403***	-1.1631**	-0.0296	-0.0128*	2028	0.1341
	(0.0070)	(1.3403)	(1.1367)	(0.5072)	(0.1159)	(0.0071)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are Discroll Kraay 1998 standard errors adjusted for cross-sectional correlation and autocorrelation with 5 lags. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1B

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0284***	-5.2710***	-5.7441***	0.2859	-0.2746***	-0.0167***	2052	0.1891
	(0.0065)	(0.8467)	(0.8848)	(0.3981)	(0.0801)	(0.0046)		
CAD	-0.0267***	-4.6086***	-5.4603***	0.5648	-0.2635***	-0.0208***	2052	0.1723
	(0.0061)	(0.7837)	(0.7222)	(0.3450)	(0.0863)	(0.0048)		
EUR	-0.0203***	-4.6406***	-5.0187***	-0.0199	-0.1843**	-0.0254***	2052	0.1434
	(0.0062)	(0.6121)	(0.9137)	(0.3296)	(0.0930)	(0.0079)		
JPY	-0.0400***	-4.3863***	-6.3171***	2.1844***	-0.1223	0.1746***	2052	0.1692
	(0.0092)	(1.2074)	(1.5754)	(0.5636)	(0.1226)	(0.0392)		
NZD	-0.0276***	-6.2906***	-6.0200***	0.1755	-0.1178	-0.0141***	2052	0.1955
	(0.0084)	(0.7842)	(0.9889)	(0.3758)	(0.1047)	(0.0050)		
NOK	-0.0190***	-4.0106***	-4.8711***	0.6109*	-0.1815**	0.0234***	2052	0.1537
	(0.0059)	(0.3982)	(0.7786)	(0.3405)	(0.0858)	(0.0070)		
SEK	-0.0226***	-4.5193***	-4.5991***	-0.3225	-0.1193	0.0289***	2052	0.1315
	(0.0064)	(0.6925)	(0.8353)	(0.3145)	(0.0958)	(0.0077)		
CHF	-0.0129**	-2.3197**	-2.7587**	0.6843	-0.2153***	-0.0129***	2052	0.0509
	(0.0053)	(0.9886)	(1.3119)	(0.5223)	(0.0755)	(0.0048)		
GBP	-0.0227***	-3.3495***	-5.2385***	0.8066**	-0.3468***	-0.0337***	2052	0.1283
	(0.0064)	(0.9132)	(0.9555)	(0.4076)	(0.0901)	(0.0100)		
USD	-0.0113	-6.4388***	-4.7717***	-1.1849***	-0.0761	-0.0088	2052	0.1689
	(0.0071)	(0.8019)	(0.9464)	(0.4383)	(0.0996)	(0.0072)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are Discroll Kraay 1998 standard errors adjusted for cross-sectional correlation and autocorrelation with 5 lags. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

Full table of Table 1F (excluding U.S. dollar)

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2(\Delta \tilde{\eta}_{j,t}) + \beta_3(\Delta i^R_{j,t}) + \beta_4(\tilde{\eta}_{j,t-1}) + \beta_5(i^R_{j,t-1}) + u_{j,t}$

	$q_{j,t-1}$	$\Delta \tilde{\eta}_{j,t}$	$\Delta i^R_{j,t}$	$\tilde{\eta}_{j,t-1}$	$i^R_{j,t-1}$	constant	N	R2_within
AUD	-0.0322***	-4.7984***	-5.6396***	0.5626	-0.2767***	-0.0243***	1824	0.1843
	(0.0070)	(0.7985)	(0.8500)	(0.4356)	(0.0874)	(0.0055)		
CAD	-0.0325***	-4.3134***	-5.4166***	0.9654***	-0.3029***	-0.0294***	1824	0.1779
	(0.0069)	(0.7571)	(0.7286)	(0.3497)	(0.0922)	(0.0062)		
EUR	-0.0261***	-4.3161***	-4.9467***	0.3973	-0.2206**	-0.0355***	1824	0.1413
	(0.0064)	(0.6446)	(0.9354)	(0.3547)	(0.0935)	(0.0089)		
JPY	-0.0441***	-4.7844***	-6.6379***	2.4014***	-0.0940	0.1899***	1824	0.1801
	(0.0102)	(1.3048)	(1.6347)	(0.5937)	(0.1338)	(0.0426)		
NZD	-0.0333***	-5.9481***	-5.9658***	0.3598	-0.1308	-0.0216***	1824	0.1942
	(0.0092)	(0.7738)	(1.0099)	(0.3679)	(0.1122)	(0.0058)		
NOK	-0.0230***	-3.4899***	-4.9305***	0.8936**	-0.2366***	0.0260***	1824	0.1533
	(0.0062)	(0.4383)	(0.7912)	(0.3530)	(0.0826)	(0.0066)		
SEK	-0.0292***	-4.0158***	-4.5171***	0.1306	-0.1701*	0.0340***	1824	0.1249
	(0.0062)	(0.6853)	(0.8403)	(0.3050)	(0.0887)	(0.0070)		
CHF	-0.0153**	-1.8779*	-2.7105*	0.9696*	-0.2059**	-0.0158***	1824	0.0491
	(0.0060)	(1.0949)	(1.3988)	(0.5808)	(0.0800)	(0.0061)		
GBP	-0.0243***	-3.4335***	-5.4040***	1.1084**	-0.3789***	-0.0399***	1824	0.1358
	(0.0067)	(0.8753)	(1.0010)	(0.4794)	(0.0975)	(0.0113)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 9 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF) and British Pound (GBP). We exclude United States Dollar (USD) from all the regressions. Each row represents a regression estimation using the first column currency as the home currency and the other 8 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate. $\tilde{\eta}_{j,t}$ is a measure of the treasury liquidity, $i^R_{j,t}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are Discroll Kraay 1998 standard errors adjusted for cross-sectional correlation and autocorrelation with 5 lags. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.

16.Baseline regression Table 1A, controlling for market rate instead of government bond rate

Estimation result of $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta \hat{\eta}_{j,t} + \beta_3 \Delta i_{j,t}^{mR} + \beta_4 \hat{\eta}_{j,t-1} + \beta_5 i_{j,t-1}^{mR} + u_{j,t}$

	$q_{j,t-1}$	$\Delta \hat{\eta}_{j,t}$	$\Delta i_{j,t}^{R}$	$\hat{\eta}_{j,t-1}$	$i_{j,t-1}^{R}$	constant	N	R2_within
AUD	-0.0280***	-0.1967	-5.6436***	0.6526**	-0.2797***	-0.0164***	2028	0.1925
	(0.0052)	(0.4434)	(0.2874)	(0.2988)	(0.0684)	(0.0043)		
CAD	-0.0292***	2.5448***	-6.2239***	0.9298***	-0.2702***	-0.0218***	1836	0.1780
	(0.0054)	(0.5721)	(0.3348)	(0.3157)	(0.0823)	(0.0059)		
EUR	-0.0208***	1.5049***	-5.0296***	0.2666	-0.1604**	-0.0260***	2028	0.1199
	(0.0046)	(0.4271)	(0.3218)	(0.2228)	(0.0648)	(0.0079)		
JPY	-0.0379***	1.9928***	-6.1899***	2.0792***	-0.2840***	0.1586***	2028	0.1433
	(0.0054)	(0.6647)	(0.3936)	(0.3849)	(0.0629)	(0.0410)		
NZD	-0.0286***	-0.1790	-5.8825***	0.3880*	-0.1196	-0.0150***	2028	0.1689
	(0.0052)	(0.3498)	(0.3295)	(0.2308)	(0.0743)	(0.0045)		
NOK	-0.0177***	1.5089***	-4.3967***	0.5703**	-0.1699***	0.0212***	2028	0.1213
	(0.0042)	(0.3840)	(0.2853)	(0.2494)	(0.0546)	(0.0068)		
SEK	-0.0235***	0.2537	-4.4555***	-0.1595	-0.0883	0.0301***	2028	0.1128
	(0.0049)	(0.4217)	(0.3107)	(0.2365)	(0.0615)	(0.0076)		
CHF	-0.0101***	-0.0489	-3.0788***	0.7932***	-0.2172***	-0.0115**	2028	0.0509
	(0.0031)	(0.4767)	(0.3516)	(0.2795)	(0.0737)	(0.0048)		
GBP	-0.0204***	1.2685***	-5.3545***	0.8962***	-0.3377***	-0.0304***	2028	0.1336
	(0.0042)	(0.4157)	(0.3273)	(0.2765)	(0.0724)	(0.0098)		
USD	-0.0139***	-1.3029**	-4.7403***	-1.1335***	-0.0296	-0.0128*	2028	0.1341
	(0.0035)	(0.5187)	(0.3301)	(0.3030)	(0.0582)	(0.0071)		

The table reports the OLS estimates of the coefficient of the panel fixed effect regression listed above. The 10 currencies used are Australian Dollar (AUD), Canadian Dollar (CAD), Euro (EUR), Japanese Yen (JPY), New Zealand Dollar (NZD), Norwegian Krone (NOK), Swedish Krona (SEK), Swiss Franc (CHF), British Pound (GBP) and United States Dollar (USD). Each row represents a regression estimation using the first column currency as the home currency and the other 9 currencies as foreign currency j. $s_{j,t}$ is the nominal exchange rate between home and foreign country j, defined as home currency price of foreign currency, $q_{j,t}$ is the real exchange rate, $\hat{\eta}_{j,t}$ is a measure of the treasury liquidity, $i_{j,t}^{R}$ is the home minus foreign interest rates. Δ is a difference operator. The sample period is 1999M1-2018M1.

Standard errors in parentheses are standard errors adjusted for cross-sectional correlation. *, **, and *** indicate that the alternative model significantly different from zero at 10%, 5%, and 1% significance level, respectively, based on standard normal critical values for the two-sided test.