Covered Interest Parity in Emerging Markets: Measurement and Drivers

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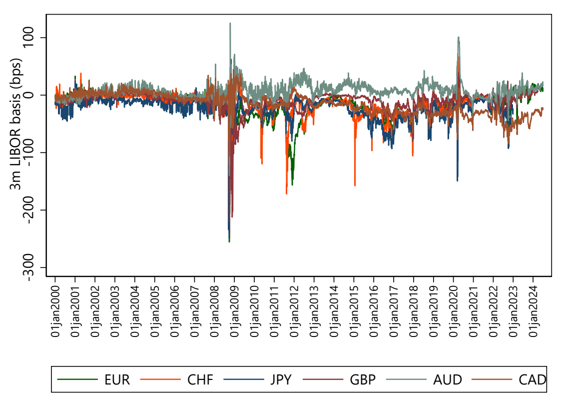
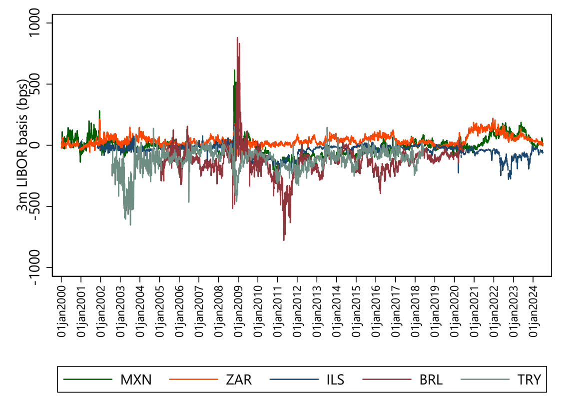
LIBOR-based CIP basis



(a) Advanced Economies



(b) Emerging Markets

Source: Bloomberg. The LIBOR CIP basis is computed using the 3-month LIBOR or corresponding interbank rate in each country and the 3-month forward rate vis-a-vis the USD. $\tau = i^* - (i - (f - s))$

Motivation and Research Questions

Recent growth in literature on CIP deviation, focused on G-10 currencies.

- Documenting permanently wider CIP basis in AE after the GFC
  - Attributed to balance sheet constraint
- Much less known about CIP deviation in EM's
  - Problem of measuring risk-free yields in EM's and comparability of benchmark rates across EM and US.
  - Capital controls, market segmentation, differential taxation additionally complicate interpretation of CIP in EM's (Cerrutti and Zhou, 2024).

This paper:

- Constructs CIP deviation free of credit risk & market-segmentation from supranational bonds issued in EM currencies
- Confirms that the 'purified' CIP deviation conforms with model predictions better than 'naive' ones
- Determinants for the cross-section and time-series of CIP: scope for policy intervention.

Conceptual decomposition of the CIP deviation

CIP= Credit risk premium + Liquidity premium + “pure” CIP deviation

$$\begin{aligned}
\phi_{i,n,t}^{Gov} &= y_{USD,n,t}^{Govt} + \rho_{i,n,t} - y_{i,n,t}^{Govt} \\
&= \left(y_{USD,n,t}^{Govt} - y_{USD,n,t}^{rf}\right) - \left(y_{i,n,t}^{Govt} - y_{i,n,t}^{rf}\right) + y_{USD,n,t}^{rf} + \rho_{i,n,t} - y_{i,n,t}^{rf} \\
&= \left(l_{USD,n,t} - \lambda_{USD,n,t}\right) - \left(l_{i,n,t}^{Gov} - \lambda_{i,n,t}^{Gov}\right) + \tau_{i,n,t} \\
&= \hat{\lambda}_{i,n,t}^{Gov} - \hat{l}_{i,n,t}^{Gov} + \tau_{i,n,t}
\end{aligned}$$

- $l_{i,n,t}$ is the LC credit spread, $\hat{l}_{i,n,t}$, the relative credit spread, expected > 0
- $\hat{\lambda}_{i,n,t}$ is the relative liquidity premium/convenience yield, expected < 0
- $\tau_{i,n,t}$ is the risk-free (pure) CIP deviation

JKL (JF’21) attribute $\phi_{i,n,t}^{Gov}$ in AE’s to $\hat{\lambda}_{i,n,t}$; DS (JF’16) argue that $\phi_{i,n,t}^{Gov}$ in EM’s captures mostly $\hat{l}_{i,n,t}^{Gov}$. But clearly, all terms matter.

A General Formula for CIP Deviation

Under these assumptions, general formula for CIP deviation

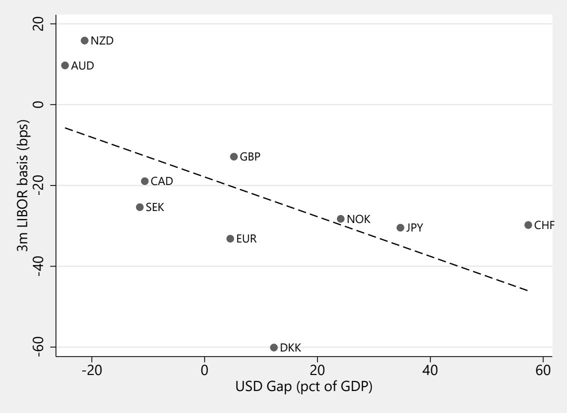
$$\tau_t = \mu_t a \left(\frac{|\bar{F}_t^*|}{\bar{W}_t^*} \right)^{\alpha} \operatorname{sign}(\bar{F}_t^*)$$

where μ_t is the Lagrange multiplier on the balance sheet constraint

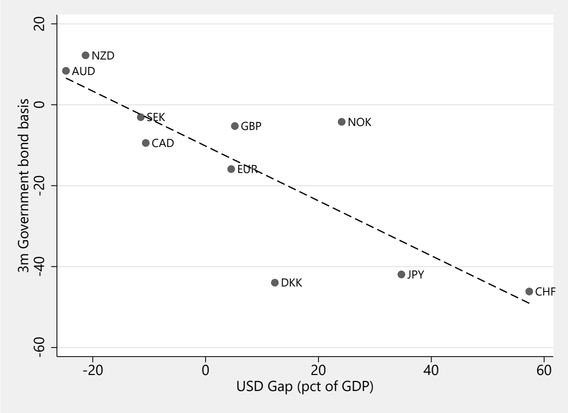
- sign of CIP deviation same as sign of the demand for dollar forwards (F_t^*). Underlying hedging demand:
  - $F_t^* > 0$: demand to hedge net dollar liabilities by domestic debtors (and/or LC assets by foreign investors.)
  - $F_t^* < 0$: demand to hedge dollar assets by domestic investors (and/or LC liabilities by foreign investors)
- Demand for $F_t^* < 0$ also reflects demand for dollar funding
- CIP basis increases with overall forward exposure (F_i^*) and shadow cost of dollar funding μ_t

USD hedging demand and the CIP basis: AEs

Do we observe the corresponding negative relationship in the data? Broadly yes for AE (G10):



(a) LIBOR CIP basis

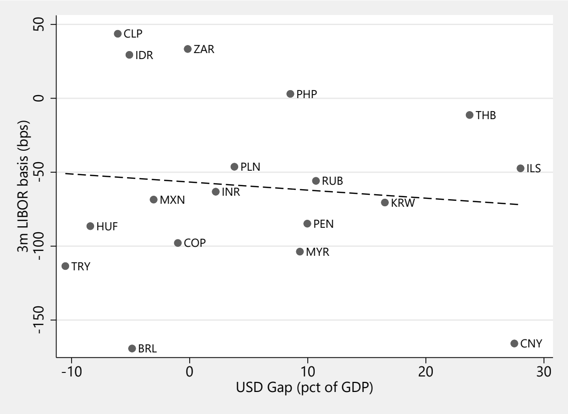


(b) Government bond CIP basis

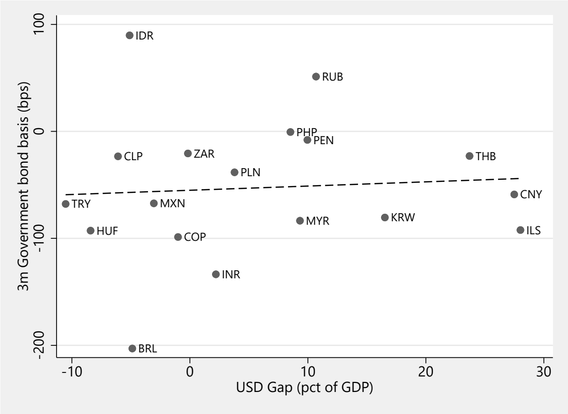
USD Gap is the net external Dollar debt asset position from Benetrix et al. (2019), proxying for net hedging demand. Scatter plots show 2010-2018 means for both variables.

USD hedging demand and the CIP basis: EMs

Do we observe the corresponding negative relationship in the data? **Not** for EM's:



(a) LIBOR CIP basis



(b) Government bond CIP basis

USD Gap is the net external Dollar debt asset position from Benetrix et al. (2019), proxying for net hedging demand. Scatter plots show 2010-2018 means for both variables.

Risk-purified CIP basis using supranational bonds

Bonds issued by supranational entities, backed by shareholder governments (G-10 and others). No differential credit risk, i.e. $\hat{l}_{i,j,t} = 0$.

$$\phi_{i,j,t}^{Supra} = \lambda_{i,j,t}^{Supra} - \lambda_{USD,j,t}^{Supra} + \tau_{i,t}$$

- Observe USD convenience yield: $\lambda_{USD,j,t}^{Supra} = y_{USD,j,t}^{Supra} - y_{USD,j,t}^{rf}$
- recover the convenience yield in LC from

$$\lambda_{i,j,t}^{Supra} = \lambda_{i,j}^{Supra} + \alpha_j \times BidAskS_{i,j,t} + \epsilon_{i,j,t}, \quad \alpha_j < 0$$

Putting everything together, we estimate:

$$\phi_{i,j,t}^{Supra} = \quad \tau_{it} + \lambda_{i,j}^{Supra} - \lambda_{USD,j,t}^{Supra} + \alpha_j \times BidAskS_{i,j,t} + \varepsilon_{i,j,t},$$

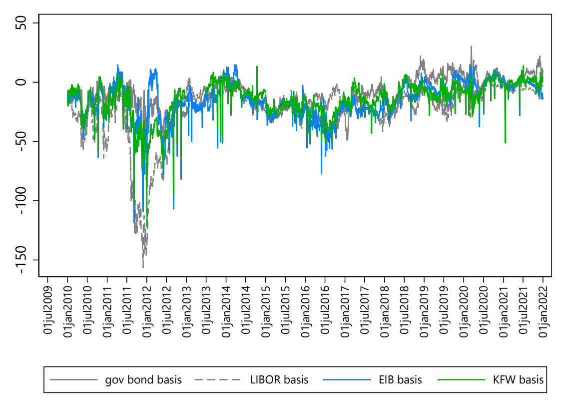
Estimation strategy: $\lambda_{i,j}^{Supra}$ can be extracted by currency-issuer FE and τ_{it} by a currency-time FE if have at least 2 issuers in the same EM currency with the same tenor at a given time.

Summary statistics of supranational bonds (1)

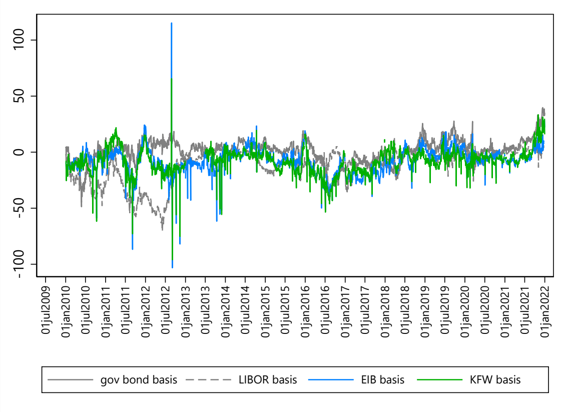
Table 1: Market Share (% of total amount outstanding), by issuer/currency

	IBRD	KFW	EIB	IFC	EBRD	ADB	IADB	AFDB
USD	58.0	20.2	22.5	38.9	28.3	63.0	75.4	40.4
AUD	4.5	2.3	2.6	15.6	4.1	6.6	6.8	11.2
CAD	3.7	0.6	1.7	2.9	0.1	2.6	3.6	0.1
CHF	0.0	0.2	0.8	0.0	0.0	0.3	0.0	0.0
EUR	12.3	66.0	56.6	1.4	15.3	7.3	0.1	24.1
GBP	9.5	7.7	9.4	7.4	13.1	8.7	9.8	6.7
JPY	0.0	0.5	0.4	1.7	0.4	0.3	0.0	0.1
NZD	2.3	0.1	0.1	4.1	0.0	4.1	1.5	0.5
BRL	0.5	0.0	0.2	2.5	2.3	0.1	0.1	1.2
CNY	0.5	0.4	0.1	1.5	1.7	1.4	.	1.3
IDR	0.2	0.0	0.1	0.2	2.5	0.1	1.1	0.1
INR	0.3	0.0	0.0	2.0	1.3	0.5	0.1	0.3
MXN	0.8	0.0	0.3	7.8	4.2	0.2	1.0	2.2
PLN	0.0	0.1	1.7	0.0	1.0	0.3	.	.
RUB	0.1	0.0	0.0	0.7	2.4	0.1	0.0	0.1
TRY	0.3	0.0	0.4	4.6	9.3	0.5	0.1	1.4
ZAR	2.5	0.3	0.7	1.5	7.1	0.6	0.0	5.5

Sanity check: Supra CIP basis and Treasury & LIBOR basis in AE's

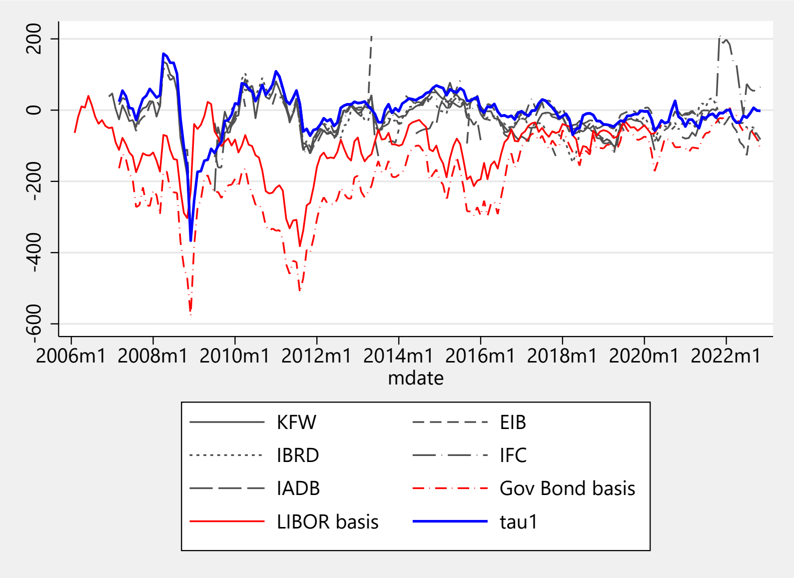


(a) EUR

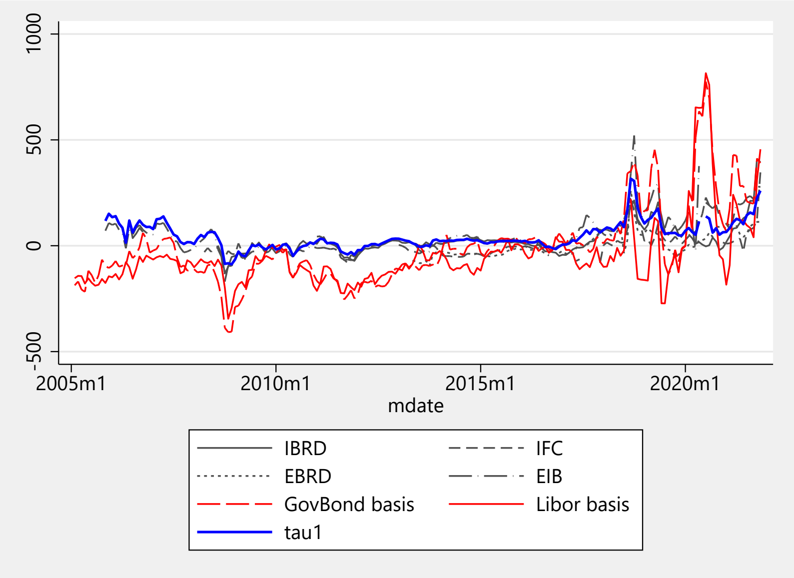


(b) GBP

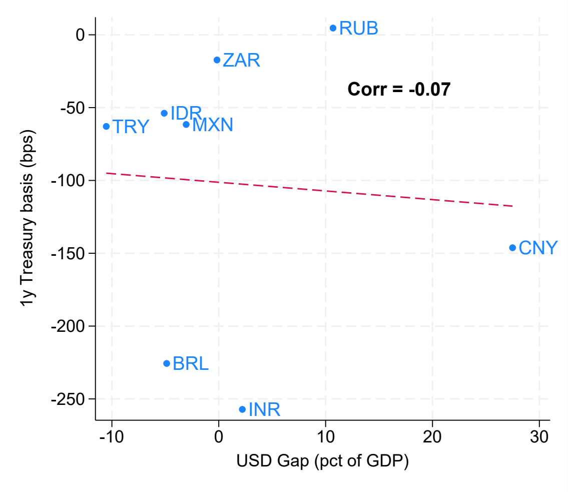
Brazil: LIBOR, Government Bond, Supranational bond (1-year tenor)



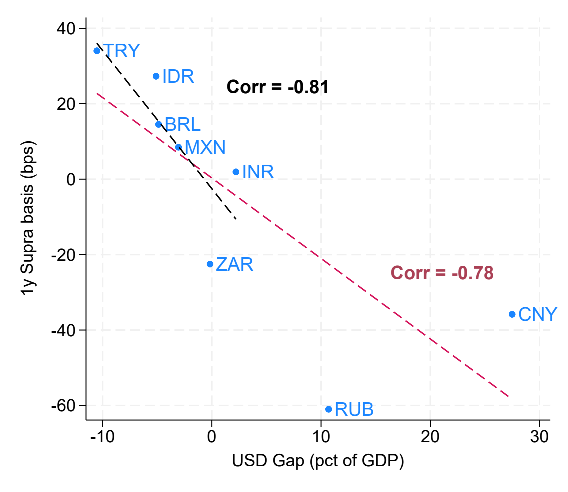
Turkey: LIBOR, Government Bond, Supranational bond (1-year tenor)



Cross-sectional correlation with proxied USD hedging demand in EM's: naive vs. purified CIP basis for 1-year tenor



(a) 1-year Treasury CIP basis



(b) 1-year Supra CIP basis

Model prediction for CIP deviation in the time-series

Assuming $\alpha = 1$, $W_{it}^* = \kappa_i Y_{it}$, the model-implied CIP deviation becomes:

$$CIP_{it} = \frac{a}{\kappa}\mu_t \left(\frac{F_{it}^*}{Y_{it}} \right) \propto \mu_t \left[\rho_0 + \rho_1(-USDGAP_i) \right], \text{with } \rho_0 < 0, \rho_1 > 0$$

- Over time, the CIP basis varies with Dollar funding costs μ_t but the sensitivity to μ_t is higher with higher hedging demand $F_{i,t}^*$, or lower intermediation capital (κ).
- We can test these predictions empirically, using conventional measures of CIP basis in AE and EM's, and using the "purified" supra-national CIP basis.
- Baseline regression equation:

$$CIP_{it} = \alpha_i + \beta_1 \times \Delta Dollar_t + \beta_2 \times \Delta Dollar_t \times (-USDGAP)_i + \varepsilon_{it},$$

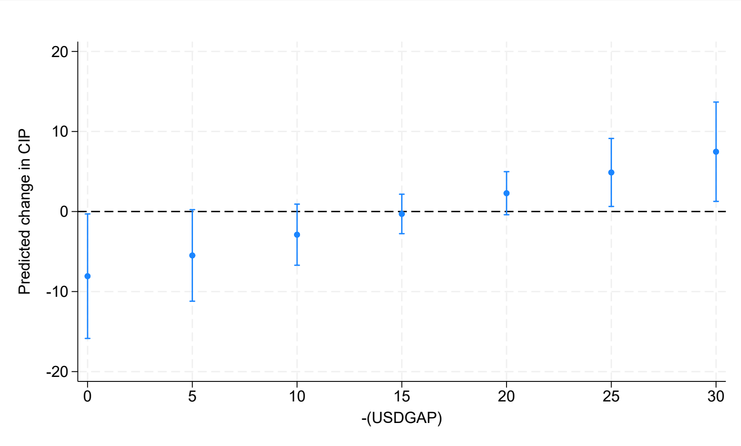
Expect $\beta_1 < 0, \beta_2 > 0$

Time-series results using purified CIP basis in EM's

	(1)	(2)	(3)	(4)	(5)	(6)
	ΔCIP_{it} measure:					
	$\Delta\tau_{it}$	$\Delta\tau_{it}$	ΔGOV_{it}	ΔGOV_{it}	$\Delta Libor_{it}$	$\Delta Libor_{it}$
CIP_{t-1}	-0.137***	-0.121***	-0.0817***	-0.0552***	-0.106***	-0.148***
	(0.0203)	(0.0211)	(0.0210)	(0.0198)	(0.0290)	(0.0427)
$\Delta Dollar_t$	-3.654**	-5.806***	-2.585	-6.192***	-1.289	-2.494
	(1.825)	(1.807)	(2.717)	(1.798)	(1.418)	(1.711)
$\Delta Dollar_t * -(USDGAP_i)$	**0.198****	**0.261*****	0.0955	0.136	-0.0153	0.0600
	(0.0871)	(0.0754)	(0.180)	(0.160)	(0.137)	(0.163)
$-(USDGAP_i)$	0.260*	0.223**	0.494**	0.350*	0.0542	0.138
	(0.135)	(0.113)	(0.245)	(0.182)	(0.154)	(0.160)
Observations	801	493	801	493	658	487
Number of EM currencies	6	3	6	3	5	3
Within R2	0.0849	0.110	0.0441	0.0585	0.0546	0.0792

- Results with supranational (purified) CIP consistent with model prediction.
- Results stronger for top 3 EM's currencies with most liquid supra bond markets (TRY, BRL, MXN)
- Magnitude: A 1.3 pct broad $ appreciation raises the CIP deviation by 8 bps when USDGAP $\approx$ 25% and decreases it by 8 bps when USDGAP=0.

Magnitudes



- A 1.3 pct broad $ appreciation raises the CIP deviation by 8 bps when USDGAP $\approx$ 25% and decreases it by 8 bps when USDGAP=0.
- Standard deviation change in purified CIP is around 8 bps

Role of intermediary wealth η_t : $CIP_{it} = \frac{a}{\kappa_i}\mu_t\eta_t\left(\frac{\bar{F}^*_{it}}{Y_{it}}\right)$

	Dep. Var Δy_t:			
	$\Delta\tau_t$	$\Delta\tau_t$	ΔGOV_t	$\Delta LIBOR_t$
y_{t-1}	-0.114***	-0.131***	-0.071***	-0.112**
	(0.019)	(0.021)	(0.026)	(0.053)
$\Delta\eta_t$	-4.018***	-2.092***	-2.769	-2.529
	(1.283)	(0.675)	(1.803)	(2.014)
$\Delta\eta_t \times (-USDGAP_i)$	0.172**	0.114*	-0.081	0.028
	(0.068)	(0.059)	(0.140)	(0.143)
$\Delta dollar_t \Delta\eta_t$		-1.383***	-0.016	0.194
		(0.194)	(0.362)	(0.377)
$\Delta dollar_t \Delta\eta_t \times (-USDGAP_i)$		0.036*	-0.106***	-0.116**
		(0.019)	(0.040)	(0.0506)
Observations	548	493	493	487
Number of currencies	3	3	3	3
Within R2	0.097	0.154	0.088	0.082

$\Rightarrow$ Intermediary net worth amplifies the impact of marginal dollar funding cost on the CIP basis, proportional to the dollar gap. But only using purified CIP basis.

Conclusion

- The “purified” CIP basis conforms with model-implied prediction for cross-sectional and within-country correlation with fundamental forces driving supply and demand for USD (spot v. forwards).
- In the cross-section, CIP basis differential explained by hedging *demand* determinants. In the time-series, global drivers of Dollar *supply* move CIP (in proportion to their cross-sectional exposure).
- Can the ‘purified basis’ be a sufficient statistic for financial frictions and associated externalities? Role for ‘basis targeting’?
- A way to measure policy impact in EM’s (FXI, K-controls, CB swap lines) in the presence of intermediation frictions.