Uncovering CIP Deviations in Emerging Markets:
Distinctions, Determinants, and Disconnect

Eugenio Cerutti
IMF

Haonan Zhou
Princeton University

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Motivation

- Covered Interest Parity (CIP): "Basic equilibrium condition" in FX markets.
  - Set out by Keynes (1923) during the floating exchange rate period after WWI.
- Deviations from CIP for G10 currencies since the GFC receive much attention.
  [Du-Tepper-Verdelhan '18, Avdjiev-Du-Koch-Shin '19, Cerutti-Obstfeld-Zhou '21, among others]
  - Post-GFC regulation-induced limits to arbitrage; USD supply-demand imbalances.
  - Broad dollar appreciation as a gauge for intermediaries' risk-bearing capacity.
  - Currency/episode heterogeneity: not a single factor unformly applies.
- Relevant concept for Emerging Market (EM) currencies, yet less explored.
  - FX-hedged investment/borrowing/cash flow.
  - Local-currency sovereign risk. [Du-Schreger '16]
  - Cost of FX intervention. [Amador-Bianchi-Bocola-Perri '19]

This paper

- Taking into account FX market frictions in emerging markets, this paper:
  - Constructs short-term CIP deviations for 20 EM currencies based on onshore/offshore forward.
  - Studies macro-financial correlates of EM CIP deviations.

- Main takeaways:
  - Larger and more volatile deviations compared to G10 currencies.
  - Sensitivity to global risk aversion/intermediary risk-bearing capacity:

    Offshore > Onshore; Segmented currencies > Integrated currencies.
  - Less clear evidence on domestic factors after accounting for global factors:
    - Country default risk.
    - FX intervention (more relevant for onshore, segmented markets)

Related literature

- CIP deviations in Emerging Markets:
  - Du-Schreger ’16: Local-currency sovereign risk measured from long-term government bond.
  - Bush ’19: Regulatory data establish connection between MXN CIP deviations and hedging demand.
  - Hong-Oeking-Kang-Rhee ’20: Different implications of widening of CIP deviations to net debtor/creditor countries.
- EM FX forward markets and deviations from interest parity:
  - Kalemli-Özcan-Varela ’21: UIP premium associated with policy uncertainty through expectations.
  - Patel-Xia ’19, Schmittmann-Chua ’20: Non-deliverable forward spills over to onshore prices during market stress.

EM CIP deviations: Definition, interpretation, and construction

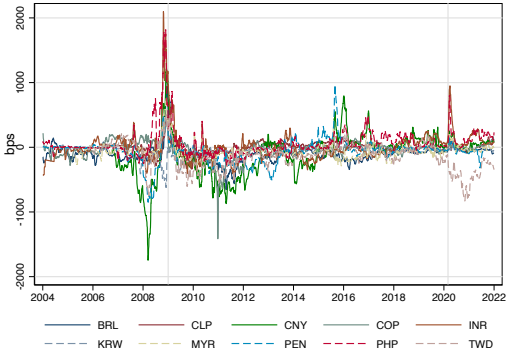
- Define n-period ahead CIP deviation (the "basis") as [f, s: LC/USD]

$$x_{t,t+n} = \overbrace{i^{\$}_{t,t+n} - [i^{*}_{t,t+n} - (f_{t,t+n} - s_t)]}^{(1)} = \overbrace{[i^{\$}_{t,t+n} + (f_{t,t+n} - s_t)] - i^{*}_{t,t+n}}^{(2)}$$

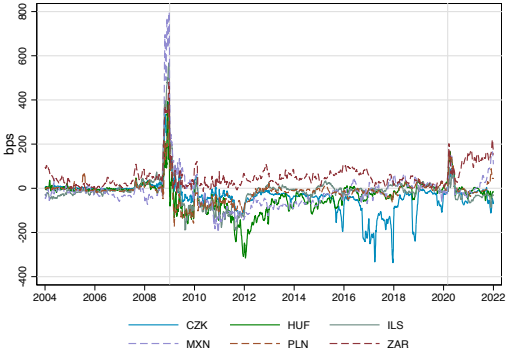
  - $x_{t,t+n} < 0$ (negative basis):
    - International lender (1): hedged return in EM currency > direct $ return.
    - EM borrower (2): synthetic LC borrowing cost using $ < direct funding cost in local currency.

- Our approach:
  - $i^{*}_{t,t+n}$: 1 & 3-month money market / interbank rate (liquidity / less credit risk concern).
  - $f_{t,t+n}$: distinguish between off-shore / on-shore rates.
  - $i^{\$}_{t,t+n}$: A2/P2 non-financial CP rate (baseline, match credit quality); US Libor (robustness).

Large, volatile CIP deviations



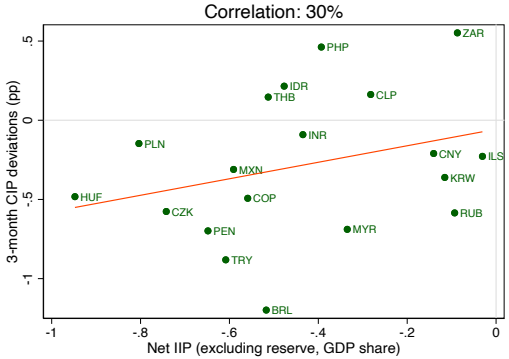
currencies with non-deliverable forwards



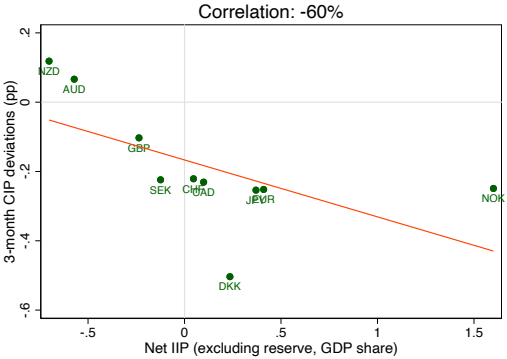
deliverable forwards

3-month offshore CIP deviations, 2004-2021, 10-day moving averages ▸ Additional currencies ▸ Tables

Cross-sectional differences from G10 currencies



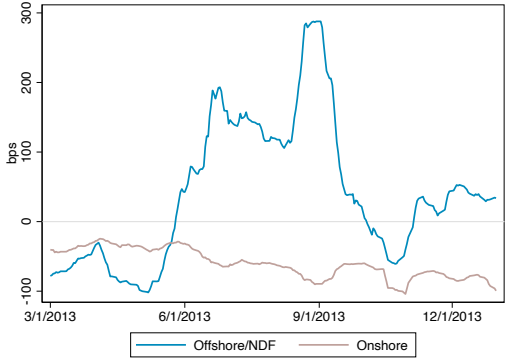
EM currencies (excl. TWD)



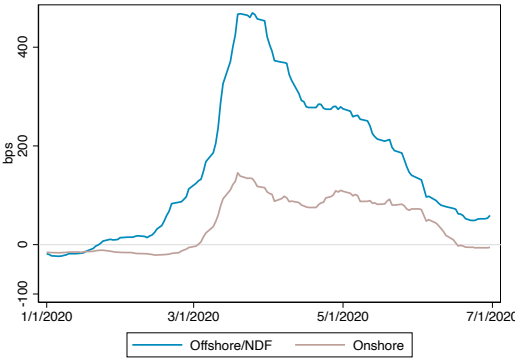
G10 currencies

Average 3-month offshore CIP deviations vs. IIP/GDP, 2004-2021 ▸ Interest rate

Offshore-onshore spread reflects financial frictions & segmentation



Taper Tantrum



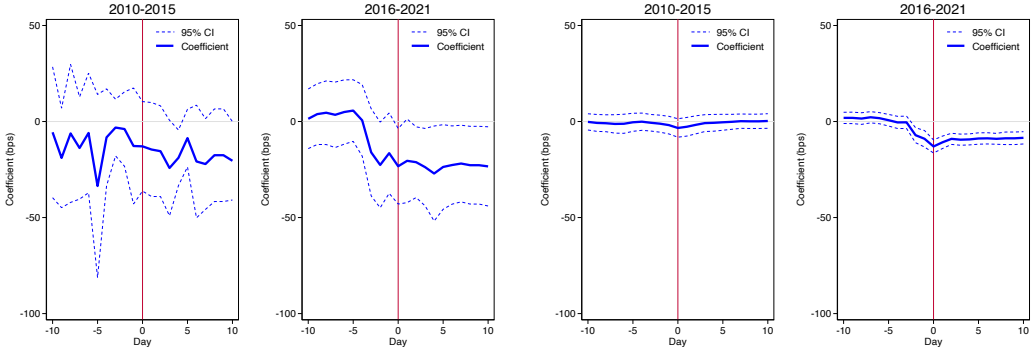
COVID-19

3-month offshore/onshore CIP deviations: BRL, CNY, IDR, INR, MYR, PHP, THB, TWD ▸ Individual currencies

Regulation-induced limits to arbitrage: EM > G10

Day 0: First day when 3-month forward contract settles in the next year (typically late Sep.).

Projecting offshore IBOR basis on dummy variables indicating days before/after day 0.



EM Europe (CZK, HUF, RUB, PLN)

G10

Global factors and EM CIP deviations: Theories and hypotheses

[Liao-Zhang '20]

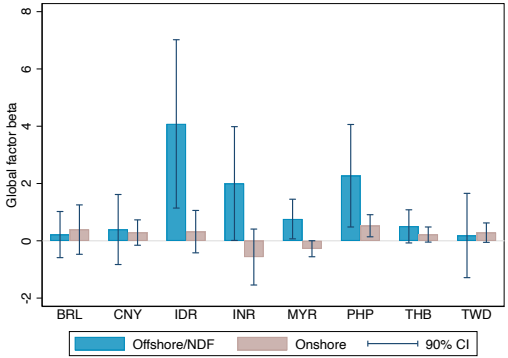
- EM's negative external imbalance → net selling pressure of local currency forward.
- Global financial tightening → dealer capacity ↓, forward LC depreciates, bases **increase**.
- Logic extended to segmented markets:
  - Forward depreciation stronger in offshore markets vs. onshore markets.
  - More inelastic supply of FX hedging services in segmented vs. integrated markets: Amplification.
- Hypotheses:
  (1) $\beta(x_{\text{offshore}}, \text{global risk}) > 0; \beta^{\text{offshore}} > \beta^{\text{onshore}}$.
  (2) $\beta^{\text{offshore, segmented}} > \beta^{\text{offshore, integrated}}$.
- Measure global factors:
  - Global FX dealer leverage ratio. [He-Kelly-Manela '17]
  - First PC & residual of USD, CHF, JPY effective exchange rate ("safe haven"). [Cerutti-Obstfeld-Zhou '21]

Global factors and EM CIP deviations: Panel evidence

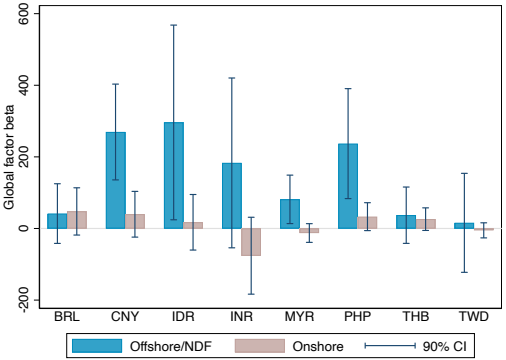
Δx_{3m}	(1) offshore	(2) Integrated offshore	(3) Segmented offshore	(4) Segmented onshore
$\Delta(r^{US} - r)$	0.156**	0.096	0.317***	0.210**
	(0.065)	(0.080)	(0.050)	(0.076)
Δ log dealer leverage	0.599**	0.491*	0.734*	0.341
	(0.235)	(0.241)	(0.360)	(0.268)
Δ fwd bid-ask	0.698**	0.392	1.368*	0.177
	(0.276)	(0.243)	(0.628)	(0.278)
Δ safe haven common factor	40.409*	17.656	78.277*	4.363
	(20.225)	(17.769)	(35.639)	(20.453)
Δ safe haven residual	10.710***	3.614	21.325**	1.398
	(3.257)	(2.599)	(6.199)	(2.366)
Observations	2,706	1,637	1,069	1,087
R-squared	0.070	0.044	0.121	0.059
Country FE	✓	✓	✓	✓

2010-2021, changes of monthly averages. Segmented currencies: BRL, CNY, IDR, INR, MYR, PHP, THB, TWD.

Global factors and EM CIP deviations: Individual currencies



β(3m basis, log dealer leverage)



β(3m basis, safe haven PC)

Domestic factors: country default risk and FX intervention

Δx_{3m}	(1) offshore	(2) Segmented offshore	(3) Segmented onshore	(4) offshore	(5) Segmented offshore	(6) Segmented onshore
Δ log dealer leverage	0.593**	0.795	0.363	0.588**	0.729*	0.344
	(0.245)	(0.489)	(0.243)	(0.234)	(0.367)	(0.263)
Δ safe haven common factor	37.994*	91.786*	14.722	42.667*	80.605*	3.251
	(20.012)	(41.191)	(17.821)	(20.396)	(35.897)	(20.386)
Δ safe haven residual	9.772***	21.955**	2.413	10.945***	22.145**	1.082
	(3.313)	(7.607)	(2.521)	(3.336)	(6.568)	(2.349)
Δ 5y cds spread (residualized by first PC)	0.482**	0.608	-0.065			
	(0.221)	(0.589)	(0.159)			
FX intervention (% GDP)				3.426	9.758	-3.642*
				(2.070)	(6.046)	(1.547)
Observations	2,439	802	809	2,706	1,069	1,087
R-squared	0.076	0.132	0.077	0.071	0.126	0.063
Other controls ($\Delta(r^{US} - r)$, Δ fwd bid-ask)	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓

2010-2021, changes of monthly averages. Segmented currencies: BRL, CNY, IDR, INR, MYR, PHP, THB, TWD.

Taking stock

- Negative bases for most EM currencies.
  - During global financial tightening, ↑ basis poses challenge to borrowers & lenders.
- Sensitivity to global risk: Offshore > onshore; Segmented currencies > integrated currencies.
  - Less clear evidence on domestic factors (sovereign default risk / FX intervention).

Policy implications:

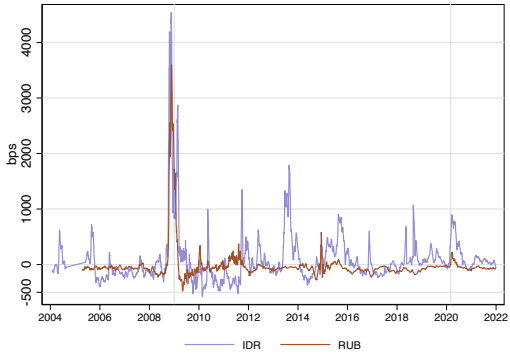
- Macroprudential management: [Gourinchas '21]
  - ↑ basis in normal times (prevent overborrowing); ↓ basis in crisis times (bolster borrowing capacity).
- Tradeoff of FX market regulation segmentation:
  - Reduce onshore sensitivity to global factors.
  - Capital outflow pressure due to a more volatile offshore market.

Malaysia (full)

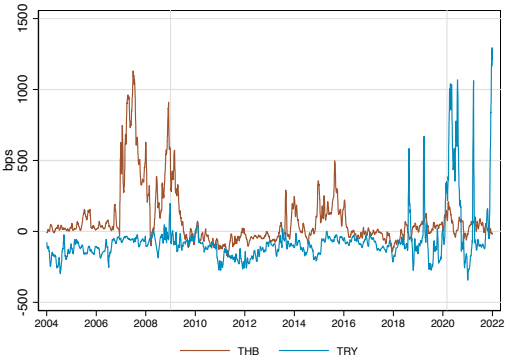
Brazil/Indonesia/India (partial)

APPENDIX

CIP deviations: other currencies



currencies with non-deliverable forwards



deliverable forwards

3-month offshore CIP deviations, 2004-2021, 10-day moving averages

Back

Average CIP deviations by currency by Dollar interest rate

	Dollar rate: A2/P2 CP			Dollar rate: IBOR		
	02-07 mean/sd	08-09 mean/sd	10-21 mean/sd	02-07 mean/sd	08-09 mean/sd	10-21 mean/sd
CZK	8.36	53.11	-57.61	-1.10	-38.28	-74.39
	(15.12)	(108.89)	(62.96)	(9.53)	(35.80)	(57.67)
HUF	1.18	4.23	-48.25	-7.74	-91.06	-67.18
	(24.93)	(136.49)	(65.48)	(22.35)	(101.53)	(61.09)
ILS	-11.03	85.36	-22.80	-20.75	-21.59	-43.11
	(21.58)	(168.66)	(43.39)	(17.88)	(70.44)	(42.78)
MXN	-10.07	141.07	-31.06	-19.47	36.76	-50.48
	(32.22)	(246.14)	(58.98)	(28.57)	(121.60)	(55.90)
PLN	4.04	5.66	-14.70	-5.39	-93.11	-35.53
	(17.80)	(115.13)	(36.18)	(13.30)	(62.40)	(33.23)
RUB	-57.70	303.41	-57.44	-62.14	132.50	-73.20
	(33.56)	(1001.67)	(90.27)	(33.17)	(814.97)	(87.78)
TRY	-168.51	-56.43	-54.94	-174.80	-136.87	-75.42
	(138.58)	(63.42)	(235.15)	(141.71)	(91.09)	(224.41)
ZAR	38.38	96.17	55.17	29.22	6.16	36.60
	(30.67)	(122.03)	(41.92)	(25.05)	(31.49)	(42.64)

Back

Average CIP deviations by currency: Onshore/offshore

	Offshore forward			Onshore forward		
	02-07 mean/sd	08-09 mean/sd	10-21 mean/sd	02-07 mean/sd	08-09 mean/sd	10-21 mean/sd
BRL	-261.18	48.65	-122.20	-313.83	-77.50	-139.28
	(542.58)	(293.88)	(102.95)	(1047.24)	(103.25)	(104.87)
CNY	-329.56	-202.18	-61.84	-154.40	-157.29	-127.51
	(211.00)	(685.55)	(269.09)	(205.45)	(418.48)	(180.77)
IDR	-85.12	546.05	83.47	-49.32	140.87	-16.92
	(205.09)	(1298.53)	(336.09)	(102.23)	(242.22)	(99.82)
INR	29.96	192.54	-3.36	-32.03	-19.92	16.58
	(135.85)	(630.61)	(160.19)	(146.55)	(250.39)	(91.04)
MYR	-55.11	66.45	-68.76	-18.31	23.27	-39.09
	(76.40)	(264.97)	(98.45)	(19.22)	(96.83)	(33.75)
PHP	33.63	345.16	48.59	5.49	37.42	17.23
	(151.27)	(548.80)	(144.27)	(22.79)	(72.88)	(22.38)
THB	153.66	245.01	14.62	12.07	60.59	-17.97
	(260.51)	(235.84)	(93.25)	(17.72)	(109.04)	(30.85)
TWD	35.32	-123.52	-167.52	-3.28	13.26	-68.80
	(88.67)	(348.94)	(177.30)	(12.58)	(109.03)	(45.09)

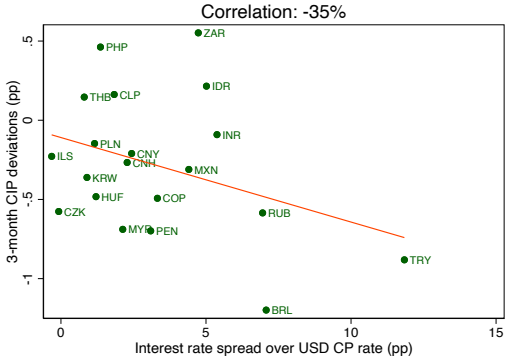
Back

Average CIP deviations by currency: Onshore/offshore (cont'd)

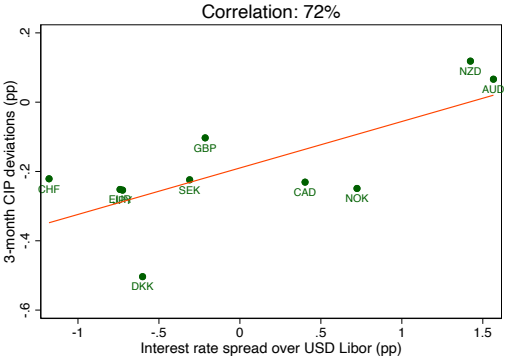
	Offshore forward (NDF) mean/sd	Onshore forward mean/sd
CLP (9/15/2017-12/31/2021)	-6.92	-8.39
	(44.31)	(60.32)
COP (11/29/2018-12/31/2021)	4.99	3.19
	(49.37)	(46.26)
KRW (8/16/2004-12/31/2021)	-52.36	-53.10
	(77.11)	(79.40)
PEN (9/30/2002-12/31/2021)	-56.18	.
	(183.28)	(.)

Back

Cross-sectional differences from G10 currencies



EM currencies (excl. TWD)

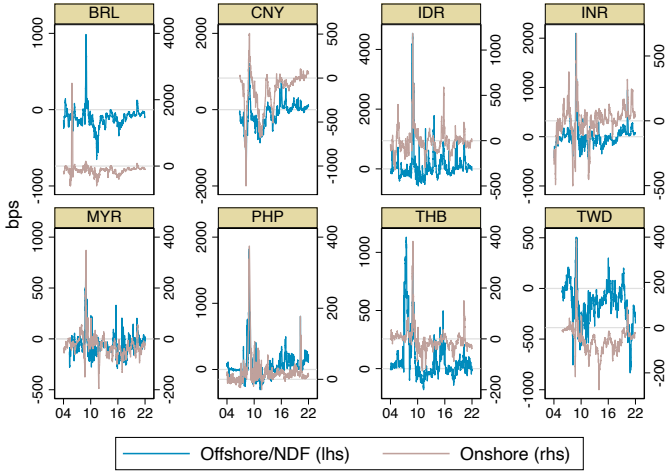


G10 currencies

Average 3-month offshore CIP deviations vs. interest rate differential, 2004-2021

Back

Onshore-offshore differentials



Offshore-onshore CIP deviations: Currency-specific series

Back