

# Uncovered Equity "Disparity" in Asian Emerging Markets

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## Bridging the two separate areas of International Finance:

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## FX Determination:

- 1 **Micro:** FX order flows – How about **international capital flows**?
- 2 **Macro:** (Un)Covered Interest rate Parity – How about **equity returns**?

# Uncovered Equity Parity (UEP)

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Empirically under-research:

While Curcuru et al.(2014) only test the **two steps** but not the prediction using data of US investors, other papers only test its **prediction** without flow data.

# Negative correlations for Developed Markets (DMs)

## Natural hedging implication (Campbell et al., 2010):

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- 2 Hau and Rey (2006): 17 OECD countries vis-à-vis the US; **daily, monthly and quarterly** from 1980s to 2001.
- 3 Capiello and De Santis (2007): the UK, Germany and Switzerland vis-à-vis the US; **monthly** from Jan1981 to Oct2006. (Expected equity and FX returns).

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- 2 Cho et al.(2016): 12 EMs, **quarterly** from 1996 to 2009 (**Flight-to-quality**).
- 3 Cenedese et al.(2015): FX do not offset **monthly** equity return movements in a cross-section of 43 markets (“-” for DMs, and “+” for EMs, **Global Volatility**).

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- 4 If the foreign investors in aggregate **chase expected equity returns** in EMs, it should not be surprising to find a positive rather than negative correlation.

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- 3 **Methodology:** Structural vector autoregressive (SVAR) models: i) control for reverse causality, ii) distinguish contemporaneous and inter-temporal effects.
- 4 **Result:** Explaining the failure, unveiling another side of the UEP, reconciling the mixed evidence in literature, and contributing to FX determination.

# Data description

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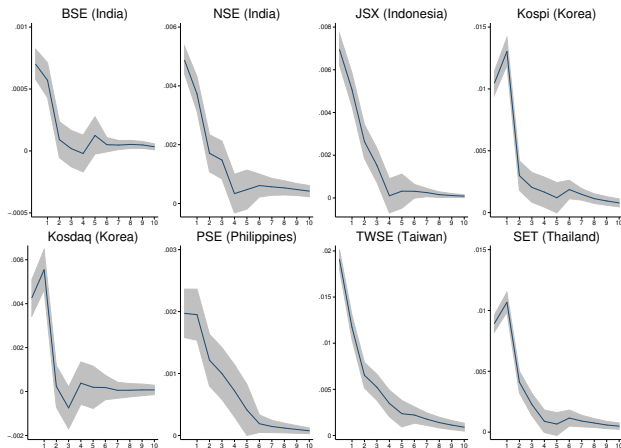
**FX Returns (FXR):** Negative log returns of FX spot rates.

# Preliminary data analysis

Country	Start Date	Obs	Stock Exchange	Mean	Median	StDev	Autocorrelations					Pairwise Correlations		
							AC(1)	AC(2)	AC(3)	AC(4)	AC(5)	NEF	LER	
India	Jan 1, 2008	1463	BSE	NEF	0.0001	0.0001	0.0027	<b>0.264 *</b>	<b>0.249 *</b>	<b>0.238 *</b>	<b>0.232 *</b>	<b>0.190 *</b>		
				LER	0.0028	0.0209	1.7312	0.070	-0.023	-0.031	-0.049	-0.031	0.295 *	
				FXR	-0.0309	-0.0103	0.5970	0.056	-0.055	-0.002	0.042	0.076	0.196 *	0.465 *
India	Jan 1, 2008	1463	NSE	NEF	0.0026	0.0031	0.0122	<b>0.497 *</b>	<b>0.403 *</b>	<b>0.328 *</b>	<b>0.293 *</b>	<b>0.284 *</b>		
				LER	-0.0086	0.0433	1.6475	0.095	0.018	0.001	-0.044	-0.034	0.453 *	
				FXR	-0.0309	-0.0103	0.5970	0.056	-0.055	-0.002	0.042	0.076	0.329 *	0.465 *
Indonesia	Sept 9, 1996	4224	JSX	NEF	0.0059	0.0020	0.0260	<b>0.189 *</b>	0.119	0.092	0.096	0.065		
				LER	0.0489	0.0998	1.6955	<b>0.144 *</b>	0.020	-0.026	-0.024	-0.020	0.297 *	
				FXR	-0.0390	0.0000	1.7235	-0.021	0.083	-0.011	-0.034	-0.029	0.059 *	0.201 *
Korea	June 30, 1997	4080	Kospi	NEF	0.0042	0.0012	0.0390	<b>0.482 *</b>	<b>0.325 *</b>	<b>0.265 *</b>	<b>0.238 *</b>	<b>0.225 *</b>		
				LER	0.0243	0.0855	1.9422	0.065	-0.043	-0.018	-0.037	-0.042	0.312 *	
				FXR	-0.0043	0.0223	1.0543	0.016	-0.106	-0.006	-0.075	-0.111	0.119 *	0.310 *
Korea	March 15, 1999	3655	Kosdaq	NEF	0.0030	0.0010	0.0292	<b>0.421 *</b>	<b>0.264 *</b>	<b>0.228 *</b>	<b>0.221 *</b>	<b>0.203 *</b>		
				LER	-0.0133	0.1303	2.0533	<b>0.144 *</b>	0.042	0.033	0.022	-0.021	0.197 *	
				FXR	0.0042	0.0256	0.7164	-0.021	0.034	-0.037	0.021	-0.030	0.089 *	0.293 *
Philippines	March 15, 1999	3633	PSE	NEF	0.0010	0.0001	0.0127	<b>0.179 *</b>	<b>0.146 *</b>	0.118	0.104	0.089		
				LER	0.0305	0.0351	1.3840	<b>0.126 *</b>	-0.002	-0.045	-0.015	-0.044	0.179 *	
				FXR	-0.0037	0.0000	0.4462	-0.029	-0.040	0.027	-0.040	-0.013	0.064 *	0.246 *
Taiwan	Jan 1, 2001	3226	TWSE	NEF	0.0063	0.0057	0.0402	<b>0.515 *</b>	<b>0.339 *</b>	<b>0.263 *</b>	<b>0.222 *</b>	<b>0.185 *</b>		
				LER	0.0185	0.0525	1.4134	0.057	0.017	0.013	-0.015	-0.015	0.516 *	
				FXR	0.0032	0.0000	0.2650	0.034	0.017	-0.007	0.023	0.065	0.325 *	0.312 *
Thailand	Dec 1, 1997	3937	SET	NEF	0.0010	-0.0004	0.0299	<b>0.564 *</b>	<b>0.382 *</b>	<b>0.293 *</b>	<b>0.252 *</b>	<b>0.217 *</b>		
				LER	0.0307	0.0336	1.6408	0.075	0.049	-0.004	-0.011	-0.002	0.371 *	
				FXR	0.0058	0.0000	0.5286	0.121	-0.034	-0.053	0.025	0.117	0.132 *	0.206 *

# Testing the 1st step: Do foreign equity investors rebalance?

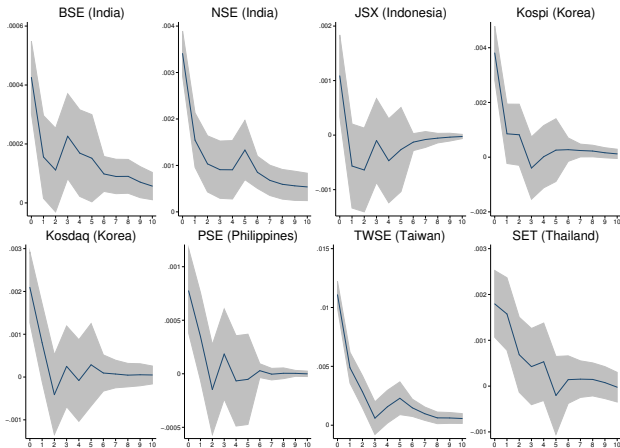
Neither in equity markets: Flows  $\uparrow$  if past local-currency equity returns  $\uparrow$ .



$$NEF_{i,t} = \alpha_{NEF} + \sum_{d=1}^5 \phi_{2,1,d} NEF_{i,t-d} + \sum_{d=0}^5 \phi_{2,2,d} LER_{i,t-d} + \sum_{d=1}^5 \phi_{2,3,d} FXR_{i,t-d} + \epsilon_{i,t}^{NEF}$$

# Testing the 1st step: Do foreign equity investors rebalance?

Nor in FX markets: Flows **don't respond** to **past FX returns**.



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# Return-chasing: Equity VS FX markets

**Why** are foreigners positive feedback investors regarding past equity returns?

- 1 **Return-chasing/information extracting hypothesis**: Investors react “+” to lagged returns to chase high expected returns (Bohn and Tesar, 1996).
- 2 **Macroeconomic news/sentiment hypothesis**: Good (bad) news leads flows into (out of) equity markets (Ben-Rephael, et al., 2011).

Indirect test: Previous results suggest a dominating role for return-chasing, as

- 1 Return-chasing relies on **momentum**: Equity markets
- 2 Macroeconomic news relies on **liquidity**: FX markets



# Return-chasing: Expected VS unexpected returns

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Following Richards (2005), for local-currency equity returns, we construct:

- 1 a series for **expected returns** on day t from the VARs below, using only variables predetermined up to day t-1, i.e., excluding same-day returns and flows.
- 2 a series for **unexpected returns** derived as actual returns less expected returns, which represents the macroeconomic news or sentiment.

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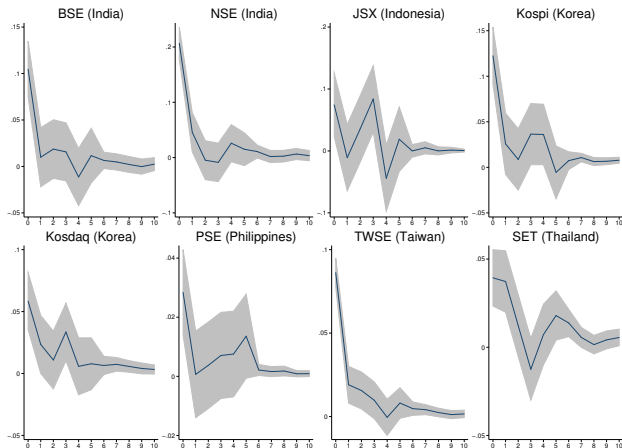
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	BSE (India)	NSE (India)	JSX (Indonesia)	Kospi (Korea)	Kosdaq (Korea)	PSE (Philippines)	TWSE (Taiwan)	SET (Thailand)
<b>Panel A. Impact of local equity returns on flows</b>								
ExpectedLER	0.0018 *** (3.98)	0.0122 *** (3.70)	0.0172 *** (7.49)	0.0303 *** (7.89)	0.0172 *** (7.26)	0.0073 *** (5.28)	-0.0188 (-0.78)	0.1128 *** (9.68)
UnexpectedLER	0.0004 *** (7.13)	0.0030 *** (10.81)	0.0042 *** (15.21)	0.0055 *** (14.86)	0.0021 *** (7.67)	0.0015 *** (8.03)	0.0137 *** (25.85)	0.0056 *** (18.61)
<b>Panel B. Impact of FX returns on flows</b>								
ExpectedFXR	-0.0003 (-0.23)	0.0026 (0.45)	-0.0001 (-0.03)	-0.0011 (-0.25)	-0.0083 (-0.47)	-0.0025 (-0.39)	0.0868 ** (2.41)	0.0092 * (1.68)
UnexpectedFXR	0.0007 *** (6.30)	0.0058 *** (10.86)	0.0006 (1.27)	0.0037 *** (3.32)	0.0029 *** (4.50)	0.0017 ** (2.03)	0.0423 *** (16.16)	0.0041 *** (4.34)

# Testing the 2nd step: Do flows cause FX returns?

Only a strong contemporaneous “+” relationship: Price-pressures.



$$FXR_{i,t} = \alpha_{FXR} + \sum_{d=0}^5 \phi_{2,1,d} NEF_{i,t-d} + \sum_{d=1}^5 \phi_{2,2,d} LER_{i,t-d} + \sum_{d=1}^5 \phi_{2,3,d} FXR_{i,t-d} + \epsilon_{i,t}^{FXR}$$

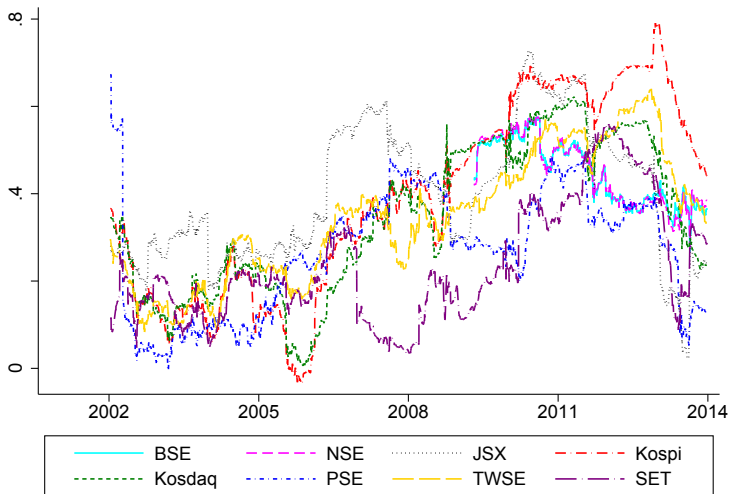
# Comparison with Global Volatility (Cenedese et al., 2015)

- 1 Cenedese et al.(2015) suggest **Global Volatility (VIX)** as a partial explanation.
- 2 Our results do not change qualitatively after controlling for VIX.

	BSE (India)	NSE (India)	JSX (Indonesia)	Kospi (Korea)	Kosdaq (Korea)	PSE (Philippines)	TWSE (Taiwan)	SET (Thailand)
<b>Panel A: Impact of local-currency equity returns on foreign net equity flows</b>								
LER	0.0004 *** (7.10)	0.0028 *** (10.23)	0.0042 *** (15.32)	0.0055 *** (14.98)	0.0021 *** (7.67)	0.0015 *** (8.08)	0.0136 *** (25.75)	0.0055 *** (17.88)
L.LER	0.0003 *** (3.48)	0.0013 *** (5.37)	0.0020 *** (5.84)	0.0050 *** (12.70)	0.0018 *** (6.21)	0.0012 *** (8.02)	0.0036 *** (6.65)	0.0044 *** (13.23)
<b>Panel B: Impact of FX returns on foreign net equity flows</b>								
FXR	0.0007 *** (6.23)	0.0054 *** (10.34)	0.0006 (1.28)	0.0037 *** (3.26)	0.0029 *** (4.51)	0.0018 ** (2.06)	0.0422 *** (16.12)	0.0035 *** (3.52)
L.FXR	0.0002 (1.54)	0.0012 ** (2.38)	-0.0004 (-0.74)	-0.0004 (-0.39)	0.0002 (0.28)	0.0006 (1.23)	0.0033 (1.35)	0.0013 (1.36)
<b>Panel C: Expected and unexpected effects of local-currency equity returns and FX returns on foreign net equity flows</b>								
ExpectedLER	0.0004 (0.63)	0.0014 (0.38)	0.0172 *** (7.50)	0.0298 *** (7.95)	0.0171 *** (7.20)	0.0075 *** (5.46)	-0.0190 (-0.80)	0.1149 *** (9.74)
UnexpectedLER	0.0004 *** (6.96)	0.0029 *** (10.19)	0.0042 *** (15.33)	0.0055 *** (14.90)	0.0021 *** (7.69)	0.0015 *** (8.05)	0.0137 *** (25.78)	0.0056 *** (18.57)
ExpectedFXR	0.0001 (0.13)	0.0029 (0.54)	0.0001 (0.03)	-0.0011 (-0.25)	-0.0085 (-0.49)	-0.0024 (-0.37)	0.0896 ** (2.48)	0.0092 * (1.67)
UnexpectedFXR	0.0007 *** (6.23)	0.0054 *** (10.34)	0.0007 (1.29)	0.0038 *** (3.33)	0.0029 *** (4.51)	0.0018 ** (2.05)	0.0423 *** (16.14)	0.0041 *** (4.34)
<b>Panel D: The impact of foreign net equity flows on FX returns</b>								
Flows	42.1698 *** (4.89)	20.6322 *** (10.96)	3.0373 (1.30)	3.8439 *** (5.03)	2.2838 *** (5.02)	2.3721 ** (2.43)	2.5564 *** (16.32)	1.6879 *** (3.71)
L.Flows	0.9713 (0.12)	0.8785 (0.42)	-0.5831 (-0.30)	-0.4416 (-0.47)	0.1987 (0.42)	-0.0980 (-0.16)	-0.3622 * (-1.92)	0.7560 (1.43)

# Comparison with Market Risk (Kim, 2011)

- 1 Kim (2011) suggests the correlation  $\downarrow$  along the path of market integration.
- 2 But we find a  $\uparrow$  time trend in (21/63/125) 250-trading-day moving correlations.



# Comparison with Flight-to-quality (Cho et al., 2016)

- 1 Cho et al.(2016) suggest that “+” correlations only exist in “down” periods.
- 2 But we find “+” correlations in various up, down, non-crisis and crisis periods.

Panel A: Contemporaneous correlations between FX and local-currency equity returns during global up and down periods

	<i>Up period (MSCI World Returns &gt; 0)</i>	<i>Down period (MSCI World Returns &lt; 0)</i>	<i>Up period (LER &gt; 0)</i>	<i>Down period (LER &lt; 0)</i>	<i>Up period (MSCI EM Returns &gt; 0)</i>	<i>Down period (MSCI EM Returns &lt; 0)</i>
BSE (India)	0.3962*	<b>0.4184*</b>	0.2838*	<b>0.3627*</b>	0.3044*	<b>0.3711*</b>
NSE (India)	0.3873*	<b>0.4334*</b>	0.2492*	<b>0.3665*</b>	0.2989*	<b>0.3794*</b>
JSX (Indonesia)	0.2039*	<b>0.2088*</b>	0.1988*	<b>0.2365*</b>	0.1179*	<b>0.1472*</b>
Kospi (Korea)	0.2258*	<b>0.2707*</b>	0.2203*	<b>0.2782*</b>	0.1604*	<b>0.2513*</b>
Kosdaq (Korea)	0.2273*	<b>0.2783*</b>	0.1737*	<b>0.2538*</b>	0.1083*	<b>0.2809*</b>
PSE (Philippines)	<b>0.3401*</b>	0.2383*	0.1843*	<b>0.1890*</b>	<b>0.2404*</b>	0.1830*
TWSE (Taiwan)	0.2530*	<b>0.2688*</b>	0.1694*	<b>0.1879*</b>	0.1981*	<b>0.2263*</b>
SET (Thailand)	0.1584*	<b>0.2017*</b>	<b>0.2006*</b>	0.1437*	<b>0.1489*</b>	0.1294*

Panel B: Contemporaneous correlations between FX returns and LER during Asian and Dotcom crisis, non-crises and Global Financial Crisis periods

	<i>Asian and Dotcom Crisis (before Oct 9, 2002)</i>	<i>Non-crisis (Oct 10, 2002 to Aug 8, 2007)</i>	<i>Global Financial Crisis (from Aug 9, 2007 to Jul26, 2012)</i>	<i>Non-crisis (after Jul27 2012)</i>
BSE (India)	NA	NA	NA	0.5111*
NSE (India)	NA	NA	NA	0.5135*
JSX (Indonesia)	0.1832*	<b>0.3872*</b>	<b>0.3895*</b>	0.2283*
Kospi (Korea)	<b>0.2331*</b>	0.1810*	<b>0.5394*</b>	0.4514*
Kosdaq (Korea)	<b>0.1811*</b>	0.1667*	<b>0.5067*</b>	0.2271*
PSE (Philippines)	<b>0.2104*</b>	0.1832*	<b>0.3346*</b>	0.1792*
TWSE (Taiwan)	0.1378*	<b>0.2472*</b>	<b>0.4187*</b>	0.3821*
SET (Thailand)	<b>0.2148*</b>	0.1235*	0.2814*	<b>0.2975*</b>

# Robustness check I: Model reliability

- 1 Using flows without **winsorization**, or using **1-day lagged** flow data.
- 2 Adding **S&P500, NASDAQ, or Philadelphia Semiconductor Returns** as Richards (2005) into our VAR models once a time as a control variable.
- 3 Adding **MSCI World Returns, MSCI EM Returns or VIX** as Ulku and Weber (2014) into our VAR models once a time as a control variable.
- 4 Various **combinations** of different control variables above.
- 5 Alternative **order** of variables.
- 6 Alternative **number of lags**.



# Robustness check II: Using return differentials

- 1 Hau and Rey (2006) build their theory in a world with **two countries** and an exogenous setting of portfolio-rebalancing regarding return differentials.
- 2 There are more than two countries in this real world and it is not straight forward which country should be used as the **benchmark** (Richards, 2005, p8).
- 3 Kim (2011) finds different results using Japan as a benchmark. Cho et al.(2016) use **no differentials**, and find different results once Japan is excluded.

Panel C: Contemporaneous correlations between FX returns and local-currency equity return differentials (LERD) with different benchmarks

	<i>S&amp;P500</i>	<i>Nasdaq</i>	<i>Phil. Semiconductor</i>	<i>MSCI World</i>
BSE (India)	0.2433*	0.2322*	0.1652*	0.1905*
NSE (India)	0.2239*	0.2138*	0.1482*	0.1677*
JSX (Indonesia)	0.1254*	0.1001*	0.0628*	0.1282*
Kospi (Korea)	0.2073*	0.1731*	0.1217*	0.1942*
Kosdaq (Korea)	0.1599*	0.1254*	0.0867*	0.1178*
PSE (Philippines)	0.1139*	0.0866*	0.0494*	0.0585*
TWSE (Taiwan)	0.1712*	0.1490*	0.1014*	0.1241*
SET (Thailand)	0.1429*	0.1101*	0.0574*	0.1136*

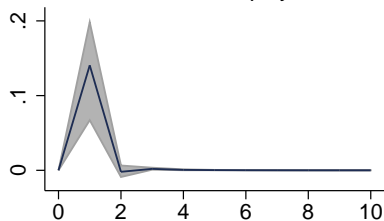
# Robustness check III: Changes in financial wealth

- 1 Scaling flows by **trading volume**.
- 2 Scaling flows by the **average of absolute flows** of previous 21/63/125/250 trading days.

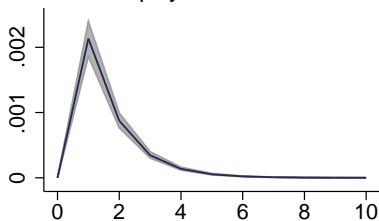
# Robustness check IV: Regional co-movement effect

General Impulse Response Functions from a tri-variate **Panel** VAR model

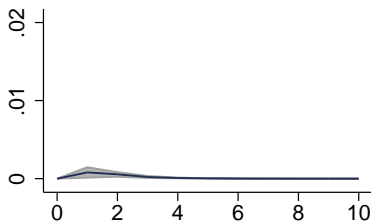
Panel A: FXReturns->EquityLocalReturns



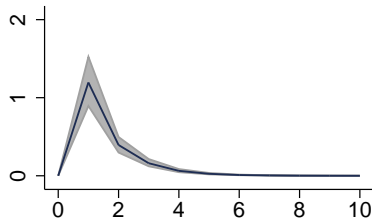
Panel B: EquityLocalReturns->Flows



Panel C: FXReturns->Flows



Panel D: Flows->FXReturns



# Robustness check V, VI, VII and theory

- 1 Use of **effective exchange rates**
- 2 Alternative **decomposing method** to generate expected and unexpected returns
- 3 Re-estimation at **weekly and monthly** horizons
- 4 We have replace the assumption of portfolio-rebalancing with **return-chasing** in the framework of Hau and Rey (2006) and derived **positive** correlation between FX return and equity return differentials.

# Summary of findings

Confirming the failure of the prediction of UEP in EMs:

- 1 “+” rather than “-” relationship between FXR and LER in EMs.
- 2 “+” in various up, down, non-crisis and crisis periods, and ↑ from 1990s.

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Regarding the 1st step of UEP, foreign investors in aggregate in EMs:

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Supporting the 2nd step of UEP:

- 1 Strong contemporaneous “+” relation between NEF and FXR.

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# Implications

- 1 For policy-makers in EMs, they should not only pay attention to their **equity markets**, but also to their **FX markets** regarding international capital flows.
- 2 For academics, other **missing rings** of UEP: The possibility that local-currency equity returns and FX returns are uncorrelated, cross-sectional testing, etc.

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- 3 For hedgers, **FX hedging** is helpful to their equity investments in EMs.
- 4 For speculators and arbitrageurs, **trading strategies** based on UEP (Cenedese et al., 2015) can be improved by incorporating international capital flows.