The Development of Local Currency Bond Markets and Uncovered Interest Rate Parity

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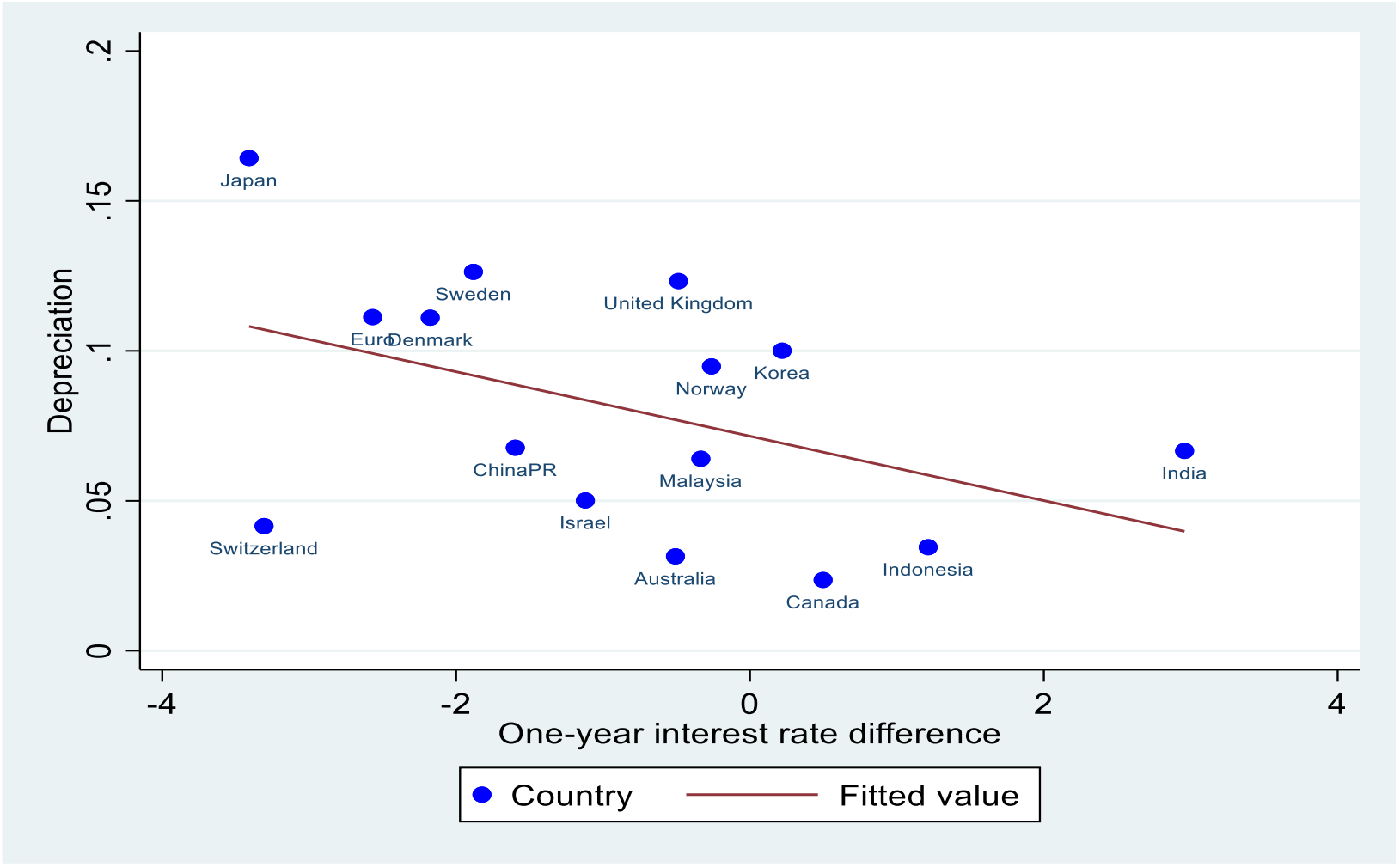
Very preliminary.

Motivation

- In response to the recent inflation surge, the Fed raises the policy rate rapidly.
- At the current pace of monetary tightening, the US interest rate will surpass that of not only developed countries but also some emerging countries.
- When it happens, unless the exchange rate is adjusted, capital flow to emerging market and developing economies will likely reverse, elevating financial risks to them.
- This reasoning heavily relies on the uncovered interest rate parity (UIP).
- A key question is where or not this uncovered interest rate parity (UIP) holds in EMEs and developing economies.

Figure 1. Interest Rate Difference and Depreciation of the Exchange Rate from January 2022 to August 2022



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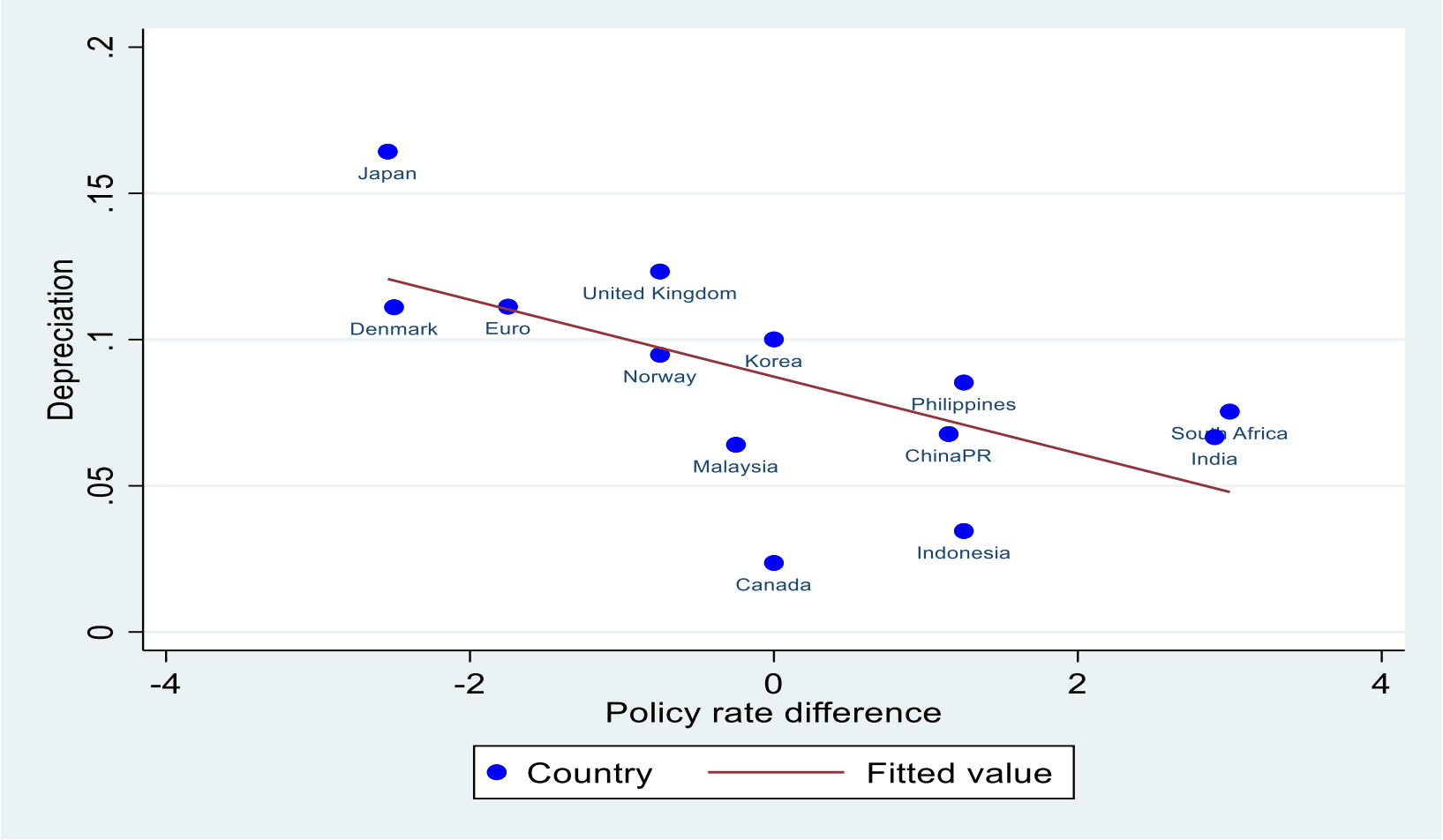


Motivation (cont.)

- Whether the UIP condition holds or not has been the subject of constant debate from the past.
- More recently, however, a number of studies show that the UIP condition holds at least between developed countries when forecasts are used for future expected exchange rates (Froot and Frankel (1989), Bussiere, Chinn, Ferrara, and Heipertz (2018), Kalemli-Özcan, 2021).
- While this is not true in all EMEs, the development of local currency bond markets (LCBMs) (Park, 2016; Park et al., 2020) and increased activities of nonbank financial institutions (NBFIs) in EMEs suggest that the UIP condition may hold more tightly at least for some EMEs.

Figure 2. Growth of Local Currency Bond Markets in Advanced and Emerging Economies

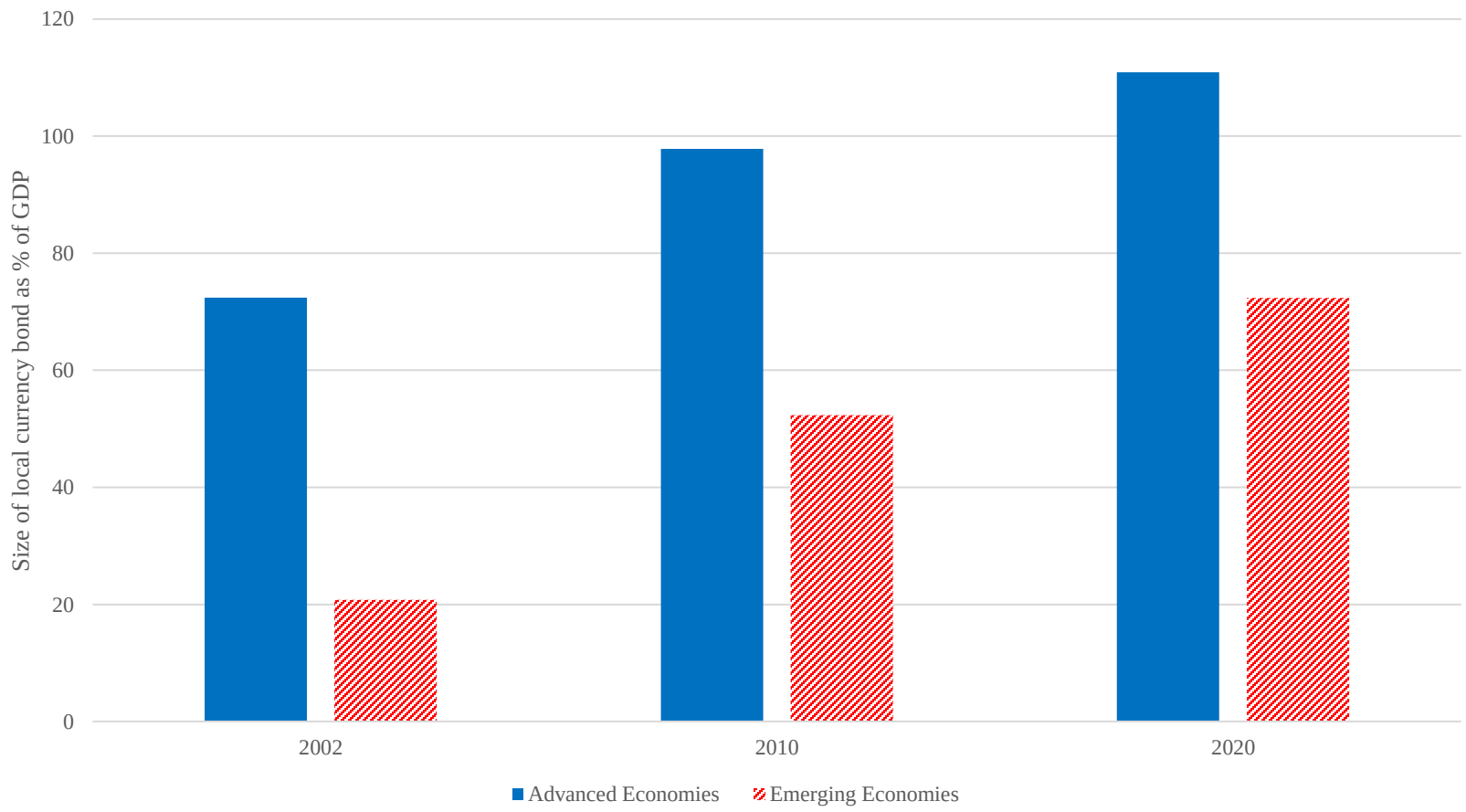
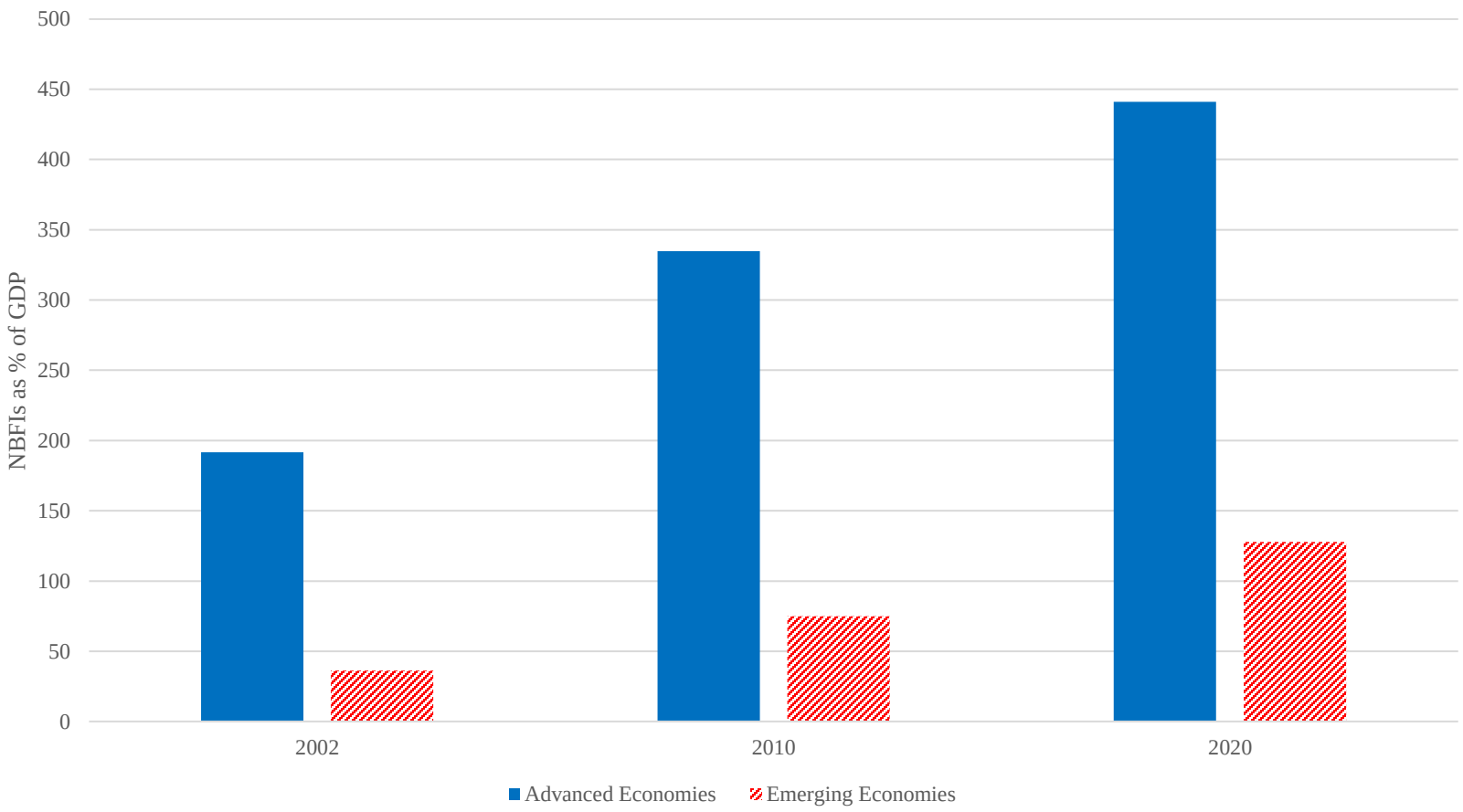


Figure 3. Growth of Nonbank Financial Institutions in Advanced and Emerging Economies



Issues addressed in the paper

- Whether the UIP condition will hold more closely in EMEs as LCBMs are more developed and NBFIs are more expanded.
- Whether the dynamics of the UIP premium in EMEs show more similar patterns to that of developed countries.
- Do capital flows to EME respond more sensitively to a deviation from the UIP condition if they have more developed LCBMs/NBFIs?
- Whether the original sin redux (Carstens and Shin, 2019) holds?
  - Does depreciation of the local currency lead bond investment outflows?
  - Is this relationship related to the size of the LCBMs or NBFIs?

Findings

- We find that as the LCBMs develop and the NBFIs expand, the UIP condition holds more tightly even in emerging economies.
  - The dynamics of the UIP premium in EMEs show more similar patterns to that of developed countries.
  - The deviation of the UIP condition decreases as LCBMs develop.
- Capital flows respond to a deviation of the UIP condition in advanced economies.
- In emerging economies, the larger the size of the LCBMs, the positive effect of the UIP premium on gross portfolio debt inflows is larger.

Findings (cont.)

- However, these findings do not necessarily imply that emerging economies are less vulnerable to large depreciations.
  - We find strong evidence of the original sin redux in both advanced and emerging economies.
  - While a larger size of LCBMs mitigates the negative effects of the original sin redux hypothesis in advanced economies, it aggravates the impact of actual exchange rate depreciation in emerging economies.

Data

- 11 advanced economies: Australia, Canada, Denmark, Israel, Japan, Euro Area, New Zealand, Norway, Sweden, Switzerland and the United Kingdom
- 8 emerging economies: China, India, Indonesia, Korea, Malaysia, Philippines, South Africa, Thailand.
- Sample period: 1996m1-2022m4
- Interest rates: One-year treasury bill rates, deposit rates
- Exchange rate forecasts: Consensus Economics (from major financial institutions)
- Size of LCBMs: BIS debt securities
- Size of NBFIs: Global Monitoring Report on Non-Bank Financial Intermediation

The UIP condition

$$E_t(S_{t+h})\left(1 + i_t^{US}\right) = S_t(1 + i_t)$$

S_t: the exchange rate in units of local currency per U.S. dollar at t

i_t and i_t^{US} are the interest rate of the country concerned and the U.S.

E_t:expectations over the horizon h conditional on the information at t

In log terms:

$$s_{t+h}^e - s_t = i_t - i_t^{US}$$

=> The interest rate differential should be exactly offset by depreciation of the local currency.

The Fama Puzzle

- Assuming rational expectations, Fama (1984) and Hansen and Hodrick (1980) use the realized exchange rate at $t + h$ as s^e_{t+h} and find that the coefficient is even negative.

  => Forward premium/discount puzzle

- The local currency appreciates rather than depreciates, further reinforcing the excess return caused by the interest rate differential.

Fama Regression

- Regress $s_{t+h} - s_t$ on $i_t - i_t^{US}$
- Whole sample period
  - 1996m1-2022m4
- Sample period 1 (before the GFC)
  - 1996m1-2007m12
- Sample period 2 (after the GFC and before the pandemic)
  - 2013m1-2019m12

Table 1. Fama Regression Using the Realized Values

Panel A: Whole sample period from 1996m1 to 2022m4

	Whole economies		Advanced economies		Emerging economies	
	OLS	Panel	OLS	Panel	OLS	Panel
Interest rate differential	0.34***	-0.18	0.28***	0.44***	0.22*	-0.52*
	(0.10)	(0.18)	(0.08)	(0.11)	(0.12)	(0.25)
Time dummies	YES	YES	YES	YES	YES	YES
R-squared	0.43	0.44	0.63	0.63	0.46	0.48
Observations	5410	5410	3137	3137	2273	2273

Panel B: Sample period 1 from 1996m1-2007m12

	Whole economies		Advanced economies		Emerging economies	
	OLS	Panel	OLS	Panel	OLS	Panel
Interest rate differential	0.34**	-0.61***	0.22**	0.01	0.17	-1.00***
	(0.14)	(0.19)	(0.09)	(0.21)	(0.15)	(0.25)
Time dummies	YES	YES	YES	YES	YES	YES
R-squared	0.38	0.40	0.62	0.62	0.45	0.49
Observations	2375	2375	1382	1382	993	993

Panel C: Sample period 2 from 2013m1-2019m12

	Whole economies		Advanced economies		Emerging economies	
	OLS	Panel	OLS	Panel	OLS	Panel
Interest rate differential	0.28***	-1.96***	0.72***	1.06	0.45***	-2.76***
	(0.07)	(0.60)	(0.18)	(1.55)	(0.09)	(0.69)
Time dummies	YES	YES	YES	YES	YES	YES
R-squared	0.45	0.50	0.62	0.65	0.43	0.52
Observations						

Findings in Table 1

- We use monthly data, and the horizon of the expectations is 12 months.
- All regressions include a constant term and time dummies.
- The panel regression results generate a negative coefficient for the whole country sample, consistent with the literature finding the Fama puzzle, but it is not statistically significant.
- The Fama puzzle is more severe in emerging economies.

Table 2. Fama Regression Using Forecast Values

Panel A: Whole sample period from 1996m1 to 2022m4

	Whole economies		Advanced economies		Emerging economies	
	OLS	Panel	OLS	Panel	OLS	Panel
Interest rate differential	0.21***	0.24	0.68***	1.07***	0.10**	-0.06
	(0.03)	(0.16)	(0.05)	(0.23)	(0.04)	(0.07)
Time dummies	YES	YES	YES	YES	YES	YES
R-squared	0.26	0.28	0.53	0.61	0.31	0.34
Observations	5611	5611	3248	3248	2363	2363

Panel B: Sample period 1 from 1996m1-2007m12

	Whole economies		Advanced economies		Emerging economies	
	OLS	Panel	OLS	Panel	OLS	Panel
Interest rate differential	0.30***	0.15	0.75***	0.93**	0.08*	-0.01
	(0.04)	(0.12)	(0.06)	(0.38)	(0.05)	(0.07)
Time dummies	YES	YES	YES	YES	YES	YES
R-squared	0.24	0.24	0.44	0.47	0.19	0.24
Observations	2356	2356	1363	1363	993	993

Panel C: Sample period 2 from 2013m1-2019m12

	Whole economies		Advanced economies		Emerging economies	
	OLS	Panel	OLS	Panel	OLS	Panel
Interest rate differential	0.09***	0.70	0.78***	1.28**	0.00	0.37
	(0.03)	(0.55)	(0.08)	(0.55)	(0.04)	(0.24)
Time dummies	YES	YES	YES	YES	YES	YES
R-squared	0.32	0.42	0.54	0.70	0.54	0.57
Observations	1596	1596	924	924	672	672

Findings in Table 2

- We use forecast values for the future exchange rate.
- For advanced countries, the coefficient of the panel regression is close to 1, consistent with the UIP condition.
- For emerging economies, the coefficient is close to zero, rejecting the UIP condition.
- If we divide the sample period, while not precisely estimated, the coefficient from the panel regression is much larger in period 2 than in period 1, suggesting that the Fama puzzle may have weakened in emerging economies in period 2.

The UIP premium

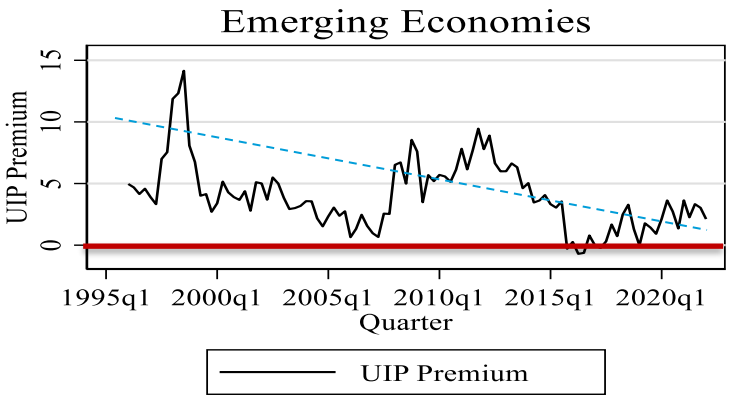
$$\lambda_{t+h}^{e} = \left(i_t - i_t^{US}\right) + \left(s_t - s_{t+h}^{e}\right)$$

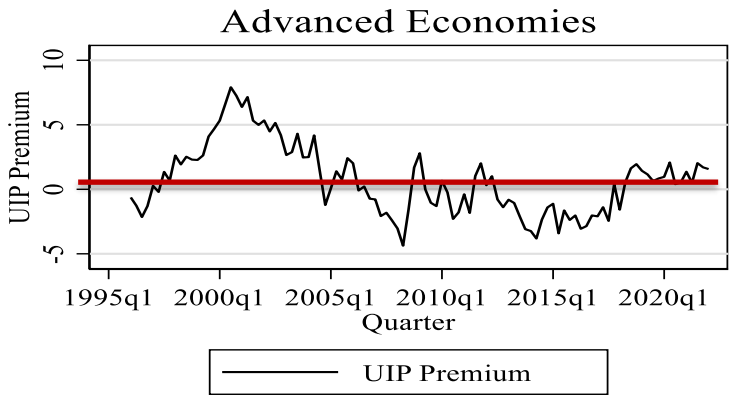
- The UIP premium is the sum of the interest rate (IR) differential, $i_t - i_t^{US}$, and the exchange rate (ER) adjustment, $s_{t+h}^{e} - s_t$.
- If the UIP condition holds, then the UIP premium is zero, i.e., $\lambda_{t+h}^{e} = 0$.
- If $\lambda_{t+h}^{e} > 0$, investing in the country concerned generates excess returns.

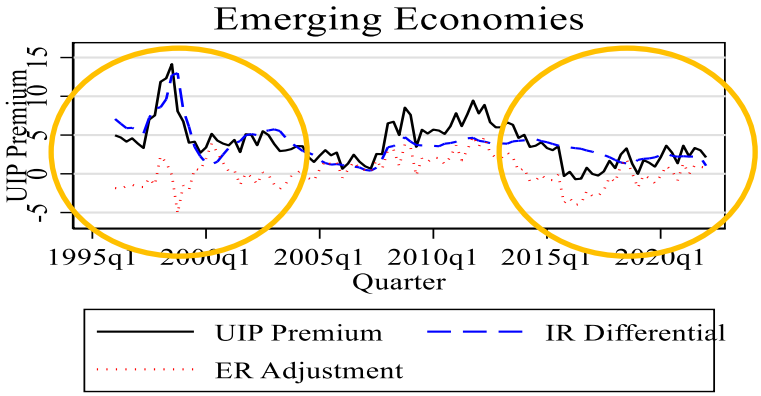
The UIP premium

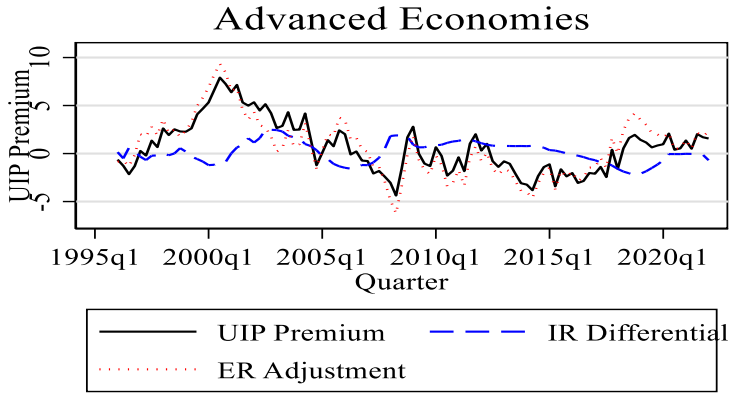
- Kalemli-Özcan and Varela (2021)
  - The comovement of the UIP premium and global risk perception (VIX) is explained by the comovement of the VIX with the IR differential in emerging economies.
  - This comovement is explained by the comovement of the VIX with the ER adjustment in advanced economies.
  - This makes the correlation between the UIP premium and the ER adjustment higher in advanced economies than in emerging economies.
  - On the other hand, the opposite is true for the correlation between the UIP premium and the IR differential.

Figure 4. Evolution of the UIP Premium in Advanced and Emerging Economies









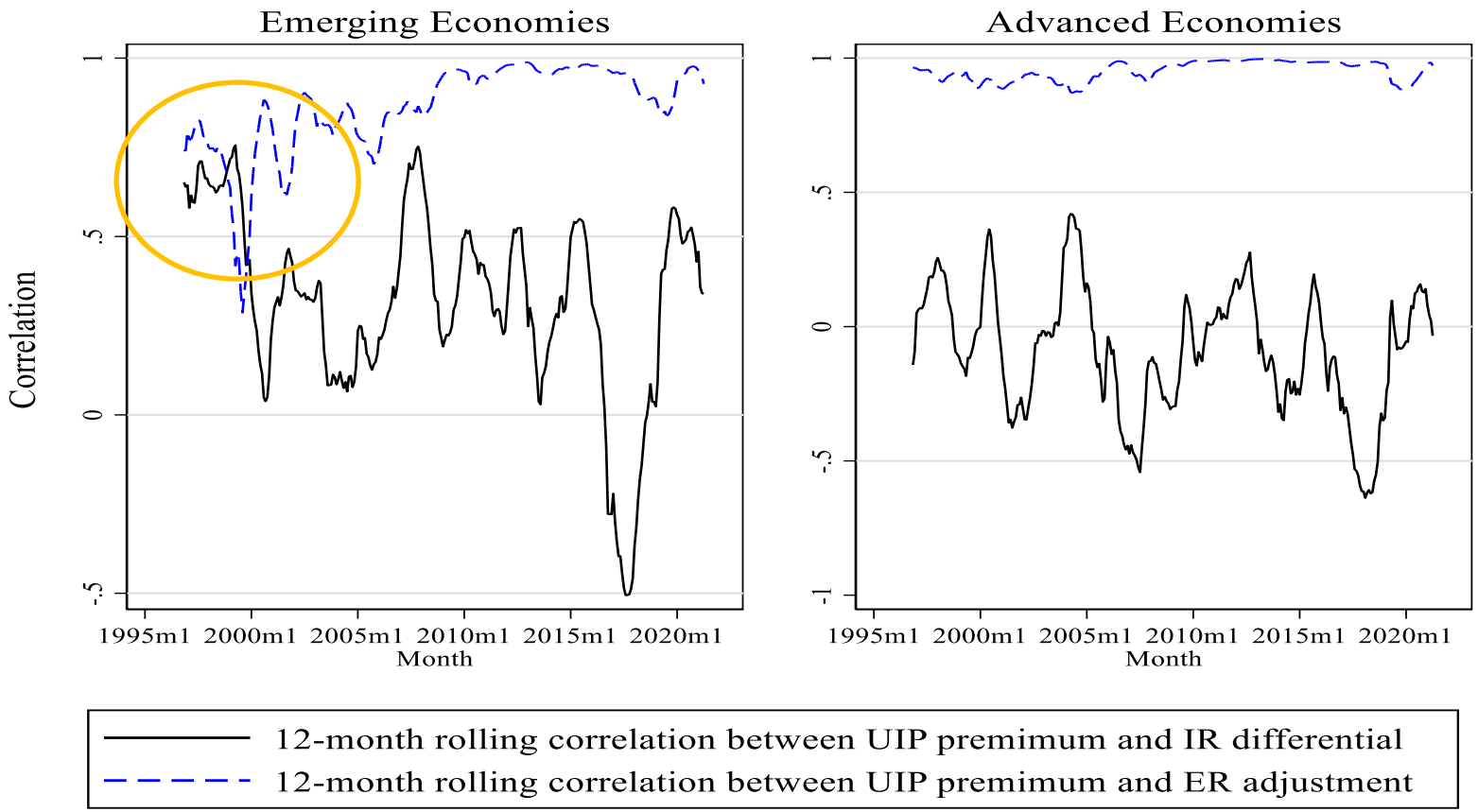
Findings from Figure 4

- We convert monthly data into quarterly data by taking quarterly averages.
  - We need this since capital flows are available only at the quarterly frequency.
- In emerging economies, the UIP premium remains largely positive (greater than zero), which suggests that the UIP condition does not hold.
- However, there has been a downward trend for the UIP premium, which is getting closer to zero in recent years.
- In advanced countries, it fluctuates around zero, indicating that the UIP condition holds on average.

Findings from Figure 4 (cont.)

- In advanced countries, the UIP premium comoves closely with the ER adjustment.
  - Even at the quarterly frequency, the correlation is also quite high at 0.92.
  - The movements in the IR differential contribute little to the movement of the UIP premium.
- In emerging economies, the movement of the UIP premium is better explained by that of the IR differential.
- However, this correlation pattern changes over time in emerging economies: while the UIP premium moves very closely with the IR difference in the earlier period, it moves more closely with the ER adjustment in the latter period.

Figure 5. Twelve-month Rolling Correlation between the UIP Premium and IR Differential/ER Adjustment



Findings from Figure 5

- We present twelve-month rolling correlations between the UIP premium and the IR differential/the ER adjustment.
- In advanced economies, over the entire period, the rolling correlation between the UIP premium and the IR differential is on average zero and placed much lower than that between the UIP premium and the ER adjustment.
- In emerging economies, the changing pattern of the rolling correlation shows that, over time, the movement of the UIP premium in emerging economies increasingly resembles that of advanced economies.

The development of LCBMs

- We have seen that the movements of the UIP premium and its two components in emerging economies bear increasingly more resemblance to those in advanced economies.
- What factors in emerging economies are driving such changes?
- We think it might be related to the rapid development of LCBMs in EMEs.

LCBMs and "original sin"

- "Original sin," referring to the fact that EMEs could not borrow long term in their local currencies, was considered as one of the most important sources of financial vulnerability in EMEs.
  - If a country's external liabilities are largely denominated in a foreign currency, a sudden depreciation of the local currency will rapidly deteriorate the financial position on the balance sheet, contributing to financial vulnerabilities.
  - In the aftermath of the 1997 crisis, ASEAN+3 countries made efforts to develop LCBMs as a top priority.

LCBMs and NBFIs

- Developing LCBMs requires a more balanced financial system that expands capital markets and the role of nonbank financial institutions (NBFIs), moving away from the bank-dominated financial system.
- These were common development approaches in emerging economies including those in Latin America.

Table 3. Local Currency Bond Markets and Non-bank Financial Institutions

	OLS		Panel	
	(1)	(2)	(3)	(4)
NBFI as % of GDP	0.14***	0.12***	0.21**	0.05
	(0.01)	(0.01)	(0.07)	(0.08)
Time dummies	NO	YES	NO	YES
R-squared	0.15	0.19	0.40	0.67
Observations	736	736	736	736

Table 4. The UIP Premium Dynamics and the Role of LCBMs and NBFIs

Panel A. UIP Premium

	Correlation between UIP premium and IR differential				Correlation between UIP premium and ER adjustment			
	OLS		Panel		OLS		Panel	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LCBM as % of GDP	-0.20***	-0.13***	0.02	-0.07	0.06***	0.03***	0.12**	0.11**
	(0.02)	(0.03)	(0.10)	(0.12)	(0.01)	(0.00)	(0.05)	(0.04)
VIX index	18.19***	22.21***	22.12***	24.31**	-1.29	2.16**	-0.68	2.16
	(3.47)	(4.73)	(6.73)	(10.22)	(0.84)	(1.08)	(1.42)	(2.36)
NBFI as % of GDP		-0.07***		0.03		0.01***		-0.01
		(0.01)		(0.03)		(0.00)		(0.01)
R-squared	0.07	0.16	0.03	0.04	0.07	0.11	0.04	0.04
Observations	1572	736	1572	736	1572	736	1572	736

Findings in Panel A of Table 4

- The regression results in columns (1)-(4) show that the more developed LCBMs are, the less is the correlation between the UIP and the IR differential.
- In column 2, the development of NBFIs also contributes similarly to the low correlation between the UIP premium and the IR differential.
- A rise in VIX increases the correlation, which is also a feature in emerging economies, emphasized in Kalemli-Özcan and Varela (2021).
- In columns (5)-(8), the coefficient of the LCBMs is positive and highly statistically significant.
- In column 2, we also find that the coefficient of NBFIs is positive and statistically significant, which is consistent with our interpretation.

Table 4. The UIP Premium Dynamics and the Role of LCBMs and NBFIs (cont.)

Panel B. log VIX

	Correlation between log VIX and IR differential				Correlation between log VIX and ER adjustment			
	OLS		Panel		OLS		Panel	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LCBM as % of GDP	-0.05**	-0.06**	-0.42***	-0.30	-0.06***	-0.12***	0.35***	0.32**
	(0.02)	(0.03)	(0.10)	(0.20)	(0.02)	(0.03)	(0.11)	(0.13)
VIX index	21.88***	10.64**	18.72***	8.85	-2.02	13.35***	1.53	15.92*
	(3.30)	(4.86)	(5.82)	(9.89)	(3.09)	(4.17)	(5.57)	(7.38)
NBFI as % of GDP		-0.02**		-0.04		0.02**		0.03
		(0.01)		(0.06)		(0.01)		(0.04)
R-squared	0.03	0.02	0.06	0.03	0.01	0.04	0.04	0.06
Observations	1572	736	1572	736	1572	736	1572	736

Findings in Panel B of Table 4

- Instead of the UIP premium, we use the VIX and its correlations with the IR differential and the ER adjustment as dependent variables.
- We find that the coefficient of LCBMs is all negative, and statistically significant in columns (1)-(3), which shows that the correlation between the VIX and the IR differential gets lower as LCBMs develop, and this is the feature of advanced economies.
  - We also find a similar evidence for NBFIs.
- The results are mixed for the correlation between the VIX and the ER adjustment.
  - The panel regression results are more consistent with our interpretation.

Does a deviation from the UIP condition decrease as LCBMs develop?

- An important feature of emerging economies is that the UIP condition does not hold and the UIP premium is on average positive.
- We test whether the development of LCBMs contributes to less deviation from the UIP condition by regressing the absolute value of the UIP premium on the size of LCBMs.

Table 5. The Deviation from the UIP Condition and the Development of LCBMs and NBFIs

	OLS		Panel	
	(1)	(2)	(3)	(4)
LCBM as % of GDP	-0.01***	-0.01***	-0.02*	0.00
	(0.00)	(0.00)	(0.01)	(0.01)
NBFI as % of GDP		-0.01***		-0.00
		(0.00)		(0.00)
VIX index	2.45***	1.82***	2.37***	1.90**
	(0.30)	(0.39)	(0.68)	(0.66)
R-squared	0.09	0.21	0.07	0.07
Observations	1617	736	1617	736

Capital Flows and the UIP Premium

- Under normal circumstances, an increase in the UIP premium will attract capital flows to a country.
- We test this implication in Table 6.
- We divide total gross capital inflows into gross portfolio equity inflows, gross portfolio debt inflows (bond) and gross bank borrowings.

Table 6. The Impact of the UIP Premium on Capital Inflows

Panel A.												
	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
L.UIP premium	0.00	0.01	0.31**	0.41**	-0.02	0.00	0.48**	0.58**	0.04	0.03	0.03	0.12
	(0.02)	(0.02)	(0.13)	(0.16)	(0.03)	(0.04)	(0.20)	(0.24)	(0.03)	(0.02)	(0.02)	(0.07)
L.VIX index	0.34	0.01	-5.87***	-6.00***	0.64	-0.03	-8.09**	-8.06**	-0.17	0.08	-2.19**	-2.49***
	(0.36)	(0.48)	(1.97)	(2.08)	(0.55)	(0.76)	(3.06)	(3.22)	(0.28)	(0.34)	(0.67)	(0.68)
R-squared	0.00	0.00	0.02	0.02	0.01	0.00	0.03	0.02	0.00	0.00	0.04	0.02
Observations	1715	1696	1725	1696	1053	1053	1059	1053	662	643	666	643

Findings in Panel A of Table 6

- In advanced economies, a rise in the UIP premium increases gross bank borrowings and total gross capital inflows.
  - Bank borrowings are largely short-term, making them more sensitive to a change in the UIP premium.
- However, a rise in the UIP premium does not induce any type of capital inflows in EMEs.
  - The UIP premium in an emerging country is associated with perceived market and/or credit risks, thereby discouraging foreign investors to invest in the country.

Table 6. The Impact of the UIP Premium on Capital Inflows (cont.)

Panel B.

	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
L.UIP premium	-0.01	-0.05	0.37	0.26	-0.03	-0.06	0.63*	0.51	-0.07*	-0.07	0.03	-0.09
	(0.03)	(0.04)	(0.22)	(0.29)	(0.04)	(0.06)	(0.33)	(0.45)	(0.03)	(0.04)	(0.07)	(0.08)
L.UIP premium*L.LCBM	0.00	0.001*	-0.00	0.00	0.00	0.00	-0.00	-0.00	0.001***	0.001**	0.00	0.003**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
L. LCBM	-0.01	-0.01	-0.05	-0.09	0.00	-0.01	-0.07	-0.11	-0.03	-0.00	0.00	-0.04**
	(0.01)	(0.01)	(0.04)	(0.06)	(0.01)	(0.02)	(0.06)	(0.08)	(0.02)	(0.01)	(0.01)	(0.01)
L.VIX index	0.46	0.17	-6.50**	-6.80**	0.88	-0.05	-9.64**	-10.03**	-0.12	0.47	-1.61***	-1.63**
	(0.40)	(0.57)	(2.52)	(2.81)	(0.57)	(0.89)	(3.93)	(4.40)	(0.37)	(0.49)	(0.30)	(0.56)
R-squared	0.01	0.00	0.02	0.03	0.01	0.00	0.03	0.04	0.04	0.01	0.03	0.03
Observations	1496	1477	1498	1477	940	940	942	940	556	537	556	537

Table 6. The Impact of the UIP Premium on Capital Inflows (cont.)

Panel C.

	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
L.UIP premium	-0.00	-0.02	0.02	0.16	0.05	0.06	-0.74	-0.48	-0.02	0.02	0.15**	0.26*
	(0.05)	(0.05)	(0.15)	(0.14)	(0.14)	(0.11)	(0.61)	(0.61)	(0.05)	(0.03)	(0.04)	(0.10)
L.UIP premium*L.NBFI	-0.00	0.00	0.001*	0.00	-0.00	0.00	0.003**	0.00	0.00	0.00	-0.001***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
L.NBFI	-0.00	-0.01	-0.04	-0.07*	-0.00	-0.01	-0.04	-0.07	-0.01**	0.01**	0.00	-0.01
	(0.00)	(0.01)	(0.03)	(0.03)	(0.00)	(0.01)	(0.03)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
L.VIX index	0.27	-0.39	-8.63*	-9.93**	0.63	-0.41	-13.53*	-14.75*	-0.24	-0.11	-1.79**	-2.36*
	(0.52)	(0.41)	(3.91)	(4.14)	(0.72)	(0.56)	(6.05)	(6.28)	(0.64)	(0.37)	(0.46)	(1.10)
R-squared	0.01	0.04	0.06	0.09	0.01	0.04	0.07	0.10	0.02	0.03	0.07	0.06
Observations	767	748	767	748	453	453	453	453	314	295	314	295

Findings in Panels B&C of Table 6

- As expected, the size of LCBMs affects the relationship mainly through gross portfolio debt inflows.
  - The larger the size of the LCBMs, the positive effect of the UIP premium on gross portfolio debt inflows is larger.
  - Interestingly, this effect is driven mostly by EMEs.
- The effect of the NBFIs works mainly through bank borrowings, but the results are mixed.

Original Sin Redux
Carstens and Shin (2019)

- The development of LCBMs was intended to mitigate financial vulnerability in emerging economies.
- However, local currency denominated debts can trigger an unwinding of carry trades by global portfolio investment firms by shifting the risk of currency mismatches in emerging economies to international investors.
- A sudden currency depreciation lowers the value of assets denominated in local currency on the balance sheets of global investors, pressuring the value-at-risk constraints and thereby triggering a flight to safety away from emerging market economies.

Table 7. The Impact of Expected Exchange Rate Adjustment on Capital Inflows

	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
ER adjusment	-0.01	-0.08*	0.30	0.31	-0.00	-0.10	0.39	0.40	-0.02	-0.05	0.05	0.05
	(0.02)	(0.04)	(0.17)	(0.20)	(0.02)	(0.06)	(0.23)	(0.26)	(0.03)	(0.04)	(0.04)	(0.11)
L.VIX	0.35	0.21	-5.22***	-5.00**	0.56	0.20	-7.02**	-6.62*	0.04	0.19	-2.28**	-2.24**
	(0.33)	(0.44)	(1.74)	(1.90)	(0.50)	(0.71)	(2.72)	(3.00)	(0.30)	(0.34)	(0.73)	(0.79)
R-squared	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.05	0.02
Obs.	1754	1738	1771	1735	1072	1075	1085	1072	682	663	686	663

Table 8. The Impact of Actual Exchange Rate Adjustment on Capital Inflows

Panel A												
	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
Actual ER	0.02	0.21***	0.12	0.29*	-0.00	0.26**	0.15	0.31	0.05*	0.14**	0.10	0.28**
	(0.02)	(0.07)	(0.14)	(0.14)	(0.03)	(0.11)	(0.26)	(0.25)	(0.02)	(0.05)	(0.06)	(0.10)
L.VIX	0.33	-0.06	-4.79**	-4.67**	0.56	-0.22	-6.50**	-6.25*	0.01	0.10	-2.21**	-2.19**
	(0.33)	(0.49)	(1.70)	(1.89)	(0.50)	(0.81)	(2.78)	(3.07)	(0.34)	(0.38)	(0.71)	(0.81)
R-squared	0.00	0.04	0.02	0.02	0.00	0.04	0.02	0.02	0.01	0.05	0.06	0.08
Observations	1761	1745	1778	1742	1079	1082	1092	1079	682	663	686	663

Findings in Panel A of Table 8

- In Table 8, instead of using the ER adjustment, $s_t - s^e_{t+h}$, we use its one period lagged value which we call the actual ER adjustment (an appreciation), $s_{t-h} - s_t$, as an explanatory variable.
- We find strong evidence of the original sin redux.
  - Gross portfolio debt inflows increase (decrease) when the exchange rate appreciates (depreciates),

Table 8. The Impact of Actual Exchange Rate Adjustment on Capital Inflows (cont.)

Panel B

	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
Actual ER	0.06	0.37**	0.06	0.46*	0.03	0.53**	0.11	0.59	-0.01	0.00	-0.03	-0.08
	(0.04)	(0.16)	(0.17)	(0.24)	(0.06)	(0.22)	(0.32)	(0.39)	(0.08)	(0.12)	(0.08)	(0.19)
Actual ER*L.LCBM	-0.00	-0.00	0.00	-0.00	-0.00	-0.003*	0.00	-0.00	0.002*	0.00	0.002***	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
L.LCBM	-0.01	-0.01	-0.05	-0.09	0.00	-0.01	-0.07	-0.12	-0.02	0.00	0.00	-0.03**
	(0.01)	(0.01)	(0.04)	(0.06)	(0.01)	(0.02)	(0.06)	(0.08)	(0.02)	(0.00)	(0.01)	(0.01)
L.VIX	0.41	-0.05	-5.63**	-6.11**	0.81	-0.33	-8.41*	-8.95*	-0.13	0.42	-1.49***	-1.55*
	(0.36)	(0.59)	(2.34)	(2.60)	(0.53)	(0.92)	(3.75)	(4.07)	(0.36)	(0.49)	(0.36)	(0.71)
R-squared	0.01	0.05	0.02	0.03	0.01	0.06	0.03	0.04	0.08	0.08	0.06	0.13
Observations	1507	1488	1509	1488	951	951	953	951	556	537	556	537

Table 8. The Impact of Actual Exchange Rate Adjustment on Capital Inflows (cont.)

Panel C

	Whole economies				Advanced economies				Emerging economies			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total	Equity	Bond	Bank	Total
Actual ER	0.08	0.12*	-0.70	-0.38	-0.07	0.22	-1.60**	-1.18	0.12	0.08	0.10	0.27
	(0.05)	(0.06)	(0.40)	(0.40)	(0.10)	(0.22)	(0.58)	(0.64)	(0.07)	(0.04)	(0.11)	(0.16)
Actual ER*L.NBFI	-0.001*	0.00	0.005*	0.00	0.00	-0.00	0.01**	0.01*	-0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
L.NBFI	-0.00	-0.01	-0.04	-0.06*	-0.00	-0.01	-0.05	-0.07*	-0.01	0.01**	-0.00	-0.01
	(0.00)	(0.01)	(0.03)	(0.03)	(0.00)	(0.01)	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.02)
L.VIX	0.17	-0.42	-8.35**	-9.93**	0.60	-0.53	-12.42*	-14.35*	-0.37	-0.05	-1.55**	-2.06
	(0.47)	(0.45)	(3.56)	(3.97)	(0.69)	(0.73)	(5.15)	(5.63)	(0.62)	(0.48)	(0.43)	(1.18)
R-squared	0.01	0.05	0.09	0.11	0.01	0.06	0.11	0.13	0.11	0.08	0.07	0.13
Observations	770	751	770	751	456	456	456	456	314	295	314	295

Findings in Panels B&C of Table 8

- In advanced economies, a larger LCBM mitigates the negative effects of the original sin redux hypothesis.
- However, a larger size of NBFIs aggravates the problem of the original sin redux in advanced economies
- In emerging economies, the larger the LCBMs, the stronger the effect of the actual exchange rate.
- As far as the original sin redux is concerned, the size of NBFIs is irrelevant in emerging economies.

Conclusion

- The development of LCBMs and NBFIs in EMEs makes the UIP condition more tightly held and the patterns of the UIP dynamics become more assimilated to that of advanced countries.
- However, these findings do not necessarily imply that emerging economies are less vulnerable to sudden depreciations since the development of the LCBMs makes EMEs more sensitive to the original sin redux.