The dollar, bank leverage and the deviation from covered interest parity*

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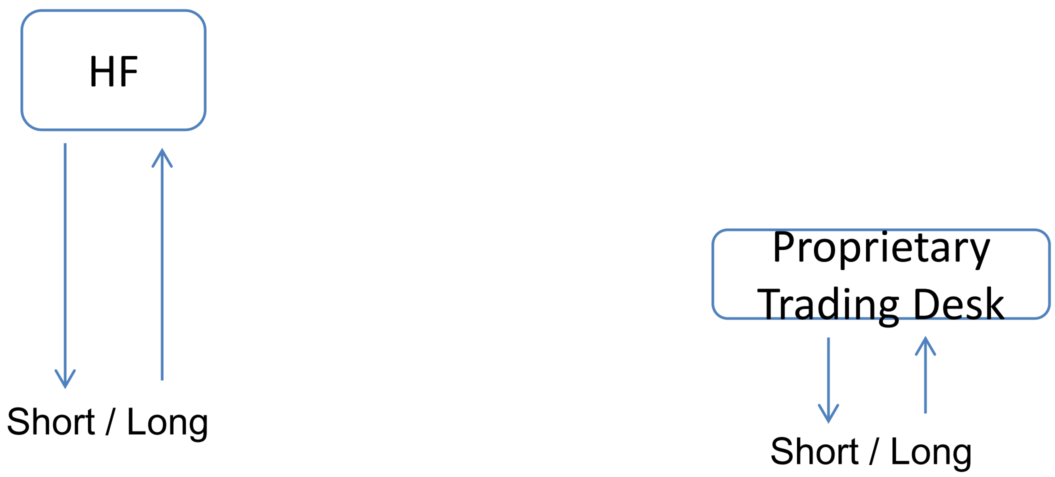
Key Results

1. Time Series: A stronger USD is correlated with larger deviations from CIP
2. Cross-section: *Currencies* with larger beta of CIP deviation to USD strength, are those with larger CIP deviations in the cross section
3. The result holds also for EUR

Interpretation: “USD is a proxy for a *global* risk factor: shadow price of bank leverage.”

Ecosystem of Arbitrage



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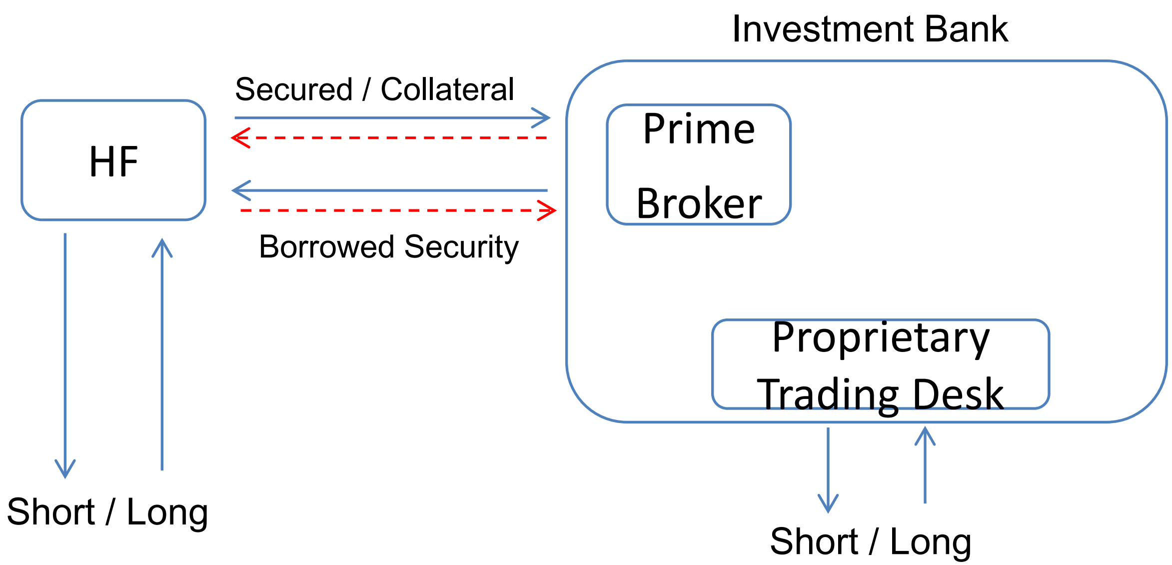

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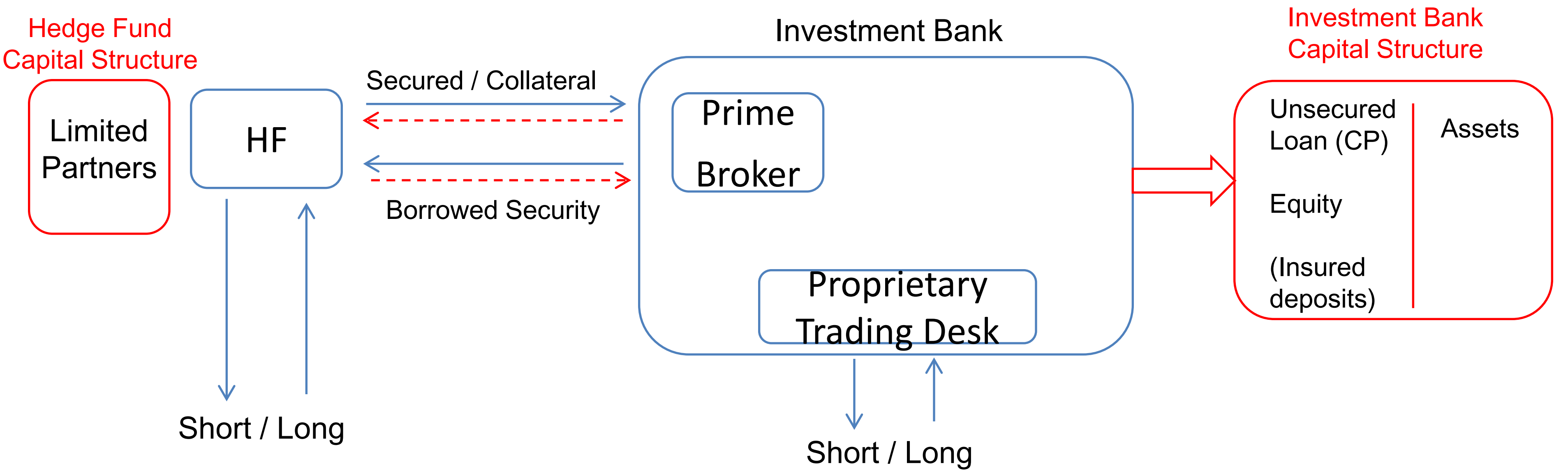

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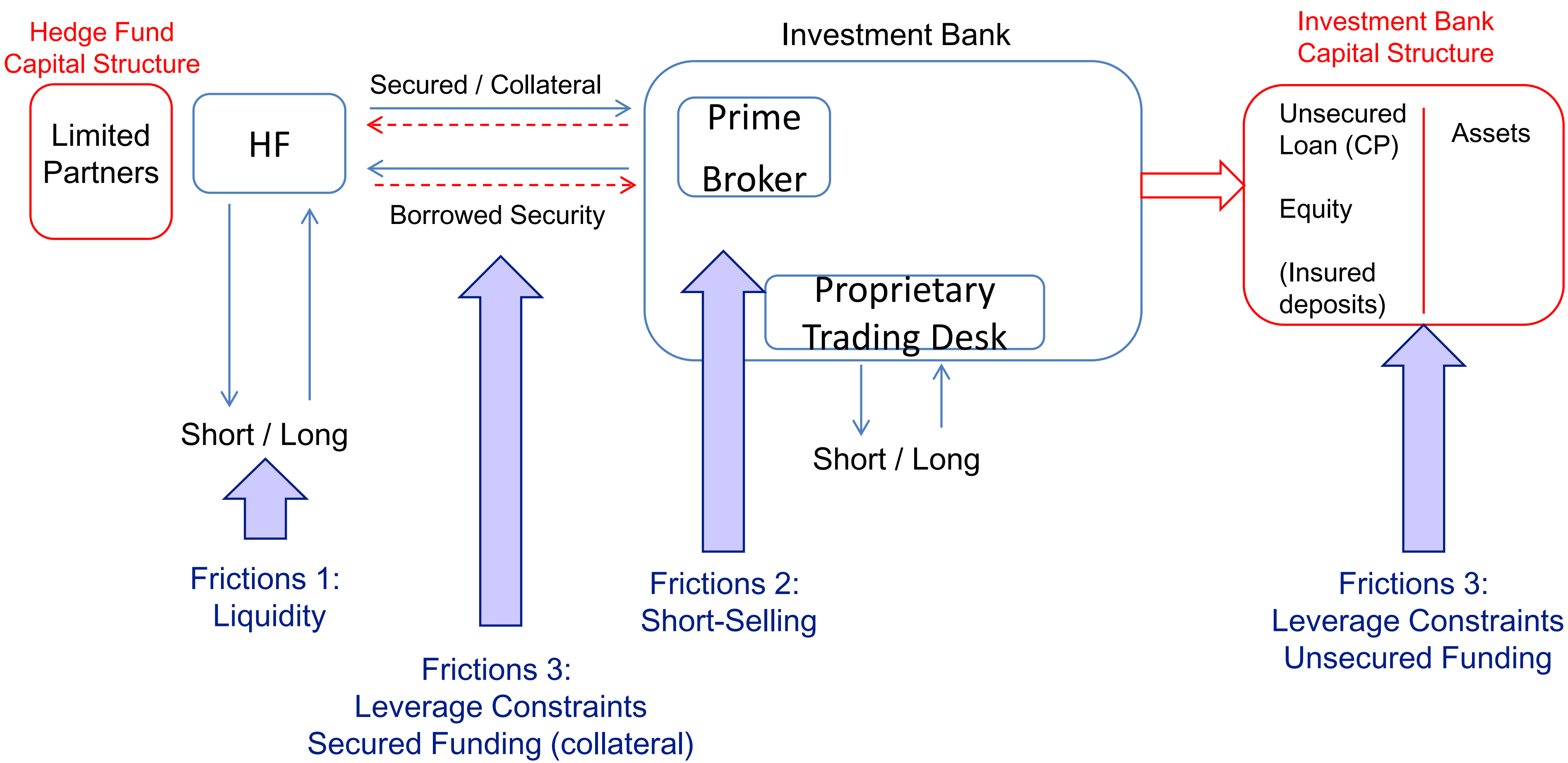

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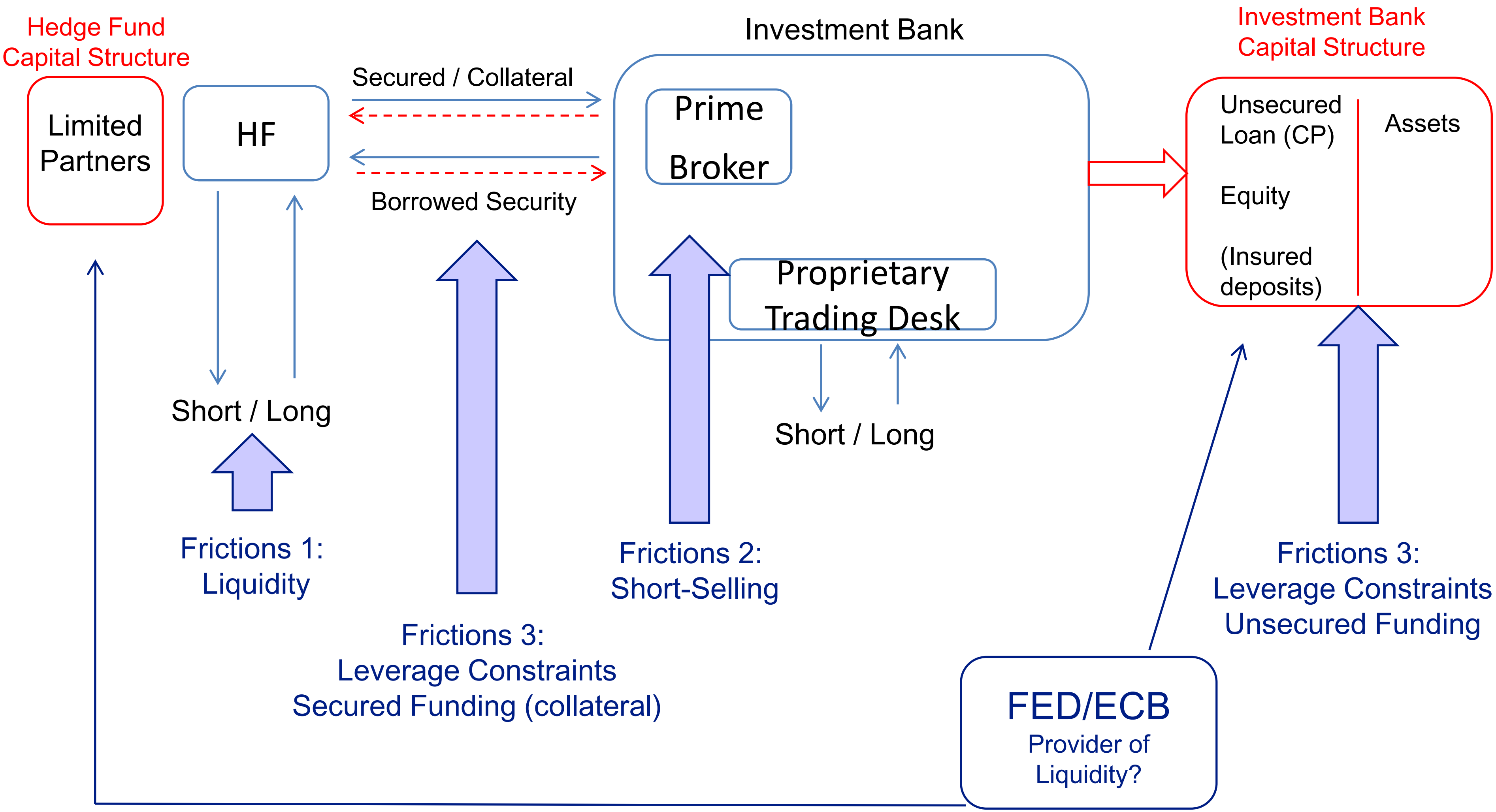
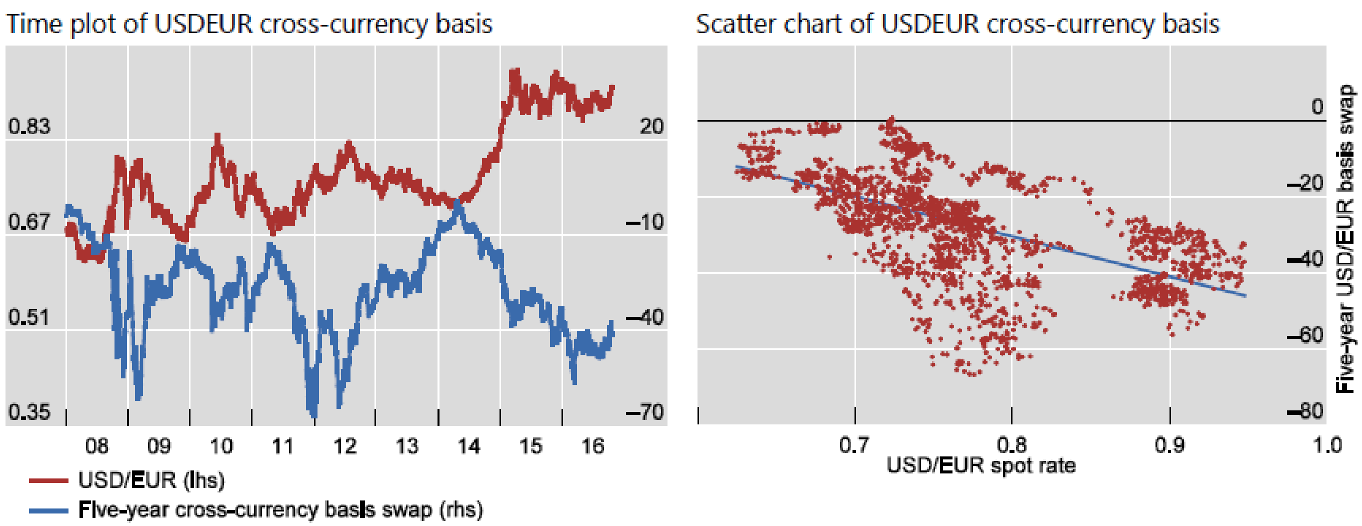


The EURUSD Basis and the EURUSD

Cross-currency basis of euro against the dollar Figure 2



Source: Bloomberg.

- Significant contemporaneous correlation (at daily level) of EURUSD FX and the Basis
- Stronger USD -> Bigger Basis -> Synthetic USD becomes more expensive

Result #1 (Time Series)

- Specification: $$\Delta x_{it} = \alpha_i + \beta \Delta Dollar_t + \gamma \Delta BER_{it} + \delta \prime \mathrm{CONTR}_{it} + \varepsilon_{it}$$

Dollar = USD Trade-weighted index (USD and basket)

BER = Bilateral Exchange Rate (USD and country-i)#

CONTR = lnVIX, FX-Vol(USD-i), etc..

1. *Global* USD appreciation correlates with widening of CIP deviations.
2. *Bilateral* USD appreciation is not important.
3. The result holds at daily frequency
4. 100bp of USD appreciation -> 2.1bp of CIP widening

Regression results of the 3-month cross-currency basis (daily frequency) Table 2

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_t$	-2.641***		-2.915***	-2.908***	-2.307***	-2.080***
	(0.682)		(0.786)	(0.793)	(0.731)	(0.634)
ΔBER_{it}		-0.440*	0.228	0.284	0.238	0.239
		(0.236)	(0.233)	(0.238)	(0.222)	(0.194)
$\ln VIX_t$				0.000596	0.00135	0.00130
				(0.00489)	(0.00477)	(0.00417)
$\Delta \ln VIX_t$				-0.0183	0.00465	-0.0158
				(0.0231)	(0.0237)	(0.0191)
$\Delta \ln Vol_{it}$					-0.263***	-0.221***
					(0.0613)	(0.0519)
ΔRR_{it}					0.0112*	0.0110
					(0.00587)	(0.00748)
$\Delta(y_{it} - y_t^{US})$						0.106***
						(0.0367)
$\Delta(ts_{it} - ts_t^{US})$						-0.140***
						(0.0492)
Observations	21,555	21,949	21,555	20,896	20,495	18,092
R-squared	0.016	0.002	0.016	0.016	0.026	0.038

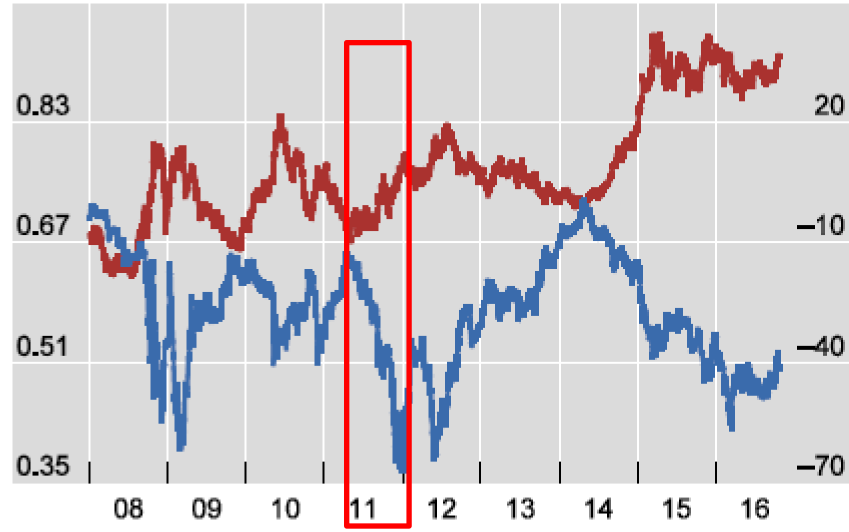
Economic Significance (D)

- The result is super interesting!
- Caveat: The economic significance is not massive

  In 2011, the CIP Basis changed by 70bp in 7 months, while the FX by 8%

  8 x 2.1bp = 16.8bp (vs. 70bp)
- Still, the result is certainly interesting
- Even more important is the lack of importance of the bilateral exchange rate

Time plot of USDEUR cross-currency basis



Economic Significance (Q)

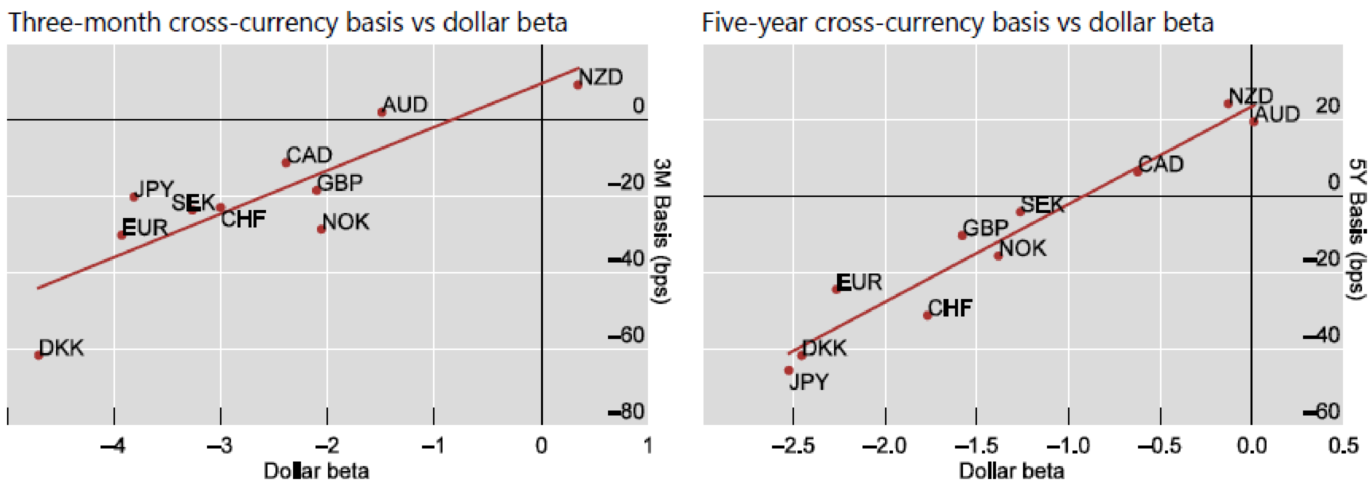
Regression results of the 5-year cross-currency basis (quarterly frequency) Table 3

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_t$	-1.399***		-1.293***	-1.071***	-1.078***	-0.965**
	(0.303)		(0.437)	(0.370)	(0.404)	(0.404)
ΔBER_{it}		-0.562***	-0.0738	-0.0885	-0.0398	-0.409**
		(0.126)	(0.137)	(0.126)	(0.148)	(0.202)

- The economic significance is halved at quarterly frequency.
- Moreover, at this frequency the country specific effect (BER) matters

Result #2 (Cross-Section)

- First, estimate a CIP beta: $$\Delta x_{it} = \alpha_i + \beta_i \Delta Dollar_t + \epsilon_{it}$$
- Is there a cross-sectional pattern between CIP and Beta?



- This is a fascinating result. However,
  - You use contemporaneous variations. The results could be just mechanical.. by definition $\beta_i = \Delta x / \Delta USD$, countries with the largest changes in the Basis are those with the largest beta (contemporaneously). You should do this similarly to Fama-MacBeth.
  - Also, a formal test is missing.

Result #3 (Role of Banking Frictions)

- Is a strong USD negative news for banks equity (relative to their index?

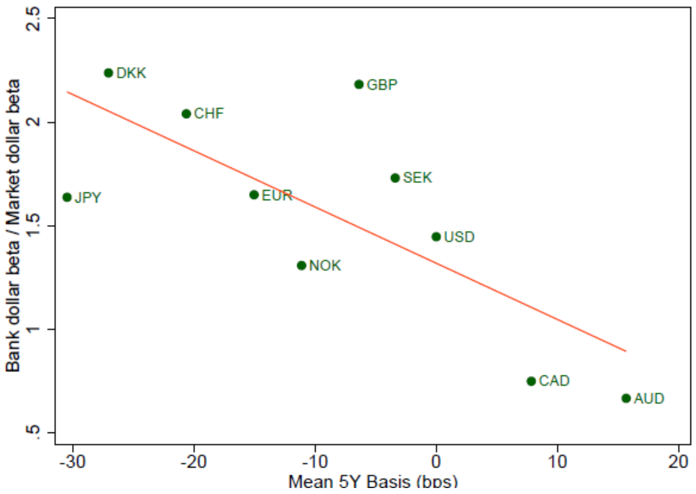
Table 7: Regressions of bank equity returns on the broad dollar movements

	(1) Bank Equity Return	(2) Bank Equity Return	(3) Bank Equity Return
$\Delta Broad_t$	-2.016***	-0.268**	-0.0303
	(0.127)	(0.103)	(0.0838)
$\Delta Broad_t \times bs_t$			2.875***
			(0.808)
$\Delta Market_t$		1.246***	1.236***
		(0.0527)	(0.0524)
Constant	-0.00444***	-0.00762***	-0.00728***
	(3.25e-05)	(0.000122)	(0.000166)
Observations	3,755	3,755	3,755
R-squared	0.102	0.452	0.459

Notes: In all three columns, the dependent variable is the quarterly equity return in local currency. The independent variables are $\Delta Broad_t$, quarterly change in the broad dollar index ($\Delta Broad_t > 0$ indicates broad appreciation), $\Delta Broad_t \times bs_t$, the interaction between the broad dollar movement and the 5-year cross-currency basis, and $\Delta Market_t$, quarterly benchmark equity index return. All regressions include bank fixed effects and use robust standard errors clustered by banks, $^{***}p < 0.01$, $^{**}p < 0.5$ and $^{*}p < 0.1$.

- Column 1: +1% USD appreciation -> -2% in bank equity.
- Column 2: After controlling for Market, -0.2% return. Very small
- Column 3: The results survives for countries with large Basis

- Interpretation:
  - AUD and CAD have bank equities that are insensitive to USD fluctuation *and* positive basis
  - DKK and CHF have bank equities that are very sensitive to USD *and* very negative basis.



Why does it matter?

- Main hypothesis: Stronger USD, lower bank lending in USD. The channel that generates CIP deviations is *global* bank lending friction.
- The friction is currency specific, it is *not country* specific.

Bilateral Panel Regressions: US dollar-denominated cross-border lending, by borrowing sector — Table 5

	All sectors			Banks			Non-banks		
Panel A: Q1/2002 – Q3/2015	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta Dollar_t$	-0.591***		-0.490***	-0.752***		-0.614***	-0.401***		-0.338***
	(0.055)		(0.066)	(0.103)		(0.119)	(0.058)		(0.068)
ΔBER_{it}		-0.209***	-0.107***		-0.275***	-0.146**		-0.137***	-0.066*
		(0.043)	(0.041)		(0.062)	(0.062)		(0.039)	(0.040)
Constant	5.068	5.286	5.237	-4.308	-4.866*	-4.411	3.338	3.477	3.443
	(3.272)	(3.252)	(3.256)	(2.741)	(2.538)	(2.701)	(3.131)	(3.125)	(3.129)
Observations	6,215	6,215	6,215	6,207	6,207	6,207	6,211	6,211	6,211
R^2	0.048	0.040	0.050	0.030	0.026	0.031	0.035	0.031	0.035

Currency (i.e *Global*)
or
Country Specific (i.e. *Local*) Explanation?

More Insights from the Cross-Section

DOLLAR FUNDING AND THE LENDING BEHAVIOR OF GLOBAL BANKS

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CIP: Currency or Country Specific?

- Let's focus on USDEUR, but consider sovereign bonds issued by different countries.

$$Basis^*(t, T+t) = \underbrace{\frac{F_{t,T+t}}{X_t}(1 + R^a_{t,T+t}) - (1 + R^b_{t,T+t})}_{\text{CIRP Component}} + \underbrace{\frac{F_{t,T+t}}{X_t} S^a_{t,T+t} - S^b_{t,T+t}}_{\text{Bond Spread Component}} .$$

- The Total basis is due to: (1) FX CIP violation, *plus* (2) Bond specific Basis.

- We know that FX CIP is violated, but how large is the contribution of the bond specific (country, instead of currency) component ?

- Let's focus on the country specific component, instead of the currency component.

- This allows us to investigate the importance of the "USD channel" versus "Country specific" funding structure (like different currency exposures)

Implementation via Asset Swap

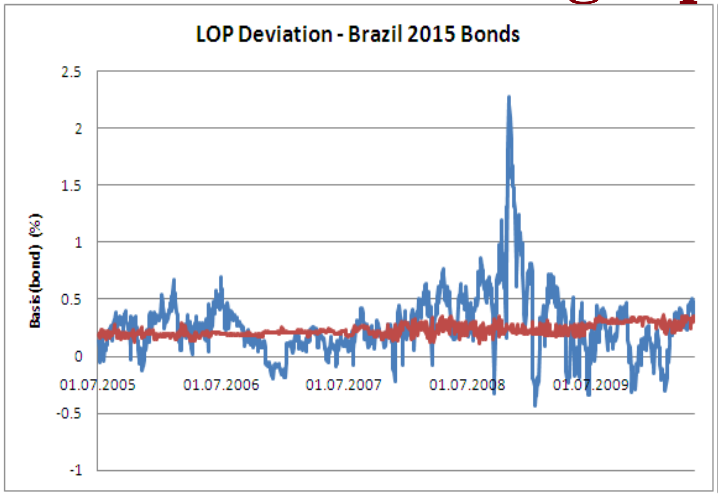
- EXAMPLE. Brazil issues two bonds maturing on March 7 2015, one denominated in USD and one in EUR.

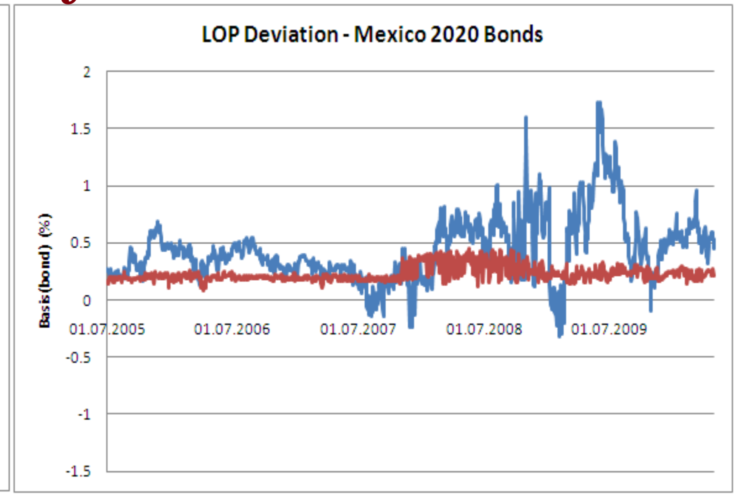
- Take the 7.375% Eur bond and do an asset swap to convert into Usd cash flows using traded FX forward strips. This creates a synthetic Usd-denominated bond.
- If cash flows were identical, LOP applies.
- We match the face value, the coupon stream do not match exactly. Thus, we define:

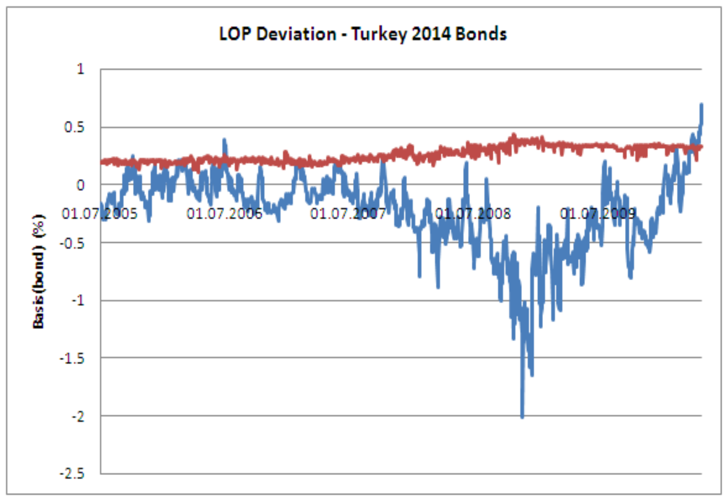
$$Basis = Yield(B_{usd}) - Yield(\mathbb{S} \circ B_{Eur})$$

- The difference in the two bond spreads is equal to the cost of hedging the FX risk.

The Geography of the Basis







- The sign of the Basis is different even keeping the currency pair constant:
- Example: the correct strategy for the trader is:
  - Turkey – Long USD bonds and Short Euro bonds
  - Mexico and Brazil – Long Euro bonds and Short USD bonds
- Cannot be explained by a single common risk factor affecting all these markets at the same time.

Data on Geographical Exposure

- From BIS: detailed data on the geographical distribution of bank holdings:
  - All contractual lending by the head office, and all its branches (and subsidiaries) on a worldwide consolidated basis but disaggregated by country exposure.
  - We strip out all other forms of lending to focus exclusively on *sovereign bond exposure*.
  - The classification is based on "**Ultimate Risk**" (as opposed to "**Immediate Borrower**"). Namely, the country where the guarantor of the claim is located, or in other words, where the domestic bank head office is located. The exposures of the foreign branches and subsidiaries are included.
  - Example: a purchase by the Morgan Stanley *London* branch of Turkish bonds, for instance, contributes to the exposure of its *U.S. head office*.

Table 2
Banks holding exposure and international reserve distribution
Panel A displays the time evolution of the distribution of European and U.S. banks' on-balance sheet exposure to Brazilian, Mexican, and Turkish aggregate amounts of external sovereign bonds based on "ultimate risk," covering the sample from 2005 to 2010. Panel B displays the time evolution of the distribution of foreign asset values to total foreign assets for the Central Bank of Brazil (Banco Central do Brazil) and the Central Bank of Turkey (Turk Merkez Bankasi), covering the sample from 2004 to 2010. The reserve distribution data preceding 2008 are not available for Turkey. Foreign assets include the following currencies: the U.S. dollar (USD), euro (EUR), and others (e.g., Japanese yen (JPY), British pound (BGP), Canadian dollars (CAD), Australian dollars (AUD)).

Panel A: Banks' holding exposure

Year/quarter	**Brazil**		**Mexico**		**Turkey**	
	Europe	*U.S.*	*Europe*	*U.S.*	*Europe*	*U.S.*
2005-Q4	8.7%	81.6%	10.0%	85.0%	75.0%	9.0%
2006-Q4	8.5%	84.0%	10.0%	83.0%	81.0%	10.0%
2007-Q4	11.0%	81.0%	10.0%	84.0%	83.0%	11.0%
2008-Q4	9.0%	81.0%	9.0%	85.0%	80.0%	11.0%
2009-Q4	7.6%	85.0%	8.0%	83.0%	79.0%	8.0%
2010-Q4	10.0%	82.0%	5.0%	85.0%	79.0%	9.0%

Hypothesis

- Turkish Example: Turkish assets bonds are mostly funded by European balance sheets (2008Q4: 80% of claims were held in Europe vs. 11% in USA
- Brazil and Mexico: the opposite is true.

Main Message from Data:

1) Existence of a geographical dispersion in the funding markets of sovereign bonds.
2) Countries that rely more on funding from European (resp., American) banks are also those with higher cost of USD (EUR) financing, during the credit crisis.
3) During the crisis, the relative cost of funding through outside capital (unsecured commercial paper) versus inside capital (insured deposits) increases. That rise makes funding of USD-denominated assets by European banks increasingly expensive in comparison to euro-denominated assets.
4) The opposite holds for American banks, which then find funding euro-denominated assets more expensive than funding dollar assets.

Summary

- Both papers are extremely interesting and well written
- They highlight two slightly different channels/frictions that may give rise to CIP deviations
- More should be done in terms of understanding the Geography of Risk Capital and to distinguish currency vs. country specific channels
- Both papers will be very influential.