

# The Dollar, Bank Leverage and Deviations from Covered Interest Rate Parity

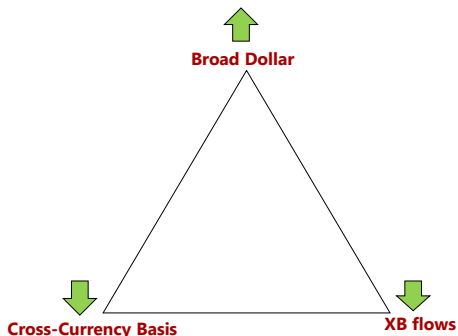
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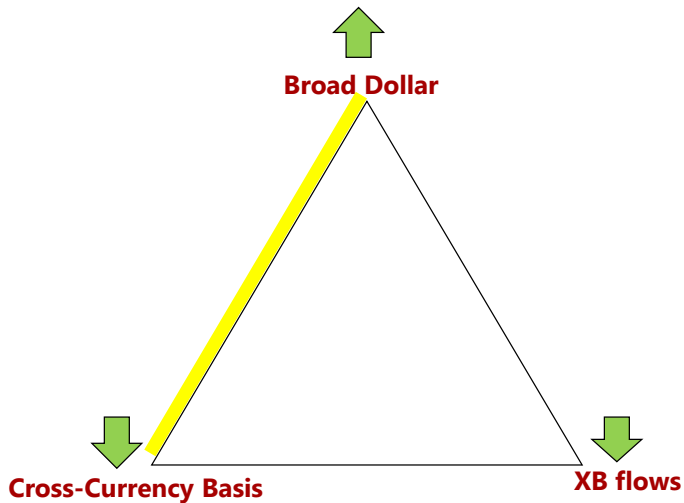
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# Spot-Basis-XB Flows Triangle



- ▶ Stronger dollar, wider CIP deviations, lower cross-border lending in dollars
- ▶ The dollar is a risk barometer in global capital markets: stronger dollar, higher shadow cost of banks' balance sheet capacity and lower bank leverage.

# Spot and Basis



# Broad Dollar and the Basis



The red line shows the Federal Reserve Board's US trade-weighted broad dollar index, with higher values indicating a stronger US dollar. The blue line is the simple average of the five-year cross currency basis swap spreads for AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, NZD and SEK vis-à-vis the US dollar.

Sources: Board of Governors of the Federal Reserve System; Bloomberg.

# Regression of 3M Basis on the Dollar

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_t$	-2.641*** (0.682)		-2.915*** (0.786)	-2.908*** (0.793)	-2.307*** (0.731)	-2.080*** (0.634)
$\Delta BER_t$		-0.440* (0.236)	0.228 (0.233)	0.284 (0.238)	0.238 (0.222)	0.239 (0.194)
$\ln VIX_t$				0.000596 (0.00489)	0.00135 (0.00477)	0.00130 (0.00417)
$\Delta \ln VIX_t$				-0.0183 (0.0231)	0.00465 (0.0237)	-0.0158 (0.0191)
$\Delta \ln Vol_t$					-0.263*** (0.0613)	-0.221*** (0.0519)
$\Delta RRR_t$					0.0112* (0.00587)	0.0110 (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

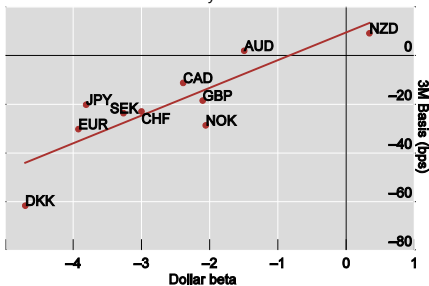
# Regression of 5Y Basis on the Dollar

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_t$	-1.399*** (0.303)		-1.293*** (0.437)	-1.071*** (0.370)	-1.078*** (0.404)	-0.965** (0.404)
$\Delta BER_t$		-0.562*** (0.126)	-0.0738 (0.137)	-0.0885 (0.126)	-0.0398 (0.148)	-0.409** (0.202)
$\ln VIX_t$				-0.0338 (0.0250)	-0.0326 (0.0248)	-0.0383* (0.0223)
$\Delta \ln VIX_t$				-0.0472** (0.0238)	-0.0398 (0.0279)	-0.0108 (0.0342)
$\Delta \ln Vol_t$					-0.0188 (0.0436)	0.0144 (0.0333)
$\Delta RR_t$					-0.00327 (0.00987)	-0.00450 (0.00937)
$\Delta(y_{it} - y_t^{US})$						-0.0929*** (0.0236)
$\Delta(ts_{it} - ts_t^{US})$						0.0152 (0.0151)
Observations	360	360	360	360	358	316
R-squared	0.191	0.117	0.191	0.208	0.209	0.278

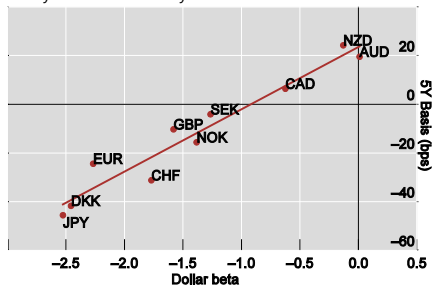
# Cross-Currency Basis vs. Dollar Beta

- ▶ Dollar beta by currency:  $\Delta x_{it} = \alpha_i + \beta_i \Delta \text{Dollar}_t + \epsilon_{it}$
- ▶ The dollar beta is strongly correlated with the level of the basis.
- ▶ The dollar is a potential risk factor pricing the cross-sectional of CIP arbitrage returns.

Three-month cross-currency basis vs dollar beta



Five-year cross-currency basis vs dollar beta



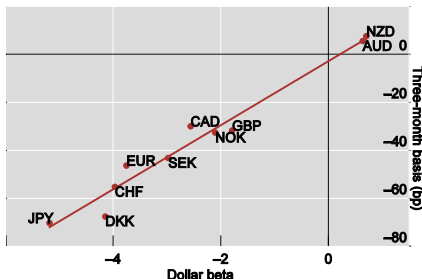
# The Dollar and Basis after the U.S. Election

- ▶ The relationship between the dollar beta and the basis is strongly confirmed in the event study after the U.S. election.

Changes in the broad dollar index and three-month cross-currency basis since the US election

Currency	8/11/ 2016	29/11/ 2016	change	dollar beta <sup>1</sup>
Broad dollar	122.8	127.6	4.8 (3.9%)	
AUD	5.5	8.0	2.5 bps	0.64
CAD	-30.0	-40.0	-10.0 bps	-2.56
CHF	-55.3	-70.8	-15.5 bps	-3.97
DKK	-67.5	-83.7	-16.2 bps	-4.14
EUR	-46.4	-61.0	-14.7 bps	-3.75
GBP	-31.8	-38.8	-7.0 bps	-1.79
JPY	-70.3	-90.5	-20.3 bps	-5.18
NZD	7.5	10.3	2.8 bps	0.70
NOK	-32.6	-40.8	-8.2 bps	-2.10
SEK	-43.2	-54.9	-11.6 bps	-2.98

Cross-currency basis vs dollar beta<sup>2</sup>



<sup>1</sup> The dollar beta is calculated as the ratio of changes in the three-month cross-currency basis over changes in the broad US dollar index between 8 November and 29 November 2016.

<sup>2</sup> The vertical axis shows the three-month cross-currency basis expressed in basis points on 8 November 2016, while the horizontal axis indicates the dollar beta.

Sources: Board of Governors of the Federal Reserve System; Bloomberg; BIS calculations.



# Alternative Base Currency

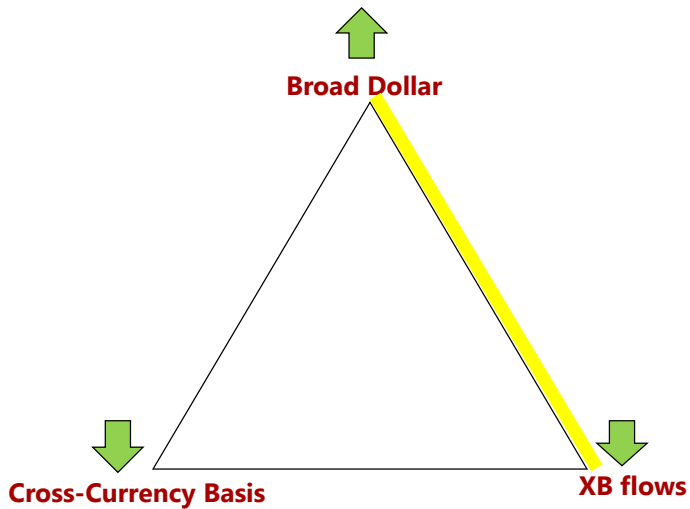
- ▶ The relationship between basis and the dollar is not mechanical.
- ▶ When we calculate the basis using another major currency as the base currency. Only for the euro, the spot and basis relationship is robust at both short and long maturity .

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	AUD	CAD	CHF	DKK	EUR	GBP	JPY	NOK	NZD	SEK
<b>Panel (A): 3-month basis, daily frequency</b>										
$\Delta \overline{NEER}_t^{(j)}$	-0.0963	-0.179	-0.0476	-0.633***	-0.378**	-0.165	-0.231	0.114	0.0677	-0.598***
	(0.209)	(0.209)	(0.274)	(0.239)	(0.174)	(0.194)	(0.232)	(0.206)	(0.270)	(0.159)
<b>Panel (B): 5-year basis, quarterly frequency</b>										
$\Delta \overline{NEER}_t^{(j)}$	0.156	0.093	-0.143	-0.418*	-0.589**	-0.0722	-0.119	-0.142	0.241	-0.14
	-0.32	-0.293	-0.162	-0.233	-0.232	-0.206	-0.283	-0.172	-0.302	-0.183

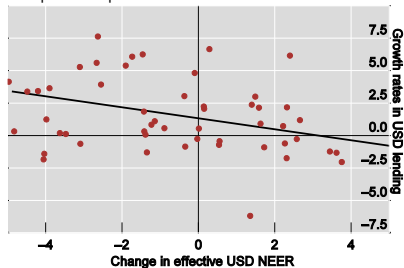
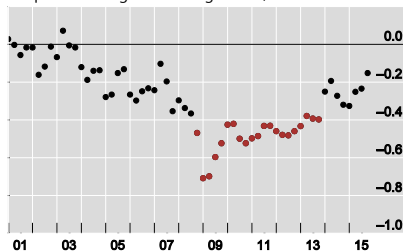
This table reports regression coefficients of changes in the cross-currency basis of currency  $i$  against the base currency  $j$  on changes in the aggregate exchange rate against the base currency  $j$ ,  $\Delta \overline{NEER}_t^{(j)}$ , controlling for changes in the bilateral exchange rate of  $i$  against  $j$ , and the log level and changes in VIX. The variable  $\Delta \overline{NEER}_t^{(j)}$  is the change in the BIS nominal effective exchange rate for currency  $j$ . Each column corresponds to a different base currency. Panel A is performed on daily changes for the 3-month basis and Panel B is performed on quarter changes for the 5-year basis.

Sources: Bloomberg; BIS bilateral exchange rates ; BIS calculations

# Spot and XB Flows



# Regression of Aggregate \$XB Flows on the Dollar

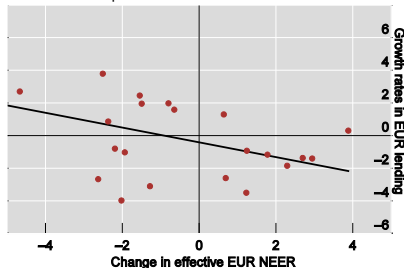
Complete sample<sup>1</sup>20 quarter rolling window regression, all sectors<sup>2</sup>

# Panel Regression of Bilateral \$XB Flows on the Dollar

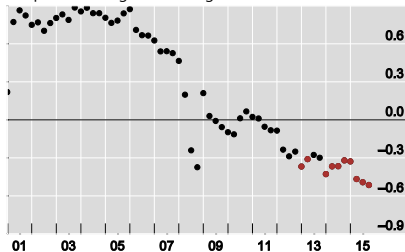
$\Delta Dollar_t$	-0.636***		-0.486***
	(0.062)		(0.073)
$\Delta BER_{it}$		-0.295***	-0.155***
		(0.043)	(0.041)
Constant	-4.178*	-4.649**	-4.289*
	(2.264)	(2.163)	(2.237)
Observations	3,975	3,975	3,975
R <sup>2</sup>	0.076	0.068	0.080

# Regression of Euro-XB Flows on the EUR NEER

Post-crisis sample<sup>1</sup>



20 quarter rolling window regression, all sectors<sup>2</sup>



# Our Model

- ▶ A risk-neutral bank has two business lines:
  - ▶ Lend \$ to FX-mismatched borrowers (e.g. EME corporates) with gross return  $r_1$ .
  - ▶ Provide \$ in the FX swap market with gross return  $r_2$ .
- ▶ B/S identity:  $a_1 + a_2 = e + d$ .
- ▶ Bank maximizes profits subject to a VaR constraint:

$$\max_{a_1, a_2} \mathbb{E}(r_1 a_1 + r_2 a_2)$$

subject to  $\alpha \sigma_r \leq e$ .

- ▶ Let  $\mu_1 = \mathbb{E}(r_1)$  and  $\mu_2 = \mathbb{E}(r_2)$  and  $\Sigma$  be the covariance of returns.
  - ▶  $\mu_2 - 1$  is the absolute value of the basis.

## Solving the Model

- ▶ Let  $\lambda$  be the Lagrange multiplier on the b/s constraint,

$$\lambda = \frac{\alpha}{2e} \sqrt{u' \Sigma^{-1} u}.$$

- ▶ Optimal supply of dollar loans from the banking sector:

$$\begin{bmatrix} A_1 \\ A_2 \end{bmatrix} = \frac{E}{\alpha} \frac{1}{\sqrt{u' \Sigma^{-1} u}} \Sigma^{-1} \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix}.$$

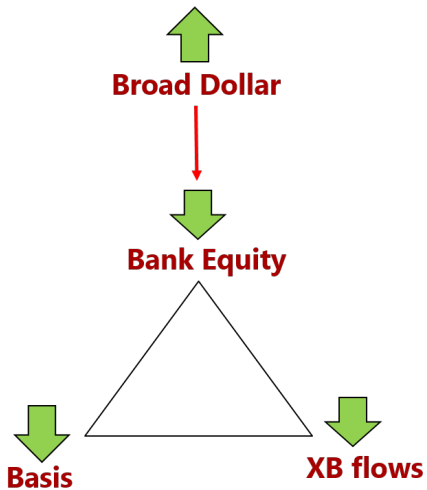
- ▶ Market clearing after imposing downward-sloping demand curves for dollars in the loan and FX swap markets:

$$\begin{bmatrix} X_1(\mu_1) \\ X_2(\mu_2) \end{bmatrix} = \frac{E}{\alpha} \frac{1}{\sqrt{u' \Sigma^{-1} u}} \Sigma^{-1} \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix}.$$

## Proposition

*An appreciation of the dollar entails a widening of the basis and a contraction of bank lending in dollars.*

# Extended Triangle





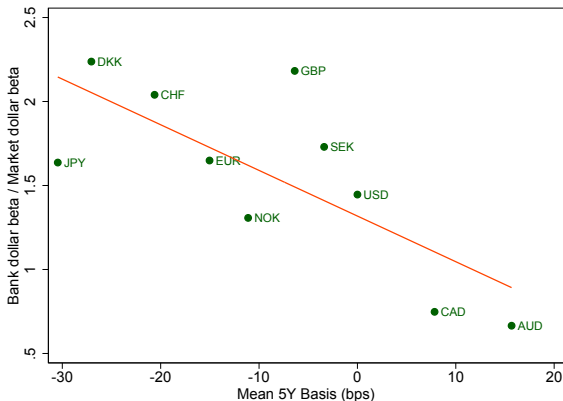
# Impact of A Stronger Dollar on Bank Equities

## Regressions of bank equity returns on the broad dollar movements

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

# Dollar, Bank Equity and the Basis

Bank equity's dollar beta (normalized by market's dollar beta) vs. the basis



- ▶ A stronger dollar has a negative effect on bank equities.
- ▶ The effect is stronger for banks in countries with a more negative cross-currency basis, or a more severe dollar shortage.

# Conclusion

- ▶ Triangular relationship among
  - ▶ The value of the dollar
  - ▶ CIP deviations
  - ▶ XB lending denominated in the dollar
- ▶ The U.S. dollar is a barometer of risk-bearing capacity in global capital markets.
  - ▶ A stronger dollar adversely affects bank equities, which limits the banks' balance sheet capacity,
  - ▶ CIP deviations widen and XB lending declines due to a higher shadow cost of bank balance sheet capacity.