Global banks and synthetic funding: the benefits of foreign relatives

Fernando Eguren-Martin
Bank of England &
University of Oxford

Matias Ossandon Busch
Halle Institute for Economic Research (IWH)

Dennis Reinhardt
Bank of England

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Motivation

Cross-border banking flows are sizeable and have remained so after 2008...

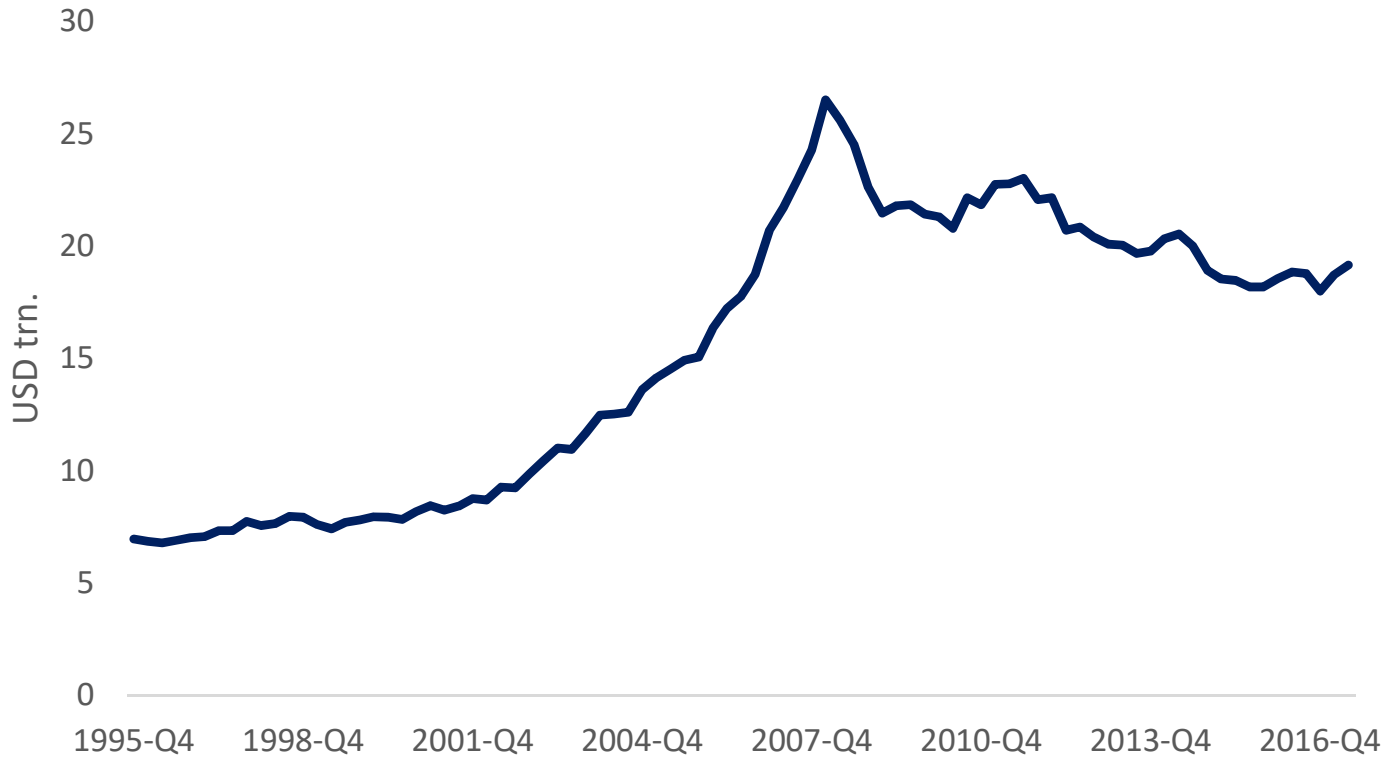


Fig.1: *Global cross border bank claims in nominal USD trillions. Authors' elaboration based on BIS locational statistics.*

Motivation

... and UK leads the pack

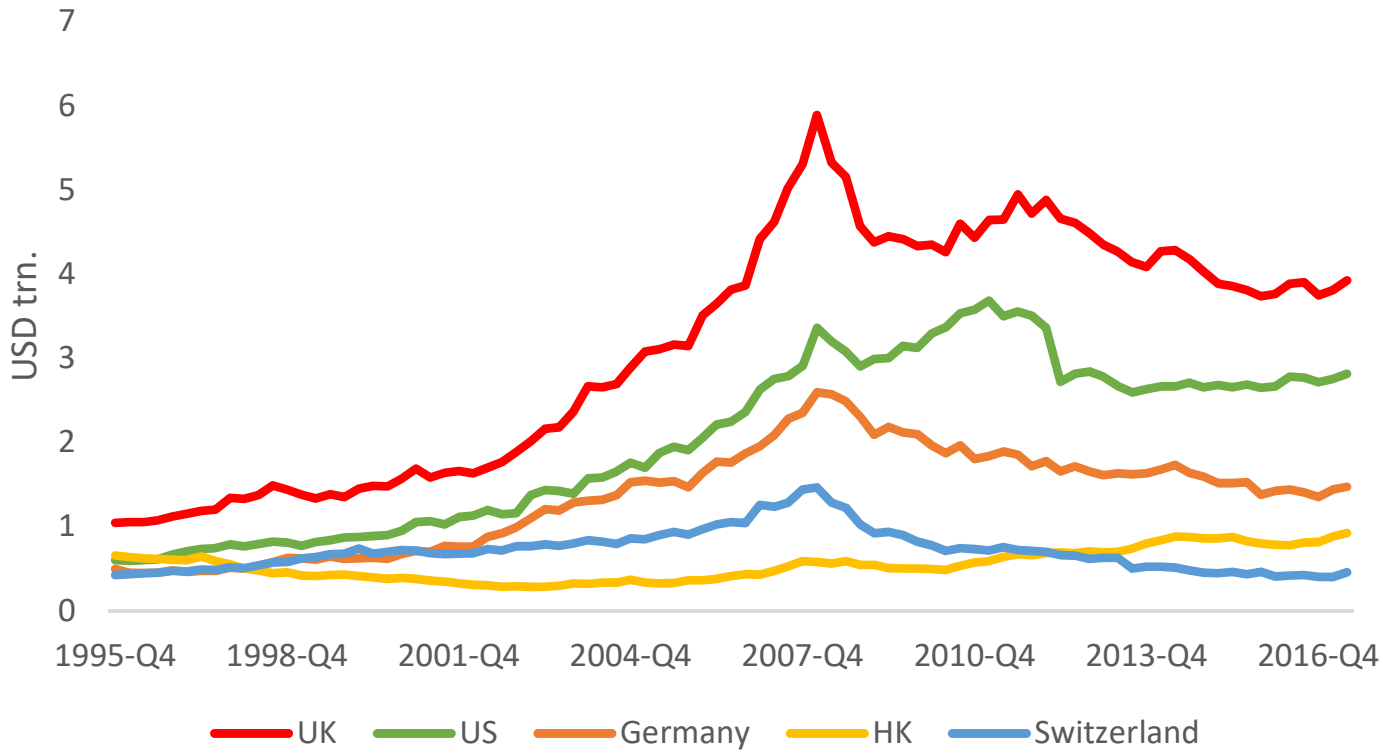


Fig.2: *Global cross border bank claims in nominal USD trillions by country of origination. Authors' elaboration based on BIS locational statistics.*

Motivation

A large share of global cross-border bank claims is originated in 'foreign' currencies from lenders' perspective

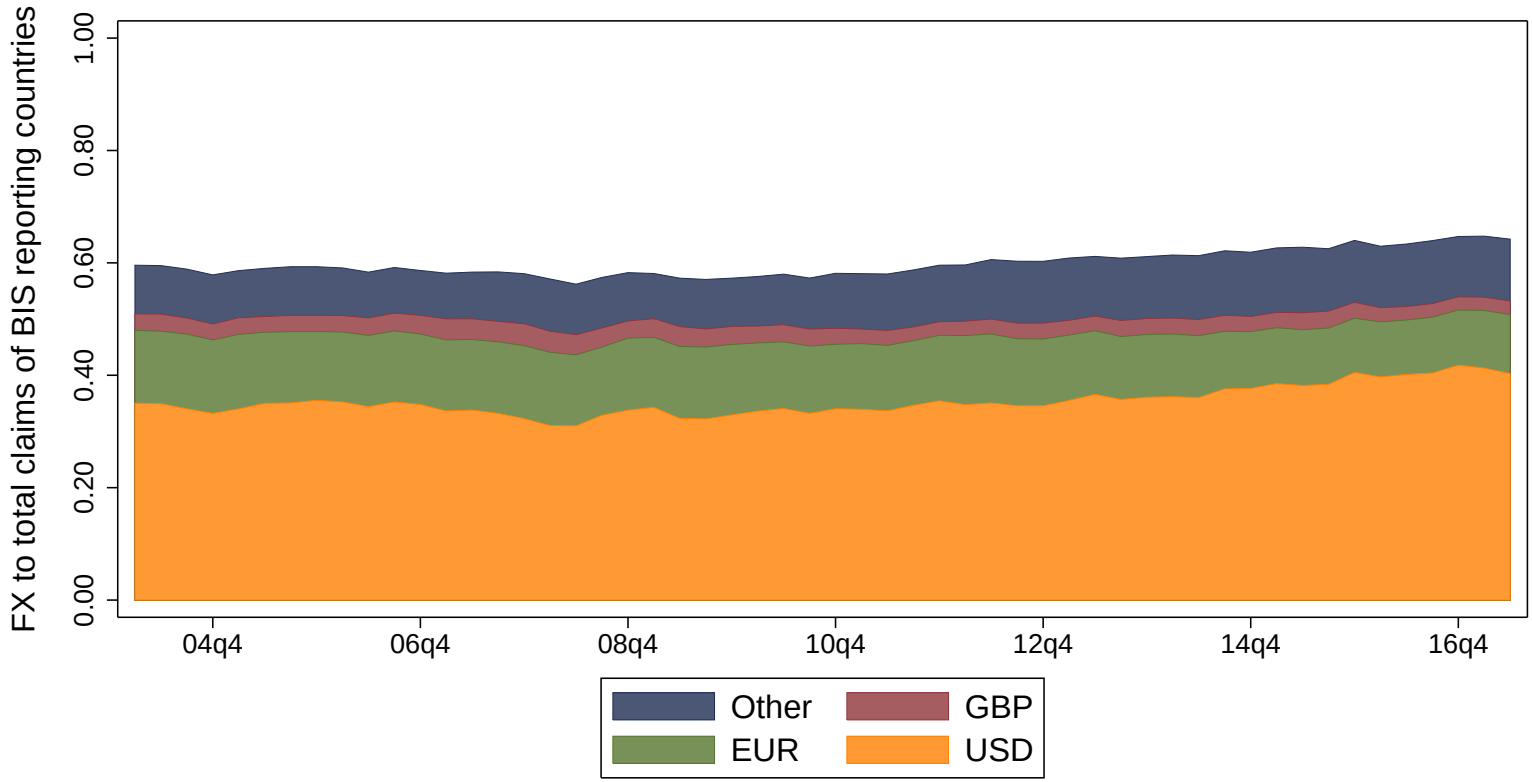
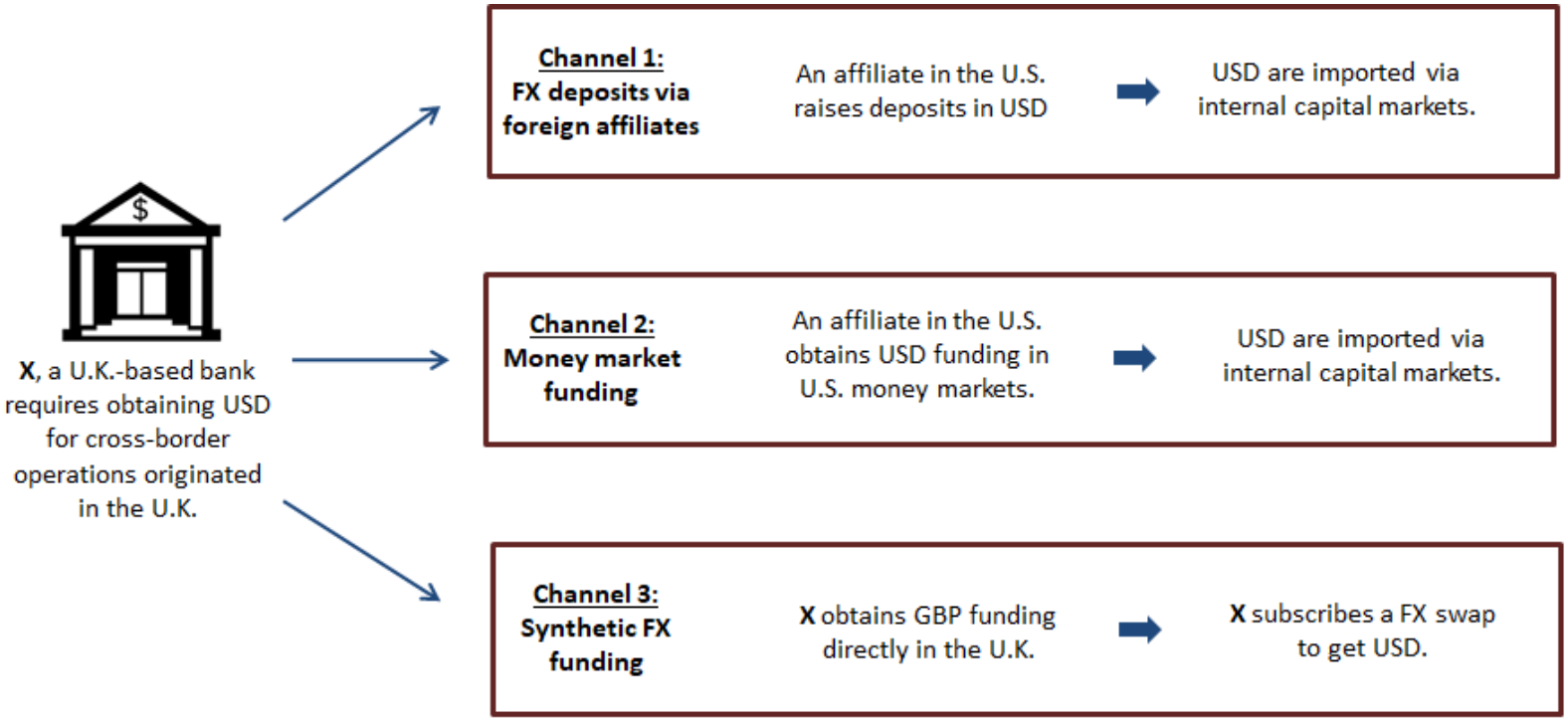


Fig.3: *Authors' elaboration based on BIS locational statistics. The figure shows the share of cross-border claims originated outside the currencies' domestic countries for USD, EUR, GBP and other currencies.*

Motivation

An important question is how do global banks obtain FX funding



- Synthetic FX funding allows banks to "transform" their local currency funding into FX funding while avoiding FX risk! Stats

Motivation

By no arbitrage, cost of funds should be equalised across alternatives

- The covered interest rate parity ('CIP') condition implies that the n-years interest rate in USD should equal the implied interest rate in USD when swapping GBP for USD.
- By no arbitrage condition: $\left(1 + i^{usd}_{t,t+n}\right)^n - \left(1 + i^{gbp}_{t,t+n}\right)^n \frac{S_t}{F_{t+n}} = 0$
- However...

CIP RIP

Since 2008, the average currency basis of GBP vis-à-vis major currencies has repeatedly deviated from the CIP condition Bilaterals

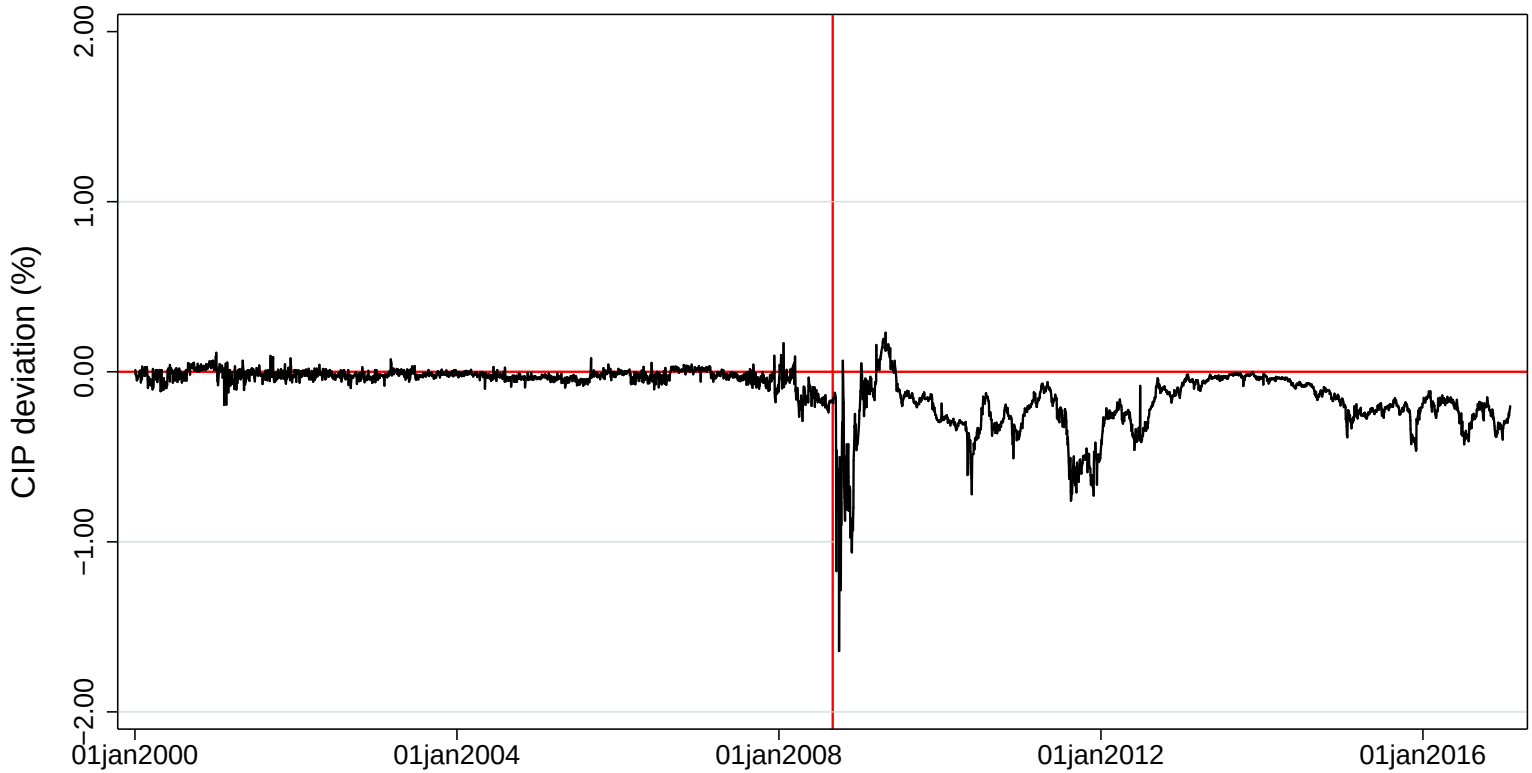


Fig.4: *Authors' elaboration based on data from Bloomberg. The graph shows the average cross-currency basis between GBP four currencies: USD, JPY, CHF and EUR. The red vertical line marks September 1st 2008.*

Motivation

Taking stock

- The global market for cross-border bank lending is sizeable, and the UK is the largest originator
- A large share of cross-border claims are denominated in 'foreign' currencies (from lenders' perspective)
- There have been large dislocations in pricing in one the markets banks use to secure FX funding

Our paper

- We ask whether banks' reliance on synthetic funding affects their FX lending when FX swap markets dry-up. **We should not expect so in a Modigliani-Miller world.**
  - Do synthetic FX funding shocks affect cross-border FX lending by global banks active in the U.K.?
  - Is this relationship affected by banks' access to alternative funding sources?
  - What is the macro dimension of this? Is there substitution towards other lenders?

Literature

We contribute to three main strands of literature

- Funding frictions and bank lending

  Domestic: Peek and Rosengren (1997), Kashyap and Stein (2000)

  Cross-Border: Cetorelli and Goldberg (2012 a,b,c), Temesvary et al (2015), Correa et al (2017)

  $\Rightarrow$ We focus on impact of synthetic FX funding shocks on cross-border banking flows

- FX angle

  Ivashina et al. (2015), Takats & Temesvary (2016), Brauning & Ivashina (2017)

  $\Rightarrow$ We use bank-level data (to quantify exposure to our channel) and depart from crisis periods

- CIP deviations

  Sushko et al. (2016), Du et al. (2017), Avdjiev et al. (2018), Abbassi and Bräuning (2018)

  $\Rightarrow$ We take CIP deviations as given and trace their impact on cross-border FX lending

METHODOLOGY AND DATA

Research design

Identification strategy based on three building blocks

- First, we compute series of deviations in the covered interest rate parity (i.e. 'CIP deviations') between GBP and other major currencies (USD, EUR)

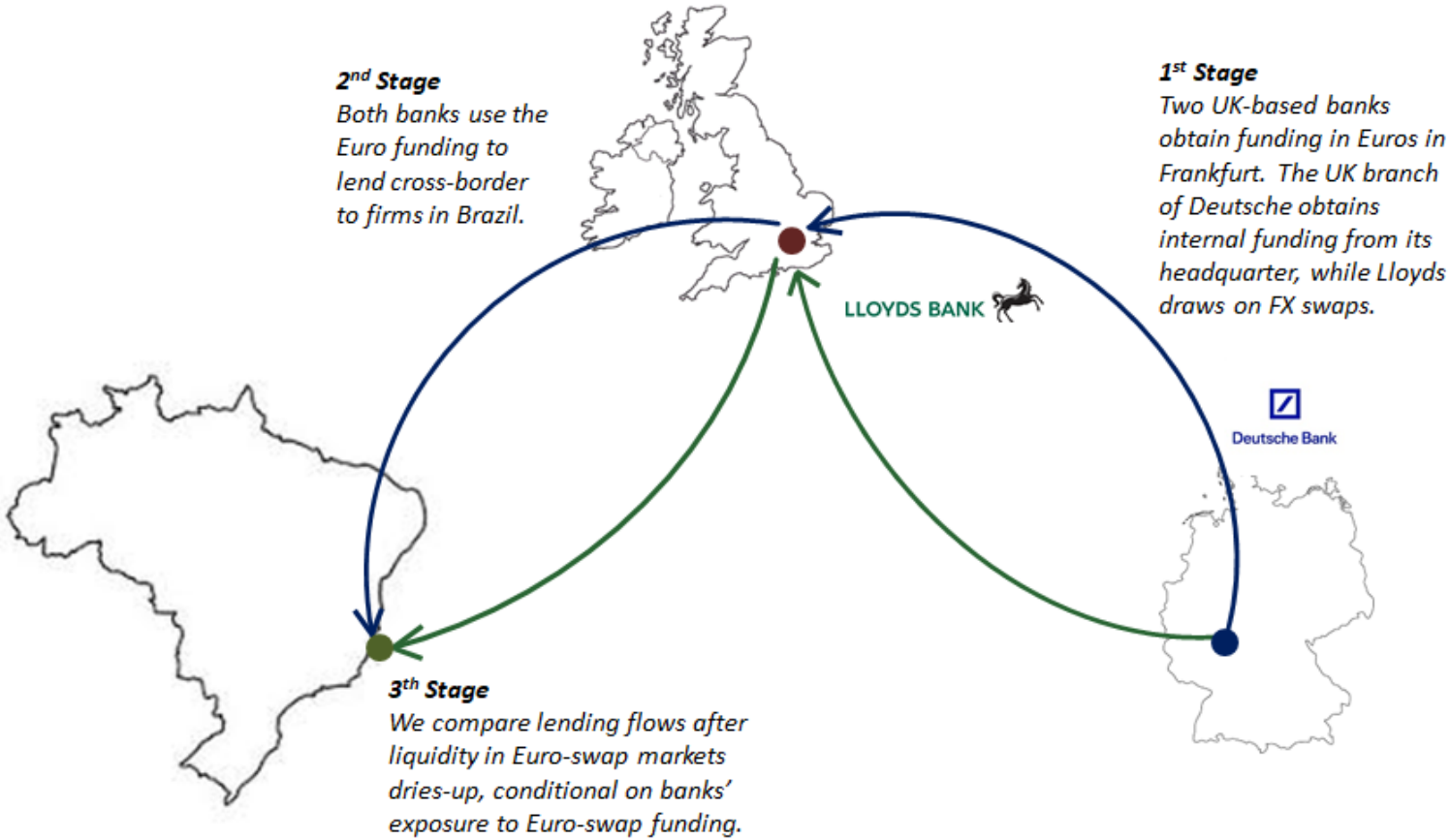
- Second, we merge the series of CIP deviations with bank-level data covering cross-border claims by banks based in the U.K. (UK-owned, foreign branches and subs.)

  - Structure: bank-country-currency-quarter panel
  - Compute measure of bank-level exposure to currency-specific synthetic FX funding

- Third, we exploit the rich structure of the data to isolate a supply-driven lending channel from demand shocks affecting cross-border flows

Research design

Routing FX swaps shocks via cross-border lending.



Methodology – FX swap exposure

Use banks' consolidated balance sheet to measure their reliance on synthetic FX funding (see Avdjiev et al., 2018; Abbassi and Bräuning, 2018) Descriptives

- Eq.(1) represents the measure of bank i exposure to synthetic funding in currency k:

$$RSF_{i,t}^{k} = \frac{Claims_{i,t}^{k} - Liabilities_{i,t}^{k}}{Claims_{i,t}^{k}} \tag{1}$$

- Eq.(1) considers bank's i claims and liabilities in currency k both in the U.K. and abroad
  - Banks' *RSF* increases with the share of assets funded synthetically
  - *RSF* measure uncorrelated with other (observable) balance sheet items Table

Methodology – empirical model

We exploit the rich structure in the data to isolate the effect of CIP deviations on credit supply

$$\begin{aligned}\Delta Claims_{i,j,k,t} =& \alpha_0 + \sum_{n=1}^{4} \beta_{1,n} \Delta CIP_{k,t-n} + \beta_2 RSF_{i,k,t-5} \\ &+ \sum_{n=1}^{4} \beta_{3,n} \left(\Delta CIP_{k,t-n} \times RSF_{i,k,t-5}\right) \\ &+ \beta_4 \Delta Claims_{i,t}^{\neq k} + \beta_5 X_{i,t-1} + \gamma_{i,j,k} + \delta_{j,k,t} + \epsilon_{i,j,k,t}\end{aligned} \tag{2}$$

- Focus is on the joint coefficient of $\sum_{n=1}^{4} \beta_{3,n}$.
  - $\gamma_{i,j,k}$ captures common factors at the bank-destination country-currency level
  - $\delta_{j,k,t}$ captures trends common to all banks at the destination country-currency level ('demand control')
  - Controls: size (log assets), liquid assets ratio, capital-asset ratio, deposits ratio

Methodology – Data description

We rely on a dataset tracing the cross-border positions of U.K.-based banks

- "Clean" dataset covers 106 banks over 2003-2016 (quarterly frequency)
- These banks lend in 70 countries (10 per bank on average)
- We observe 1,315 bank-country-currency relationships (in USD and EUR) that we can trace over time
- Hence, we work with approx. 63,000 bank-currency-country-time observations

RESULTS

Baseline results

Evidence of a bank-lending channel of synthetic FX funding shocks

	I	II	III	IV	V
Joint CIP x RSF t-5		0.745**	0.678***	0.617***	0.605***
		0.287	0.251	0.195	0.176
Joint CIP	0.108**	0.0259	0.0224	-0.0241	
	0.051	0.091	0.084	0.081	
RSF t-5		-0.022	-0.024	0.007	0.020
		(0.015)	(0.017)	(0.021)	(0.031)
Observations	62,739	62,739	62,739	62,739	62,739
Controls	No	No	Yes	Yes	Yes
Fixed effects	None	None	None	i + j,t	i,j,k + j,k,t
R-squared	0.01	0.01	0.01	0.06	0.11

- With a USD CIP deviation of -14bp (sample average) a high-RSF bank reports a 1.4 p.p. lower currency-specific credit growth rate than an average-RSF bank

Exploring heterogeneities

We extend Eq. (1) to shed light on underlying mechanism driving the results

- If banks had swift access to alternative FX funding (at similar price), synthetic funding shocks should not affect lending a priori
- We explore two potential sources of heterogeneity:
  - Ownership/regulation structure
  - Access to on-balance-sheet FX funding (Not 1-RSF!), with focus on internal capital markets

Exploring heterogeneities I

Ownership/regulation structure

	Benchmark	Branch	CA branch	Non-CA branch
	I	II	III	IV
Joint RSF x CIP x Dum		-0.522**	-0.795**	0.194
		0.246	0.390	0.479
Joint RSF x CIP	0.605***	0.813***	0.793***	0.594***
	0.176	0.227	0.238	0.170
Joint Dum x CIP		0.0379	0.0800	-0.0445
		0.107	0.0761	0.108
RSF x Dum		0.061	0.005	0.124*
		(0.066)	(0.072)	(0.069)
Dum		0.000	0.211***	-0.228***
		(0.000)	(0.035)	(0.030)
RSF	0.020	-0.012	0.019	-0.003
	(0.031)	(0.043)	(0.040)	(0.032)
Observations	62,739	62,739	62,739	62,739
R-squared	0.11	0.11	0.11	0.11

- (CA) branches are shielded from effect Not due to RSF!

Exploring heterogeneities II

- Unpacking the "branch effect"
- Two exercises:
  - Look at aggregate on-balance-sheet funding
  - Look at use of internal capital markets Motivation

Exploring heterogeneities II

On-balance-sheet FX funding

	Total OBS	ICM	Non-ICM	ICM: branch	ICM: UK-reg
	I	II	III	IV	V
Joint RSF x CIP x Dum	-0.795	-1.263***	2.367	-1.720	-2.574**
	1.783	0.395	3.318	1.364	1.231
Joint RSF x CIP	0.693**	1.059***	0.518**	0.726**	1.013*
	0.299	0.328	0.223	0.327	0.535
Joint Dum x CIP	0.0101	0.0979	-0.175**	-0.00375	1.083**
	0.108	0.174	0.0825	0.192	0.391
RSF x Dum	-0.070	0.039	0.108	0.078	-0.011
	(0.226)	(0.055)	(0.262)	(0.113)	(0.120)
Dum	-0.018	-0.009	-0.055***	-0.014	-0.000
	(0.025)	(0.022)	(0.013)	(0.022)	(0.080)
RSF	0.056	0.038	0.042	0.004	0.142*
	(0.039)	(0.032)	(0.037)	(0.054)	(0.077)
Observations	36,573	36,573	37,887	21,318	14,503
R-squared	0.11	0.11	0.11	0.14	0.23

- Access to internal capital markets shields banks from baseline effect. True for non-branches too!

Exploring heterogeneities II

Look at effect on ICM liabilities now (losing *j* dimension, so cannot measure CA funds)

	Benchmark	**Branch**		**UK reg: ICM split**	
	I	II	III	IV	V
Joint RSF x CIP x Dum		-3.532**	-2.161	-2.085*	-3.258*
		1.859	2.087	1.216	1.852
Joint RSF x CIP	-0.624	1.519	0.522	1.334	0.85
	1.694	1.093	1.432	1.447	1.662
Joint Dum x CIP		-0.0269	-0.46	0.784*	1.132*
		0.166	0.435	0.445	0.6
RSF x Dum		-0.449***	-0.490***	-0.112	-0.125
		-0.142	-0.143	-0.146	-0.213
RSF	0.138	0.510***	0.541***	0.467**	0.480**
	-0.139	-0.122	-0.123	-0.182	-0.202
Observations	4,214	4,214	4,214	1,019	1,019
Fixed effects	None	i + k	i + k,t	i + k	i + k,t
R-squared	0.02	0.02	0.03	0.04	0.08

- Some evidence of banks effectively drawing ICM funds in the face of shocks

Results: taking stock

- Banks with high reliance on synthetic funding adjust FX-specific cross-border lending in the face of changes in its cost
- Branches in general, and banks with high access to internal capital markets in particular, are "shielded" from this effect
  - These banks indeed draw from ICM when CIP deviations occur
- Is there substitution towards other lenders?
  - Need to understand this to get an idea of general equilibrium effect

SUBSTITUTION

Substitution and macroeconomic dimension

- If borrowers can substitute towards unaffected lenders, potentially no GE/macro impact
- Potential dimensions of substitution:
  - Within sample (across UK banks)
  - Across originating countries (BIS aggregate data)

Substitution and macroeconomic dimension

Empirical approach

- Eq.(3) traces within sample substitution effects (losing i dimension):

$$\Delta Claims_{j,k,t} = \alpha_0 + \sum_{n=1}^{4} \beta_{1,n} \Delta CIP^{k}_{t-n} + \sum_{n=1}^{4} \beta_{2,n} RSF^{k}_{j,t-5} + \sum_{n=1}^{4} \beta_{3,n} \left(\Delta CIP^{k}_{t-n} \times RSF^{k}_{j,t-5} \right)$$
$$+ \beta_4 \Delta Claims^{\neq k}_{j,t-1} + \sum_{z=5}^{Z} \beta_k x_{j,t-1} + \gamma_{j,k} + \delta_t + \epsilon_{j,k,t} \qquad (3)$$

- $\Delta Claims_{j,k,t}$ is computed as the aggregate claims growth rate of all U.K.-based banks in market j, k. RHS variables are weighted by market-share.

Substitution: within sample

		Branches share		High ICM share	
	Full sample	Low	High	Low	High
	I	II	III	IV	V
Joint CIP x RSF	1.159**	1.326**	0.646	1.688*	-1.096
	0.461	0.618	0.936	0.848	1.181
RSF	-0.057	-0.099**	0.081	-0.110	0.047
	(0.037)	(0.041)	(0.065)	(0.078)	(0.095)
Obs	6,576	4,896	1,680	2,856	980
R-squared	0.04	0.04	0.06	0.04	0.06

- No evidence of countries substituting away the change in supply by tapping other UK lenders

Substitution: across countries

	Rest of world	**Home CA**		
			Share UK claims:	
	Full sample I	Full sample II	Low III	High IV
Joint CIP x RSF	-0.499 0.403	-0.959* 0.541	-0.651 0.661	-1.694** 0.769
RSF	-0.048 (0.033)	0.021 (0.041)	-0.041 (0.051)	0.079 (0.069)
Obs	6,546	5,695	2,999	2,696
R-squared	0.076	0.035	0.043	0.048

- Some evidence of lenders from unaffected currency areas stepping in

Substitution: across countries

Back of the envelope quantification

- Offset will depend on relative importance of UK and currency area (US)
- Stick to 2012Q2 for simplicity (7 bps widening in GBP-USD basis)
- Two cases: Singapore (30% of USD inflows from UK) and South Africa (50%) (market-weighted *RSF* of active UK banks is similar across countries at c. 20%)
- Given estimated coefficients, increase in lending from US banks offsets 2/3's of fall in UK lending to Singapore, but only 1/3 of that going to South Africa

ROBUSTNESS

Robustness

- We consider a battery of robustness checks:
  - Alternative measures of CIP deviations, cross-border claims and *RSF*
  - Alternative fixed effect structures
  - Exclusion of GFC and EA crisis
  - Exclusion of swap market makers
  - Placebo CIP deviations
  - Role of US dollar
  - Horse races vs. RSF

Conclusion

- We provide robust evidence of a cross-border bank lending channel arising from shocks to the cost of synthetic FX funding:
  - Banks with high reliance on FX synthetic funding cut back FX lending in the face of increases in its cost
  - Access to internal capital markets shields banks from this effect
  - Some evidence of banks from unaffected currency areas offsetting part of this effect

- Results warn about negative consequences of funding markets' fragmentation
  - Role for central banks in stabilizing liquidity in FX swap markets
  - FX funding vulnerabilities can be compensated by banking integration

APPENDIX

Global banks' reliance on synthetic FX funding

Borio et al. (BIS, '17) suggest that around 10% of USD liabilities by non-US banks stem from FX-swaps Back

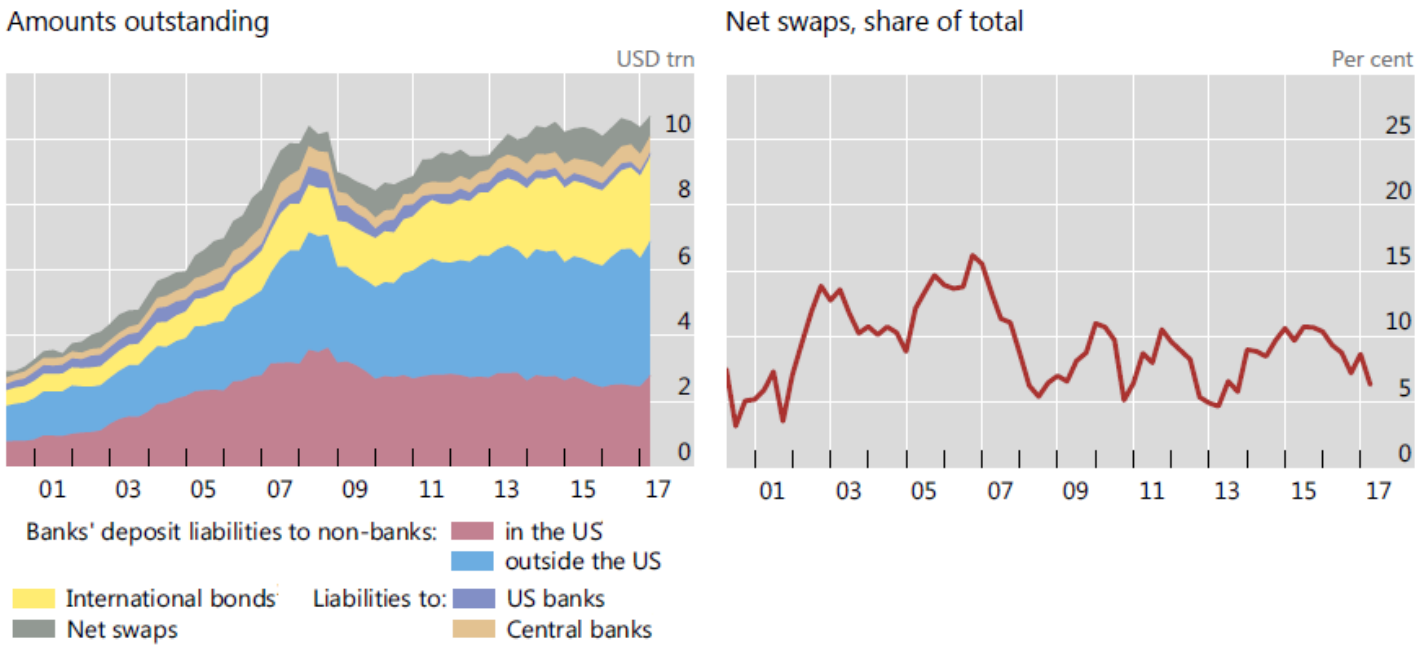


Fig.A1: *Graph ax "US dollar funding of non-US banks: on- and off-balance sheet" from the paper "FX swaps and forwards: missing global debt?" by Claudio Borio, Robert McCauley and Patrick McGuire, BIS Quarterly Review, September 2017. Downloaded from: https : //www.bis.org/publ/qtrpdf/rqt1709e.htm.*

Measuring CIP deviations

3-month CIP deviations by currency

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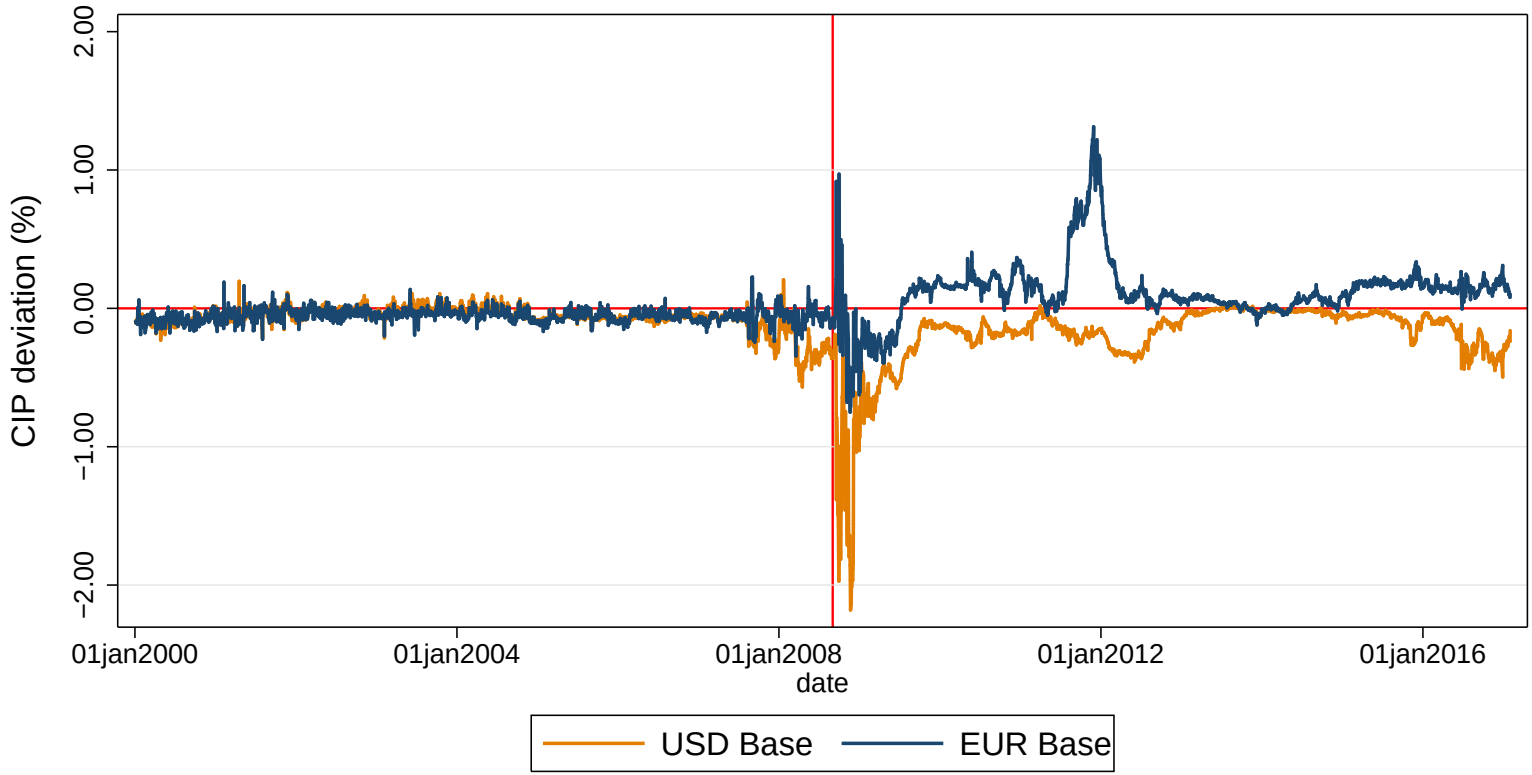


Fig.A3: *Authors' elaboration based on data from Bloomberg. The graph depicts the cross-currency basis between GBP, on the one hand, and USD and EUR, on the other.*

Balance sheet data - Summary stats

Back

					RSF vs. median		
	mean	**sd**	**min**	**max**	**large**	**low**	**diff.**
Δ Claims	0.01	0.77	-3.15	3.30	0.05	0.05	0.01
RSF	0.09	0.17	0.00	0.70	0.09	0.01	0.081*
Log assets	17.68	1.83	13.33	19.83	17.47	17.52	-0.05
FX Deposit ratio	0.76	0.32	0.03	1.75	0.77	0.68	0.10
Liquidity ratio	0.39	0.22	0.01	0.96	0.38	0.35	0.03
Capital ratio	0.08	0.09	-0.06	0.38	0.08	0.06	0.03
Δ Claims (no-k)	0.01	0.27	-0.90	0.95	0.06	0.06	0.00
GBP cross-currency basis	-0.07	0.18	-0.76	0.41			
Δ GBP cross-currency basis	0.00	0.14	-0.74	0.46			

Methodology - FX swap exposure

The average FX swap exposure fluctuates between -5% and 10% of the respective currency-specific liabilitites Back

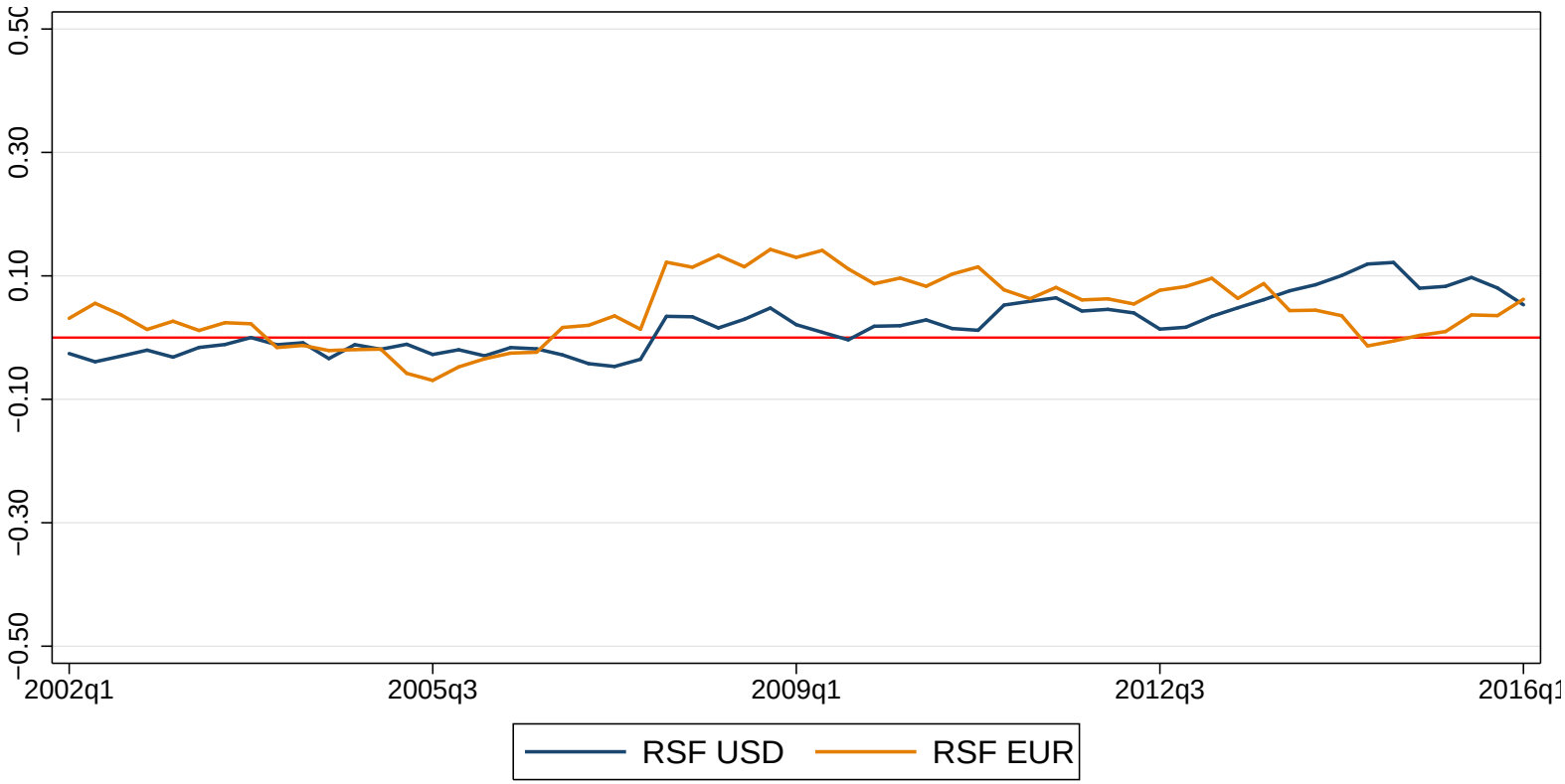


Fig.A5: *Authors' elaboration based on data from the BoE. The graph depicts the time series of the average FX swap exposure as measured by Eq.(1) for USD and EUR.*

Synthetic vs. on-balance-sheet funding

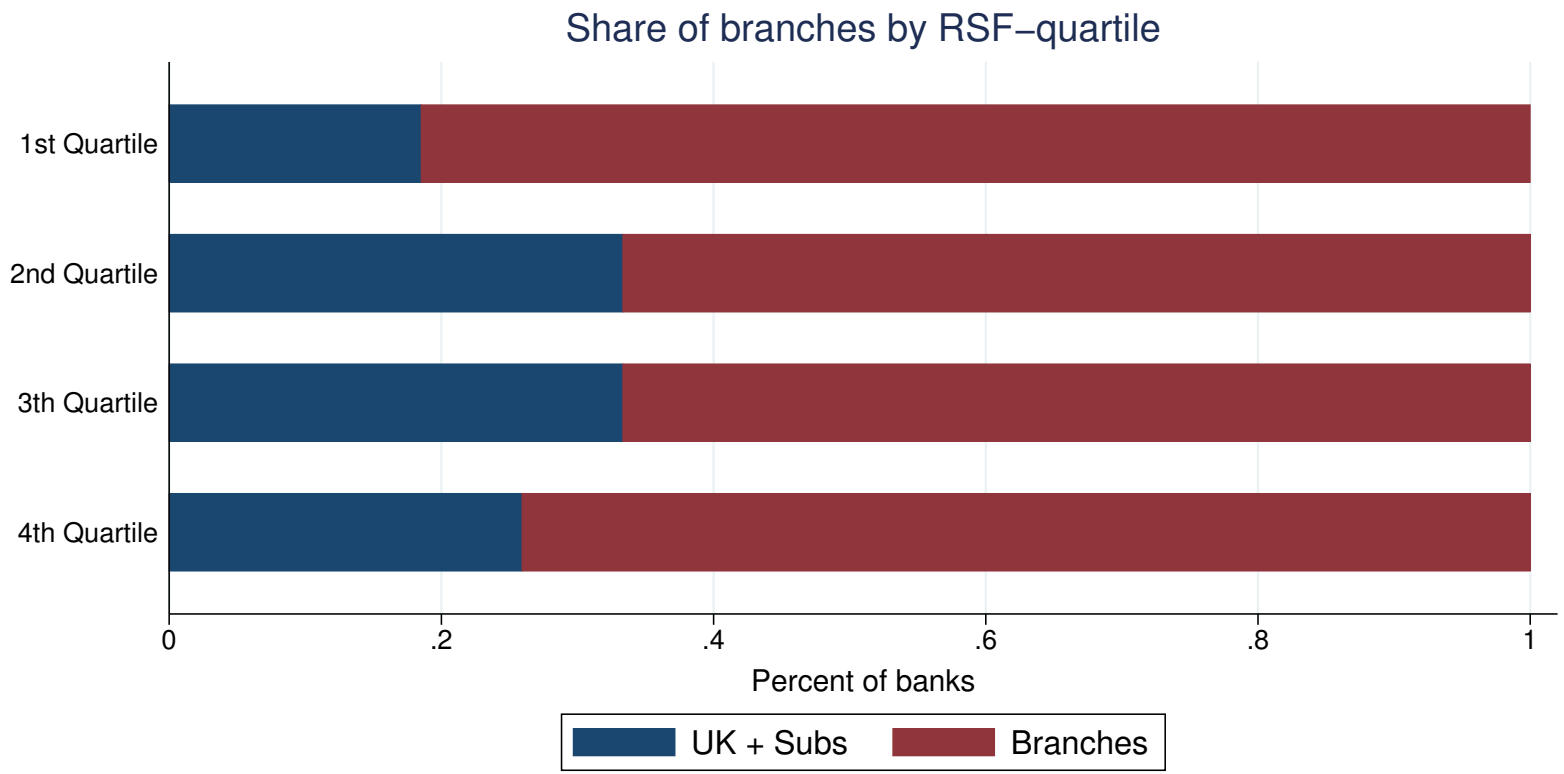
On-balance-sheet funding is not the complement of synthetic funding! Back

	Low OBF	High OBF
High RSF	A $>$ L	AA $>$ LL
Low RSF	A=L	AA=LL

OBF *stands for 'On-balance-sheet funding', while* **RSF** *stands for 'Reliance on synthetic funding'*

Branches' RSF

Back



Branches' ICM

Back