

The Spillovers, Interactions, and (Un)Intended Consequences of Monetary and Regulatory policies

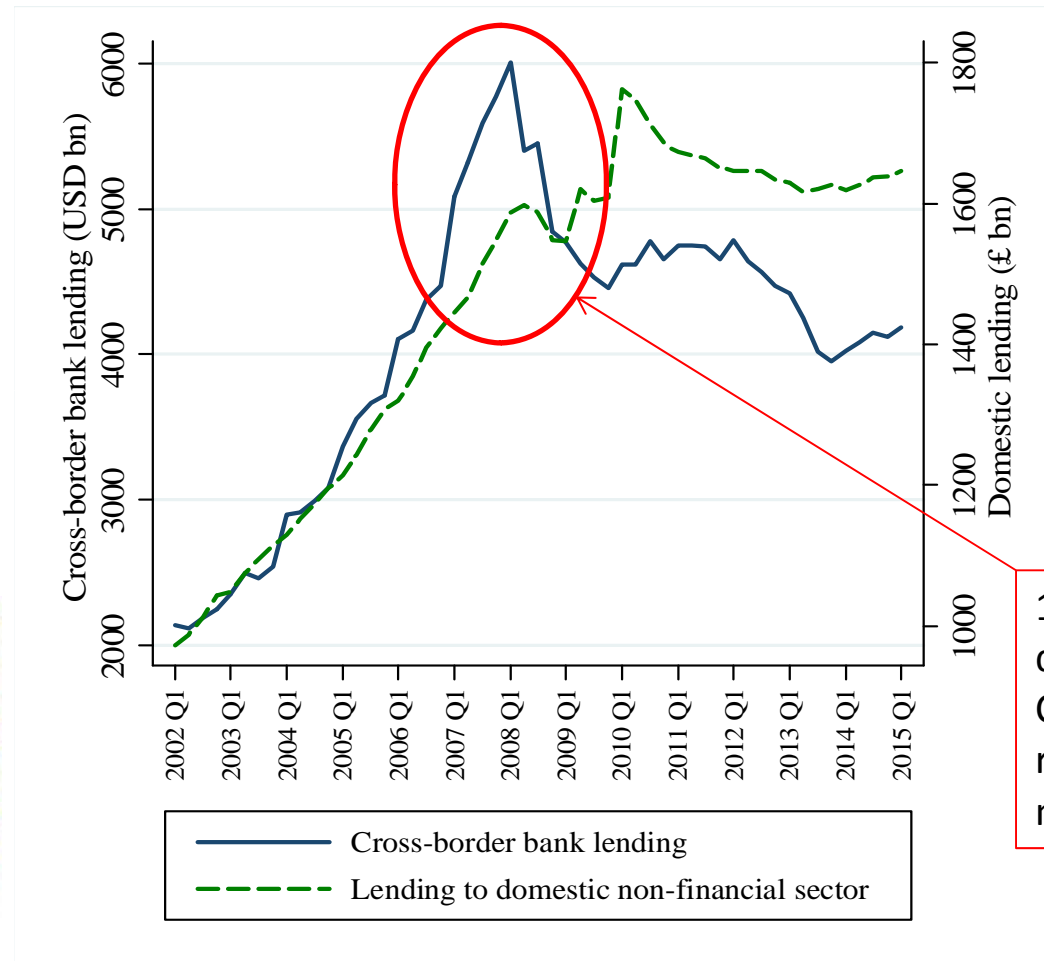
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(BoE) and Tomasz Wieladek (Barclays, CEPR)

18/19 April 2016

ECB workshop on non-standard monetary policy measures

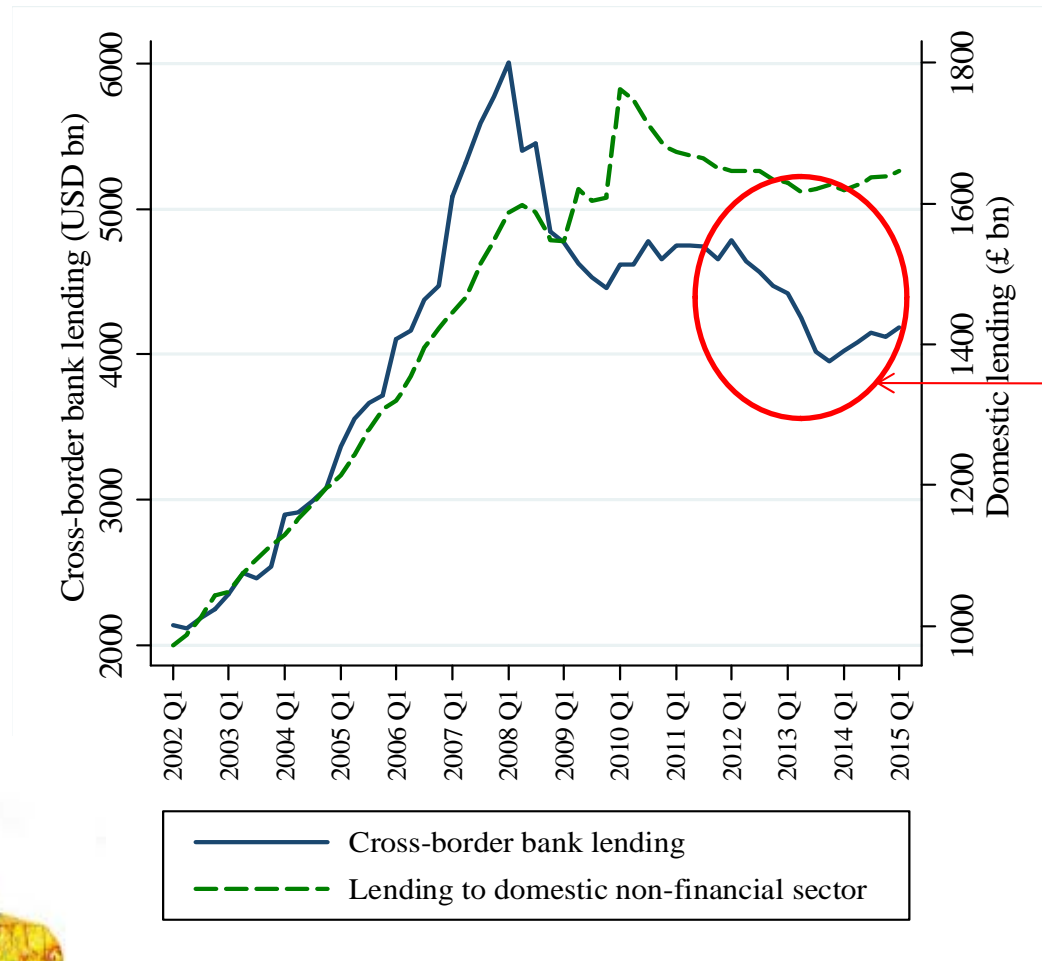
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Recent bank lending data show de-globalisation



- Similar pattern for both UK (chart) and all BIS reporters.
- ... while Portfolio and FDI flows have resumed their rising trend shortly after the crisis

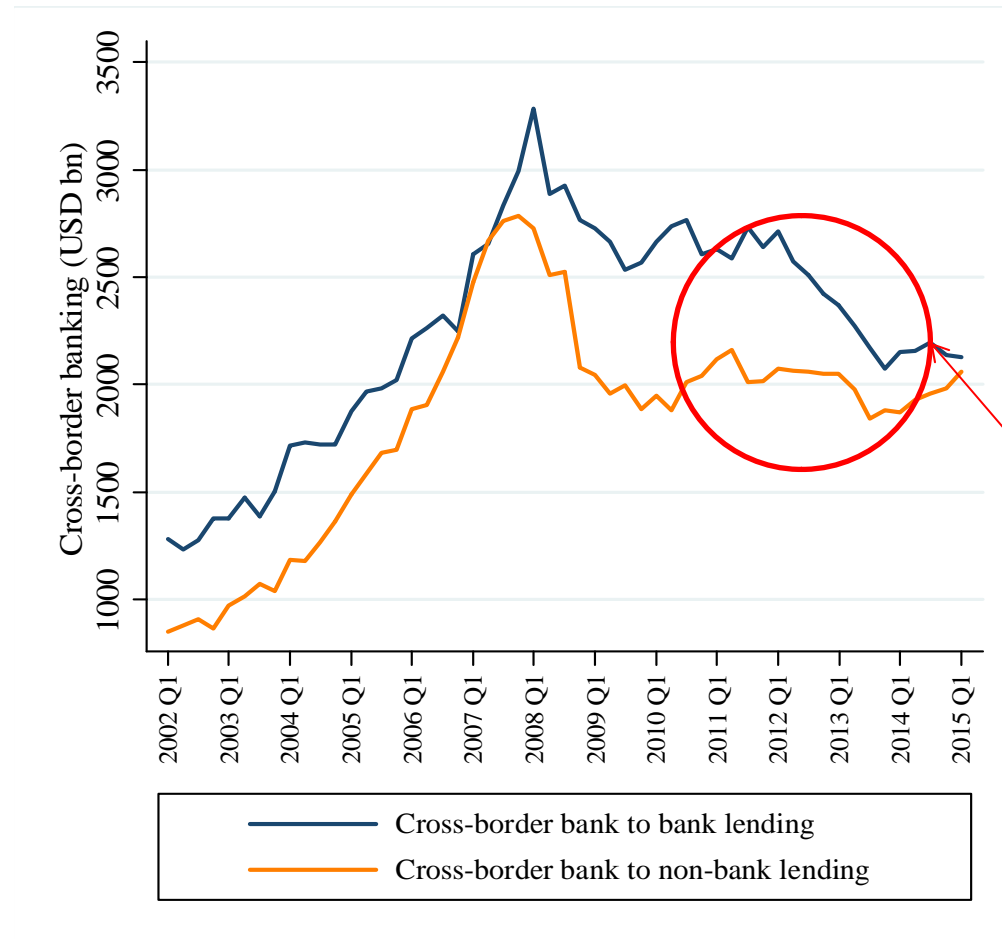
The 2nd phase of bank de-globalisation...



2nd Phase of Banking de-globalisation: Less explored

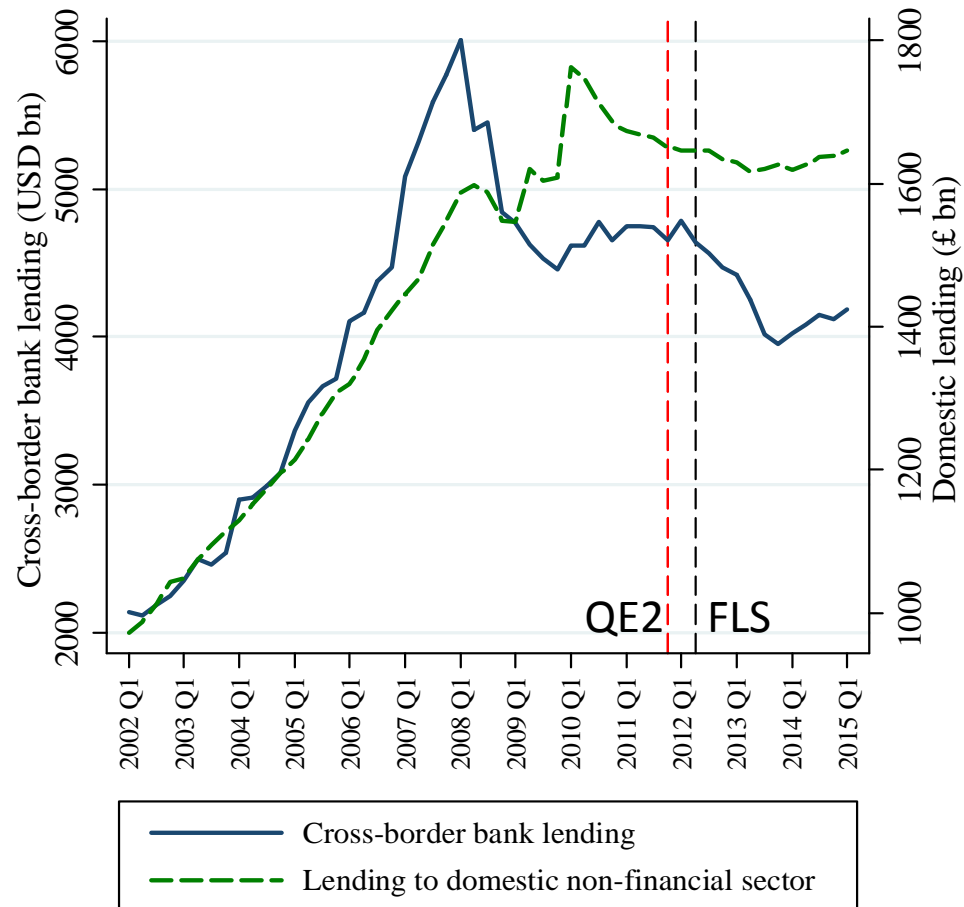


...was concentrated in cross-border bank-to-bank lending...

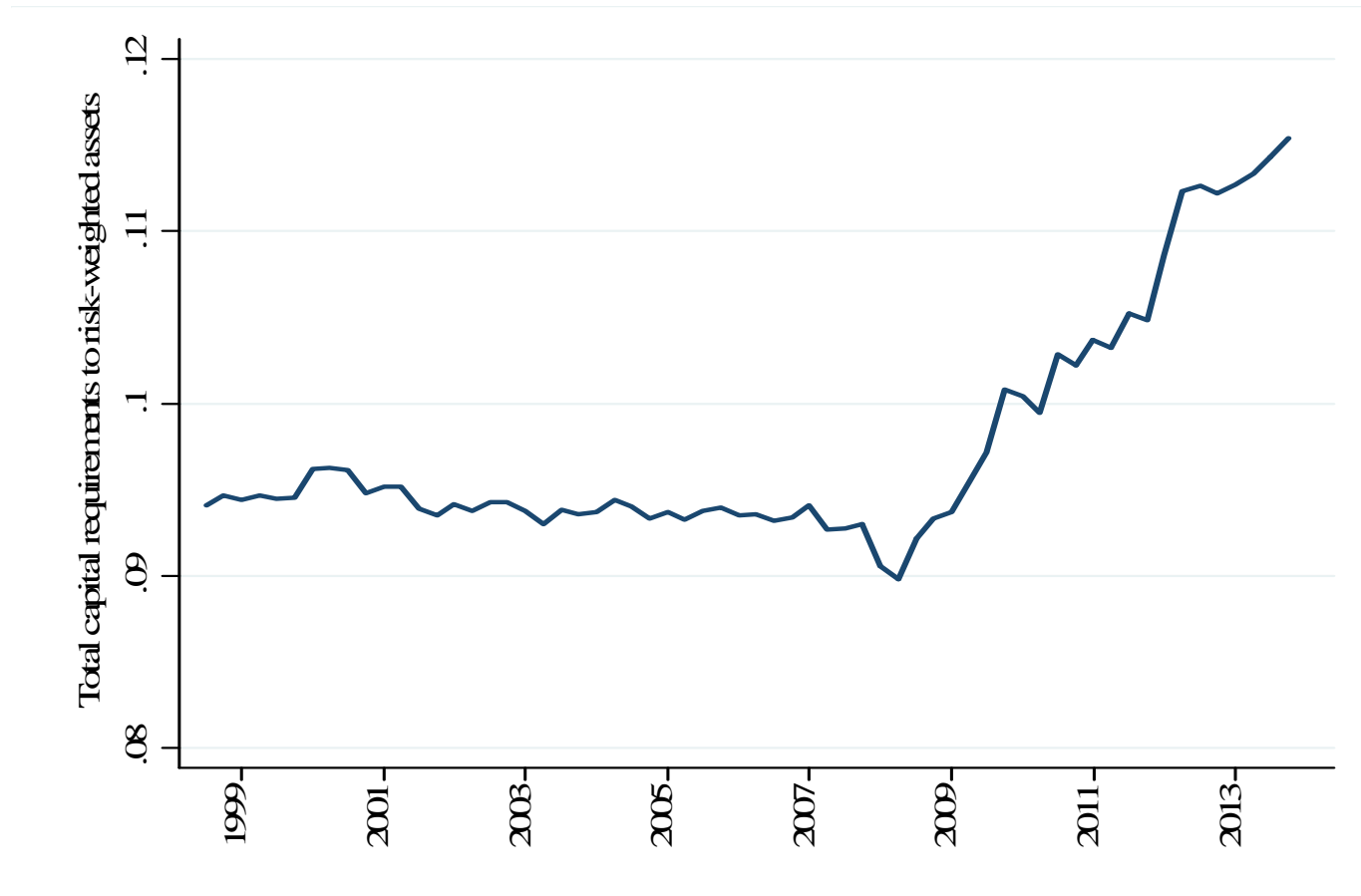


2nd Phase of Banking de-globalisation was concentrated in bank-to-bank lending

... and coincided with Unconventional Monetary Policies (UMP) ...



... and higher capital requirements



- UK regulated banks' total size-weighted capital requirements went up from 9% to 11.5% -- 250 bps a historically unprecedented amount.

Can policy interactions explain de-globalisation?

- **Question:** Can the interaction of capital requirements with UMP explain the second phase of banking de-globalisation?
- **Method:** We use detailed bank data from the UK to test if capital requirement tightening affected external bank lending and if FLS or QE amplified this effect by making this type of lending less attractive (see next slides for channels).
- **Key results:**
 - The *FLS* amplified the negative effects of tighter capital requirements on external bank lending.
 - Only mixed evidence for *QE*. Amplification significant only for external bank to non-bank lending.

Brief Literature Overview

- Explanations for 1st phase:
 - Bank's vulnerabilities, Intragroup frictions (Cerutti & Claessens, 2014)
 - Flight home effect (Giannetti and Laeven, 2012)
 - Political pressure due to banks nationalisation (Rose and Wieladek, 2014)
- Impact of capital shocks/requirement on lending abroad:
 - Peek and Rosengreen (1997)
 - Aiyar *et al* (2014)
 - Buch and Goldberg (2016)
- External transmission of monetary policy
 - Risk-taking channel (Bruno and Shin, 2015)
 - Ext. bank lending channel (Correa and Murry, 2009)
 - Internal capital markets (Cetorelli and Goldberg, 2012)
- QE spillovers (focused mostly on EMEs)
 - Asset Prices (Bauer and Neely, 2010)
 - Corporate bond issuance (Lo Duca, Nicoletti, Martinez, 2014)
 - Portfolio reallocation, re-pricing of risk (Fratzscher, Lo Duca, Straub, 2015; Correa *et al.* 2015)

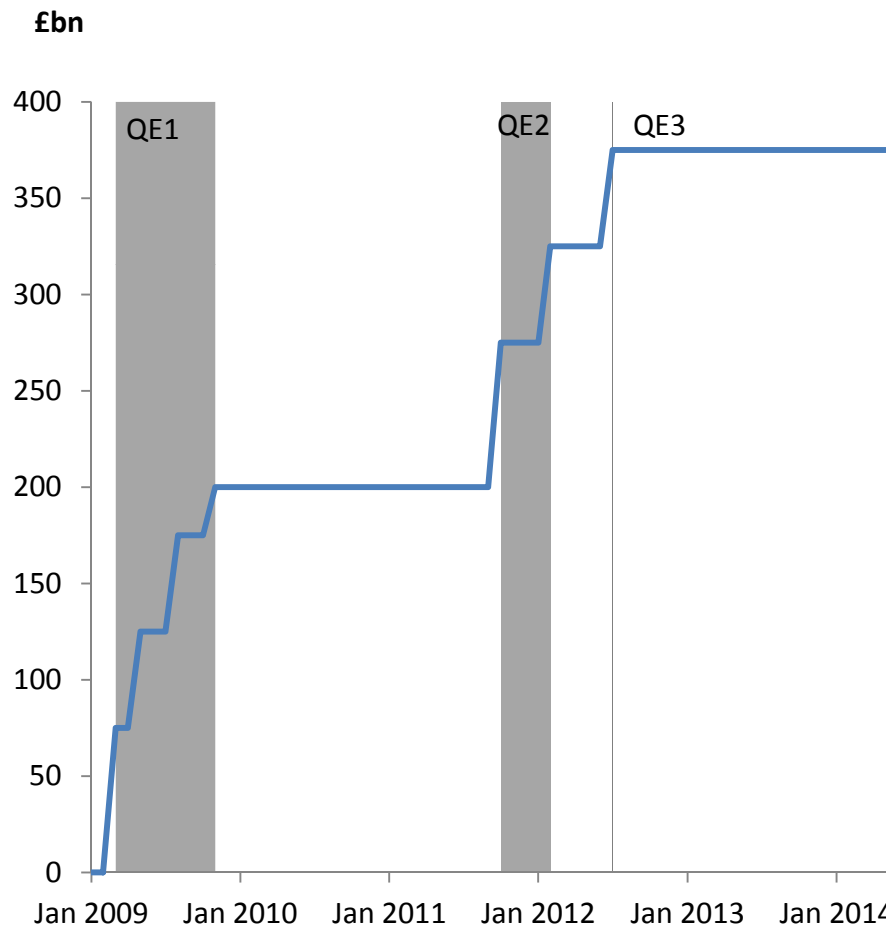
Funding for Lending Scheme (FLS) - Mechanisms

- **Scheme introduced to stimulate bank lending to Households (HH) and PNFCs**
 - For banks that borrow from the FLS, funding costs were decreasing in lending to these sectors
 - Capital offset for FLS-eligible lending *for all UK banks, regardless of their participation in the scheme*
 - i.e. option to offset capital extended in FLS-eligible lending against the capital planning buffer
- **Two phases of the FLS:**
 - **Phase I:** Up to 2013 Q4: HH & PNFC lending was eligible
 - **Phase II:** From 2014 Q1: Only PNFC lending is eligible

FLS - Outcomes

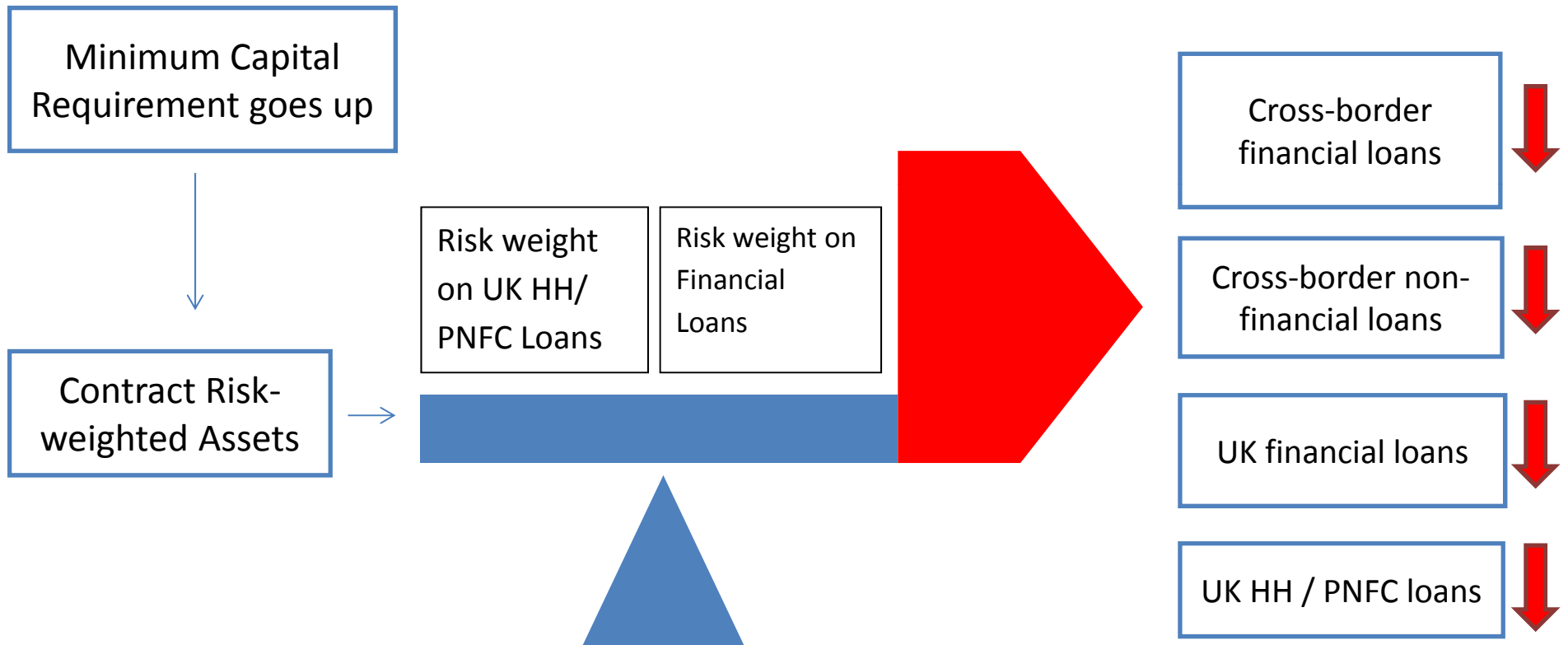
- Churm et al (2015) document a big drop in banking-system wide bank funding costs and sizable impact on GDP (0.5-0.8%)
 - This translated to lower mortgage/PNFC loan rates as well

Quantitative Easing in the UK



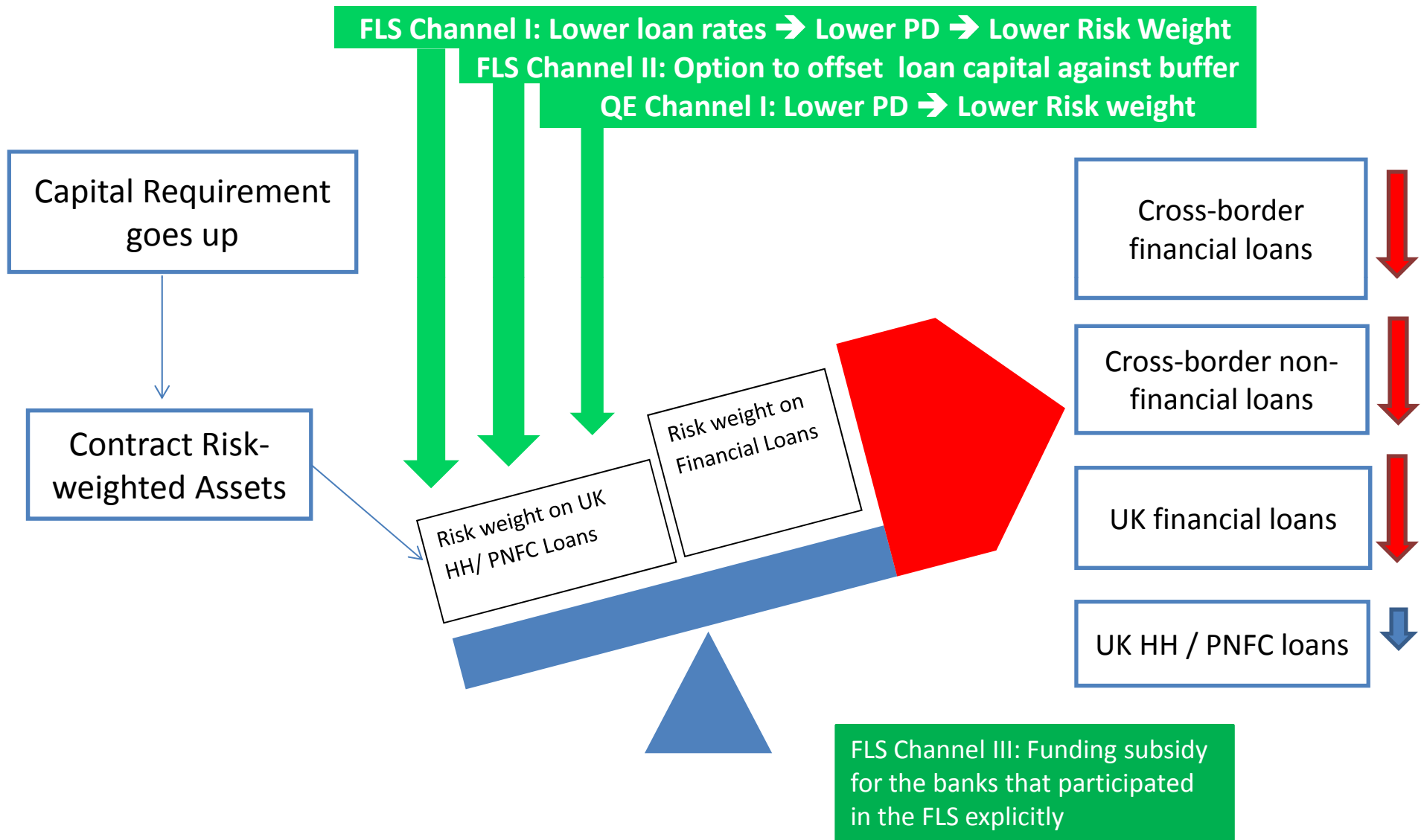
- The MPC announced QE and implemented soon thereafter.
- Credit markets too small, hence mostly focused on sovereign debt

Theory: Capital Requirement Transmission...



Under Basel II, risk weights are internal risk model based (IRB) and a function of borrower probability of default (PD), i.e. Loan interest rate, LTV ratio, unemployment risk, etc.

Theory:... and the FLS/QE



Data

- UK-resident banks' external lending data (CC Forms)
 - The average bank lends to 53 countries
- Regulatory capital requirements data (BSD3, FSA003, COREP)
- Other bank balance sheet variables including bank lending to households and PNFCs (BT, AL)
- Sample period: 1997 Q1 to 2015 Q1.

Regression model

$$\Delta l_{ijt} = \sum_{k=0}^3 \Delta KR_{it-k} (\beta_{t-k} + \delta_{t-k} QE_t + \mu_{t-k} FLS + \rho_{t-k} w_i + \sigma_{t-k} (FLS_t * w_i)) + \gamma_t (FLS_t * w_i) + \Lambda F_{jt} + e_{ijt}$$

- where Δl_{ijt} is the growth rate of lending by bank i to country j at time t .
- ΔKR_{it} is the tightening in bank i 's minimum capital requirement (in percent of risk-weighted assets) in quarter t .
- QE_t is the change in the announced flow of asset purchases, scaled by 2009Q1 UK nominal GDP.
- FLS_t is a dummy variable that takes the value of zero until 2012 Q2, 1 thereafter
- w_i is the fraction of FLS-eligible to total lending in 2012 Q2
- F_{jt} , the country-specific time fixed effects (controlling for global factors and demand)

Regression Results

		Total External Lending Growth						
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Capital Requirements		-3.394***	-4.014**	-2.570*	-2.430	-2.136	-2.136	-3.567*
	<i>p-val</i>	0.00430	0.0272	0.0666	0.209	0.286	0.286	0.0561
Δ Capital Requirements * FLS			5.099*		3.621	4.737*	4.737*	6.004**
	<i>p-val</i>		0.0550		0.177	0.0778	0.0778	0.0232
Δ Capital Requirements * Fraction			0.568		-2.332	-2.722	-0.416	-0.0280
	<i>p-val</i>		0.914		0.654	0.609	0.609	0.973
Δ Capital Requirements * FLS * Fraction			-28.62**		-24.89**	-28.21**	-4.311**	-4.761**
	<i>p-val</i>		0.0169		0.0375	0.0225	0.0225	0.0119
Δ Capital Requirements * QE				-0.781	-0.828	-0.784	-0.784	
	<i>p-val</i>			0.156	0.153	0.182	0.182	
FLS * Fraction			0.0170		0.0157	0.0293	0.00447	0.00463
	s.e		(0.0362)		(0.0362)	(0.0362)	(0.00554)	(0.00554)
Observations		47,421	47,421	47,421	47,421	47,421	47,421	47,421
R-squared		0.13	0.134	0.133	0.134	0.135	0.135	0.135
Adjusted R-squared		0.0341	0.0343	0.0343	0.0345	0.0356	0.0356	0.0354
Bank Controls		NO	NO	NO	NO	YES	YES	YES
Bank Fixed Effects		YES	YES	YES	YES	YES	YES	YES
Country-Time-Effects		YES	YES	YES	YES	YES	YES	YES
Cluster		Bank-Time	Bank-Time	Bank-Time	Bank-Time	Bank-Time	Bank-Time	Bank-Time

- Capital requirement tightening affects external lending negatively

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- The FLS amplified this effect.
- Effect seems very large at first sight (bear with me for two slides)

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- The interaction of KR and QE is not significant

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- Initial magnitude seems very large → But shows estimate for a FLS-eligible fraction of 1. Rescaling to the average bank fraction of 0.15, still suggests a sizable effect.

Robustness I

Liquid Asset Share	-0.0336 (0.0223)
Bank Size	0.0225*** (0.00688)
Commitment Share	0.0394** (0.0198)
Deposit Share	-0.0277 (0.0275)
Writeoffs (Changes)	-0.931** (0.451)
Writeoffs (Changes, L)	-0.356 (0.434)
Writeoffs (Changes, L2)	-0.0556 (0.409)
Writeoffs (Changes, L3)	-0.575 (0.414)

- Bank level controls
- Data cleaning, Winsorisation
- Clustering: country-time instead of bank-time
- Restricting sample to larger banks
- Starting sample period only after the crisis (2008 Q3)

Robustness II

		Total External Lending Growth			
		(6)	(7)	(8)	(9)
		Exclude EA banks	Vis-à-vis EA interaction	Switch 'FLS' on 2008 Q3 to 2015 Q1 - Placebo test	to 2012Q2 - Placebo test
Δ Capital Requirements		-2.403	-2.132	-5.149	-2.625
	p-val	0.240	0.287	0.120	0.427
Δ Capital Requirements * FLS		4.907*	4.752*	1.547	-0.326
	p-val	0.0697	0.0772	0.616	0.909
Δ Capital Requirements * Fraction		-1.211	-0.415	1.003	-2.389
	p-val	0.246	0.611	0.528	0.160
Δ Capital Requirements * FLS * Fraction		-4.319**	-4.229**	-3.311	2.498
	p-val	0.0312	0.0444	0.117	0.197
Δ Capital Requirements * QE		-0.704	-0.785	-1.232*	-1.207**
	p-val	0.243	0.182	0.0190	0.0254
Δ Capital Requirements * FLS * Fraction * EA			-0.317		
	p-val		0.819		
FLS * Fraction		0.00627	0.00448	0.00510	-0.00145
	s.e	(0.00568)	(0.00553)	(0.00443)	(0.00480)
Observations		45,570	47,421	48,489	48,489
Adjusted R-squared		0.0359	0.0355	0.0349	0.0349

- Col (6): exclude affiliates with a parent headquartered in the euro area. Col (7): include dummy for lending to Euro Area.

Robustness II

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Observations		45,570	47,421	48,489	48,489
Adjusted R-squared		0.0359	0.0355	0.0349	0.0349

- 'Placebo tests'. Col (8): switch on FLS dummy in 2008 Q3. Col (9): let dummy run only until 2012 Q2. → result not a 'post-crisis' effect

Extensions

- The two phases of the FLS.
- Different types of external lending
- Regulatory changes on liquidity
- Exogeneity of capital requirements

The two phases of the FLS

	(1)	(2)	(3)
	Total External Lending	Bank-to-Bank Lending	Bank-to-Non-Bank Lending
Δ Capital Requirements	-1.687	4.616	-1.670
p-val	0.390	0.122	0.423
Δ Capital Requirements * FLS 1	3.099	0.747	0.949
p-val	0.280	0.870	0.772
Δ Capital Requirements * Fraction 1	-0.795	-4.904*	-1.534
p-val	0.644	0.0677	0.464
Δ Capital Requirements * FLS 1 * Fraction 1	-5.801**	-6.829**	-4.640
p-val	0.0212	0.0126	0.130
Δ Capital Requirements * FLS 2	9.551*	12.13*	4.702
p-val	0.0757	0.0995	0.396
Δ Capital Requirements * Fraction 2	-0.348	1.910	2.269
p-val	0.797	0.384	0.175
Δ Capital Requirements * FLS 2 * Fraction 2	-1.597	-2.876	-3.275
p-val	0.465	0.285	0.187
Δ Capital Requirements * QE	-0.801	-1.028	-1.456**
p-val	0.168	0.196	0.0289

- The impact of tighter KR is only amplified in the **first**, but not **second**, phase of the FLS

Regulatory changes in liquidity requirements

		(1)	(2)	(3)
		Total External Lending	Bank-to-Bank Lending	Bank-to-Non-Bank Lending
Δ Capital Requirements		-1.804	4.626	-1.571
	p-val	0.354	0.118	0.445
Δ Capital Requirements * FLS 1		3.735	0.991	1.135
	p-val	0.197	0.826	0.726
Δ Capital Requirements * Fraction 1		-0.754	-4.974*	-1.620
	p-val	0.658	0.0638	0.444
Δ Capital Requirements * FLS 1 * Fraction 1		-6.141**	-6.900**	-4.798
	p-val	0.0160	0.0113	0.121
Δ Capital Requirements * FLS 2		9.668*	12.13*	4.648
	p-val	0.0723	0.0991	0.402
Δ Capital Requirements * Fraction 2		-0.290	2.088	2.358
	p-val	0.829	0.343	0.164
Δ Capital Requirements * FLS 2 * Fraction 2		-1.670	-3.024	-3.319
	p-val	0.444	0.262	0.181
Δ Capital Requirements * QE		-0.764	-0.999	-1.487**
	p-val	0.173	0.206	0.0205
Δ Liquidity Regulation (ILG)		-0.0647**	-0.0242	-0.0539*
	p-val	0.0360	0.660	0.0670
Observations		47,421	29,317	43,051
Adjusted R-squared		0.0359	0.0645	0.0432

- Post-crisis tightening in liquidity requirements could be associated with a decline in external lending.
- In the UK Individual Liquidity Guidance (ILG) introduced from 2010 onwards, but marginally loosened in June 2012/2013.
- Include dummy equal to 1 if requirements were introduced or tightened.

Exogeneity of capital requirements

- Are Pillar 2 capital requirements endo/exogenous?
 - Pillar 1 requirement meant to capture credit and market (Balance sheet) risk
 - *Pillar 2 set at supervisors discretion to capture other risks*
 - → Exogeneity more likely with respect to external lending
- We examine this issue more formally:
 - Examine if 31 regulatory & balance sheet variables can predict Pillar 2 changes in capital requirements
 - Single Regression & Bayesian Model Averaging to choose variables
 - Use residual from this regression, which is orthogonal to balance sheet variables, as a change in KR in baseline model

Predicting capital requirement tightening

	(1)	(2)	(3)
Other operating income	0.596*** (0.163)	0.664*** (0.178)	0.617*** (0.163)
Financial & Operating Charges	0.461*** (0.118)	0.818*** (0.287)	0.487*** (0.115)
Domestic real sector lending growth	0.0166*** (0.00598)	0.0158** (0.00619)	0.0162*** (0.00607)
External bank lending growth	0.00817 (0.00899)	0.00856 (0.00900)	
Realised gains/losses on financial assets & liabilities		2.116 (1.287)	
Interest income		-0.356 (0.243)	
Constant	0.00943*** (0.000884)	0.00910*** (0.000879)	0.00930*** (0.000876)
		Model 1	Model 2
Observations	126	126	126
R-squared	0.259	0.299	0.255
Adjusted R2	0.235	0.263	0.237

- Residuals from this regressions should be orthogonal to balance sheet characteristics

Exogeneity of capital requirements

		Total External Lending Growth		
		(1)	(2)	(3)
		Baseline	Model 1	Model 2
Δ Capital Requirements		-0.477	4.440	4.019
	<i>p-val</i>	0.835	0.313	0.350
Δ Capital Requirements * FLS		3.093	9.621	3.137
	<i>p-val</i>	0.332	0.198	0.599
Δ Capital Requirements * Fraction		-0.323	-1.835	-1.676
	<i>p-val</i>	0.860	0.528	0.544
Δ Capital Requirements * FLS * Fraction		-8.129***	-13.97**	-11.33**
	<i>p-val</i>	0.00635	0.0154	0.0252
Δ Capital Requirements * QE		-0.922	-3.434***	-3.038***
	<i>p-val</i>	0.119	0.000377	0.00136
FLS * Fraction		0.00735	-0.00501	-0.00340
	s.e	(0.00843)	(0.00758)	(0.00760)
Observations		13,411	13,411	13,411
Adjusted R-squared		0.0368	0.0369	0.0368
Bank Controls		YES	YES	YES
Bank Fixed Effects		YES	YES	YES
Country-Time-Effects		YES	YES	YES
Cluster		Bank-Time	Bank-Time	Bank-Time

Regressions from 2009 Q3:

- New reporting forms
- Coefficients are larger than in baseline
- KR*QE turns significant

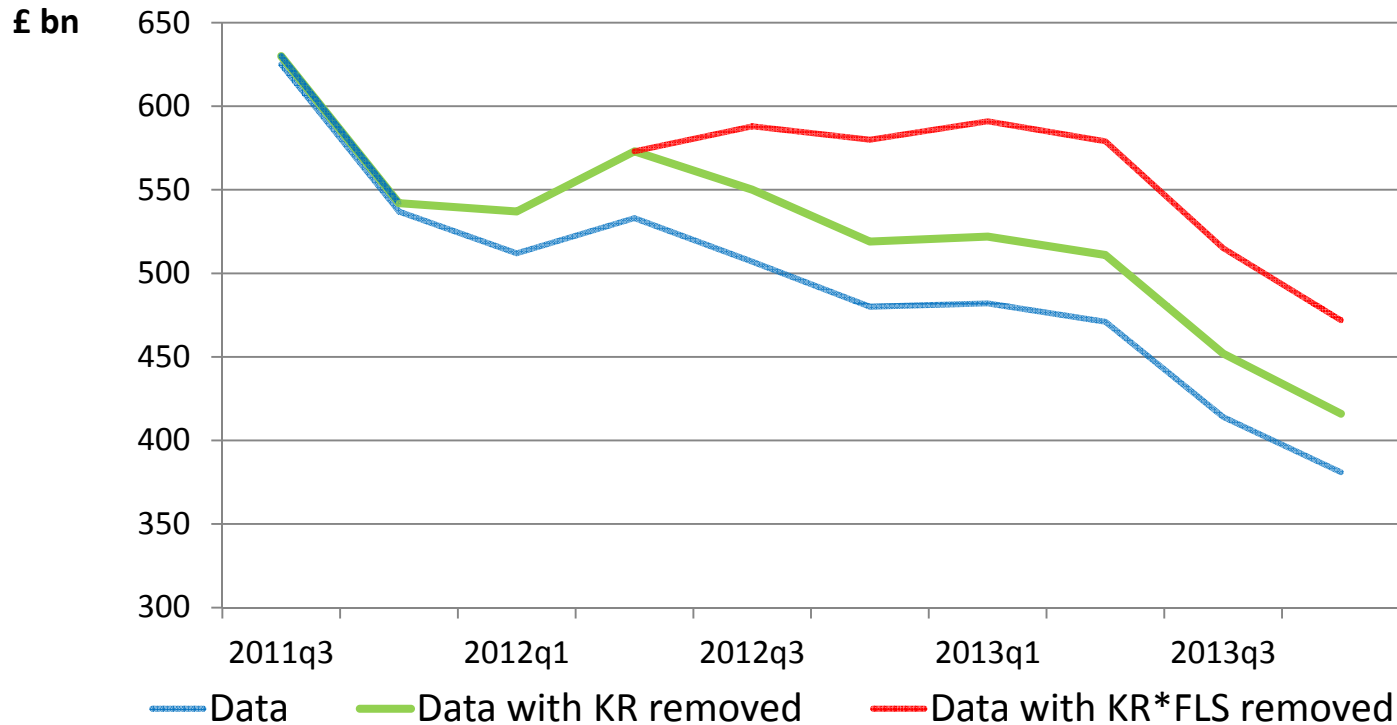
Exogeneity of capital requirements

		Total External Lending Growth	
		(7)	(8)
		Include KR determinants directly - Model 1	Include KR determinants directly - Model 2
Δ Capital Requirements		-1.073	-2.148
	<i>p-val</i>	0.650	0.378
Δ Capital Requirements * FLS		3.804	4.744
	<i>p-val</i>	0.251	0.171
Δ Capital Requirements * Fraction		0.790	1.190
	<i>p-val</i>	0.659	0.531
Δ Capital Requirements * FLS * Fraction		-7.134***	-9.356***
	<i>p-val</i>	0.0137	0.00189
Δ Capital Requirements * QE		-0.941*	-1.062*
	<i>p-val</i>	0.0991	0.0764
FLS * Fraction		0.0141*	0.00894
	s.e	(0.00819)	(0.00843)
Observations		13,324	13,370
Adjusted R-squared		0.0436	0.0376
Bank Controls		YES	YES
Bank Fixed Effects		YES	YES
Country-Time-Effects		YES	YES
Cluster		Bank-Time	Bank-Time

Including significant predictors of capital requirements directly into the regression yields similar results

Does this matter?

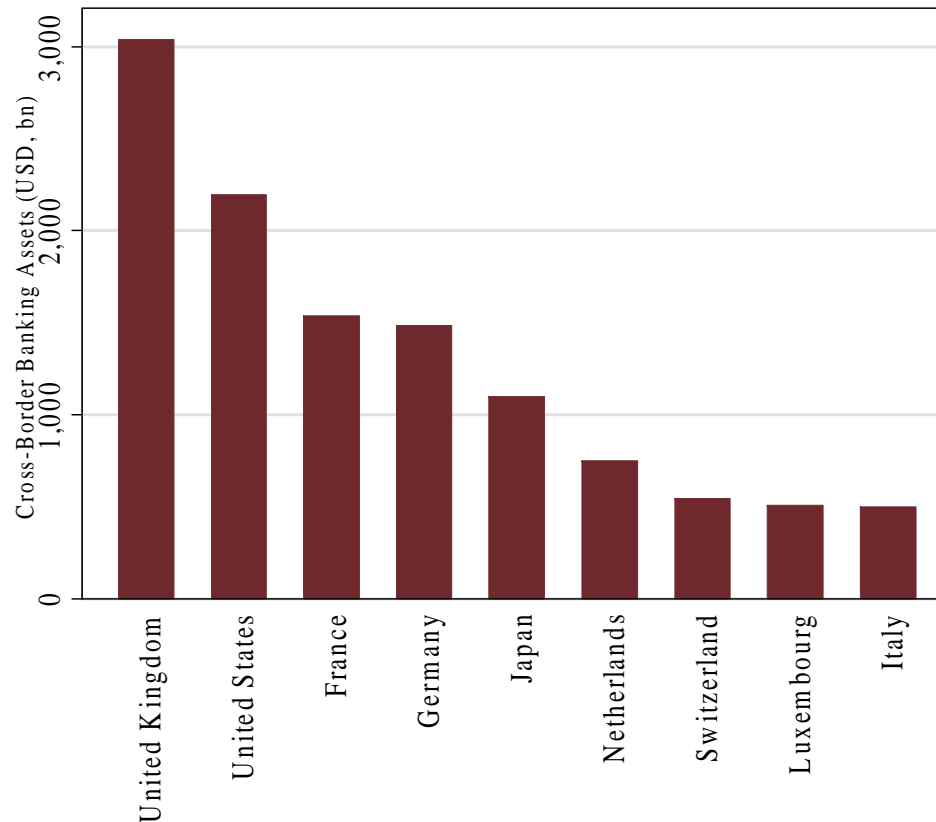
An aggregation exercise



- We use our model to remove the contribution of the KR tightening and FLS interaction from the data and aggregate up across banks.
- Up to 2013 Q4, the FLS can – in conjunction with higher capital requirements explain around 30% of the total decline in bank to bank lending

UK policies can have global implications

UK resident banking system largest creditor (among all BIS reporters).



Cross-border banking assets (2012 Q2, USD bn, BIS)

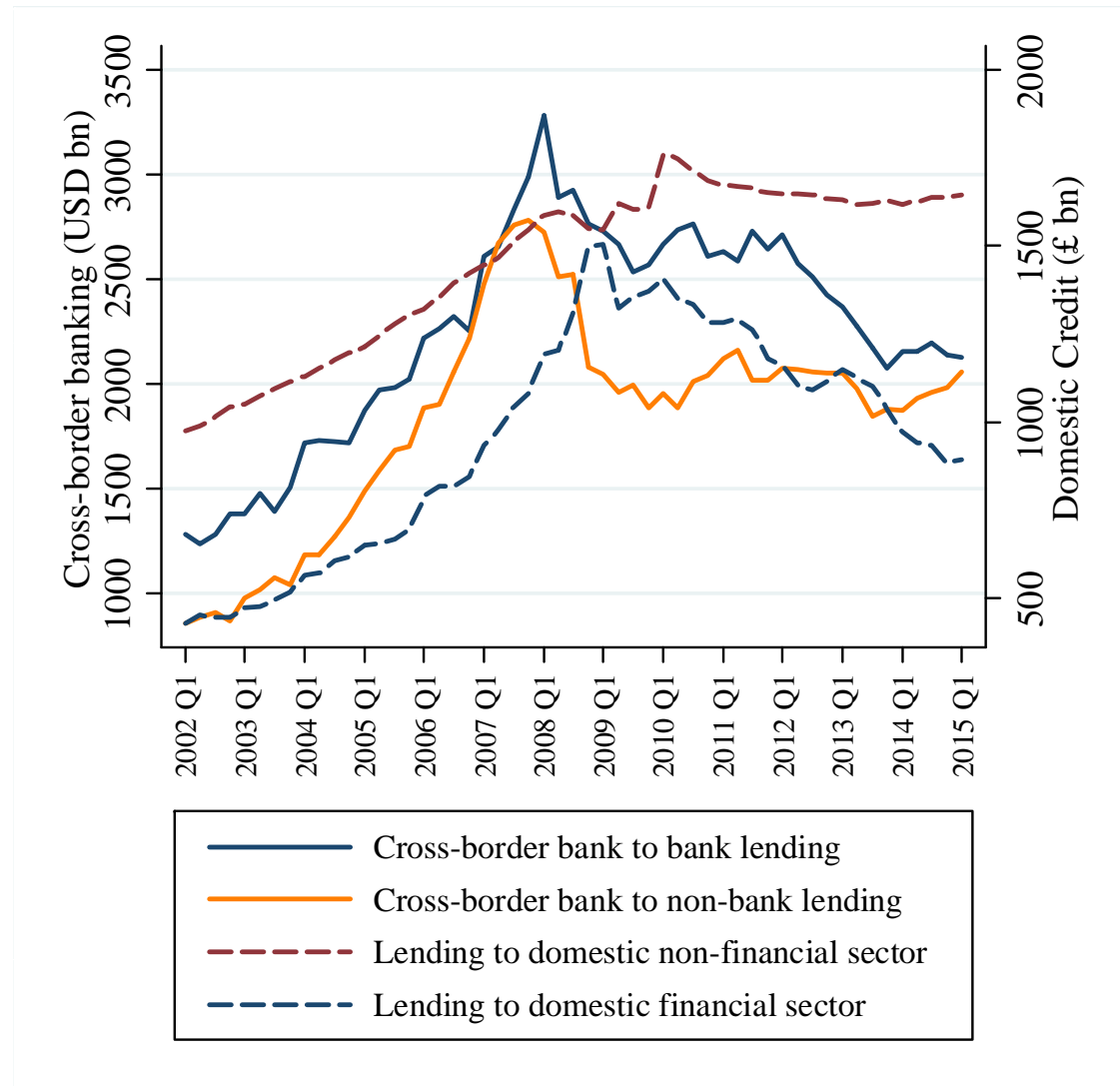
- From 2012 Q2 to 2013 Q4: Cross-border retrenchment by UK-resident banks accounts for one third of all retrenchment
- If proportionality holds, the results imply that UK regulatory and monetary policies can directly explain around 10% of the decline in bank to bank flows during the second phase of de-globalisation

Conclusions

- Although unconventional monetary policies may support domestic lending, some may have in interaction with KR tightening the (un)intended consequence of reducing foreign lending
 - Effects may be of course alleviated or offset by the 2nd round effect of UMPs improving domestic growth
- Need to understand the interactions of monetary and prudential policies better

Appendix slides

Evolution of domestic and external lending



Capital Tightening vs Loosening

		Total External Lending Growth	
		(1)	(2)
		pre-GFC 1997-2007	post-GFC 2010-2015
Δ Capital Requirements Tightening		-6.177***	-4.794***
	<i>p-val</i>	0.00669	0.00560
Δ Capital Requirements Loosening		-2.697	-0.959
	<i>p-val</i>	0.106	0.491
Test if Tightening diff. from Loosening (p-val)		0.207	0.053
Observations		41,792	17,186
Adj. R-squared		0.0468	0.0284
Bank Fixed Effects		YES	YES
Country-Time-Effects		YES	YES
Cluster		Bank-Time	Bank-Time

- In the post-GFC period: Capital requirements loosening less 'binding' than capital tightening

Robustness II

		Total External Lending Growth				
		(1)	(2)	(3)	(4)	(5)
		Winsorise at 1%	Winsorise at 5%	Different clustering	Drop small banks	From 2008 Q3
Δ Capital Requirements		-2.112	-1.888	-2.136	-1.913	-0.521
	p-val	0.289	0.289	0.270	0.359	0.812
Δ Capital Requirements * FLS		4.716*	4.231*	4.737*	4.750	2.027
	p-val	0.0781	0.0791	0.0752	0.102	0.453
Δ Capital Requirements * Fraction		-0.410	-0.390	-0.416	-0.486	-0.238
	p-val	0.614	0.595	0.572	0.570	0.840
Δ Capital Requirements * FLS * Fraction		-4.315**	-3.883**	-4.311***	-4.501**	-5.074**
	p-val	0.0222	0.0224	0.00672	0.0202	0.0127
Δ Capital Requirements * QE		-0.783	-0.689	-0.784	-0.821	-1.009*
	p-val	0.182	0.196	0.150	0.188	0.0824
Δ Capital Requirements * FLS * Fraction * EA						
	p-val					
FLS * Fraction		0.00440	0.00294	0.00447	0.00642	0.00622
	s.e	(0.00553)	(0.00500)	(0.00481)	(0.00602)	(0.00553)
Observations		47,421	47,421	47,421	39,677	16,512
Adjusted R-squared		0.0359	0.0386	0.0356	0.0403	0.0302
Bank Controls		YES	YES	YES	YES	YES
Bank Fixed Effects		YES	YES	YES	YES	YES
Country-Time-Effects		YES	YES	YES	YES	YES
Cluster		Bank-Time	Bank-Time	Country-Time	Bank-Time	Bank-Time

Variable	Transformation	(1) Coefficient	(2) PIP
Constant		0.00934*** (0.000939)	
Financial and Operating Income	Annual Growth	-0.00256 (0.0540)	0.08
Interest income	Annual Growth	-0.0818 (0.230)	0.22
Fee and commission income	Annual Growth	-0.00573 (0.0913)	0.06
Realised gains/losses on financial assets & liabilities	Annual Growth	0.943 (1.523)	0.34
Other operating income	Annual Growth	0.0152 (0.169)	0.09
Other operating income	Current Growth	0.468 (0.339)	0.74
Financial & Operating Charges	Annual Growth	0.541* (0.278)	0.95
Other costs	Annual Growth	0.00913 (0.0607)	0.08
Impairment/Provisions	Annual Growth	0.0461 (0.163)	0.12
Impairment/Provisions	Current Growth	-0.000106 (0.0277)	0.05
Write-offs	Annual Growth	0.00155 (0.0662)	0.05
Foreign currency Risk (PRR, stan. approach)	Lagged Growth	0.0836 (0.495)	0.07
Position, FX and commodity risk (internal models)	Lagged Growth	-0.0473 (0.221)	0.08
Position, FX and commodity risk (internal models)	Current Growth	0.0297 (0.193)	0.07
Pillar 1 credit risk capital component	Lagged Growth	0.00327 (0.0376)	0.05
External bank lending growth	Annual Growth	0.000758 (0.00400)	0.08
External bank-to-bank lending growth	Annual Growth	0.000167 (0.00200)	0.06
Domestic real sector lending growth	Annual Growth	0.000125 (0.00239)	0.05
Domestic real sector lending growth	Current Growth	0.0150*** (0.00520)	0.96

- Bayesian Model Averaging
- Evaluation of 500,000 models.