The Relationship Between Bank Lending Rates, Policy Rates and Bank Funding Costs After the Global Financial Crisis

by Anamaria Illes, Marco J Lombardi and Paul Mizen

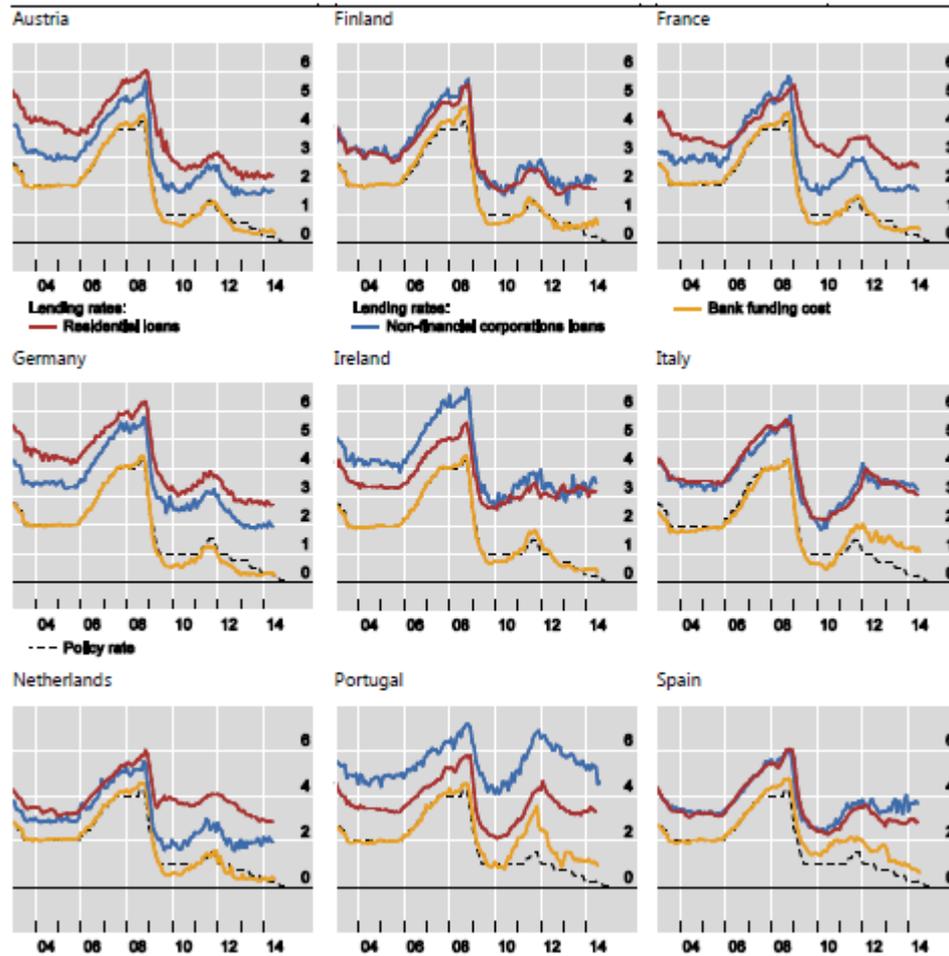National Bank of Belgium, 22 June 2015

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Key Issues

- The global financial crisis prompted central banks in many countries to cut short-term policy rates to near zero levels after the Lehman collapse in September 2008

- Based on the pre-crisis relationship between bank lending rates and policy rates, it would have been reasonable to expect lending rates to have fallen by similar amounts.

- But

  - lending rates did not fall that much.

  - margins over policy rates have widened as policy rates have fallen (business lending by 19.5%, mortgage lending by 41.8% (ST) and 37.5% (LT))

Short term lending and policy rates in the UK

Lending rates:
— Residential loans
— Non-financial corporation loans
— Bank funding cost
- - - Policy rate
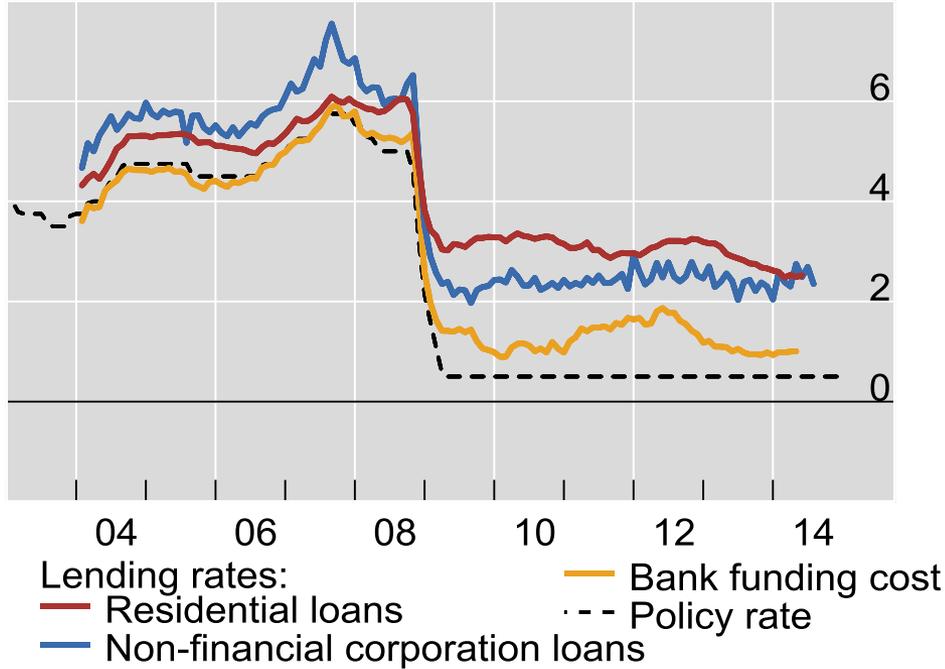
Short term lending and policy rates in the EA

Policy rates and bank lending rates

Three reasons why they do not follow policy rates

- First, the policy rate is a very short-term rate, and so ignores the maturity mismatch with lending rates.

- Second, even if we correct for the maturity mismatch using an appropriately adjusted swap rate, the adjusted policy rate is not the marginal cost of funds for banks.

- Banks obtain funds from a variety of sources including
  - retail deposits, senior unsecured or covered bonds and the interbank market, central bank operations

  these rates differ from policy rates in maturity and risk characteristics.

Policy rates and bank lending rates

Reasons why policy rates are less relevant after the crisis

Since the global financial crisis there have been a number of changes that have increased the cost of bank funding

- Larger risk premia on securities issued by banks and interbank borrowing, have raised the cost of market funding for banks (see ECB 2009, 2010a,b; Zoli, 2013).

- Greater importance of national financial conditions on secured and unsecured money and capital markets; more heterogeneity in financial conditions (ECB 2012).

- Deposit rates have been constrained by the zero lower bound; banks reduced the markdown on policy rates.

- Greater competition among banks for deposits has further raised rates on time deposits (see Paries et al. 2014).

Policy rates and bank lending rates

Why this has become a major policy issue

- Central Banks are concerned about the possible ineffectiveness of monetary policy.

- Central banks want to understand how unconventional policy affects bank lending rates and volumes.

- The transmission of monetary policy in Europe is reliant on financial intermediaries, because there is greater bank dependence than in other regions.

- Central banks wish to answer the criticism that banks seem to be setting rates 'too high' in a period of exceptionally loose monetary policy (this point has been made to us by the Bank of England, ECB and national CBs).

Funding costs and bank lending rates

We construct a weighted average cost of liabilities for banks, which reflects the increase in the cost of funds that they have experienced.

It comprises a volume-weighted average of the rates at which banks can obtain finance:

$$WACL_{it} = \sum_{j=1}^{J} w_{ijt} r_{ijt}$$

where r_{ijt} are the rates on the different component liabilities that the banks use to provide funds, and w_{ijt} are the weights on those rates based on the component share in total liabilities for the banks in each country.

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Funding costs and bank lending rates

A key issue in the paper is therefore the construction of the weights in the WACL measure of bank funding costs.

The WACL is constructed using five types of liabilities - retail deposits, senior unsecured or covered bonds and the interbank market, central bank operations.

Tables 1A and 1B provide a summary, and compare the average weights (based on outstanding amounts). **Our baseline approach is to use outstanding volumes to compute weights.**

Component weights

- **deposit liabilities** (in all currencies, and excluding the general government) vis-à-vis the euro area to MFIs and to non-MFIs.
- Deposit liabilities to MFIs are equivalent to interbank deposits, while deposits to non-MFIs correspond to deposits of the private non-financial sector.
- MFIs aggregate balance sheet on a national basis (excluding the ESCB) are obtained from the ECB and national central banks in Denmark and the United Kingdom.
- Banks have a substantial deposit base in most countries, over 90 percent of total funding in the short-term and 70 percent of total long-term funding (Table 1).

Component weights

- **debt securities**, issued in all currencies in the euro area by the MFIs. This is obtained from the MFIs balance sheets, which also report breakdowns of maturities up to and over one year.

- Bond markets are segmented to a large extent on national lines (van Rixtel and Gasperini, 2013) and tend to be influenced in different ways at times of crisis, yields showing substantial spikes.

- According to Table 1, conventional bonds comprise a small share of short-term funding, while they account for approximately 15-30 percent of funding in the long term.

Component weights

- **covered bonds** data are from Dealogic. This component is only used for the long-term calculations since all of the covered bonds have a maturity of more than one year.

- The volume of covered bonds outstanding is not large, but has grown since the crisis. Banks in Austria, Finland, France, Italy, Netherland, Portugal, Spain and the United Kingdom all increased the proportion of funding from this source after the financial crisis.

- Exceptions are Germany and Spain.

Component weights

- **central bank operations** for the euro area countries only becomes important after 2009.

- Van Rixtel and Gasperini (2013) show that Spain and Italy relied most heavily on liquidity operations provided by the ECB having borrowed, respectively, €400bn and €277bn in September 2012.

- For the short-term, we include the amounts of the Main Refinancing Operations (MROs), while for the long-term we sum up the amounts of MROs and the long-term refinancing operations (LTROs).

- 30% of total bank assets in Greece, 11%in Ireland, 8% in Spain and 5%in Portugal over the post-crisis period.

Component weights

- **equity issuance** is excluded.

- It accounts for a small percentage of the outstanding balances, and it is arguably not used by banks as a source of regular finance for bank lending, but rather as a structural adjustment (e.g. adjustment of capital ratios in response to regulatory requirements).

- Adrian *et al.* (2013) show that while changes in banks' assets (including loans) and changes in their debt move proportionally, equity remains 'sticky', i.e. it does not adjust when there is a change in assets.

Weights of the short term WACL

	MFI DEPOSITS	NON MFI DEPOSITS	SECURITIES	CB OPS
Austria	40.1	57.9	1.1	0.9
Finland	17.9	69.8	11.8	0.5
France	47.2	44.5	8.3	0.0
Germany	35.5	61.7	1.0	1.8
Ireland	55.2	39.1	3.1	2.6
Italy	38.1	61.0	0.1	0.8
Netherlands	22.1	74.9	3.0	
Portugal	30.4	68.1	0.4	1.2
Spain	25.3	71.1	2.3	1.3
Denmark	34.7	64.2	1.1	
United Kingdom	30.3	63.8	5.8	

Weights of the long term WACL

|	MFI DEPOSITS	NON MFI DEPOSITS	CONV SECURITIES	COVERED BONDS	CB OPS
Austria	28.0	40.3	28.8	1.5	1.5
Finland	15.6	61.0	19.9	2.1	1.3
France	40.7	38.3	16.3	4.1	0.6
Germany	23.8	41.6	22.0	10.4	2.3
Ireland	44.1	31.0	14.2	3.2	7.5
Italy	27.5	43.6	27.0	0.8	1.2
Netherlands	16.3	53.3	25.8	0.8	3.7
Portugal	24.4	54.3	14.7	1.9	4.7
Spain	19.8	55.4	11.7	9.6	3.5
Denmark	13.5	24.9	61.4	0.3	
United Kingdom	27.6	56.8	14.0	1.6	

Funding costs and bank lending rates

- **Adjusted stocks-based WACL.** We assume banks only use lowest cost funding options. Sharp increase in credit spreads on conventional bonds issued by banks can raise these rates above lending rates therefore we allocate greater weight to the covered bonds category by reducing the weight on conventional bonds to zero

- **Flows-based WACL.** Here the weights are based on flows data on new deposits and gross issuance by sector of securities other than shares for the short- (less than one year) and the long-term (more than one year) all from the central banks. The covered bonds are obtained from Dealogic.

Funding costs and bank lending rates

- **Interest rates** used are always based on new transactions data.

- For MFIs deposits we use the overnight and 1-year interbank money market rates for ST and LT.

- For non-MFI deposits we use ECB MFI interest rate statistics.

- For debt securities, we take the OIS interest rate swap rate plus the financial CDS spread in each country. E.g. long term rate equals 5-year interest rate swap plus the 5-year financial CDS.

- For covered bonds we use yield to maturity from Barclays.

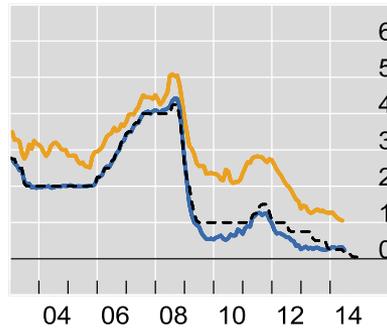- For the central bank operations we use the Main Refinancing Rate of the euro area.

Selected WACL funding costs and policy rates for France, Germany and the UK

France
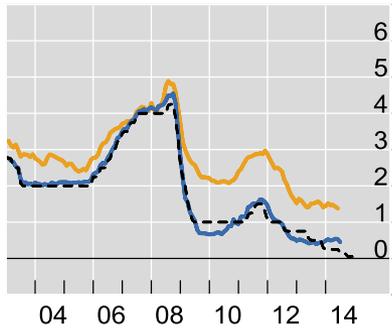
Germany

UK

— MFI funding cost: short-term
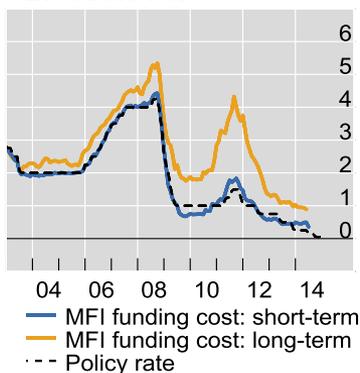— MFI funding cost: long-term
- - - Policy rate

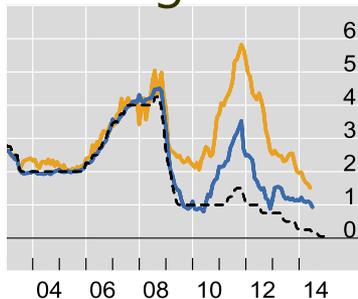# Selected WACL funding costs and policy rates for Ireland, Italy, Portugal and Spain

Ireland

- MFI funding cost: short-term
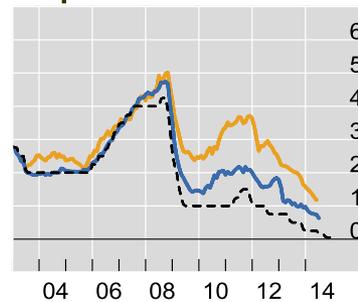- MFI funding cost: long-term
- Policy rate

Italy
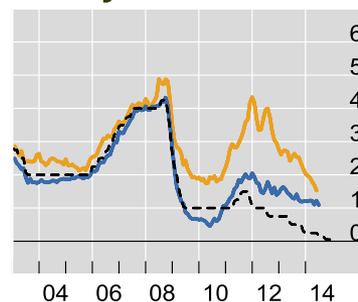
Portugal

Spain

Estimation by pooled mean group (PMG) estimator

We take y_{it} (the lending rate), and x_{it} (the driver of the lending rate i.e. policy rate or the WACL). Assuming an ARDL model

$$y_{it} = \sum_{p=1}^{P} \chi_{ip} y_{it-p} + \sum_{q=0}^{Q} \delta_{iq} x_{it-q} + \mu_i + e_{it}$$

we rewrite as a stacked set of N individual equations relating y_{it} and x_{it} for groups $i = 1,2,...N$ over the time period t=1,2,...T as

$$\Delta Y_i = \alpha_i Y_{i,-1} + \beta_i X_i + \sum_{p=1}^{P-1} \chi_{ip} \Delta Y_{i,-p} + \sum_{q=0}^{Q-1} \delta_{iq} \Delta X_{i,-q} + \mu_i 1 + \varepsilon_i$$

where $Y_i = (y_{i1}, ... y_{iT})'$, $X_i = (x_{i1}, ... x_{iT})'$, **1** = (1,..., 1)′, $e_i = (e_{i1}, ... e_{iT})'$ are all *T x 1* vectors of observations, ones and residual errors, and Δ is the first difference operator.

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Estimation by pooled mean group (PMG) estimator

After establishing the order of integration using Im, Pesaran and Shin tests, the model has the following specification:

$$\Delta Y_i = \alpha_i (Y_{i,-1} - \theta_i X_i) + \sum_{p=1}^{P-1} \chi_{ip} \Delta Y_{i,-p} + \sum_{q=0}^{Q-1} \delta_{iq} \Delta X_{i,-q} + \mu_i 1 + \varepsilon_i$$

where the relationship $\alpha_i (Y_{i,-1} - \theta_i X_i)$ for the levels provides information on the long-run relation between lending rates and driving variables i.e. policy rates or funding costs,

$\beta_i = \alpha_i \theta_i$ coefficient is an estimate of the long-run pass-through coefficient; and

α_i is the adjustment speed of rates to deviations from this long-run for the individual country i.

Results – Main messages

- Data are non-stationary according to Im-Pesaran-Shin tests.

- Cointegration relationships exist for the full sample for the WACL(stock) and WACL(flow) v.s lending rates with a few exceptions. NO cointegration exists for policy rates v.s lending rates on the full sample.

- PMG estimates imply

  - 100bp ⬆ WACL(stocks) funding cost for banks $\Rightarrow$ 85-89bp ⬆ in lending rates.

  - long-term lending rates are consistently less responsive than short-term lending rates.

Unit Root Tests

Im-Pesaran-Shin tests

Lending Rates	Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
	1.437	−2.531	−0.119	0.690
	(0.925)	(0.006)	(0.453)	(0.755)
Bank funding costs (short term)	WACL(stock, unadjusted)	WACL (stock, adjusted)	WACL (flow, adjusted)	
	0.693	0.693	1.593	
	(0.756)	(0.756)	(0.945)	
Bank funding costs (long term)	WACL(stock, unadjusted)	WACL (stock, adjusted)	WACL (flow, adjusted)	
	1.832	1.988	2.220	
	(0.967)	(0.978)	(0.987)	
Policy rate	Policy rate			
	2.593			
	(0.995)			

Cointegration tests

Cointegration test allowing for cross sectional dependence	Persyn & Westerlund (2008) Test	Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
Policy Rate					
Policy rate (full sample)	Gt	-1.253	-2.564***	1.069	-1.197
Policy rate (full sample)	Pt	-0.196	-4.409***	-0.398	-3.600***
Policy rate (Pre-GFC sample)	Gt	-6.392***	-3.681***	-3.802***	-2.080**
Policy rate (Pre-GFC sample)	Pt	-6.673***	-5.566***	-3.868***	-1.892**
Weighted Average Cost of Liabilities (WACL)					
WACL (stock, unadjusted)	Gt	-4.288***	-1.730**	-3.340***	-2.987***
WACL (stock, unadjusted)	Pt	-2.571***	-4.073***	-3.712***	-3.450***
WACL (stock adjusted)	Gt	-4.288***	-3.449***	-3.340***	-3.540***
WACL (stock, adjusted)	Pt	-2.571***	-2.554***	-3.712***	-3.645***
WACL (flow, adjusted)	Gt	0.270	-2.508***	-2.734***	-1.919**
WACL (flow, adjusted)	Pt	0.737	-3.521***	-2.087**	-3.052***

Cointegration tests

Cointegration test allowing for structural breaks and cross sectional dependence	Banerjee & Carrion-i-Sylvestre (2013) Test	Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
Policy Rate					
Policy rate (full sample, intc.break,)	Za	-3.230***	-1.0391	-2.710**	-3.229***
Policy rate (full sample, intc. and cointeg. vector break)	Zac	-4.131***	-0.2911	-1.646	-2.6664**
Weighted Average Cost of Liabilities (WACL)					
WACL (stock, unadjusted, full sample, intc. break,)	Za	-3.716***	-3.015***	-2.959***	-4.504***
WACL (stock, unadjusted ull sample, intc. and cointeg. vector break)	Zac	-2.304**	-2.564**	-2.580**	-3.760***

Results – Main messages (continued)

- Results for WACL(flows) are not statistically different from those reported for WACL(stocks) despite different weights.

- Taking all 11 countries, EA and EA(core), PMG estimates imply
  - short-term lending rates and WACL(stocks) relationships are fairly similar across the three groups of countries
  - greater differences exist between the 11 countries and the EA and EA(core).

- Adjustment coefficients are all negative and significant

PMG estimates of pass through – WACL (stock)

	WACL (stock, adjusted)			
	Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
Countries: Euro Area, UK and Denmark				
Cointegrating relation Pass through estimate	0.890***	0.879***	0.856***	0.886***
	0.012	0.037	0.016	0.047
Countries: Euro Area				
Cointegrating relation Pass through estimate	0.877***	0.733***	0.864***	0.907***
	0.013	0.038	0.016	0.061
Countries: Euro Area Core				
Cointegrating relation Pass through estimate	0.876***	0.749***	0.859***	0.953***
	0.014	0.041	0.017	0.071

PMG estimates of pass through – WACL (flow)

	WACL (flow, unadjusted)		
Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
0.890***	0.805***	0.888***	0.748***
0.017	0.051	0.018	0.058
0.890***	0.817***	0.893***	0.822***
0.017	0.052	0.018	0.072
0.899***	0.853***	0.893***	0.899***
0.017	0.055	0.019	0.094

Results – contrast with policy rates

- Pass-through estimates with policy rates: 100bp ⬆ in policy rates $\Rightarrow$ 52-96bp ⬆ in lending rates. The range of values is wider. In many cases the pass through estimate is lower.

- There is a structural break in policy rates and cointegration breaks down even when we allow for a structural break.

- A Hausman test rejects the null of equality of coefficients across countries (rejecting the PMG restriction).

PMG estimates – policy rates

	Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
Countries: Euro Area, UK and Denmark				
Cointegrating relation				
Pass through estimate	0.938***	0.615***	0.523***	0.738***
	0.015	0.032	0.014	0.031
Countries: Euro Area				
Cointegrating relation				
Pass through estimate	0.937***	0.633***	0.943***	0.699***
	0.015	0.051	0.023	0.049
Countries: Euro Area Core				
Cointegrating relation				
Pass through estimate	0.939***	0.661***	0.958***	0.720***
	0.016	0.054	0.024	0.054

Results – robustness

We consider sub-samples to explore the pass-through of WACL to lending rates up to three alternative break points:

1) the global financial crisis (GFC), July 2007, after which bank funding costs increased significantly.

2) the Lehman collapse and subsequent recession

3) the sovereign debt crisis, December 2009

Pass through was higher in the pre-crisis period, and progressively declines through the post-crisis period (by about 10%).

Adjustment was much faster and also declined (by about 33%)

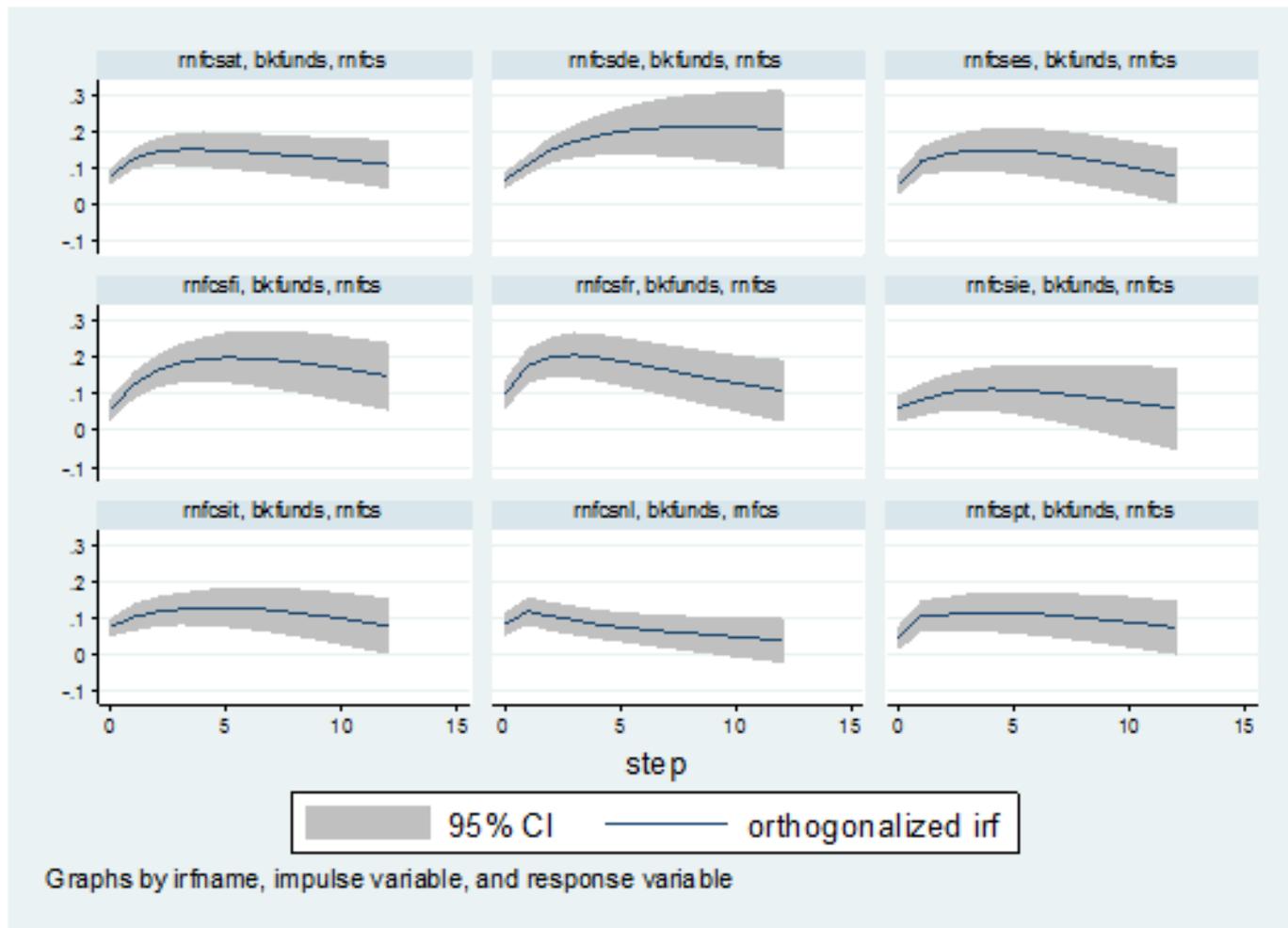The findings are robust to different weighting schemes.

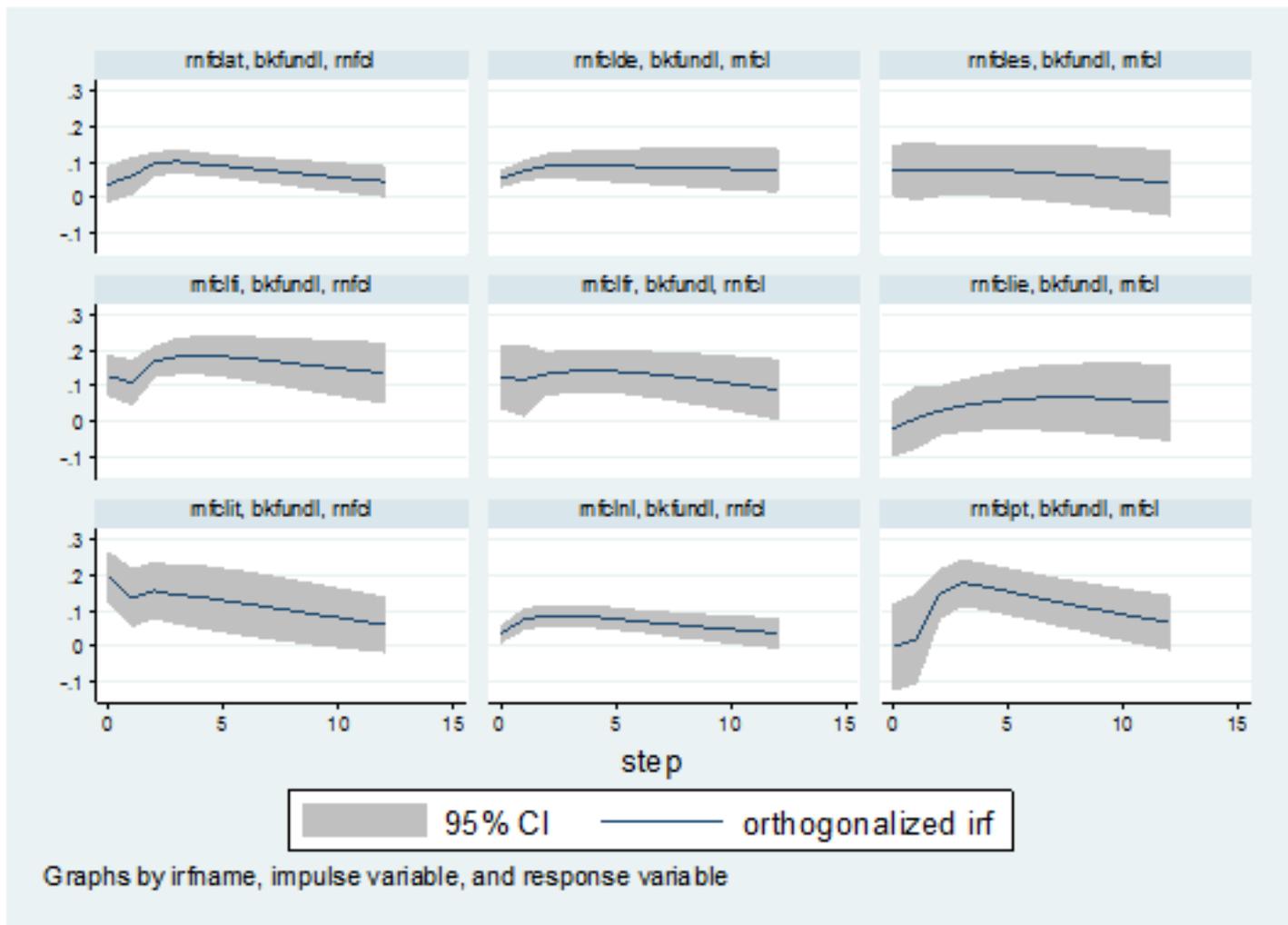# Sub sample estimation using WACL (stock)

	Short rate to NFCs	Long rate to NFCs	Short mortgage rate	Long mortgage rate
Sample extends until global financial crisis (2003M1 - 2007M7)				
Cointegrating relation				
Pass through estimate	1.040***	1.182***	1.000***	0.949***
	0.020	0.090	0.034	0.055
Sample extends until post crisis recession (2003M1 - 2008M8)				
Cointegrating relation				
Pass through estimate	0.950***	0.894***	1.003***	0.789***
	0.010	0.031	0.017	0.032
Sample extends until sovereign debt crisis (2003M1 - 2009M12)				
Cointegrating relation				
Pass through estimate	0.916***	0.783***	0.811***	0.697***
	0.010	0.025	0.015	0.023

Impulse responses using NFC short v WACL (stock)

Graphs by irfname, impulse variable, and response variable

Impulse responses using NFC long v WACL (stock)

Graphs by irfname, impulse variable, and response variable

Impulse responses for mortgage short v WACL (stock)

Graphs by irfname, impulse variable, and response variable
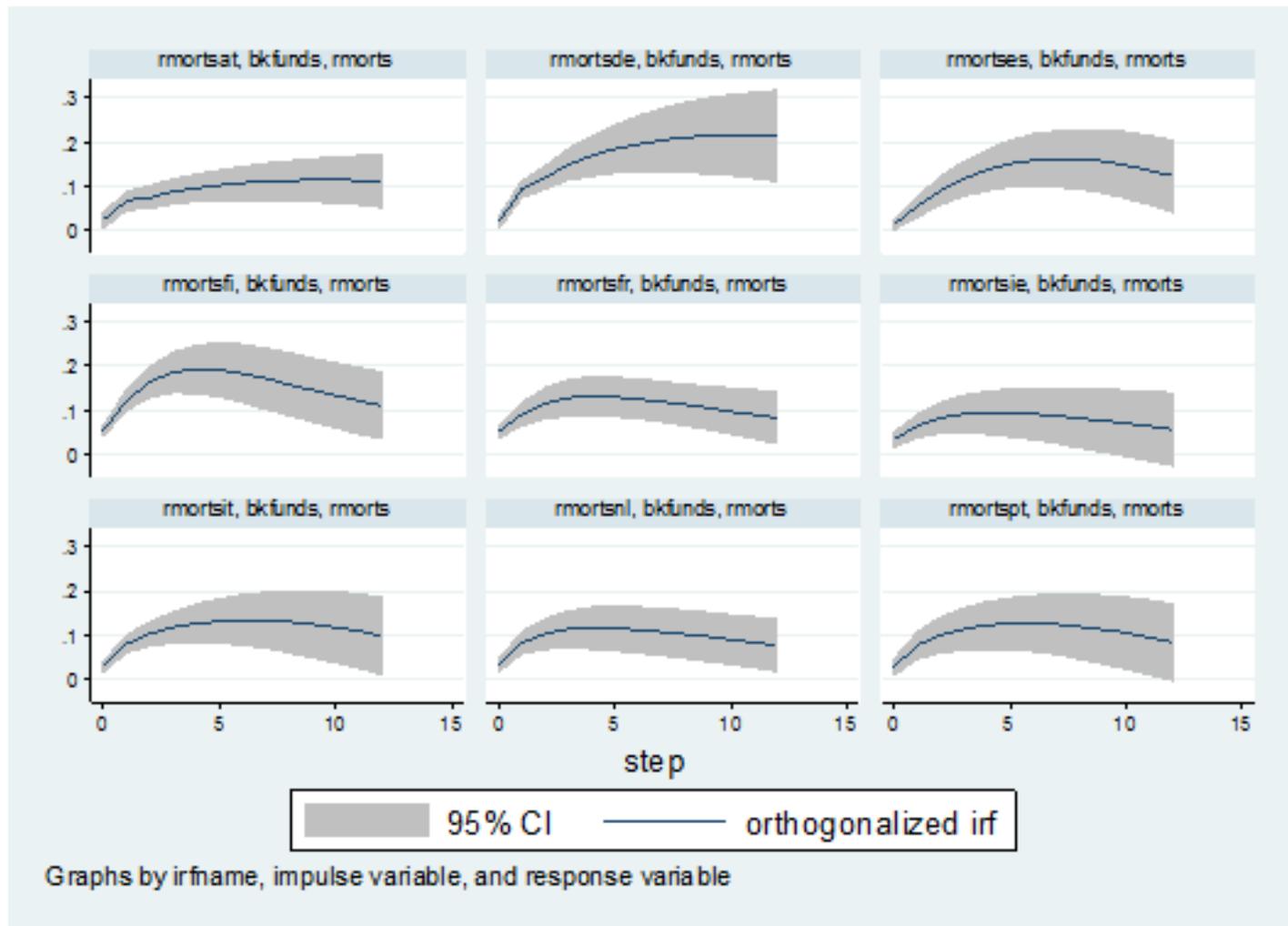
Impulse responses for mortgage long v WACL (stock)

Graphs by irfname, impulse variable, and response variable
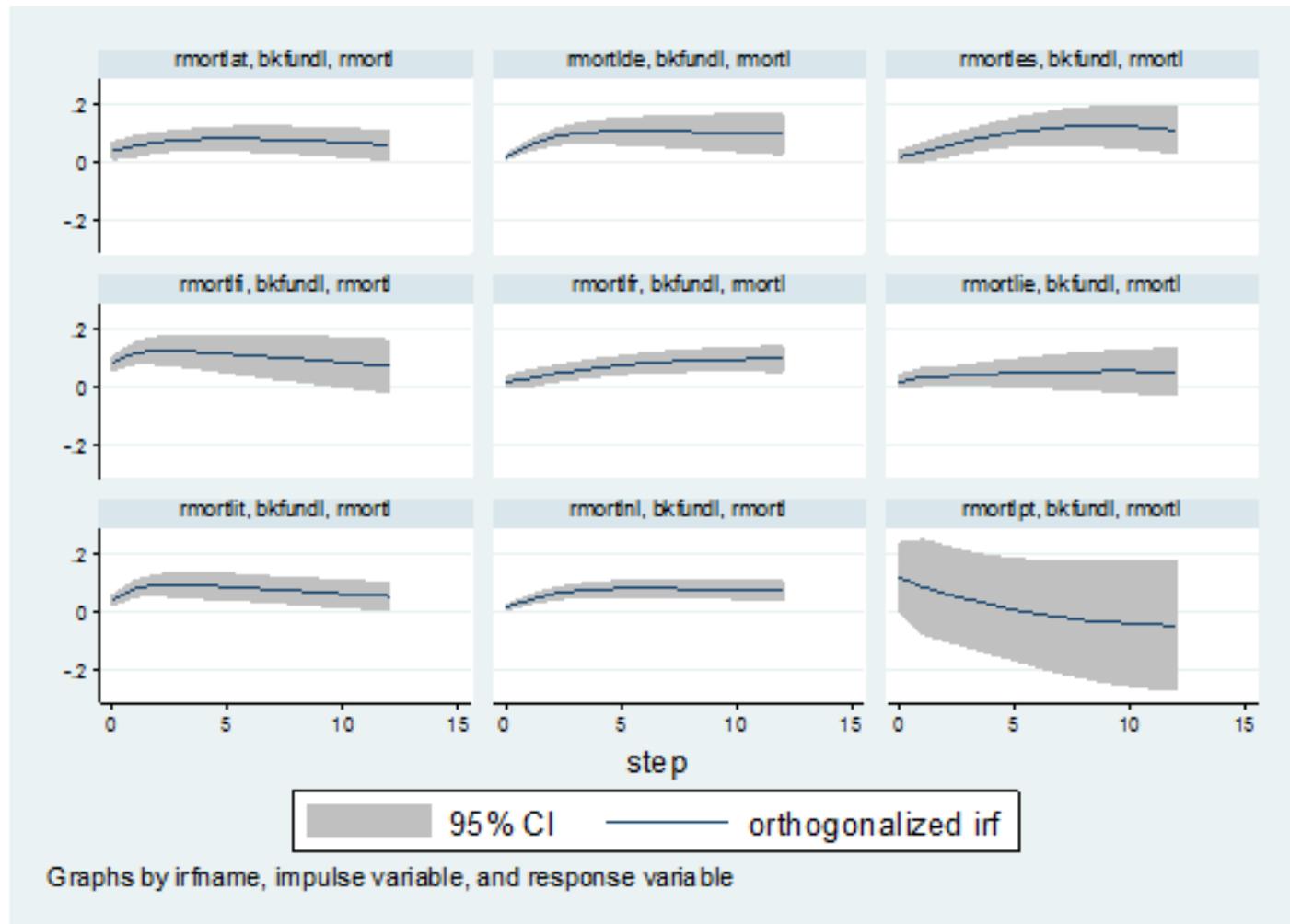
Implications

- Heterogeneity in financial conditions across the euro area has increased significantly, as some countries have been affected more substantially by the financial crisis.

- Money markets have become impaired, especially across national borders, and yields in sovereign bond markets have diverged significantly.

- As a result ECB's monetary policy stance could no longer be transmitted to short-term and longer term interest rates, as in the past, with rates reflecting increased market and liquidity risk.

- Standard pass-through models (i.e. models where policy interest rates and market interest rates are considered the most important determinants of retail bank lending rates) are ill-equipped to explain increasing levels of heterogeneity in bank lending rates during the crisis because they do not include risk factors.

Implications

For these reasons … (the bullets on the previous slide are all verbatim quotes from ECB monthly bulletins Aug 2012 pp 63-4, 68 and Aug 2013 p75)

…financing conditions have more to do with financial conditions in different countries -- which are heterogeneous in the post crisis period – and less to do with policy rates set by the ECB.

We could add that these conditions are also true outside the euro area, and the effects of the sovereign debt crisis are just as important as the financial crisis.

Conclusions

- Policy rates have fallen sharply while lending rates have not. Some conclude that banks have failed to pass through rate changes.

- We argue that funding costs are disconnected from policy rates in the post crisis period. Some funding costs have risen with elevated credit risk.

- The LR relationship between lending rates and funding costs is stable through the whole sample 2003-2014, while policy rates appear to have a structural break and the relationship with lending rates is not stable.

- We show pass through does decline by about 100bp after the GFC, but this is mostly on long rates not short rates