

# Mending the broken link: Heterogeneous bank lending and monetary policy pass-through

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“Unconventional Monetary Policy: Lessons Learned”**

**The opinions in this presentation are those of the authors and do not  
necessarily reflect the views of the European Central Bank or the Eurosystem**

- This paper presents stylized bank level evidence indicating that, over the sample 2009-2014, the interest rate channel of monetary policy in the euro area had weakened considerably
- Investigates the reasons why this happened and studies how non-standard measures may have helped to mend the link between monetary policy and real activity.
- Makes use of a novel and large data set covering European banks for the period 2009-2015 and exploits information about their balance sheet characteristics and their funding structure to examine the questions of interest

**Bank loans are 50% of external financing of euro area firms in 2002-2015 (in U.S. only 20%)**

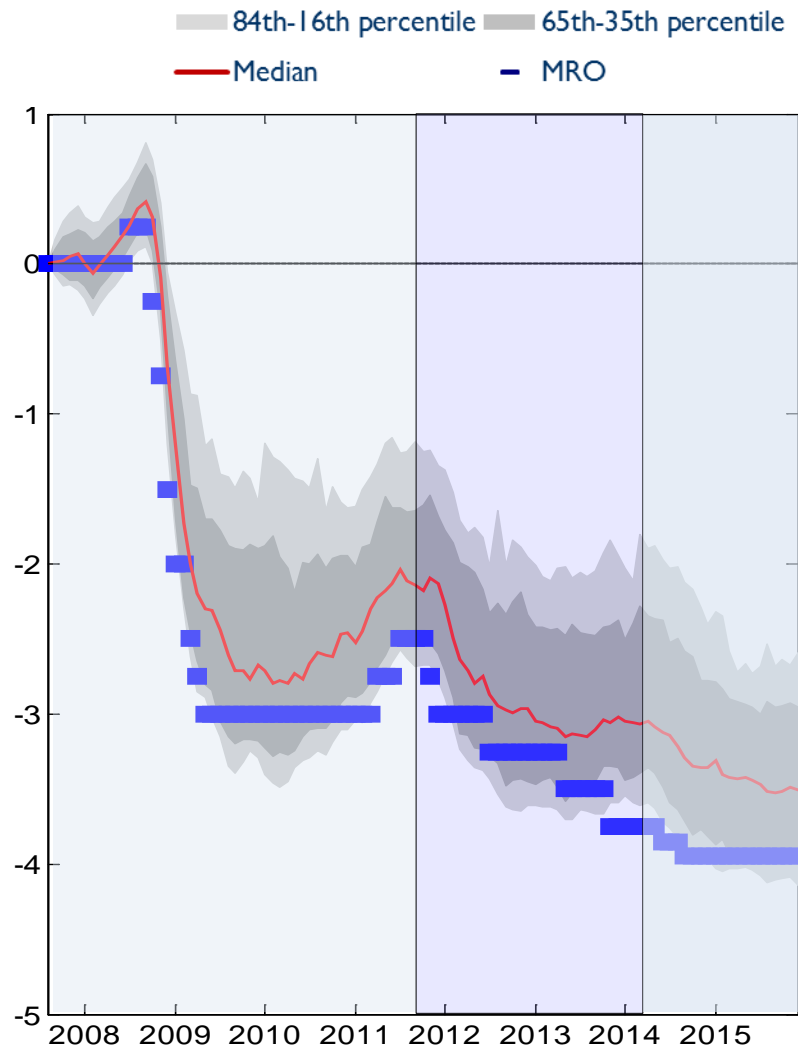
- ✓ Impairment of lending activities constrain economic activity and welfare
- ✓ Poor lending conditions hamper monetary policy transmission

**From 2000 to 2007 monetary policy pass-through was:**

- ✓ homogeneous across countries (e.g. Ciccarelli et al. 2013)
- ✓ almost complete in the long run (e.g. Hristov et al. 2014).

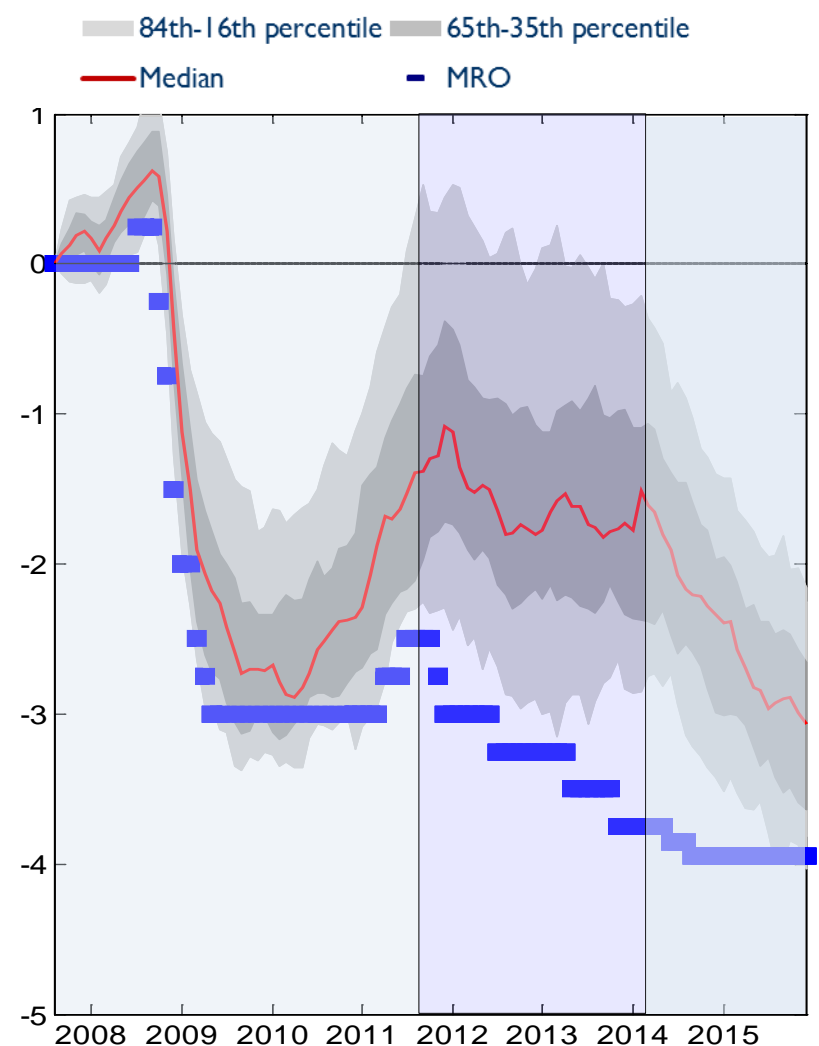
# Lending rate to non-financial corporations - NFCs

## Banks in Non-stressed Countries



*Note: Non-stressed comprise 131 MFIs from DE, AT, FR, BE, NL. Weighted averages, with weights represented by the corresponding loan outstanding amounts. Last observation: December 2015.*

## Banks in Stressed Countries



*Note: Stressed comprises 80 MFIs from IT, ES, PT, IE, GR. Weighted averages, with weights represented by the corresponding loan outstanding amounts. Last observation: December 2015.*

## ➤ Monetary policy pass-through in "normal time"

- Banks' balance sheet characteristics substantially influence the pass-through
- The pass-through seems stronger for banks
  - I. Small
  - II. Illiquid
  - III. Poorly capitalized

**In “unconventional times”** the emergence of economic and regulatory binding constraints might, in principle, substantially change these conclusions

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References: Kashyap and Stein, 1995; Stein, 1998; Kashyap and Stein, 2000; Peek and Rosengren, 1995; Kishan and Opiela, 2000; Van den Heuvel, 2002; Darmouni and Rodnyansky (2016); Chakraborty et al (2016); Carpinelli and Crosignani (2015)

- Evidence on euro area during sovereign crisis (mostly country evidence)
  - ✓ Mostly concerned with the change in pass-through before and after the crisis
  - ✓ Little difference between stressed and no-stressed countries typically found
  - ✓ Bank balance sheet characteristics matter
- ❑ **Our paper speaks about the macro effects of monetary policy using micro data identification strategies, exploring cross-section and time series variation**

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References: Acharya et al. (2015), Gambacorta (EER, 2008), Jimenez, Ongena, Peydro and Saurina (AER, 2012); Hristov et al. (JBF, 2014); von Borstel et al. (wp, 2015) ; Surico and De Santis (EP, 2013), Altavilla, Pagano, Simonelli (wp, 2015).

# Questions

1. Has the pass-through changed during the period of financial turmoil and why?
2. Do banks, even located in countries with similar characteristics, responded differently to standard monetary policy changes?
3. Were unconventional measures effective?

1. Has the pass-through changed during the period of financial turmoil and why?

YES

- Lower Median pass-through (in line with studies using aggregate data)
- Higher Dispersion and Country dimension not relevant for standard MP

2. Do banks, even located in countries with similar characteristics, responded differently to standard monetary policy changes?

YES

- Higher pass-through if high capital, low sovereign holdings and low NPLs

3. Were unconventional measures effective?

YES

- Normalized lending conditions and reduced the cross-sectional dispersion
- Higher pass-through if low capital and high NPLs
- Economically relevant macro impact



# Dataset: Matching data from different sources

## Bank-level data (250 banks, 75% of euro area))

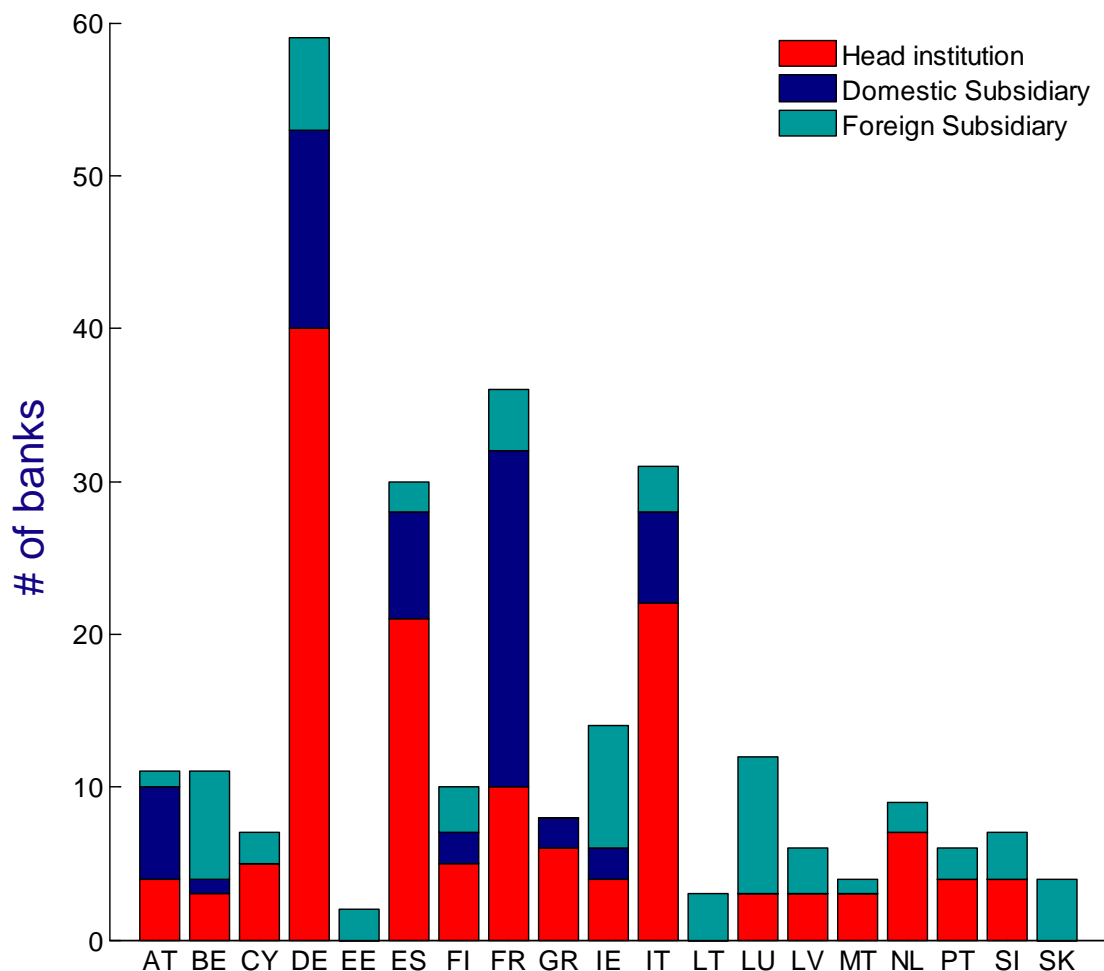
- ✓ **Individual MFI Interest Rates or IMIR (ECB)**
  - Individual bank deposit and lending rates to NFC and HH at different maturities and for different size of loans
- ✓ **Individual Balance Sheet Indicators, or IBSI (ECB)**
  - Outstanding amounts of loans, exposures to sovereign debt and other bank balance sheet information
- ✓ **Bidding behavior of banks in the refinancing operations (ECB)**
- ✓ **Bond yields for individual banks (Markit - Iboxx)**
- ✓ **Non-performing loans and capital ratios (SNL Financial)**

## Country data

- ✓ **Unemployment rate (Eurostat)**
- ✓ **Expected default frequencies (Moody's)**
- ✓ **10-year sovereign debt yields and 5-year CDS (Datastream)**

# Dataset: individual banks

## Banks included in the sample by legal status



## Important features

- **Timeliness:** track balance sheet items and lending rates month-by-month
- **Granularity:** observe 260 banks compared with approximately 90 (consolidated) banks of the EBA tests. EBA sample: 2009 (22 banks) 2010 (91 banks) 2011(90 banks) 2014 (123 banks)
- **Representativeness** main assets are about 80% of euro-area aggregate.

# **Standard-type of Monetary policy**

# Empirical Model

## Panel-BVAR

$$\begin{bmatrix} Z_t \\ X_{jt} \\ Y_{ijt} \end{bmatrix} = \begin{bmatrix} A(L) & 0 & \mathbf{0} \\ B^{1j}(L) & B^{1j}(L) & 0 \\ C^{1ij}(L) & C^{2ij}(L) & C^{3ij}(L) \end{bmatrix} \begin{bmatrix} Z_{t-1} \\ X_{jt-1} \\ Y_{ijt-1} \end{bmatrix} + \begin{bmatrix} e_t \\ v_{jt} \\ u_{ijt} \end{bmatrix}$$

### Euro Area level

EONIA

(Proxy for policy rate)

### Country level

Unemployment rate

(macroeconomic conditions)

Expected default frequency for NFCs

(borrower quality, expected loss)

Yields on 10-year sovereign bond

(sovereign risk)

### Bank Level

Bank bond yields

(funding cost)

Deposit rate

(funding cost)

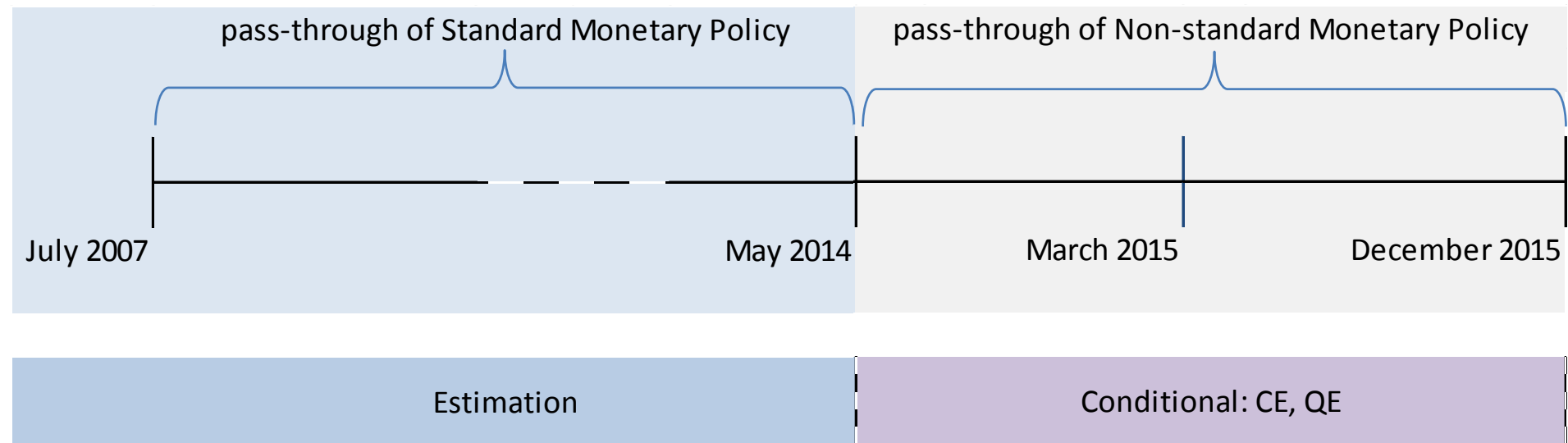
Lending rate (NFCs, HHs)

## Panel-BVAR

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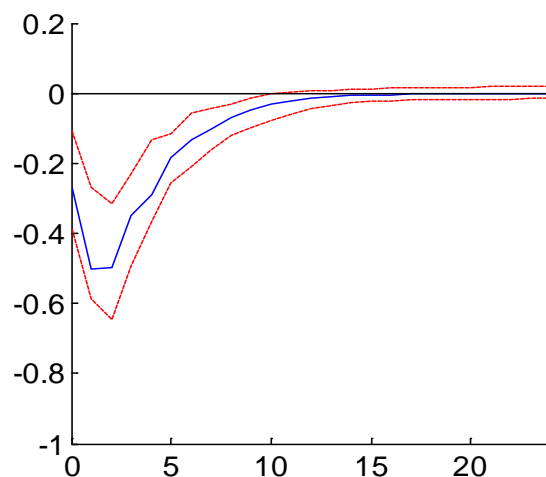
1. Estimate the model for each bank separately with Bayesian techniques
2. Simulate the impact of a conventional monetary policy shock (using estimates with data up to April 2014)
3. Group the results (IRF) according to banks' balance sheet characteristics:
  - I. Capital (CET1 ratio)
  - II. Sovereign Holding (as a ratio of main assets)
  - III. Eurosystem borrowing (VLTRO, TLTRO)
  - IV. Stable funding
  - V. Non-performing loans
  - VI. CDS

# Empirical design

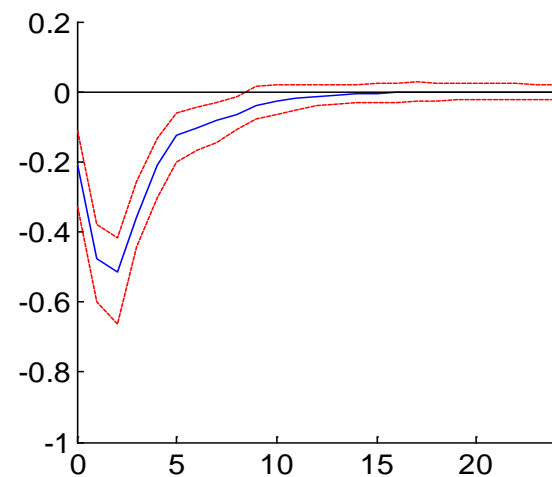


# Response to a MP shock of lending rate to NFCs

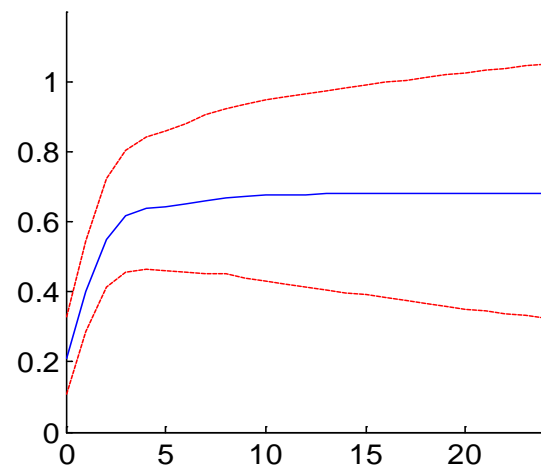
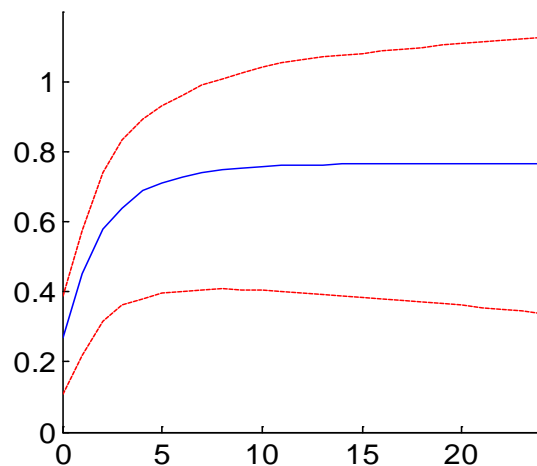
## Banks in Stressed Countries



## Banks in Non-Stressed Countries



Impulse-Response  
(in %)



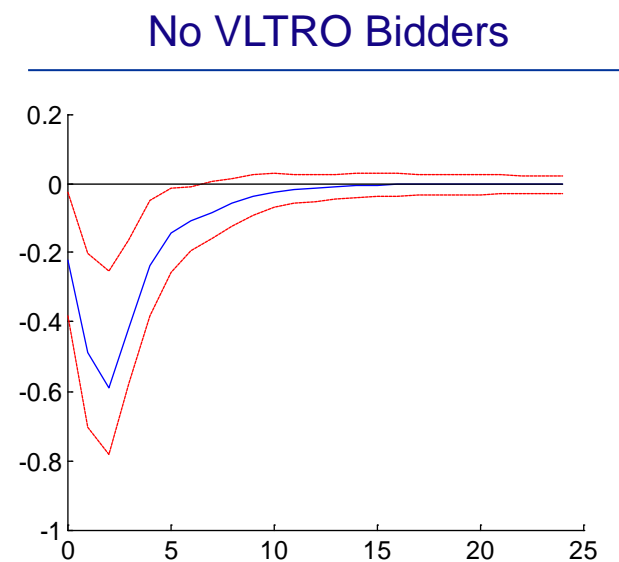
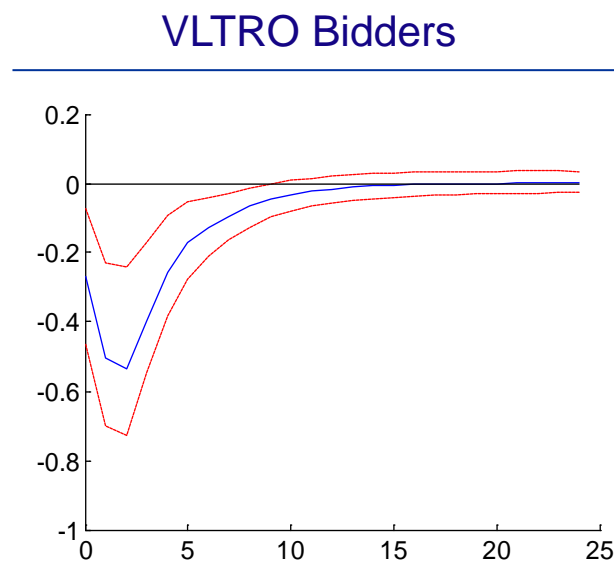
Pass-through  
(in %)

months after shock

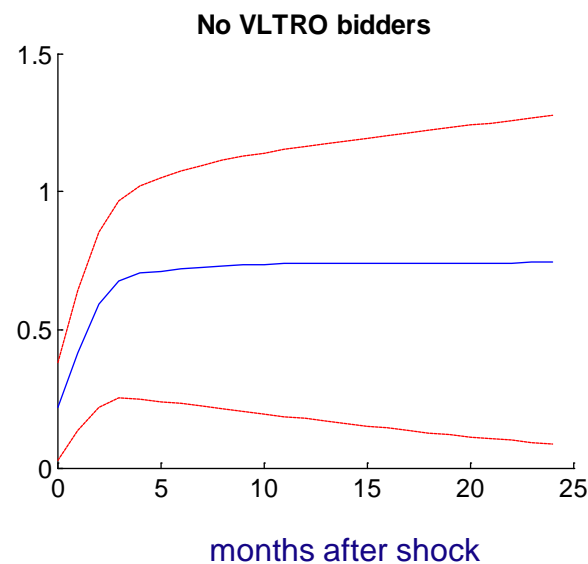
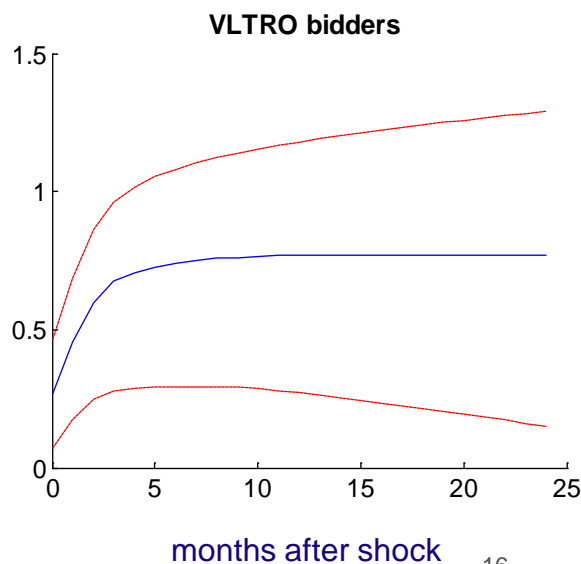
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# Response to a MP shock of lending rate to NFCs

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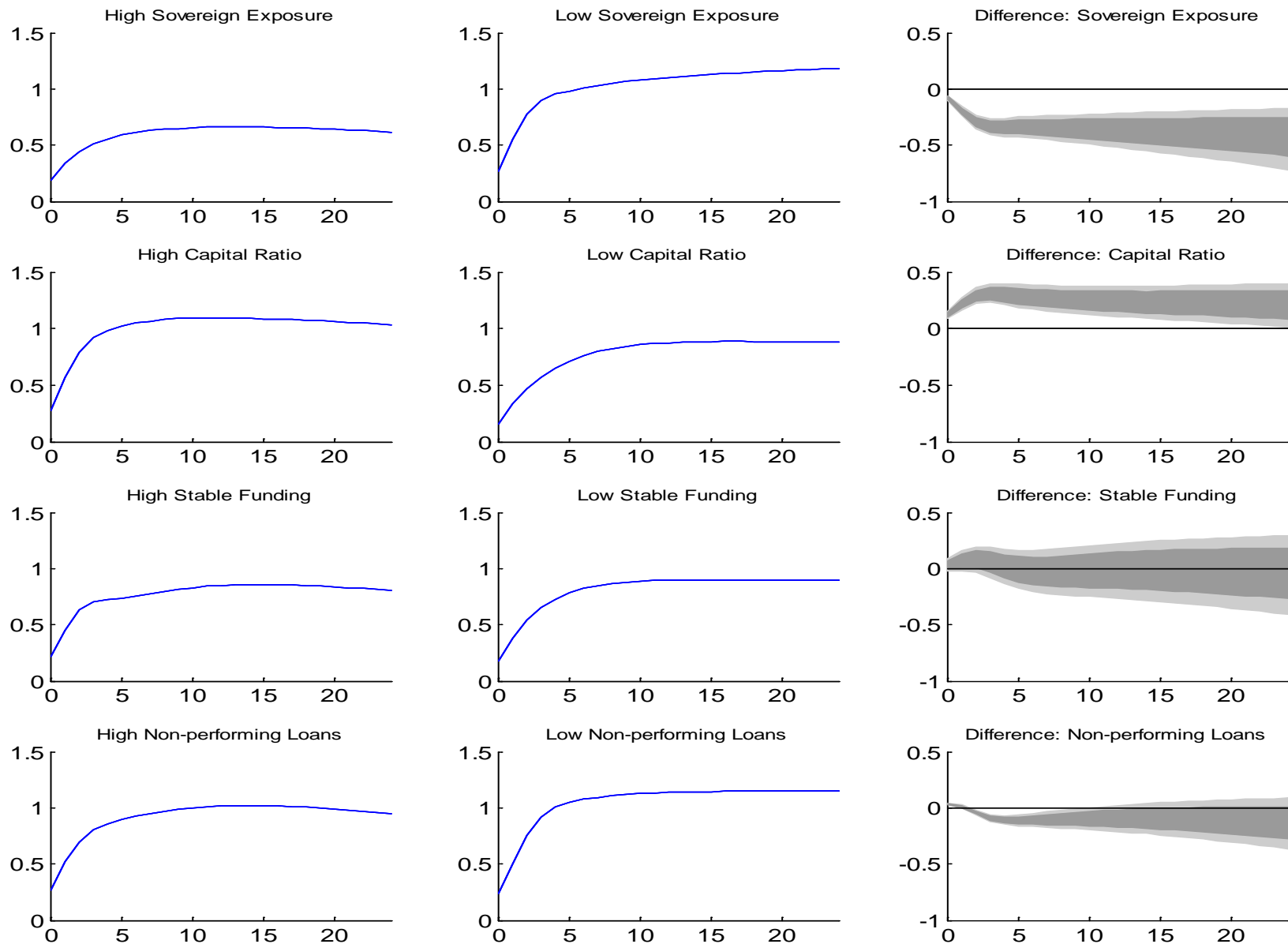


Pass-through  
(in %)





# Response to a MP shock of lending rate to NFCs



# Response to a MP shock of lending rate to NFCs

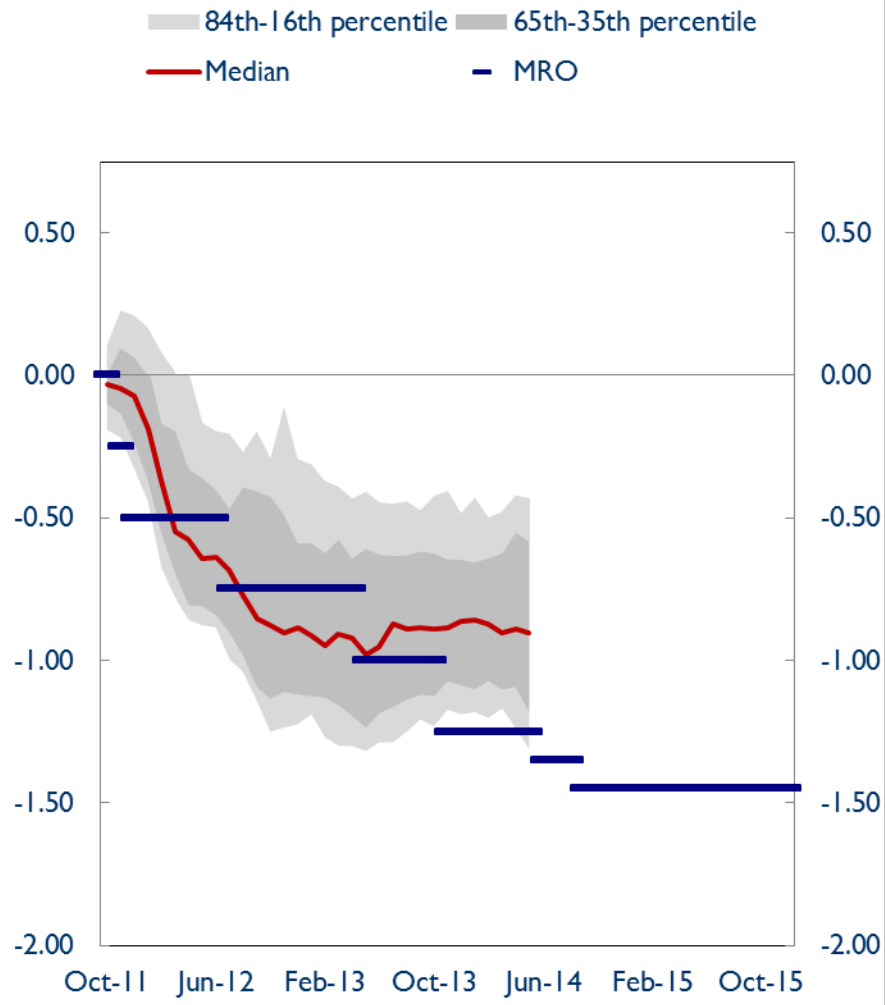
How to rationalize the results:

- ✓ Banks strategically take advantage of their balance sheet position to expand their market share in the loan market (see e.g. Gilchrist et al., 2015).
- ✓ Risk shifting incentives during crisis times (Drechsler et al. 2014; Altavilla et al. 2016; and Peydró et al. 2016)
- ✓ Sluggish adjustment of poorly capitalized and highly exposed banks (Van den Heuvel, 2003)

# **Non-standard Monetary policy**

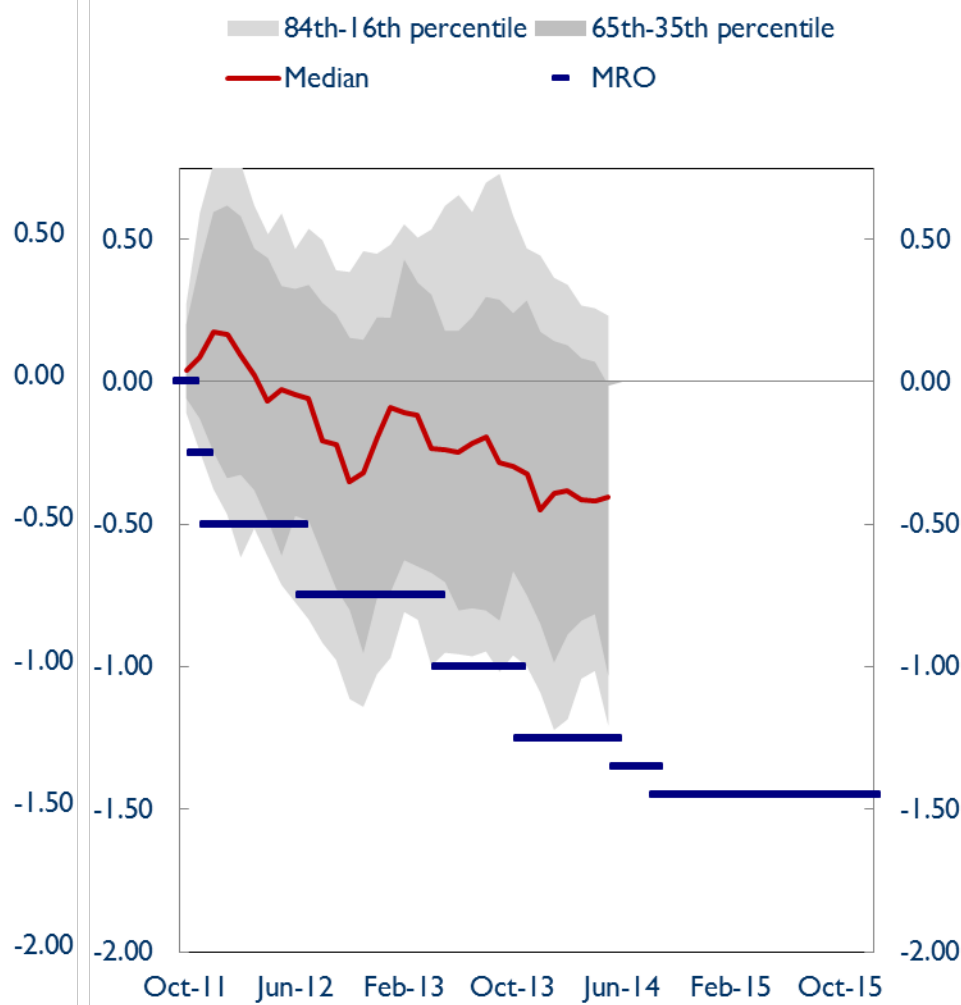
# Policy Rate Reductions and Distribution of Lending Rates

## Banks in Non-stressed Countries



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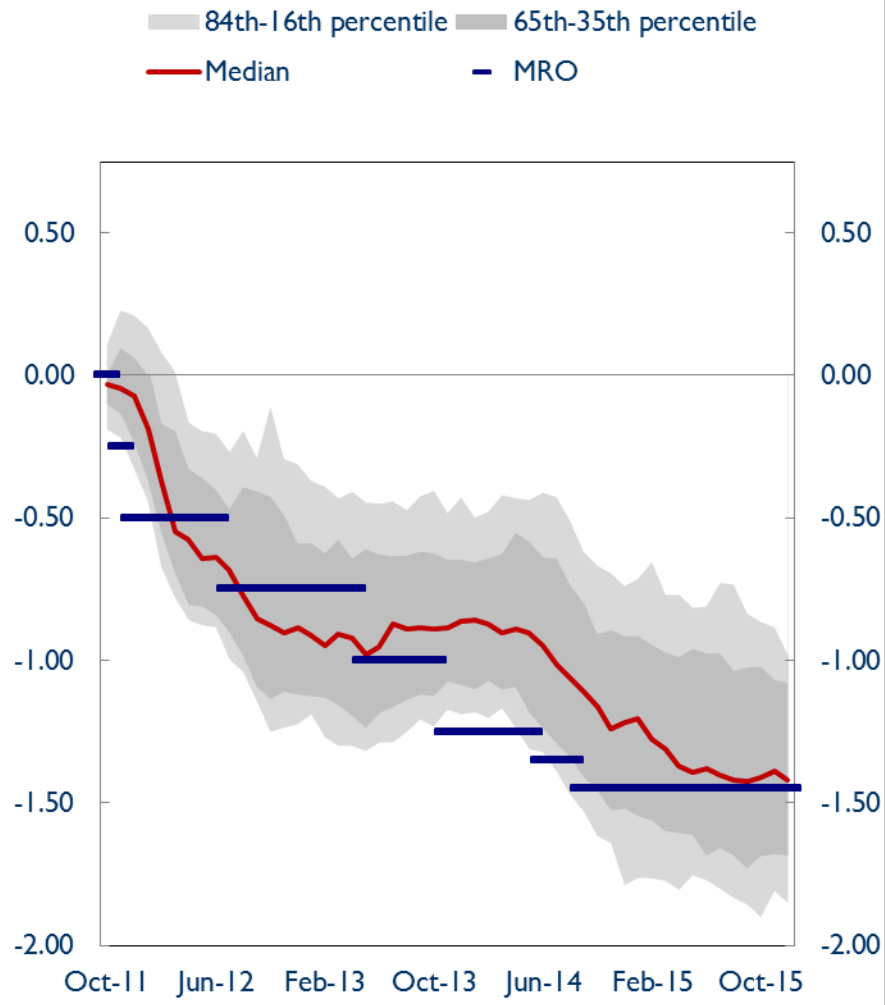
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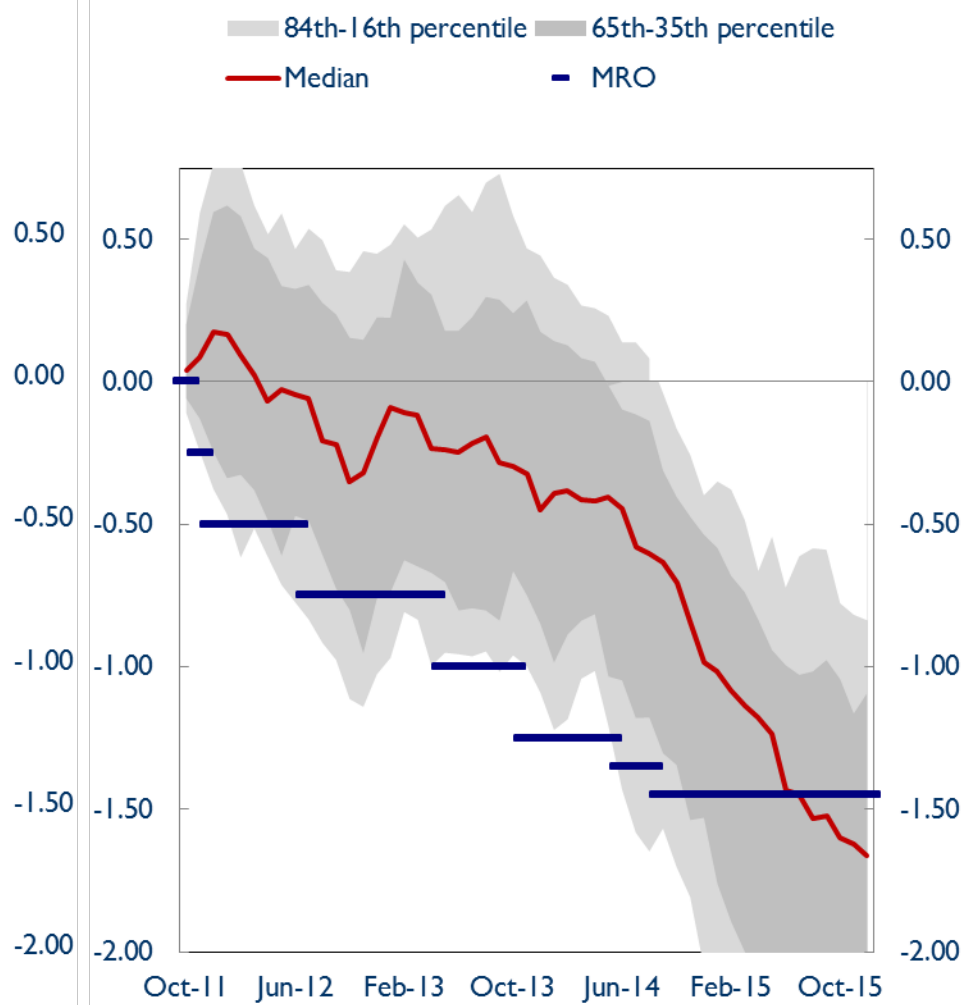
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# The effects of NSMs: Scenario Analysis

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1. Estimate the model up to April 2014
2. Quantify the impact of the TLTRO/APP on financial markets (funding cost relief)
3. Measure the impact of NSMs as the difference between
  - I. No-Policy scenario: Unconditional forecast
  - II. Policy Scenario: Conditional forecast

# The effects of NSMs: Scenario Analysis

Conditional forecasting analysis is designed to address the following question:

Given the knowledge of the economy at time  $t$  ( $\Omega_t$ )  
what is the predicted path of future time series ( $Y_{t+h}$ )  
conditional on the policy change? ( $z^*$ )

The difference in two conditional expectations that differs for the information set.

$$Y_{t+h|t}^{NSM} = E(Y_{t+h} | z^*, \Omega_t) - E(Y_{t+h} | \Omega_t)$$

Idea: TLTRO and APP are transmitted through a common signaling channel (the expected path of the EONIA rate), and a bank specific funding-cost relief channel (the implied path for sovereign bond yields, and their credit risk, the market price of a bank debt).

# Policy announcement (22<sup>nd</sup> January, 2015): intraday data, 10-year yields

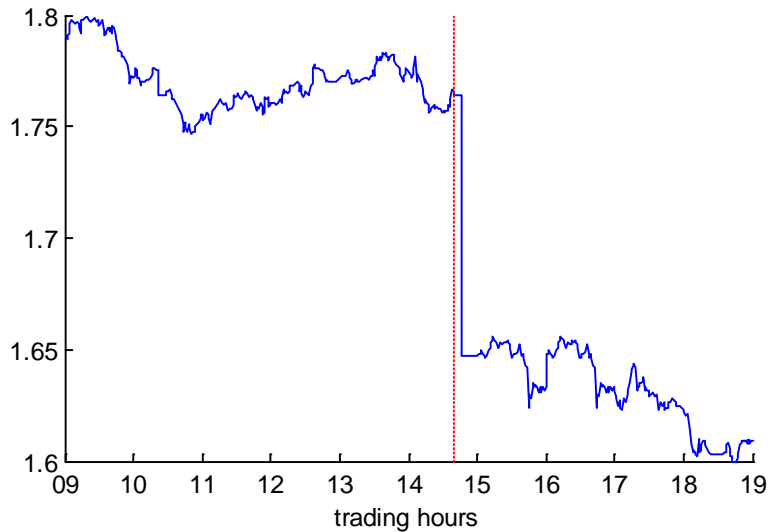
## Germany



## France



## Italy



## Spain





$$\Delta y_t = \sum_{j=1}^k \alpha_j D_{j,t} + \sum_{j=1}^k \beta_j D_{j,t-1} + \sum_{s=1}^m \gamma_s News_{s,t} + \varepsilon_t$$

$\Delta y_t$  Daily change in yields for a given asset y

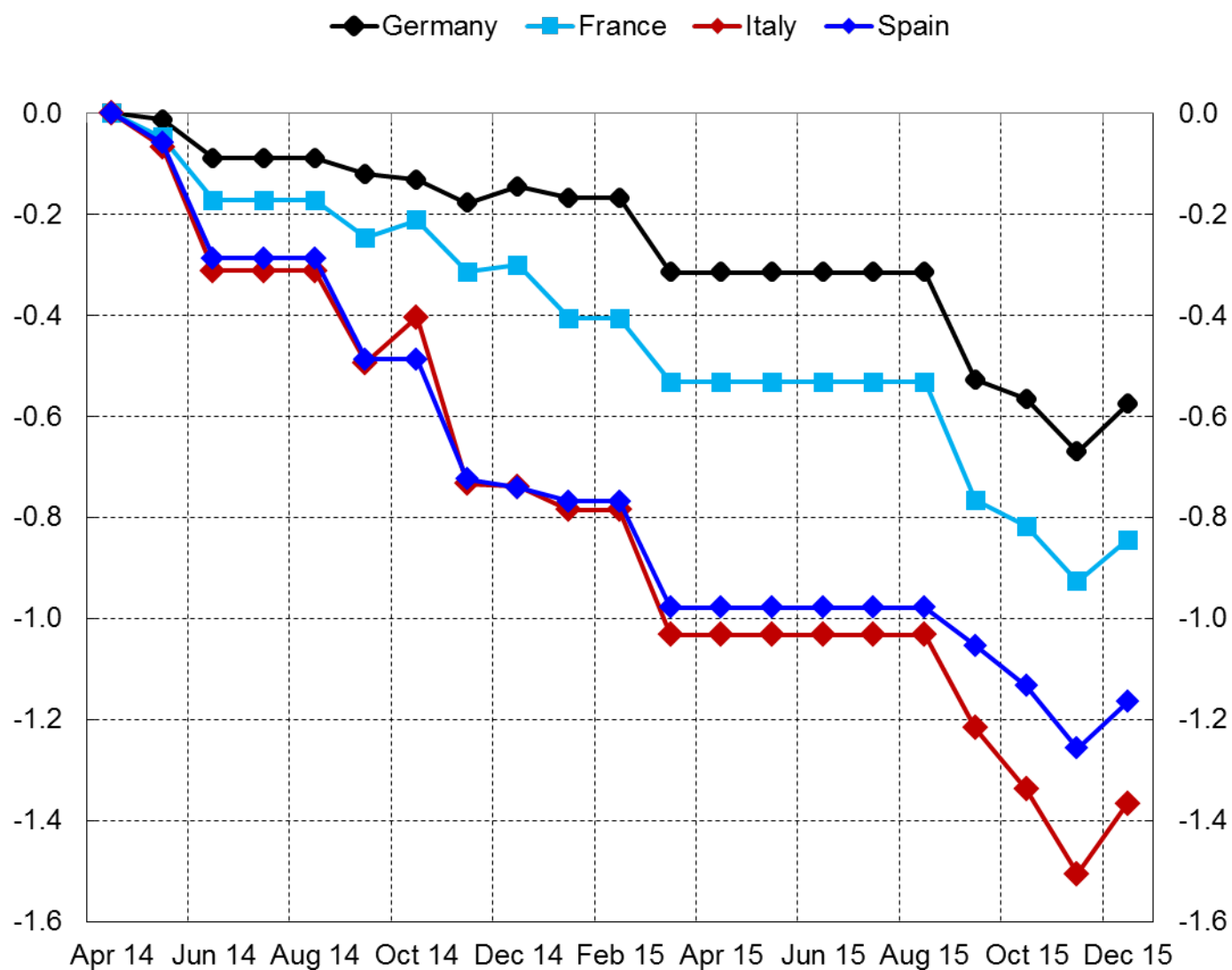
$D_{j,t} = \begin{cases} 1 & \text{if } t \in \text{Event Set (k=25)} \\ 0 & \text{otherwise} \end{cases}$

**News** Surprise component of macro release (m=40)

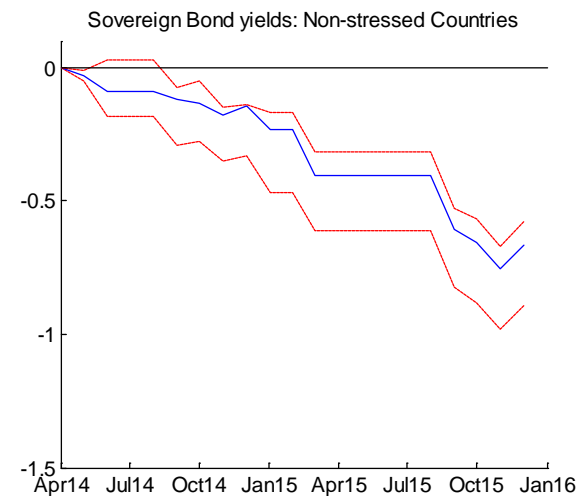
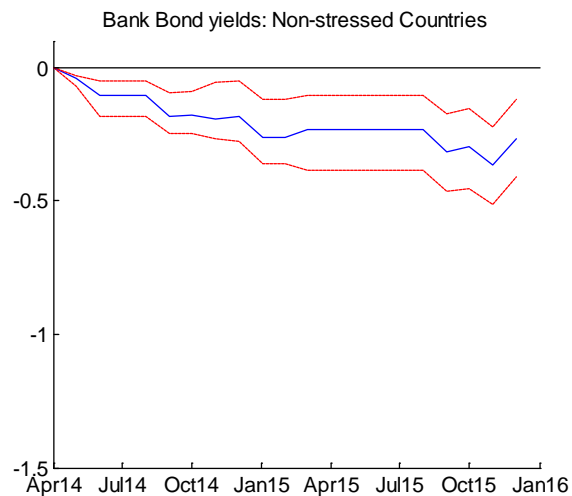
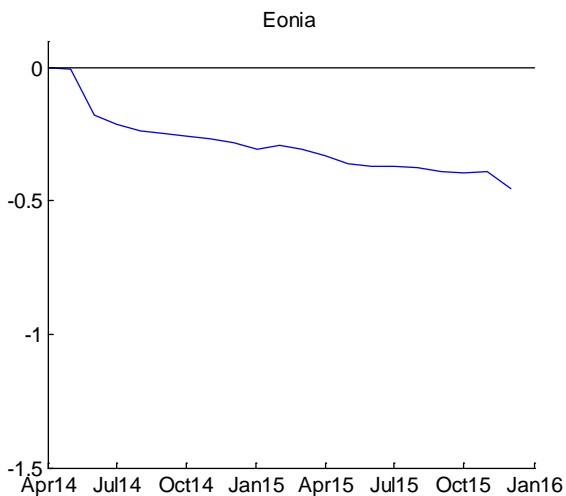
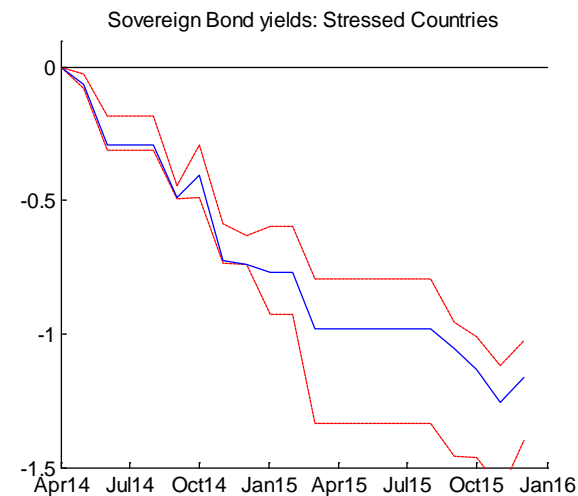
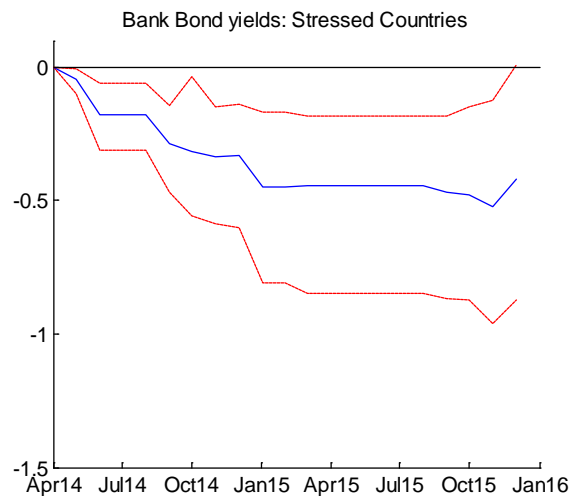
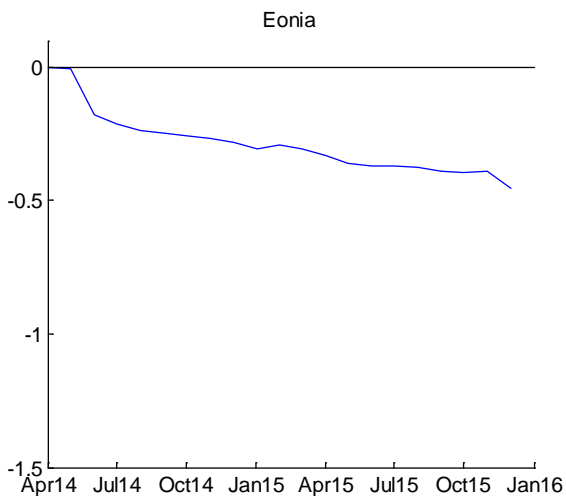
Altavilla C. Giannone D. (2016) The Effectiveness of Non-standard Monetary Policy Measures: Evidence from Survey Data, *Journal of Applied Econometrics*

Altavilla C., Carboni G. and R. Motto (2015): Asset Purchase Programmes and Financial Markets: lessons from the Euro Area, ECB Working Paper Series, No 1864

# The impact of non-standard measures on 10-year government bond

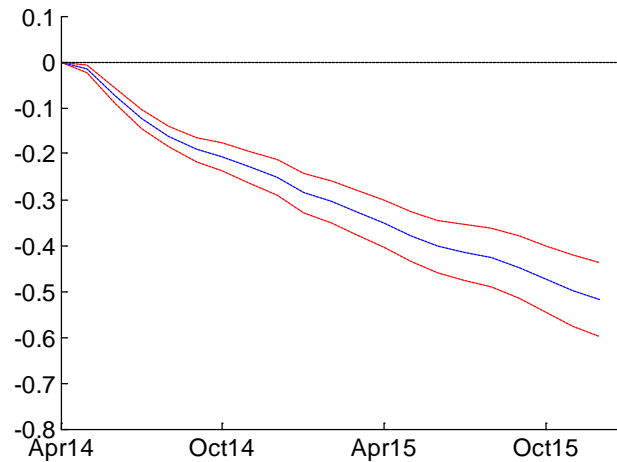


# Impact on Sovereign and Bank Bond Yields

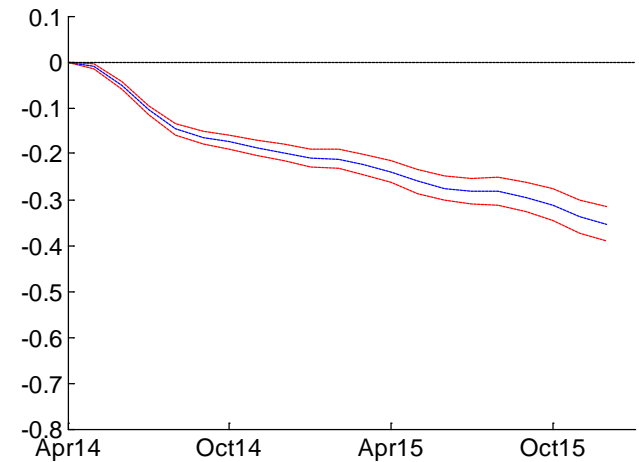


# The impact of non-standard measures on lending rates

**Banks in Stressed Countries**

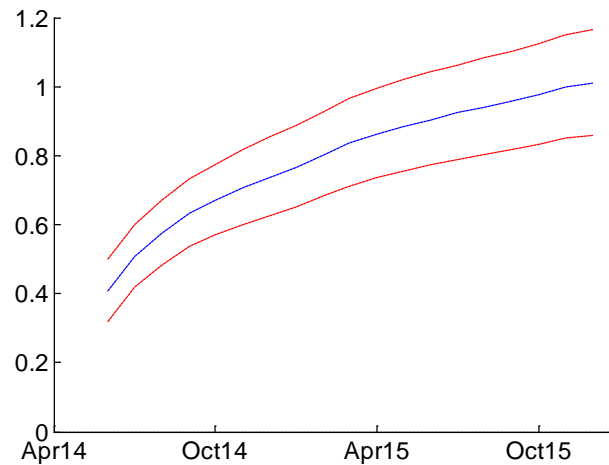


**Banks in Non-Stressed Countries**

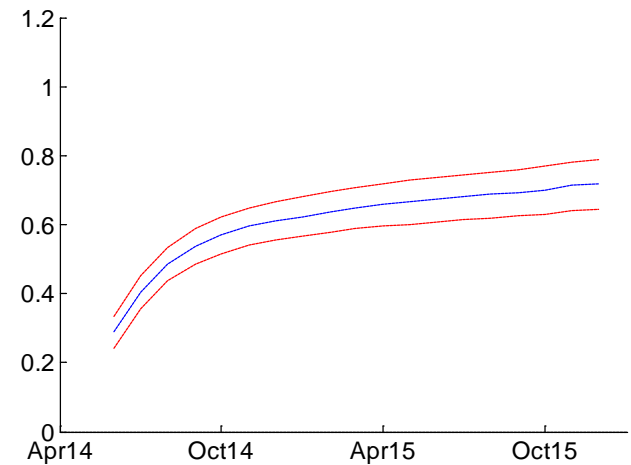


Impulse-Response  
(in %)

**Banks in Stressed Countries**

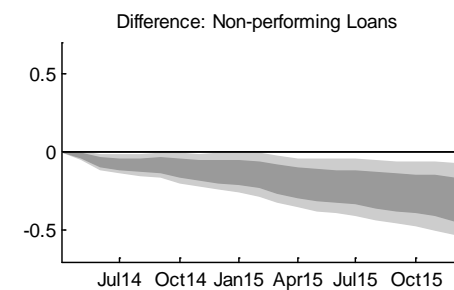
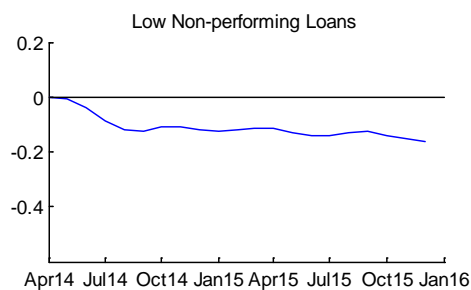
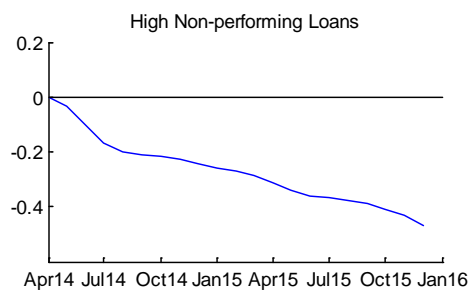
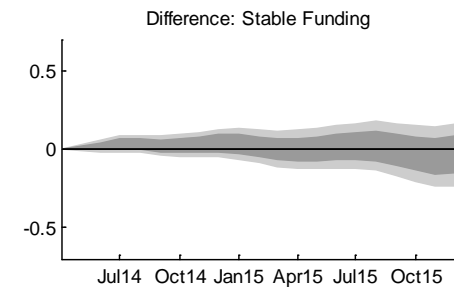
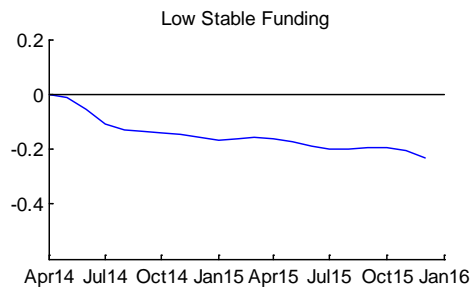
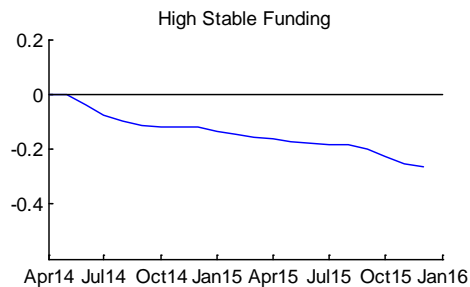
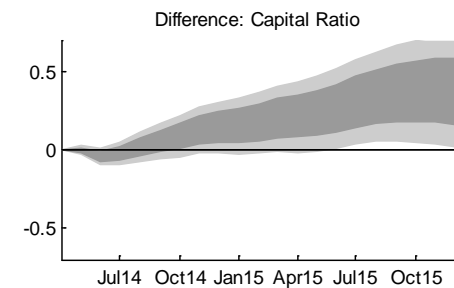
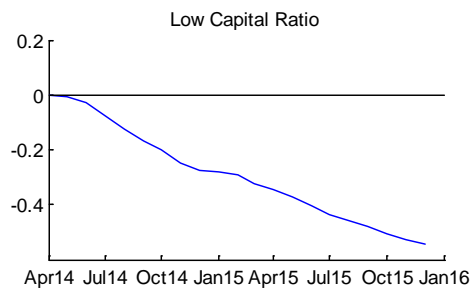
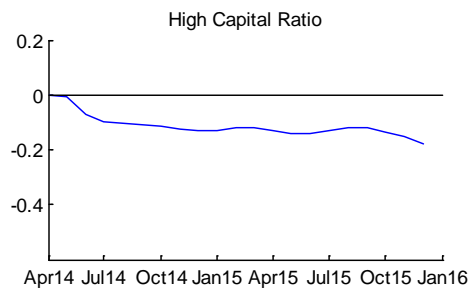
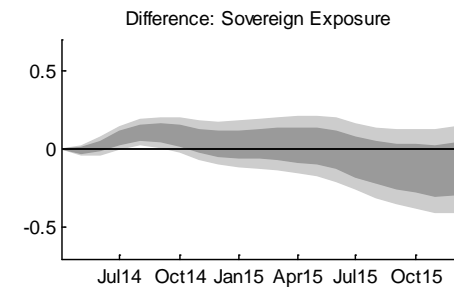
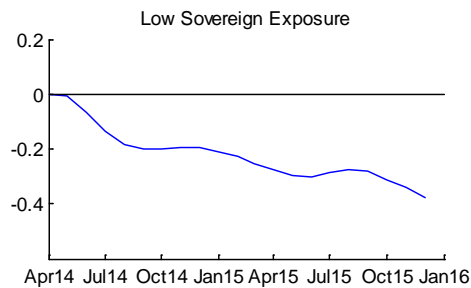
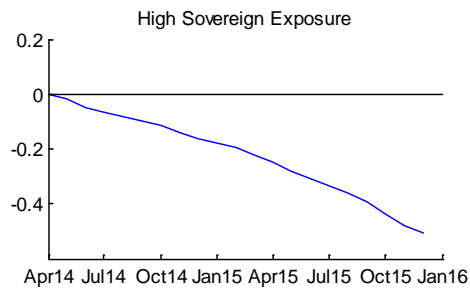


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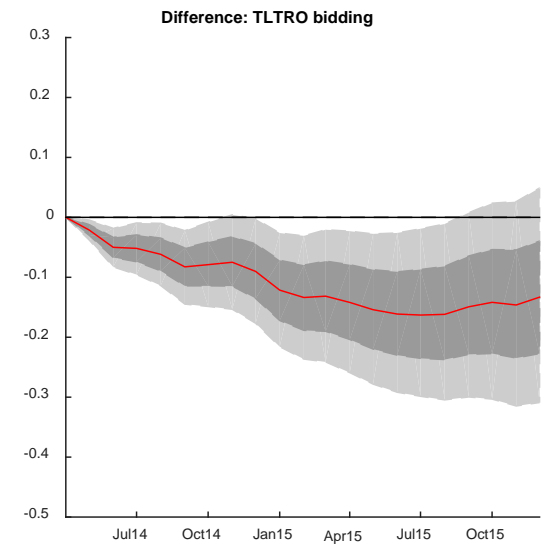
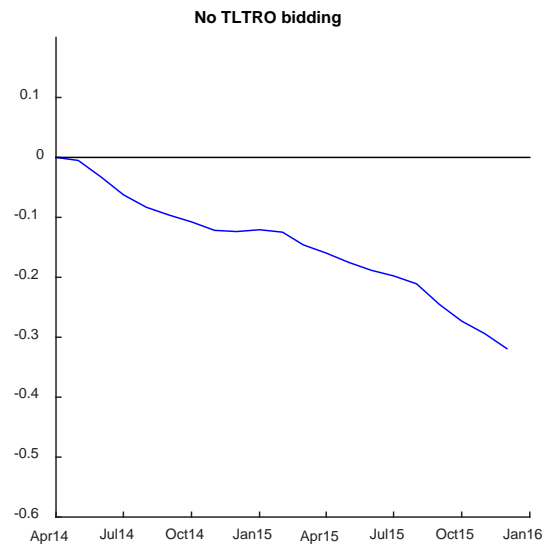
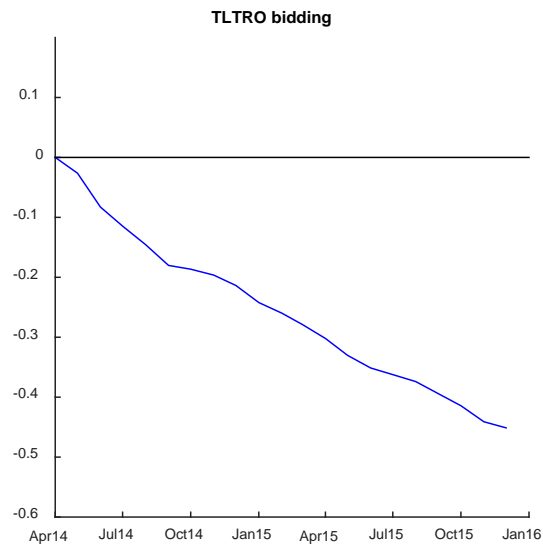
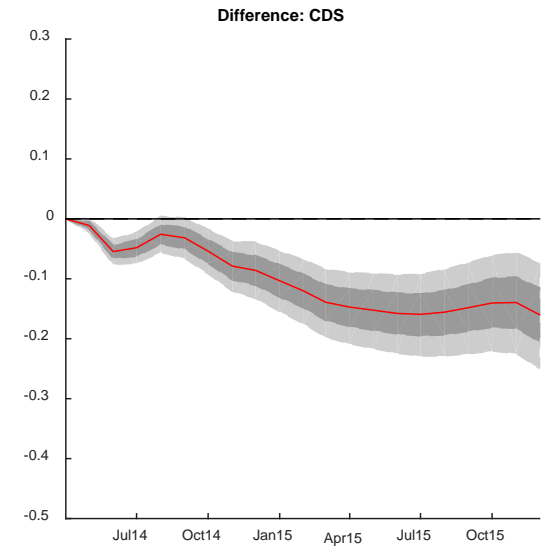
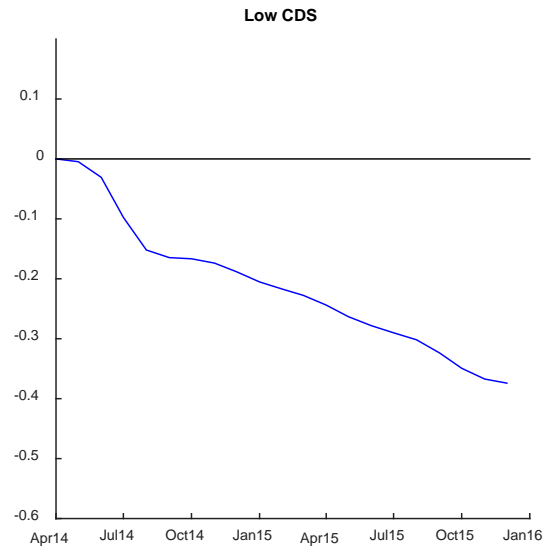
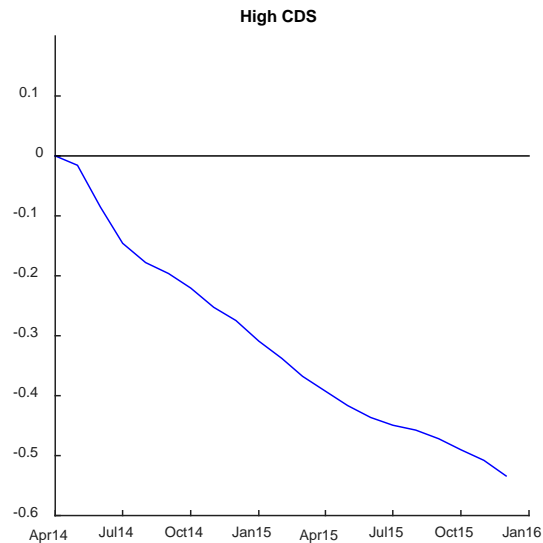


Pass-through  
(in %)

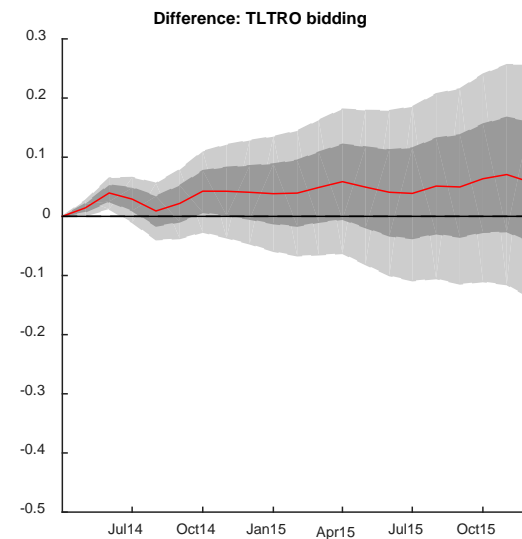
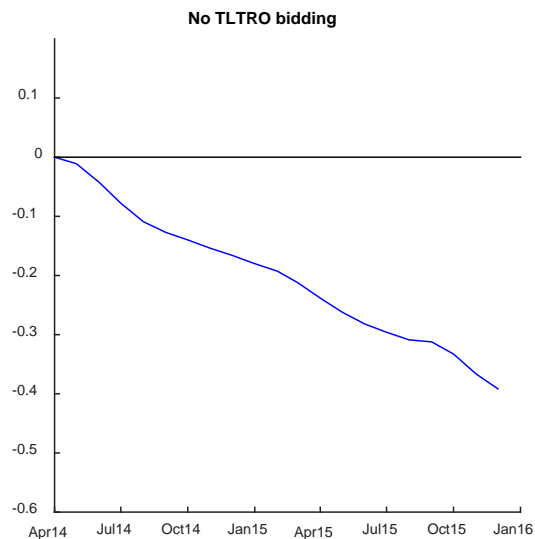
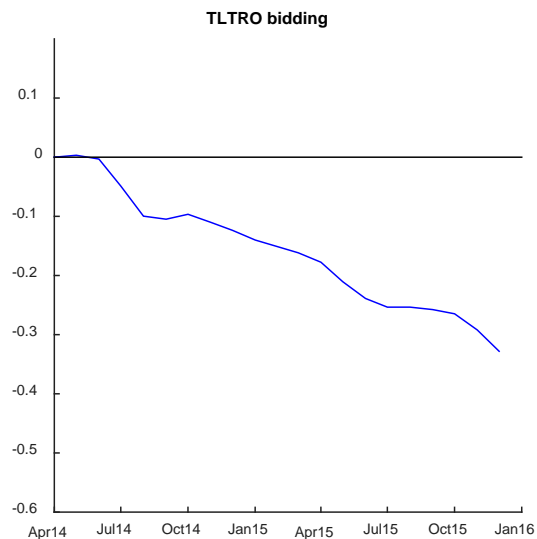
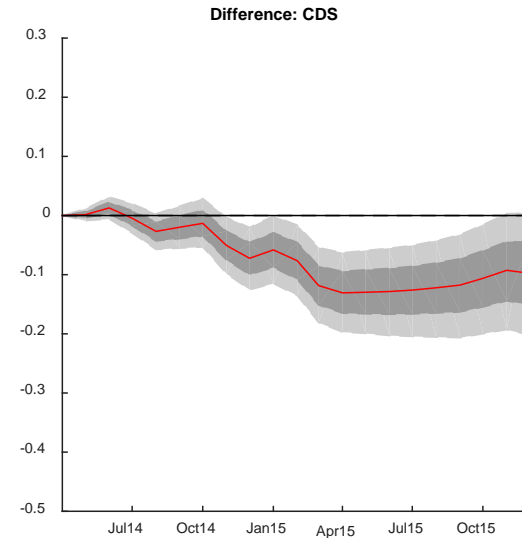
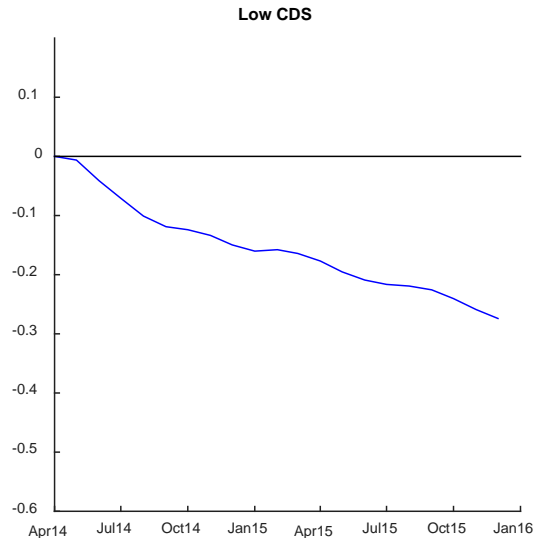
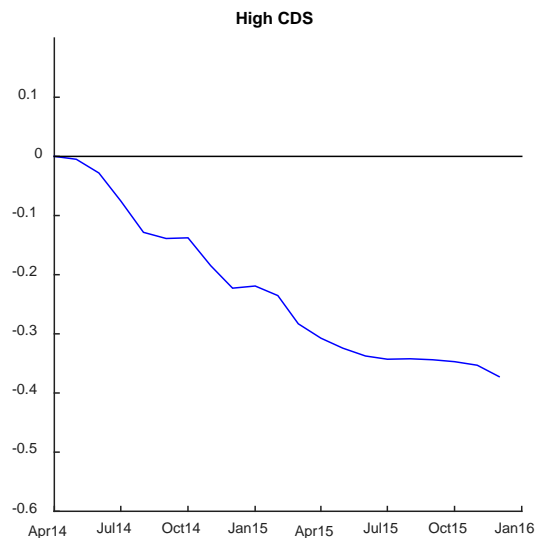
# The impact of non-standard measures on lending rates



# The impact of non-standard measures on lending rates to NFCs



# The impact of non-standard measures on lending rates to HHs



## ➤ **Pass-through of interest rate change**

- ✓ Bank balance sheet characteristics determine the magnitude of the pass-through, even in the period with financial and the sovereign debt crises

## ➤ **Pass-through of unconventional measures**

- ✓ UMP measures mended monetary policy pass-through: Fund relief and signaling channel in action

## ➤ **Macroeconomic implication**

- ✓ Inflation and output gap would have been significantly lower

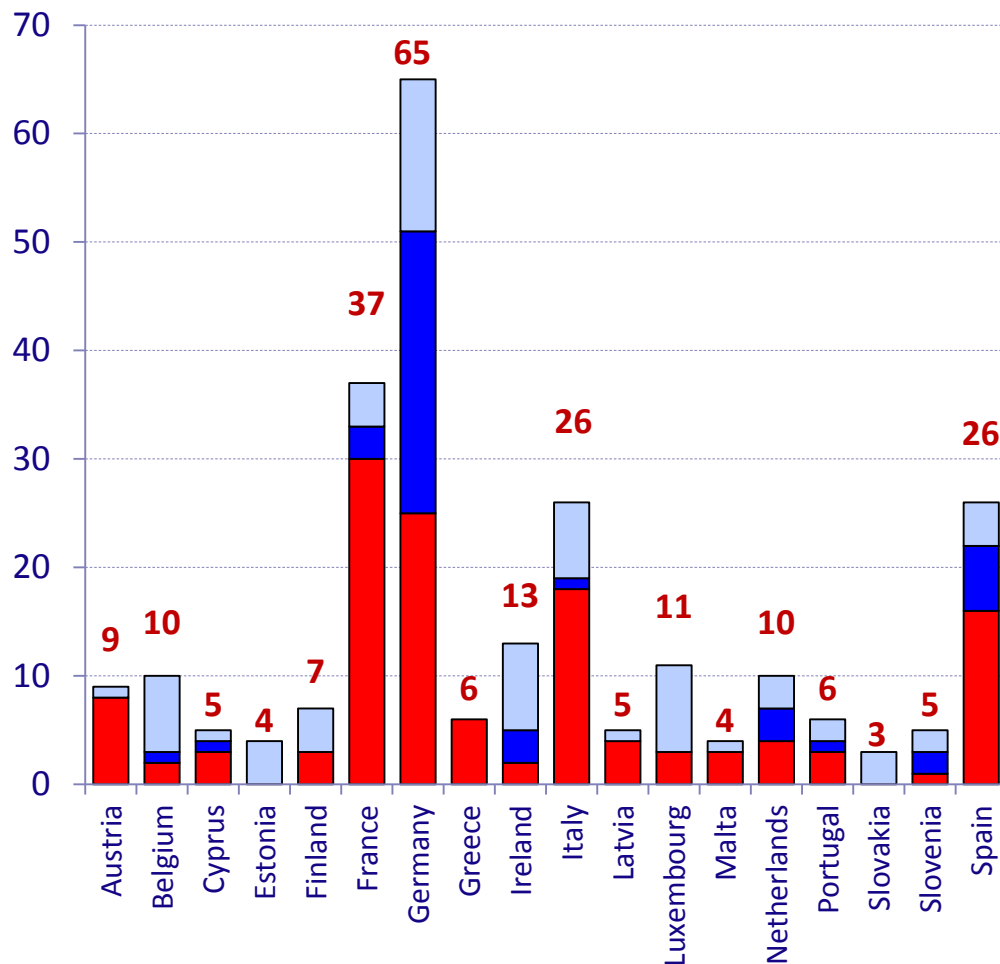


[illegible]

# Dataset: individual banks

Banks included in the sample  
by ownership structure

■ Private ■ Public ■ Foreign



Important features

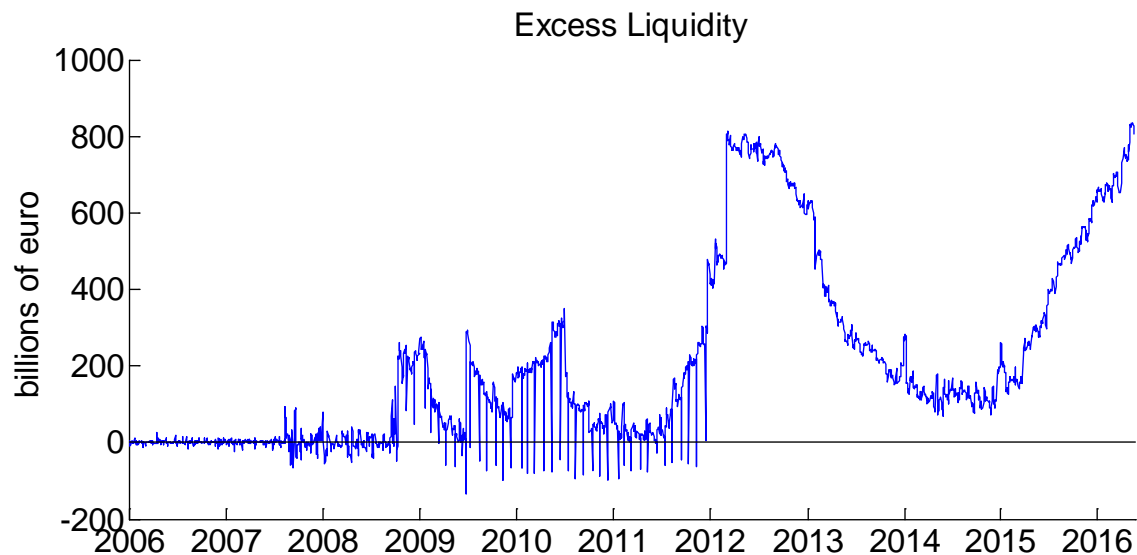
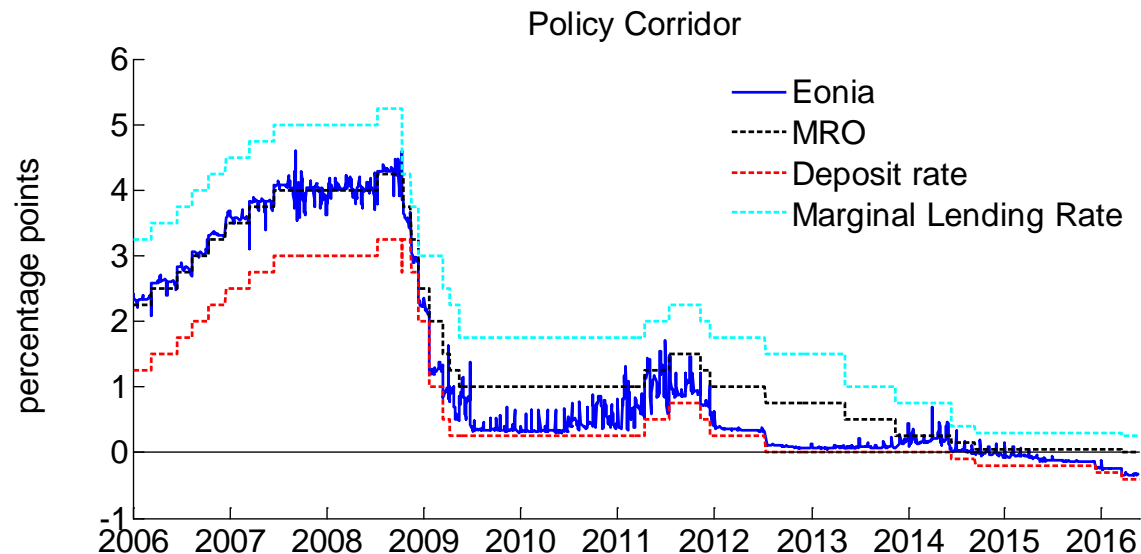
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- **Granularity:** observe 260 banks compared with approximately 90 (consolidated) banks of the EBA tests. EBA sample: 2009 (22 banks) 2010 (91 banks) 2011(90 banks) 2014 (123 banks)
- **Representativeness** main assets are about 75% of euro-area aggregate.

# Dataset: descriptive statistics

	N. obs	N. banks	Percentile		
			25th	50th	75th
Lending rate to NFCs	19717	234	2.72	3.24	4.05
Lending rate to HHs	19841	229	3.28	3.99	4.91
Bank bond yields	9332	115	2.14	2.98	4.02
Deposit rate	19299	226	1.18	1.64	2.31
Sovereign debt exposure (over main assets)	23935	258	0.83	4.05	8.09
Non-performing loans (over RWA)	7137	141	3.89	5.93	9.23
CET1 capital ratio	10264	147	8.89	9.54	10.59
Leverage ratio	23935	258	4.30	6.84	10.19
Credit default swap (CDS)	14891	160	0.95	1.27	2.00
Capital and Reserve (bn)	23935	258	0.73	2.23	6.05
Total Assets (bn)	23935	258	12.76	34.27	85.39

- Large spreads in lending rates, deposit rates, bond yields.
- Heterogeneity in assets, sovereign exposure, non performing loans, capital, and reserves.

# Empirical Model: the proxy for policy rate



[Back](#)

Note: Excess liquidity = Current Account + Deposit Facilities - Reserve requirements - Marginal Lending Facilities. Daily data, last obs.: 18 May 2016

## ➤ Features of the TLTRO I (announced 5<sup>th</sup> June, 2014)

[back](#)

- ✓ **Initial allowance:** up to 7% of a specific part of their loans in two operations in September and December 2014.
- ✓ **Additional allowance:** amounts can be borrowed in further TLTROs, depending on the evolution of the banks' eligible lending activities in excess of bank-specific benchmarks.  
The additional borrowing allowance is limited to 3 times the difference between the net lending since 30 April 2014 and the benchmark at the time it is claimed. (maturity: 26 Sept 2018)

## ➤ Features of the APP I (announced 22<sup>nd</sup> January, 2015)

- ✓ **Size:** when announced combined monthly purchases of €60 billion (CBPP, ABSPP, PSPP).  
Intended purchases: €1.14 tr. (about 11% of euro area GDP)
- ✓ **Composition** (maturity and assets)
  - primarily, securities issued by euro area central government with a residual maturity from 2 to 30 years
  - securities with different credit ratings

## ➤ Extension and Expansions

- ✓ December 15 GovC (3 December 2015): extension to March 17 (reinvestment principal payments, debt instruments issued by regional and local governments)
- ✓ March 16 GovC (10 March 2016): monthly purchases expanded to €80 billion (investment-grade euro-denominated bonds issued by non-bank corporations )

They operate mainly via three transmission channels:

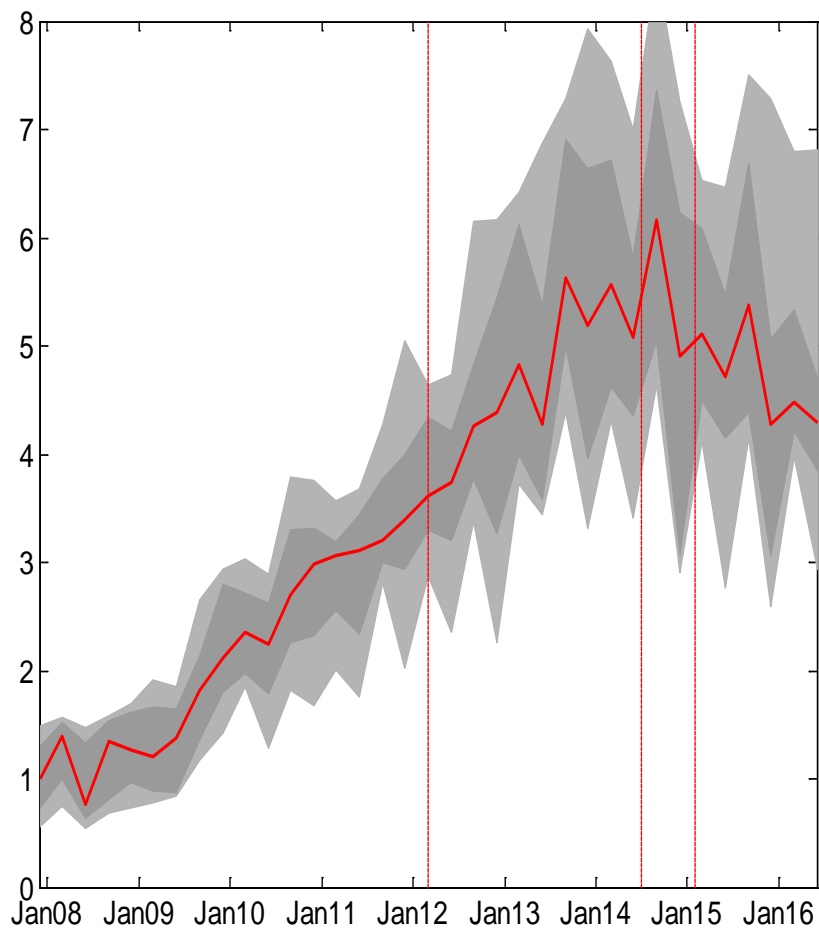
I	<b>Direct pass-through effect</b>	For TLTROs, Bidding banks pass on funding cost reductions to borrowers via lending rates
II	<b>Portfolio rebalancing effect</b>	Adjustments triggered by “carry trade” and “scarcity” of bank bonds (due to withdrawal of supply)
III	<b>Signalling effect</b>	Commitment on the expected future short-term policy rate

Purpose of the analysis:

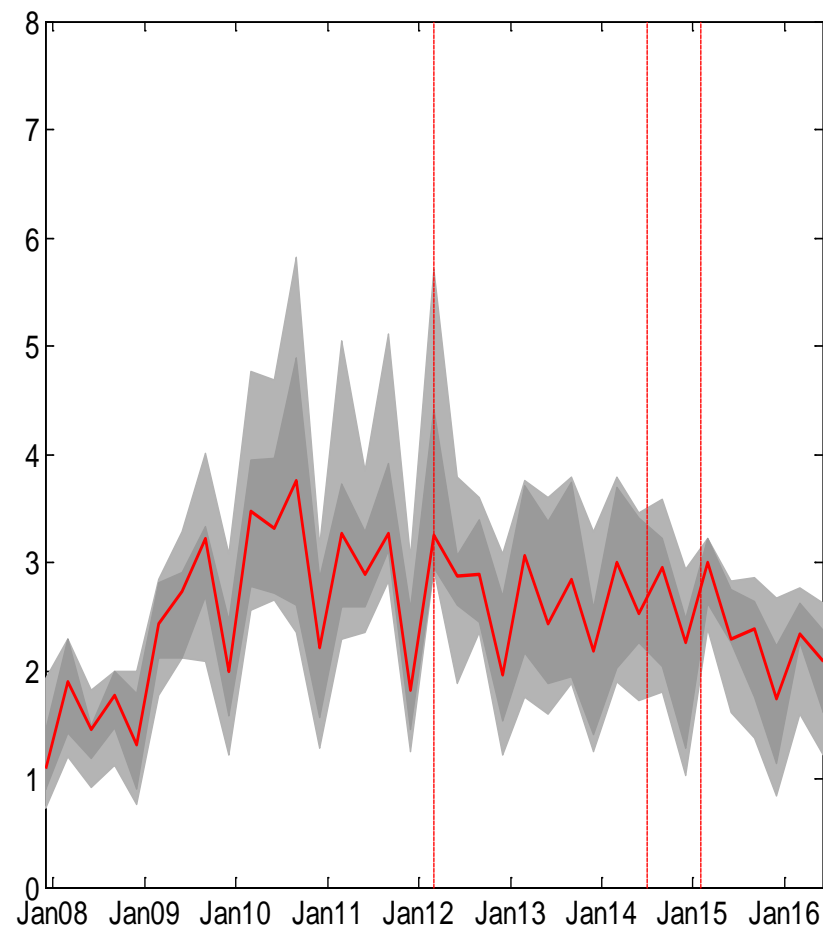
- ✓ quantify these effects on lending (and deposit) rates

# Ratio Impaired Loans over total loans: Unconditional evidence

Stressed Countries



Non-stressed Countries



# Macroeconomic implications

## Implication for Inflation and Output gap

Use a Standard New Keynesian model with sticky prices, habit persistence and working capital and assume the steady state level of the variables are the averages of Euro area over the period 2000-2007.

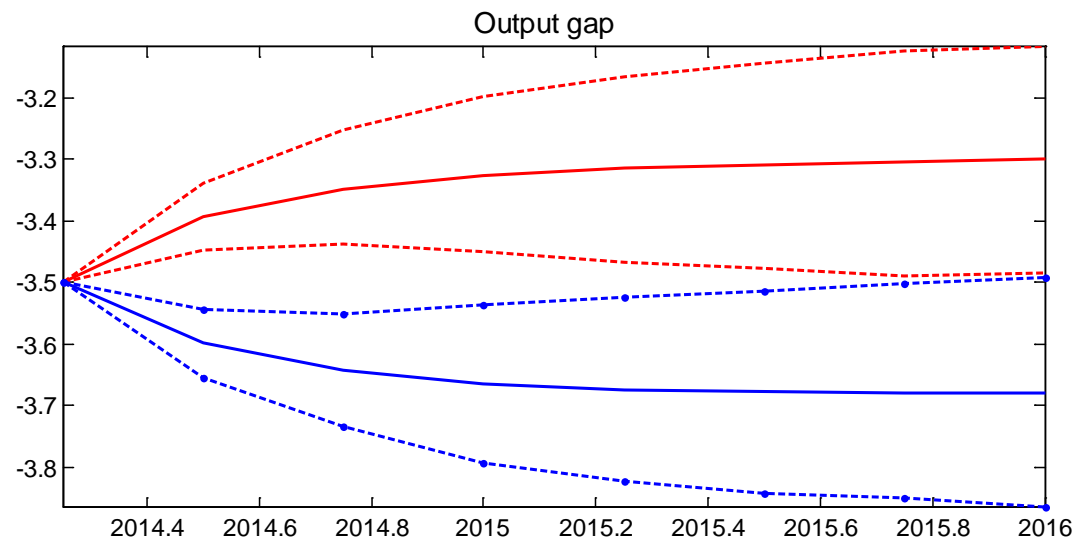
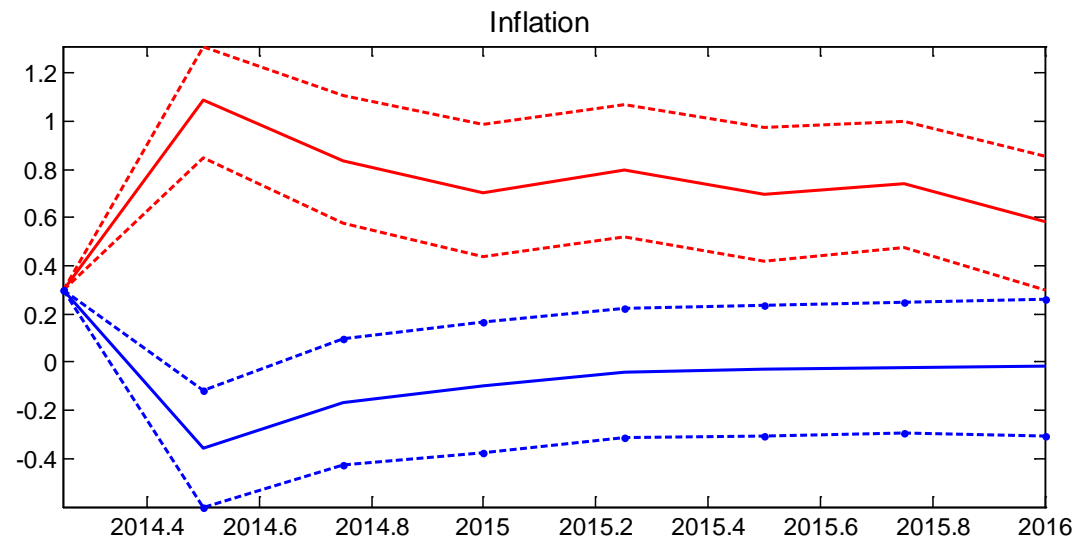
## Counterfactual experiments:

### 1. Difference between 2 Scenarios:

- i. **Policy:** policy, lending and deposit rates equal to the paths obtained in the event-study
- ii. **No-policy:** the three rates are held constant at their 2014q1 values.



# Effect of non-standard measures



— policy    - - - - -    - - - - -    — no policy    - - - - -    - - - - -

# Impact on Lending Margins

- ✓ QE policies may have two contrasting effects on lending margins:

## 1. Flattening of the yield curve

- i) maturity transformation becomes less attractive: the return on newly acquired long-term assets falls relative to the cost of short-term liabilities that banks issue.

**Results:** hampering the profitability:

## 2. Improve Macro outlook

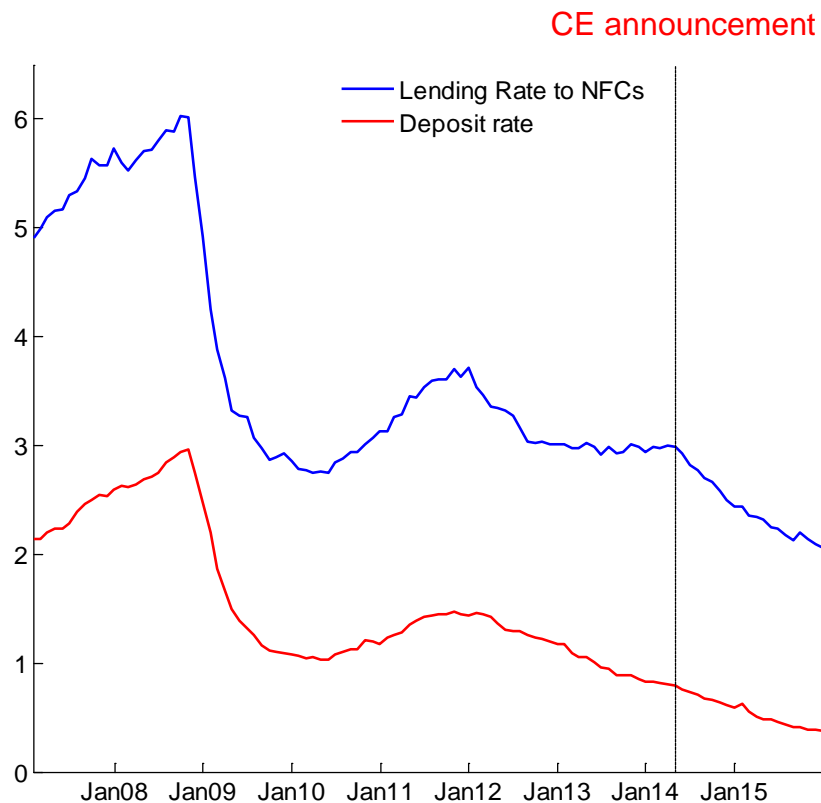
- i) the capacity of borrowers to honor their commitments
- ii) quality of the assets held in the portfolio
- iii) decline in banks' provisioning needs,

**Results:** valuation gains as asset prices increase and lower pressure to deposit rates

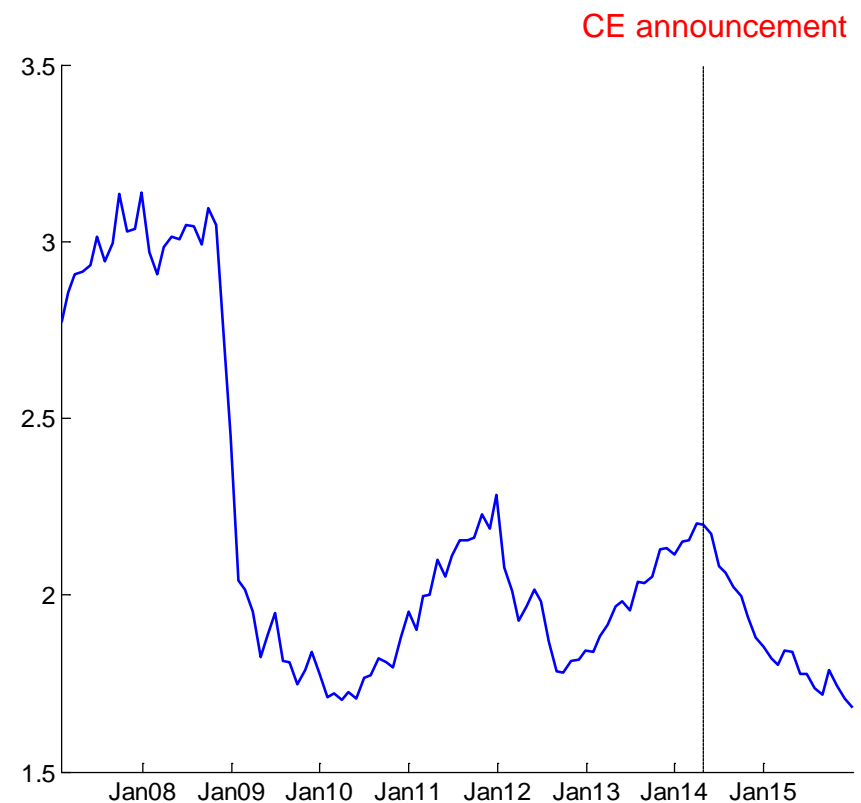
- ✓ Banks profitability is beyond the scope of the paper
- ✓ The dynamic response of lending margins to monetary policy changes may gives some hints about the relevance of these concerns

# The impact of non-standard measures on lending margins

## Lending rate and Deposit rate *new business volumes*

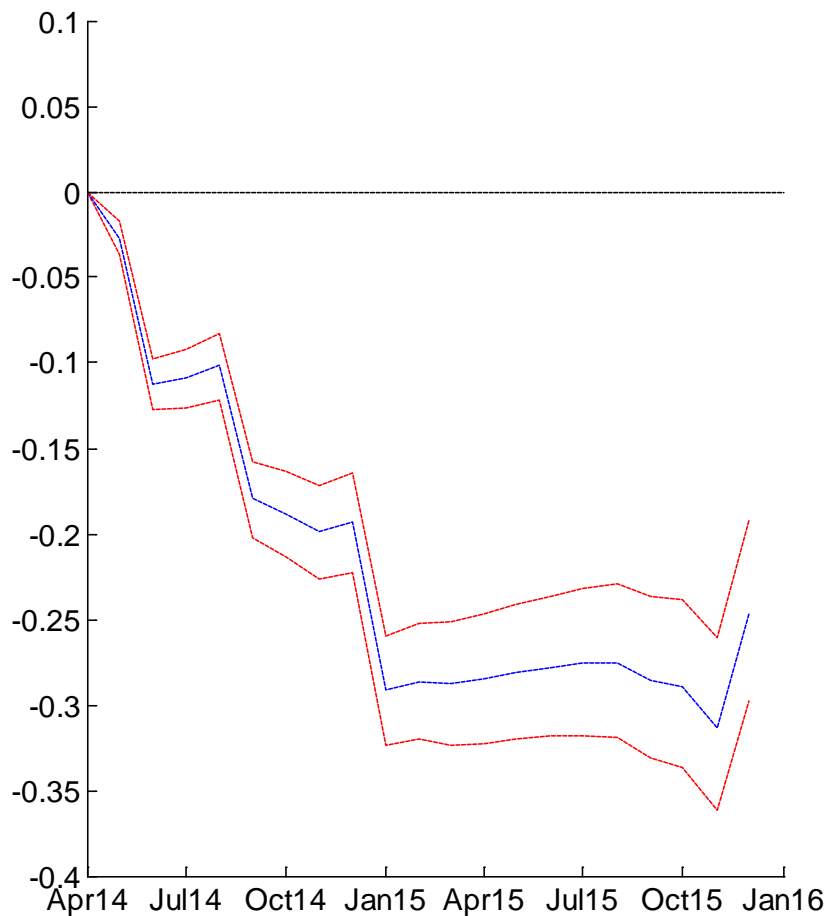


## Lending margins

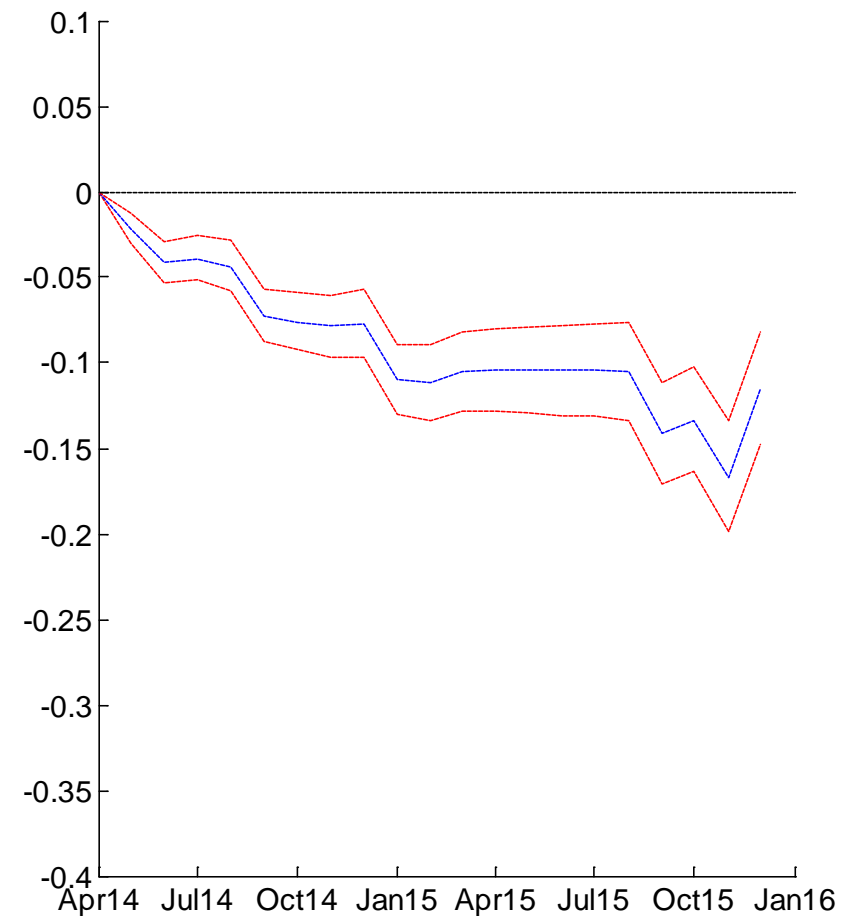


# The impact of non-standard measures on lending margins

## Banks in Stressed Countries

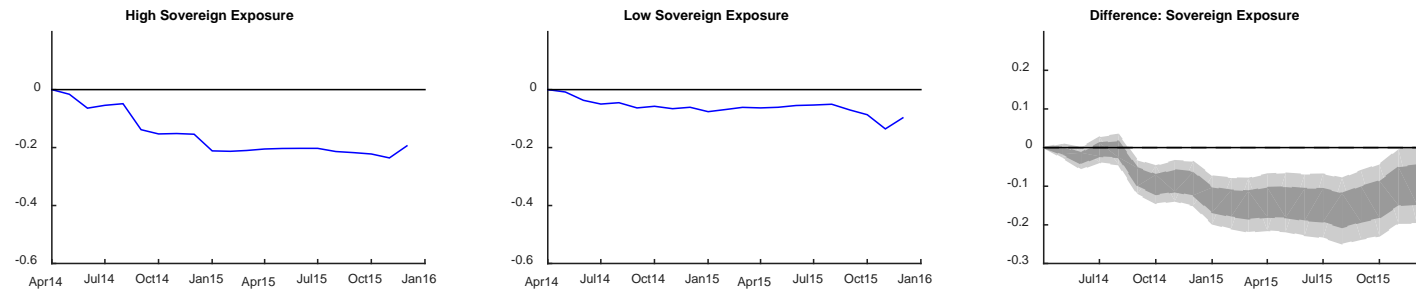


## Banks in Non-stressed Countries

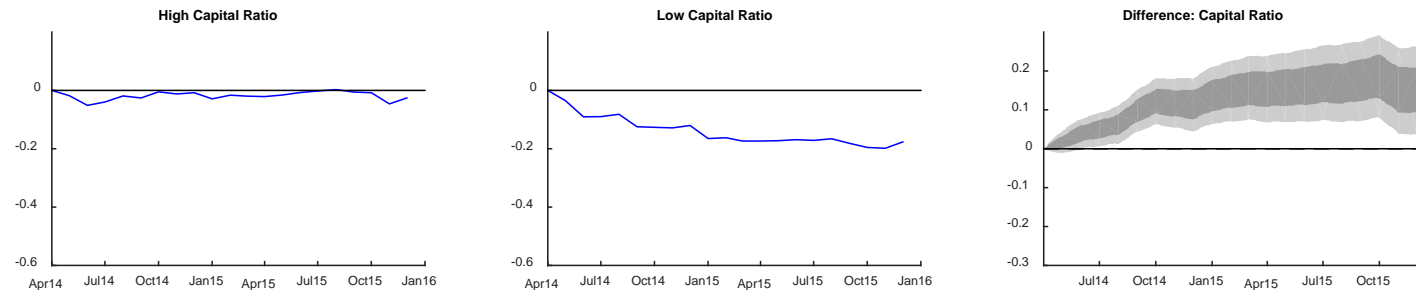


# The impact of non-standard measures on lending margins

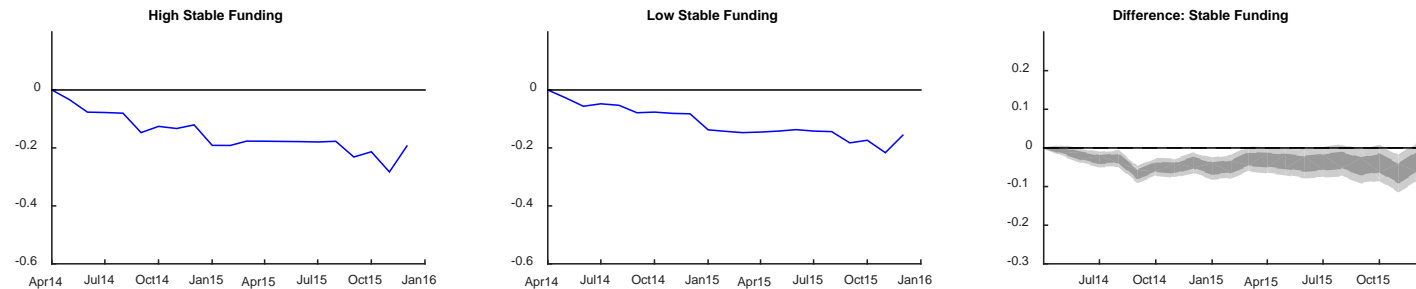
## Sovereign exposure



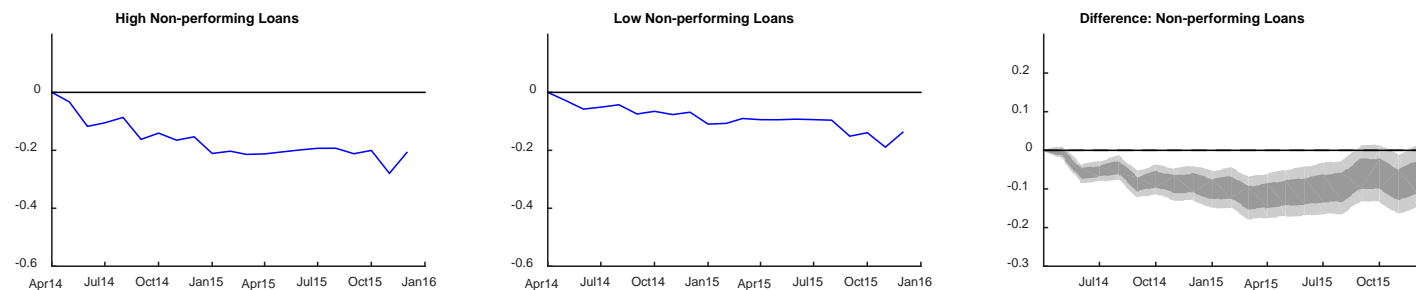
## Capital ratio



## Stable funding



## Non-performing loans



# The timing of the LTROs operations

Operation	Announcement - policy	Announcement - operation	Allotment	Settlement	Maturity	Maturity	First date for early repayment
One-year LTRO	07 May 2009	23 Jun 2009	24 Jun 2009	25 Jun 2009	1 Jul 2010	12 months	-
One-year LTRO	07 May 2009	29 Sep 2009	30 Sep 2009	1 Oct 2009	30 Sep 2010	12 months	-
One-year LTRO	07 May 2009	15 Dec 2009	16 Dec 2009	17 Dec 2009	23 Dec 2010	12 months	-
Three-year LTRO	08 Dec 2011	20 Dec 2011	21 Dec 2011	22 Dec 2011	23 Dec 2011	1134 days	30 Jan 2013
Three-year LTRO	08 Dec 2011	28 Feb 2012	29 Feb 2012	30 Feb 2012	26 Feb 2015	1092 days	27 Feb 2013

# Typology of ECB monetary policy measures

In response to the crisis, the ECB used:

- Standard measures

- work via changes in the main policy rates which affect the economy primarily via the interest rate channel

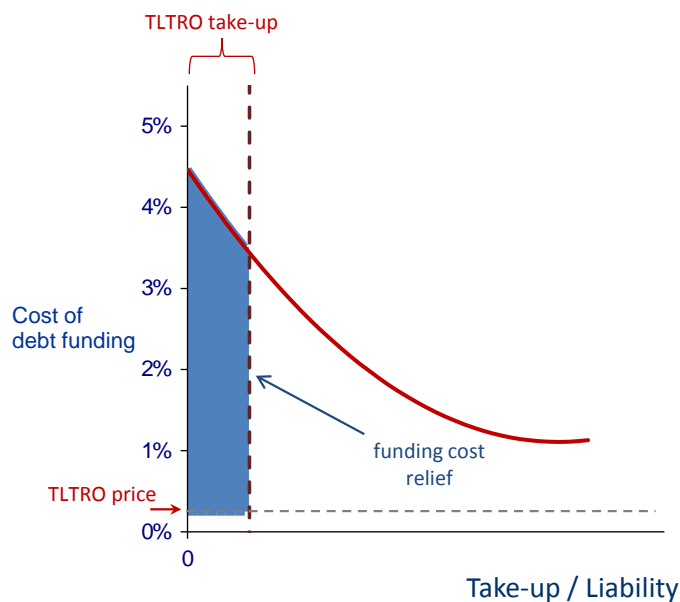
- Various non-standard measures

- enhance the functioning of monetary policy transmission by addressing impairments in selected markets
- ensure effectiveness if there is no room for further loosening via standard channel (due to zero lower bound)
- have typically a noticeable impact on the length and the composition of the central bank balance sheet

# Transmission of credit and quantitative easing

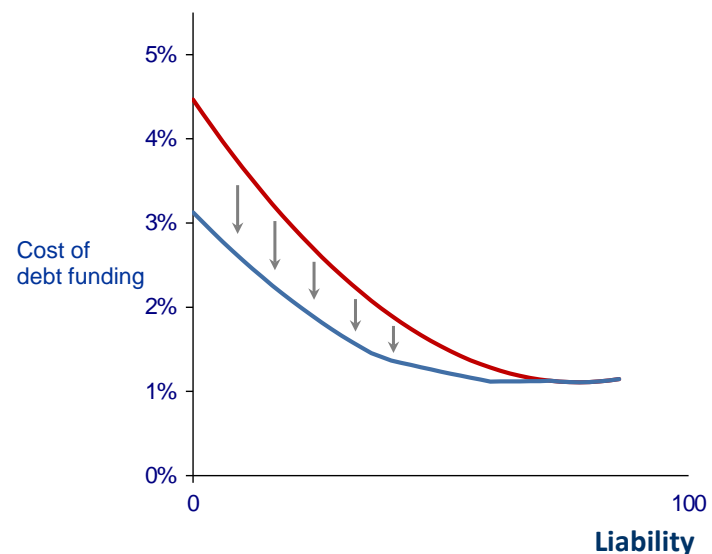
## Credit Easing

Asset	Liability
Securities (s)	Wholesale Funding (wf) $p^{wf} \downarrow$
Loans (L) $p^L \downarrow$	Eurosystem Credit (EC) $q^{EC} \uparrow$



## Quantitative Easing

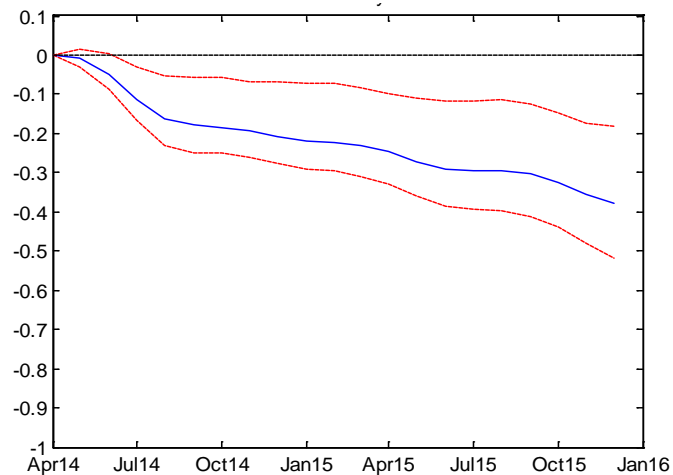
Asset	Liability
Securities (s) $q^s \downarrow$ $p^s \uparrow$	Wholesale Funding (wf) $p^{wf} \downarrow$
Loans (L) $q^L \uparrow$ $p^L \downarrow$	Eurosystem Credit (EC)



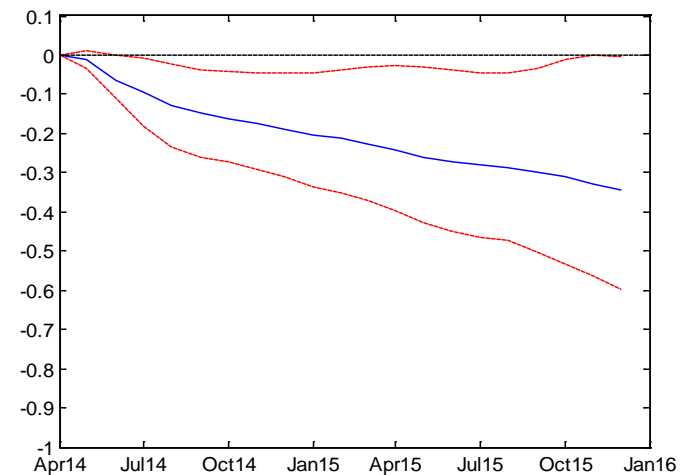


# The impact of non-standard measures on lending rates

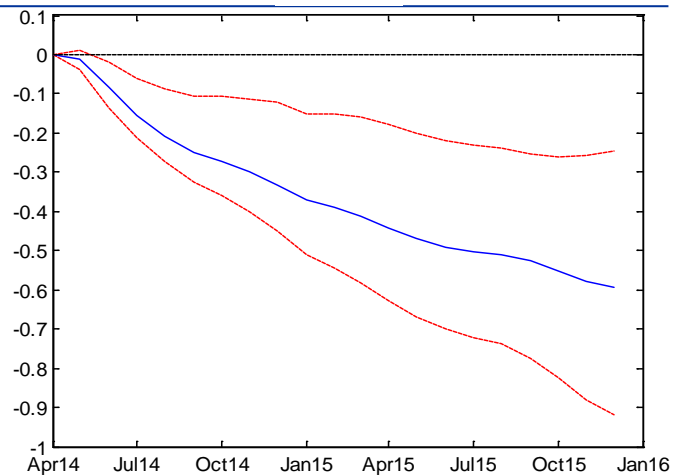
## Germany



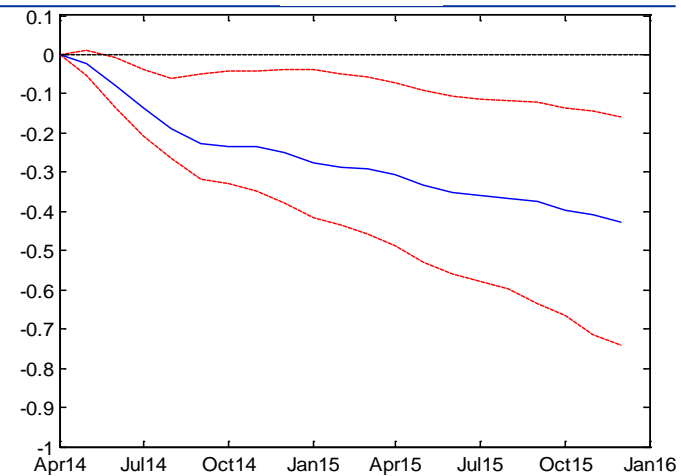
## France



## Italy

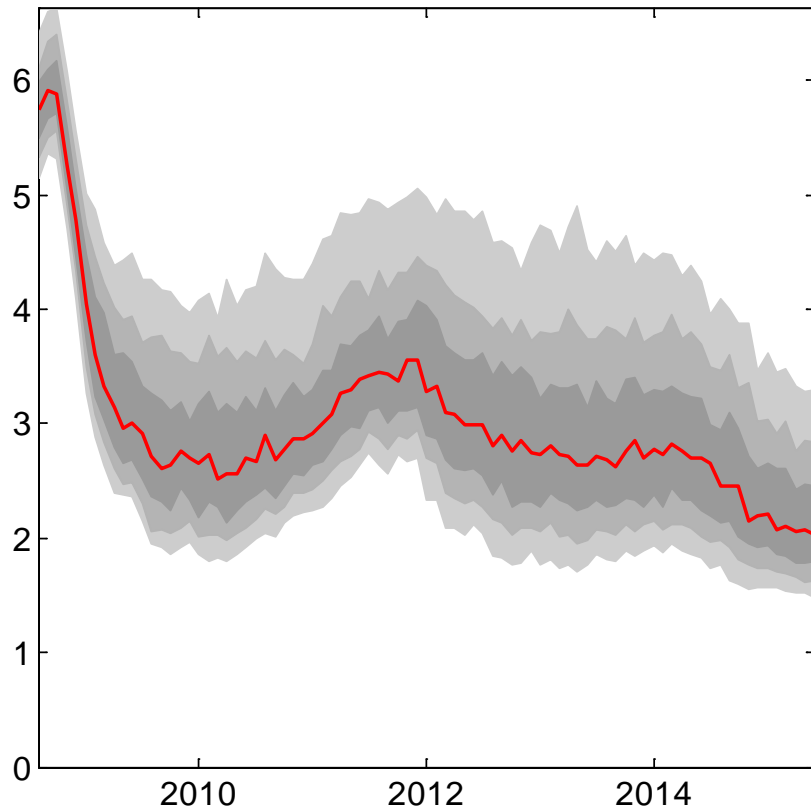


## Spain

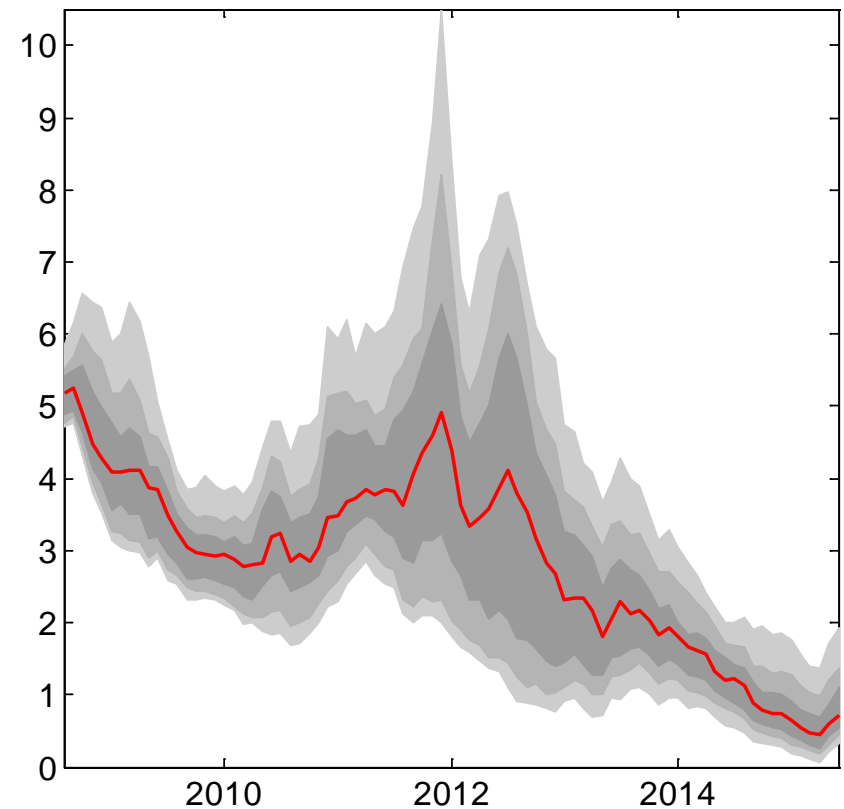


# Lending rate to NFCs and Bank Bond Yields

## Lending rate to NFCs

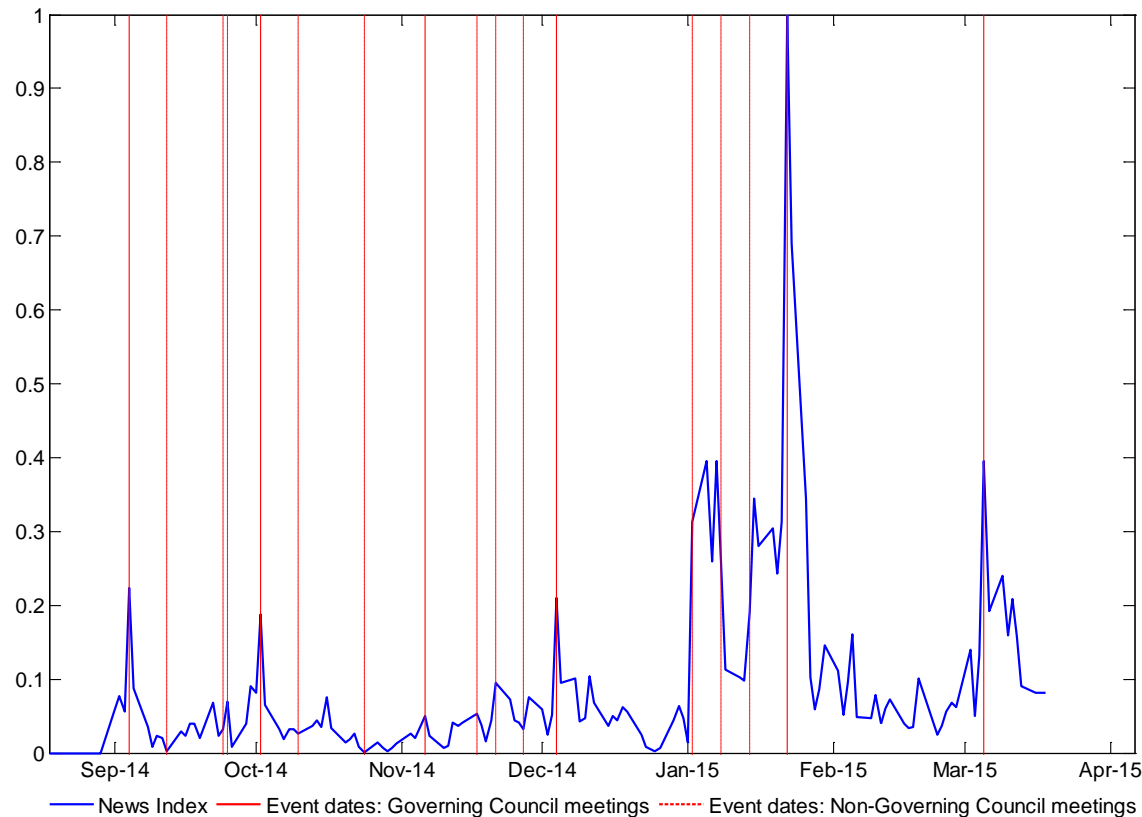


## Bank Bond Yields



# Identifying the events

- ✓ A “narrative approach”: GC meetings and official communication by ECB
- ✓ Cross-check with an “agnostic” approach based on an index of intensity of news (Factiva)



Note: The figure reports for News Index computed from Factiva. The query is set so that for an article to be included in our sample it should simultaneously contains at least one word coming from two different sets. The first set is “ECB”, “European Central Bank”, and “Draghi”. The second set is “QE”, “quantitative easing”, “asset purchase”, and “APP”. The vertical red solid lines represent the date of the ECB’s Governing Council meetings, i.e. September, 04 2014; October, 02 2014; November, 06 2014; December, 04 2014; January, 22 2015; and March, 05 2015. The vertical red dashed lines represent the non-Governing Council events.

# Broader set of official communications

Month	Date	First newswire	Event
September 14	04	14:34	ECB press conference
	12	14:12	News conference following a meeting of euro area finance ministers in Milan
	24	08:20	Interview with Europe 1, conducted on 23 September 2014 and aired on 24 September 2014
	25	05:00	Interview with Lithuanian business daily Verslo Zinios
October 14	02	14:40	ECB press conference
	10	16:00	Statement at the Thirtieth meeting of the IMFC, Washington
	24	16:41	An ECB spokesman reading from Mario Draghi's speaking points at a euro area summit, Brussels
November 14	06	14:35	ECB press conference
	17	15:17	Introductory remarks at the EP's Economic and Monetary Affairs Committee
	21	09:33	Speech at the Frankfurt European Banking Congress, Frankfurt am Main
	27	09:45	Introductory remarks at the Finnish parliament and speech at the University of Helsinki
Dec 14	04	14:37	ECB press conference
January 15	02	08:00	Interview with Handelsblatt, published on 2 January 2015
	08	16:05	Letter to Mr Luke Ming Flanagan (member of the European Parliament), published on 8 January 2015
	14	09:00	Interview with Die Zeit, published on 15 January 2015
	22	14:40	ECB press conference
Mar 15	05	14:30	ECB press conference

Newswire headlines
DJN - Draghi: council is unanimous in commitment to using additional unconventional measures
RTRS - ECB's Draghi: ECB stands ready to take further action to maintain price stability
RTRS - Draghi - we have lots of liquidity, reaffirms we are ready to use all tools at our disposal
RTRS - Draghi - ECB ready to use additional unconventional instruments [...] alter size or composition of unconventional interventions if needed
RTRS - Draghi - governing council unanimous in its commitment to using additional unconventional measures, if needed
RTRS - ECB's Draghi - governing council unanimous in its commitment to using additional unconventional instruments
RTRS - Draghi repeats ECB ready to use other unconventional measures if needed, did not speak of deflation – spokesman
DJN - Draghi: council unanimous in commitment to use unconventional instruments if needed
RTRS - ECB's Draghi - reiterates governing council unanimous in commitment to using additional unconventional instruments if needed
DJN - Draghi: committed to adjust size, pace and composition of asset purchases if needed
RTRS - ECB's Draghi - governing council unanimous in commitment to using additional unconventional measures if necessary
DJN - Draghi: rich discussion on various options of QE
RTRS - ECB's Draghi says govt bond buying is one of the tools we can use to fulfil our mandate, but must avoid state financing
BN - Draghi says ECB measures may include sovereign-bond buying
BN - Draghi says ECB is ready to buy government bonds: die zeit
RTRS - Draghi - ECB agrees expanded asset-buy programme
ECB unveils details of trillion-euro bond purchases

# Why controlling for News is important?

Country	Variable	Country	Variable
Europe	Consumer Confidence	Italy	GDP WDA QoQ
Europe	CPI MoM	Italy	Industrial Production MoM
Europe	Economic Confidence	Italy	Markit/ADACI Italy Manufacturing PMI
Europe	GDP SA QoQ	Spain	CPI EU Harmonised YoY
Europe	Industrial Production SA MoM	Spain	GDP QoQ
Europe	Markit Eurozone Manufacturing PMI	Spain	Markit Spain Manufacturing PMI
France	Consumer Confidence	Spain	Retail Sales YoY
France	CPI YoY	Spain	Unemployment Rate
France	GDP QoQ	United States	Change in Nonfarm Payrolls
France	Industrial Production MoM	United States	Chicago Purchasing Manager
France	Markit France Manufacturing PMI	United States	Consumer Confidence Index
Germany	CPI MoM	United States	CPI MoM
Germany	GDP SA QoQ	United States	FOMC Rate Decision
Germany	IFO Business Climate	United States	GDP Annualized QoQ
Germany	Industrial Production SA MoM	United States	GDP Price Index
Germany	Germany Manufacturing PMI	United States	Housing Starts
Germany	Unemployment Rate	United States	Initial Jobless Claims
Germany	ZEW Survey Expectations	United States	ISM Manufacturing
Italy	Business Confidence	United States	U. of Mich. Sentiment
Italy	CPI EU Harmonized YoY	United States	Unemployment Rate