

Money, credit, monetary policy and the business cycle in the euro area

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Monetary policy transmission mechanism in the euro area in its first 10 years

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Disclaimer: The views expressed in this paper are those of the authors and do not necessarily reflect those of the European Central Bank and the Eurosystem

Aim of this paper

Stylized features of the euro area economy? Need of empirical guidance for structural analysis

Few empirical studies of euro area (in particular, money and credit markets)

MTN: Peersman and Smets, 2003; Mojon and Peersman, 2003 (pre-euro area data).

Marginal approach: lack of consistency (except Boivin et al., 2008)

- The ECB looks at a large variety of information when setting the interest rate; private agents make their decision on the basis of lot of information
- Recent crisis: relevance of aspects of the economy, traditionally disregarded in mainstream analysis (i.e. credit and money markets)

Aim of this paper

- New database including, in particular, disaggregated information on credit and money markets
- Large model encompassing monetary, credit, financial and macroeconomic variables

Study the dynamic behaviour of the macroeconomy, financial markets **jointly** with detailed information on monetary and credit markets

We use the model to assess:

- Monetary policy transmission mechanism in the euro area
- Features of money and credit markets over the business cycle

Outline

- Data
- The model
- Model validation: out-of-sample forecasting
- The monetary policy transmission
 - IRF to monetary policy shocks
- Credit and money markets over the business cycle
 - Correlations at business cycle frequencies conditional on shocks driving the business cycle
 - Conditional forecasts of euro area economy conditional on the shocks driving the business cycle

Data

- **Macroeconomic and Financial Environment:**
 - Macroeconomy: Industrial production, Consumer confidence, Unemployment rate, HICP, PPI
 - Financial Market: Euribor, Yield curve, Exchange rate, Stock price
 - External conditions: US activity, prices and policy rate, world price of raw materials
- **Money:**
 - M1, M2, M3 and corresponding own rates
- **Credit:**
 - Loans to non-financial corporations, Consumer loans, Loans for house purchases
 - Corresponding lending rates
- Sample: January 1991 – August 2009 (31 monthly variables)

The model

Large information

➤ 31 variables

+ unconstrained model with rich dynamics

➤ VAR in levels, 13 lags

Curse of dimensionality?

Estimation uncertainty makes the model
unstable/unreliable

→ Need to limit variability owing to estimation error

The model

IDEA: Mixed estimation

Data + Prior
(Complex/Rich) (Parsimonious/Naïve)

→ Stable and reliable estimation of complex model if data comove (as typically macroeconomic data)

Comovement: sample information in all variables “massively” points in the same direction against the prior

For details see:

De Mol, Giannone and Reichlin (2008)

Banbura, Giannone and Reichlin (2008)

The model

- We set the weight of the prior naïve model relative to sample information by limiting the effective number of parameters to be estimated

In practice, we preserve the same number of degrees of freedom as in a traditional small (4 variables) Monetary VAR.

Model validation: out-of-sample forecasting

Forecasting accuracy: reflects trade-off between **estimation uncertainty** (large number of parameters) and **model mis-specification** (inclusion of many potentially relevant variables).

Evaluation on euro area sample. Average (12 months) year on year growth rates excluding interest rates (levels). MSE relative to the prior naive model (Random Walk in levels with drift)

V a r i a b l e s	R e l a t i v e M S E
I n d u s t r i a l P r o d u c t i o n	0 . 7 2
H I C P	3 . 5 4
U n e m p l o y m e n t	0 . 3 4
P P I	0 . 8 3
W o r l d p r i c e o f r a w m a t e r i a l s	1 . 7 1
U S D / E U R O	1 . 3 9
S t o c k P r i c e s	1 . 0 8
M 1	1 . 1 6
M 2	0 . 6 1
M 3	0 . 4 9
L o a n s t o N F C u p t o 1 y e a r	0 . 1 2
L o a n s t o N F C o v e r 1 y e a r	0 . 2 5
C o n s u m e r L o a n s	1 . 5 0
L o a n s f o r h o u s e p u r c h a s e s	0 . 7 9
L e n d i n g r a t e s , N F C l o a n s u p t o 1 y e a r	0 . 2 9
L e n d i n g r a t e s , c o n s u m e r l o a n s	0 . 2 7
L e n d i n g r a t e s , l o a n s f o r h o u s e p u r c h a s e s	0 . 7 0
T w o y e a r s b o n d r a t e s	0 . 8 4
F i v e y e a r s b o n d r a t e s	1 . 5 9
T e n y e a r s b o n d r a t e s	3 . 3 9

The monetary transmission mechanism

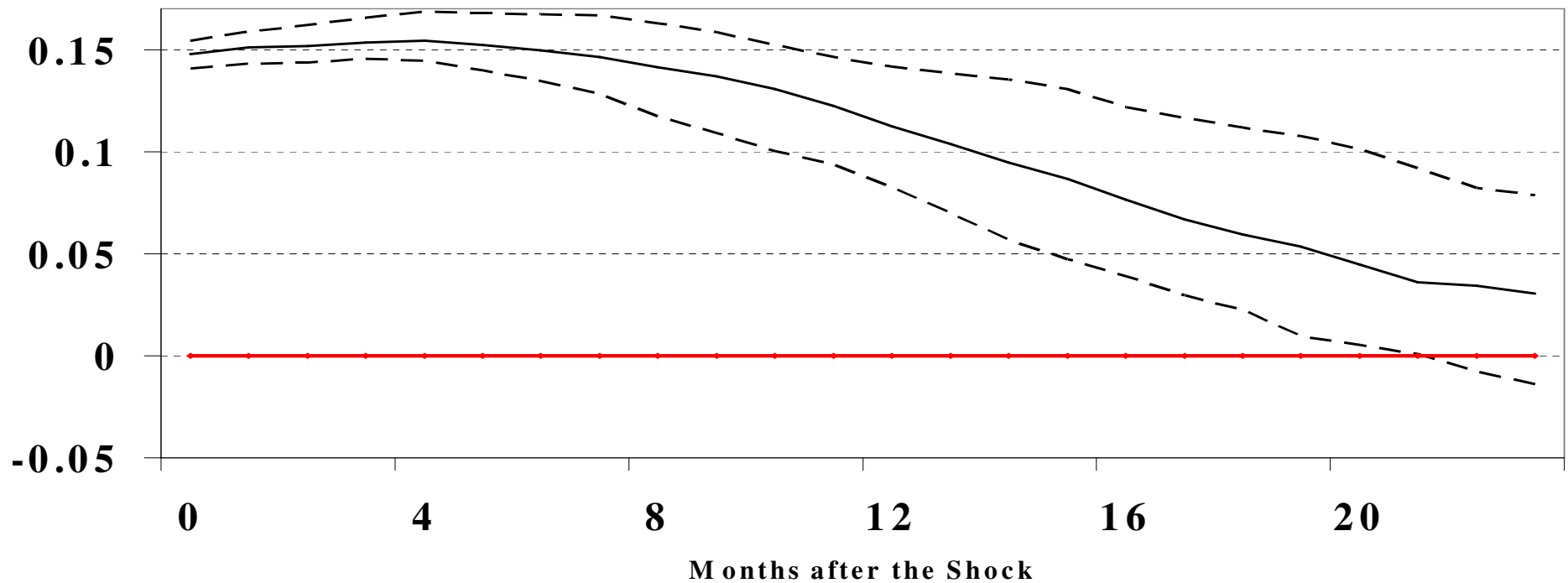
Strategy: identify an exogenous shift in monetary policy and track its effects on different aspects of the economy

Minimal set of identifying assumptions:

- It takes one month for prices and economic activity (in Europe and the US) to react to monetary policy
- Current month monetary and financial conditions are not taken into account by the ECB when setting the rates

The Monetary Policy Shock

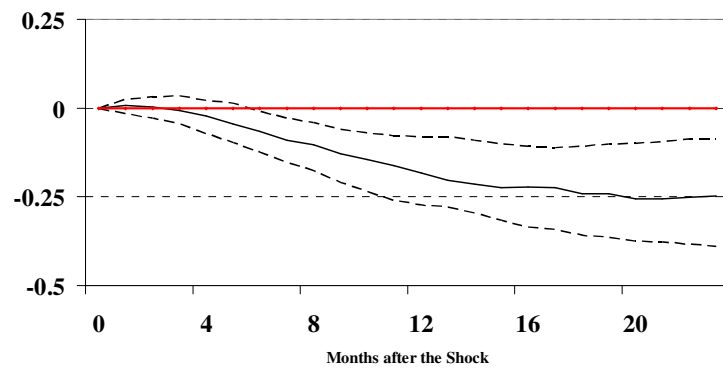
Euribor



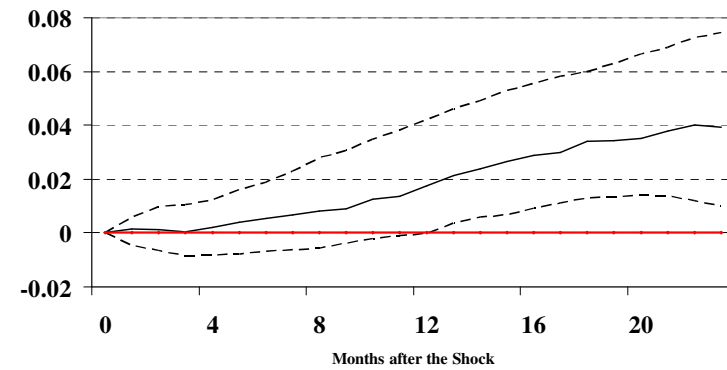
Note: Dashed lines represent the 68% confidence interval.

Macroeconomy

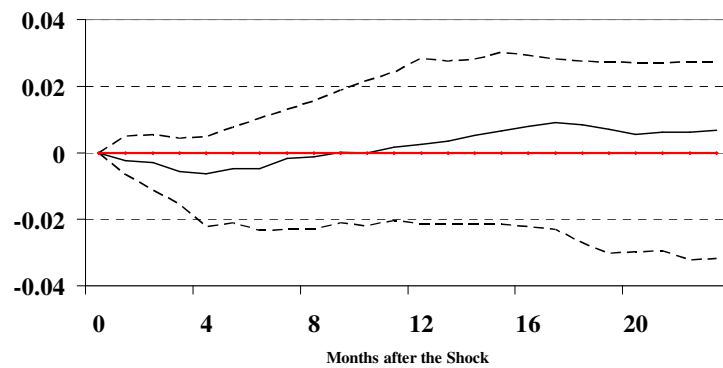
Industrial Production



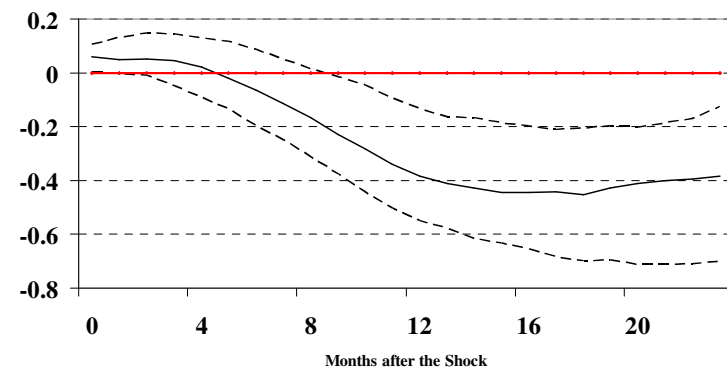
Unemployment



HICP



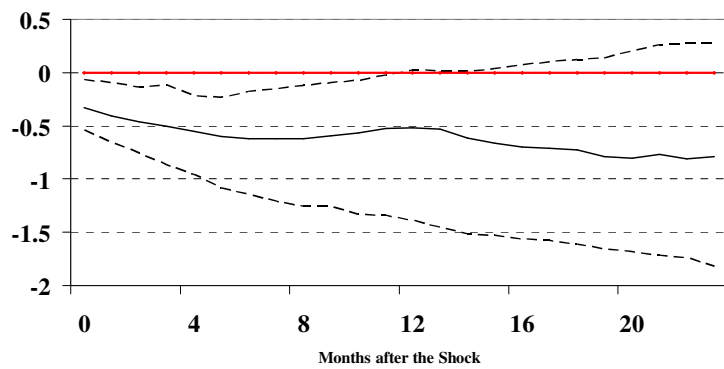
Consumer Confidence



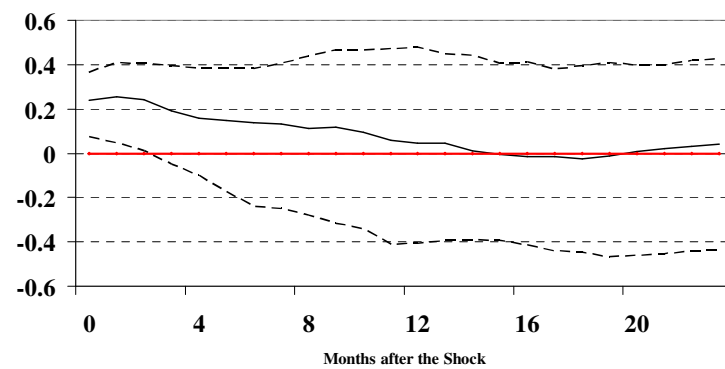
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Financial Market

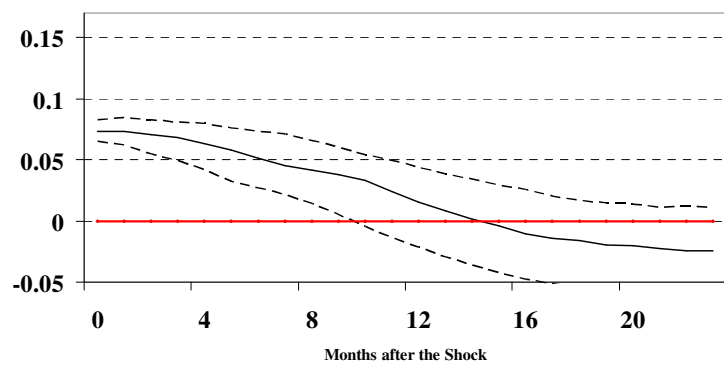
Stock Prices



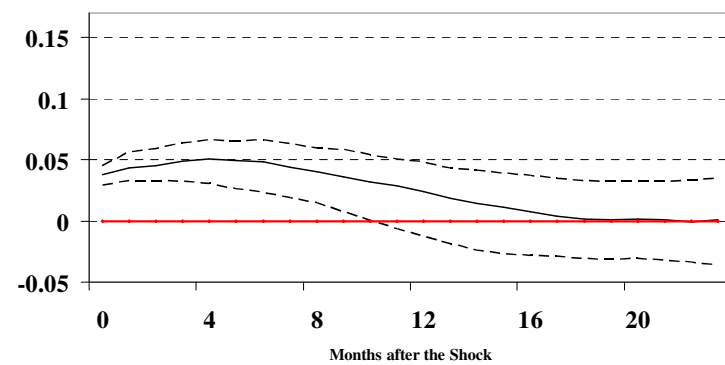
USD/EURO



Two Years Bond Rate



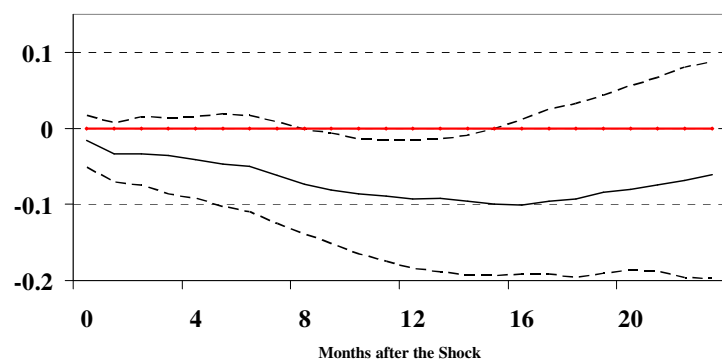
Ten Years Bond Rate



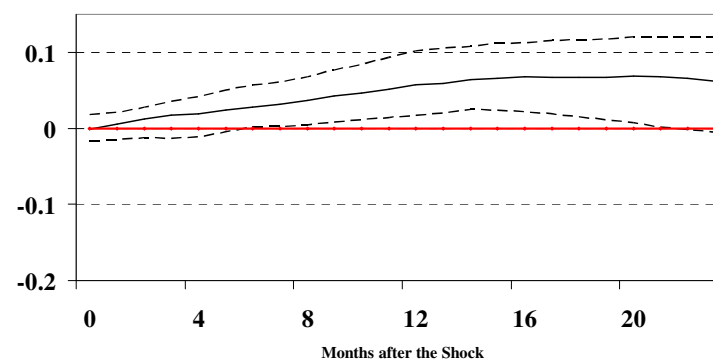
Note: Dashed lines represent the 68% confidence interval.

Money markets

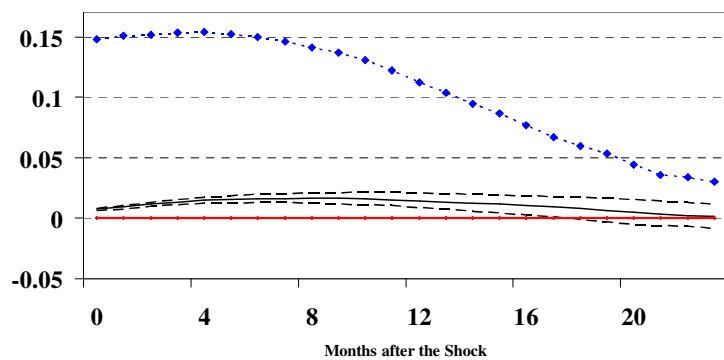
M1



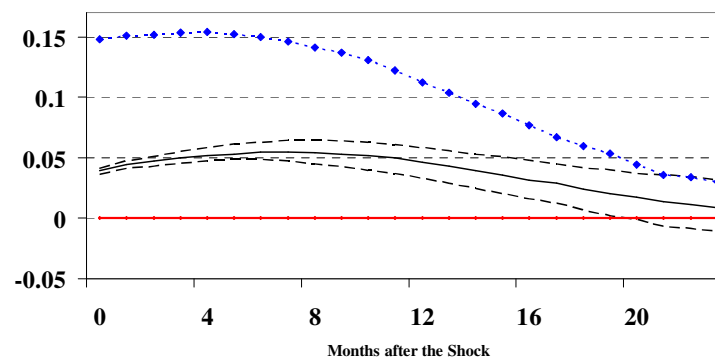
M3



Own rate of return on M1



Own rate of return on M3



Note: Dashed lines represent the 68% confidence interval.

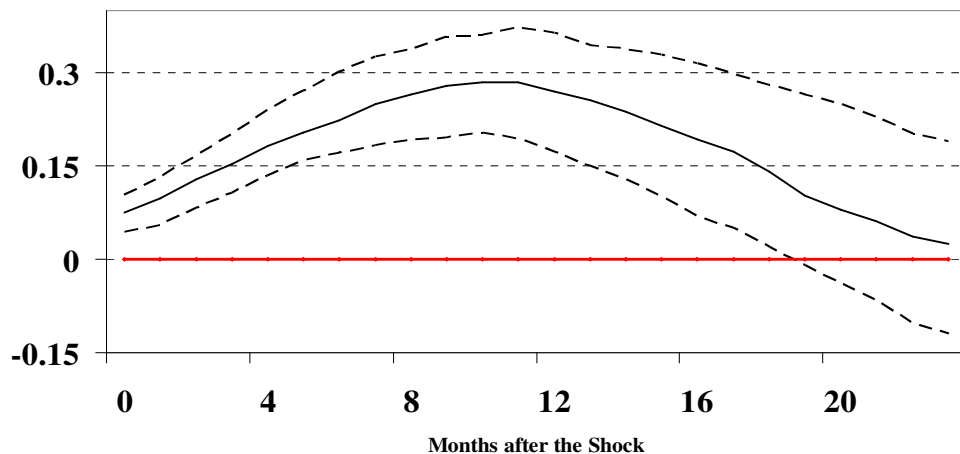
Money markets

Substantial heterogeneity

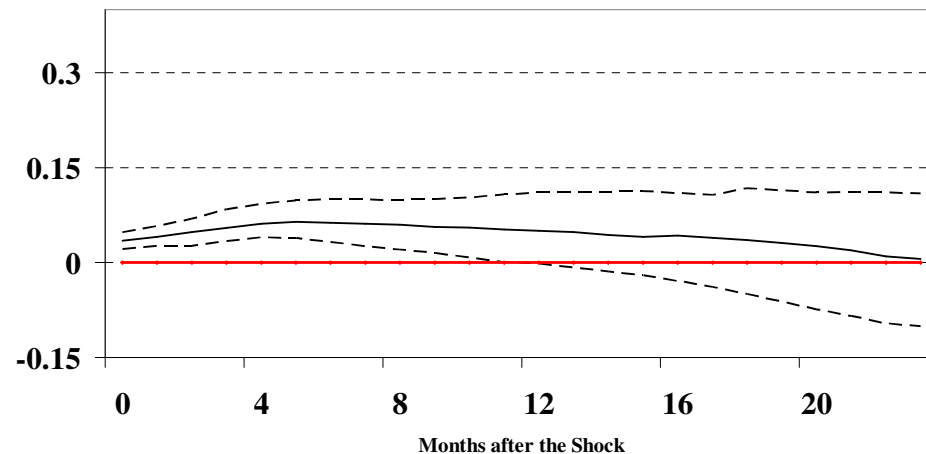
Owing to different degree of liquidity and weight of interest earning components in the three aggregates

Credit markets

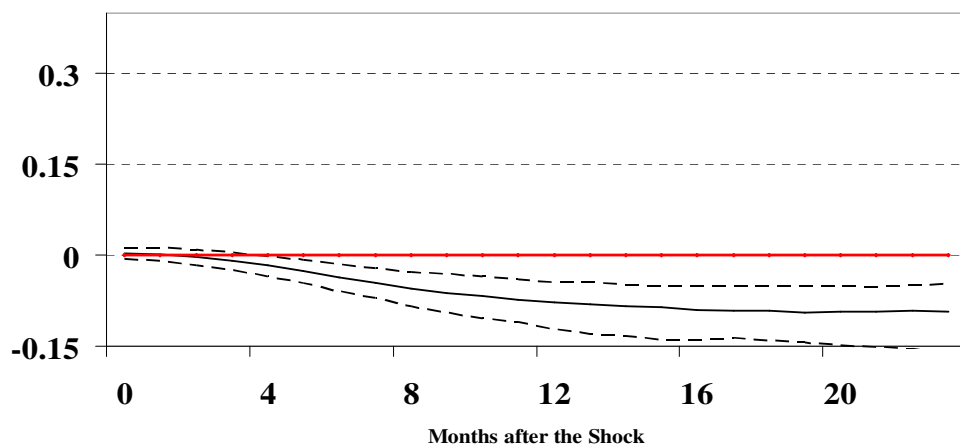
Loans to NFC up to 1 year



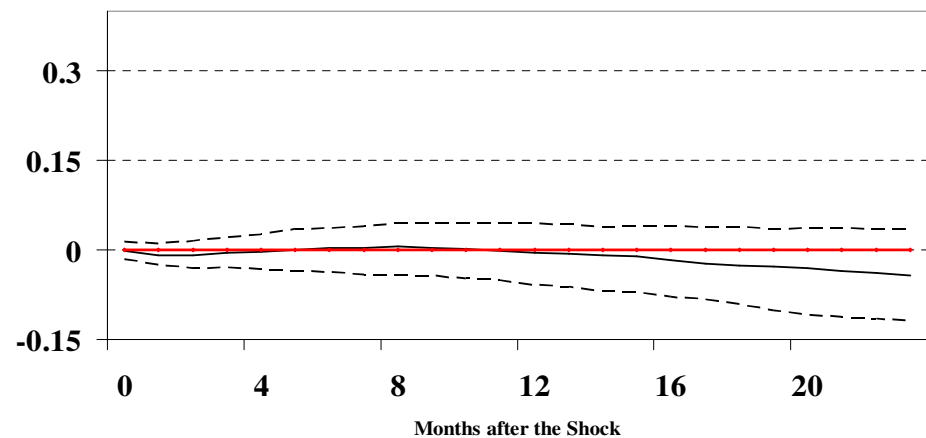
Loans to NFC over 1 year



Loans for House Purchases



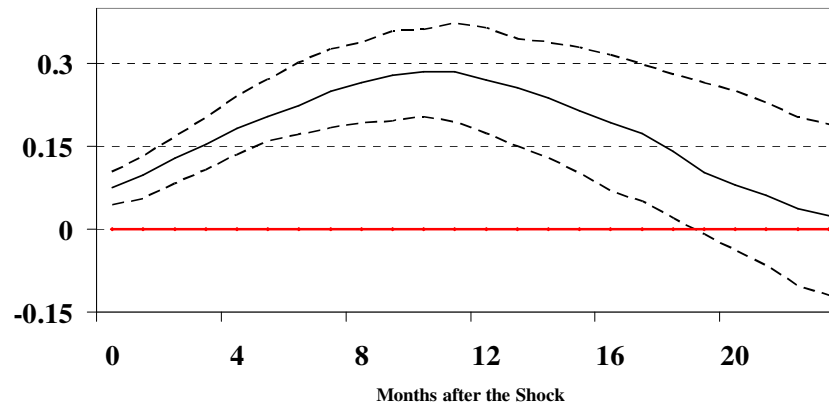
Consumer Loans



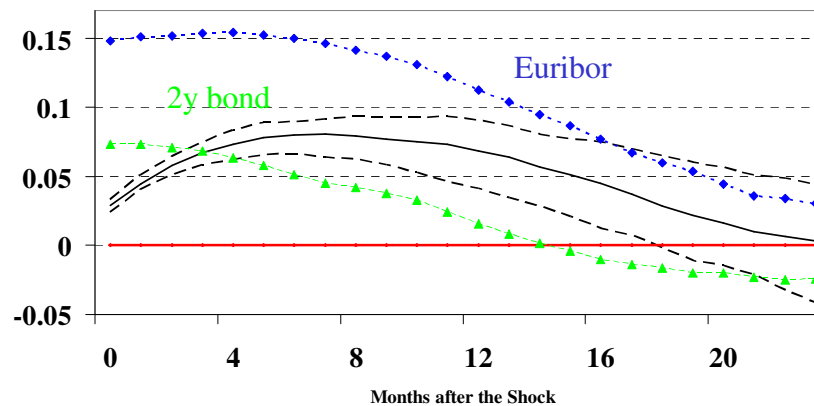
Note: Dashed lines represent the 68% confidence interval.

Pass-through to Lending rates: Loans to NFC up to 1 year

Loans to NFC up to 1 year



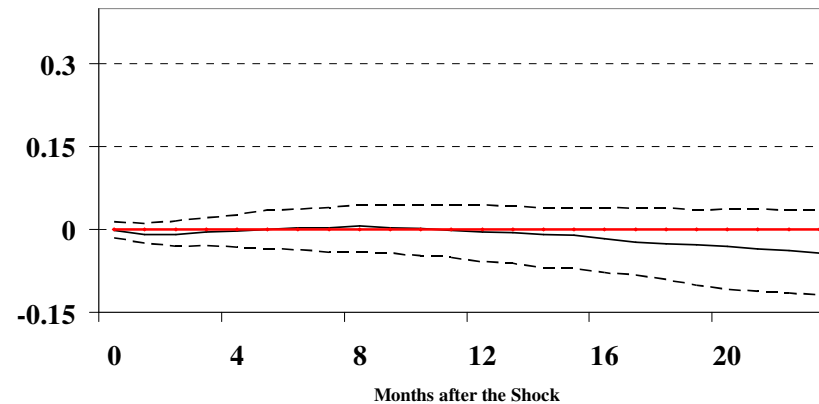
Lending rate, Loans to NFC up to 1 year



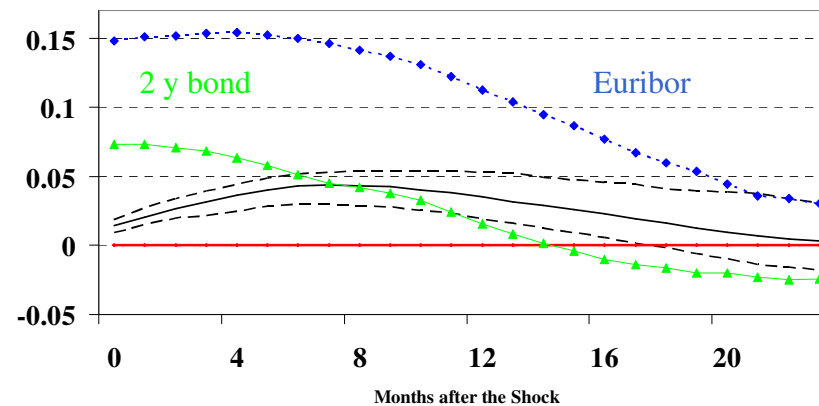
Note: Dashed lines represent the 68% confidence interval.

Pass-through to lending rates: Consumer Loans

Consumer Loans



Lending rate, Consumer Loans

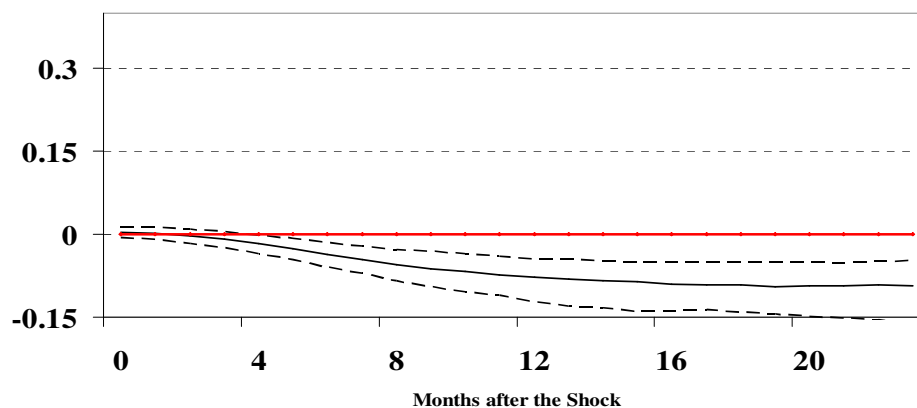


Note: Dashed lines represent the 68% confidence interval.

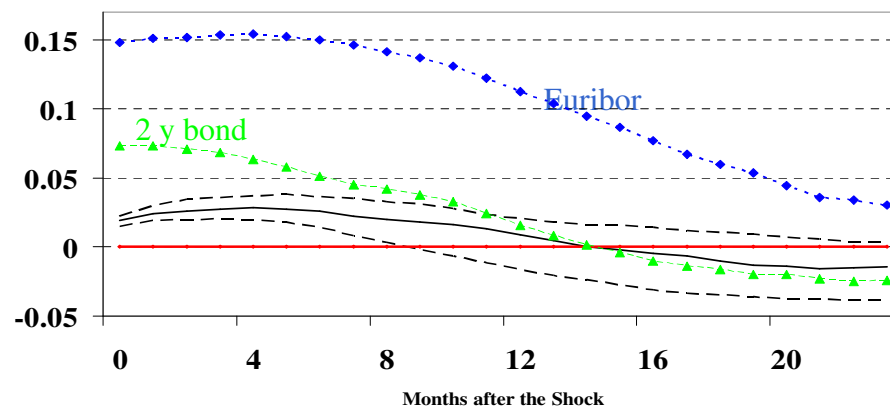
Pass-through to lending rates

Loans for House Purchases

Loans for House Purchases



Lending rate, Loans for House Purchases



Note: Dashed lines represent the 68% confidence interval.

Monetary transmission to the credit market

- Homogeneous pass-through across loans
 - Slow; in particular, much slower than US for loans to NFC [Den Haan et al. 2007]. Relationship banking.
- Heterogeneity in loans quantities
 - Loans to non-financial corporations counter-cyclical and then procyclical
 - Because of the monetary downturn, firms might increase their demand of loans to finance increased inventories or a reduced utilization of the workforce (Bernanke and Gertler, 1995; Christiano et al., 1996)
 - Other explanations: increase in supply by banks (Den Haan et al. 2007); front-loading

Business cycle properties of credit markets

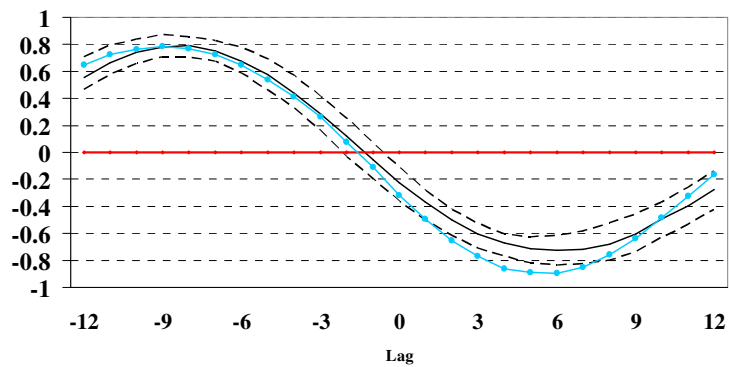
So far, behavior of credit markets in monetary downturn

Exogenous monetary policy is not seen as the main source of business cycles.

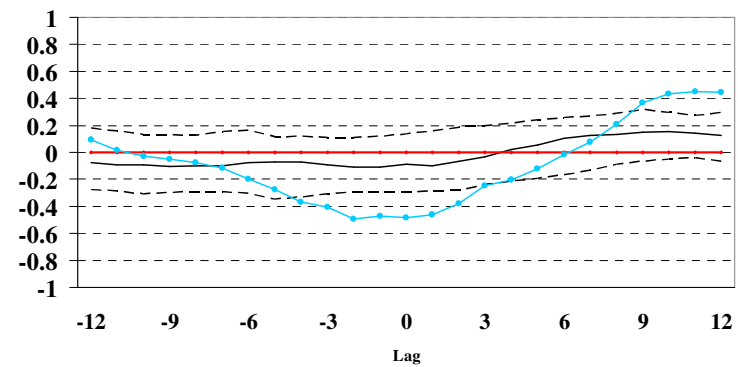
- How do credit markets behave in response to the shocks driving the business cycle?

Unconditional and conditional correlations at BC frequencies

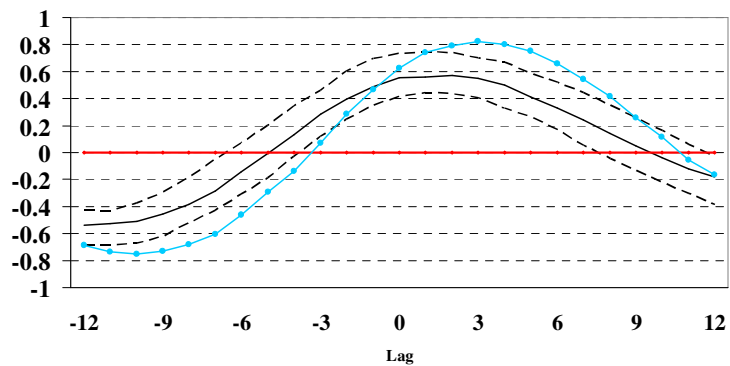
Loans to NFC up to 1 year



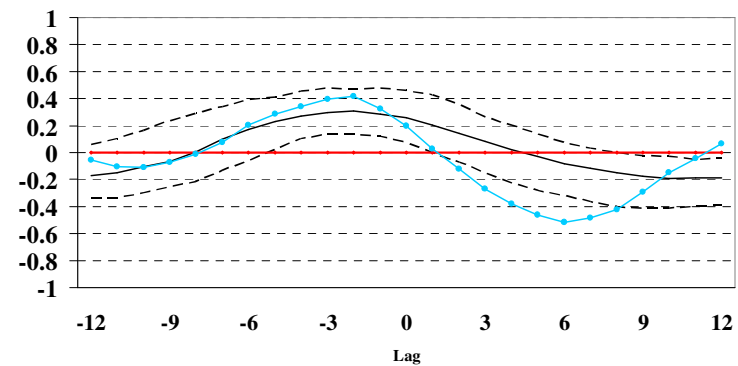
Consumer Loans



Loans for house purchases



Loans to NFC over 1 year



Unconditional and conditional correlations at BC frequencies

- Loans to Non-Financial Corporations very cyclical at shorter maturities
 - Countercyclical with a lead
 - Strongly pro-cyclical with a lag (highly predictable??)
- Consumer loans are a-cyclical (but... post-1999 different) while loans for house purchases have a strong cyclical component (and appear to be coincident with the cycle)

Counterfactual dynamics of loans conditional on “business cycle shocks”

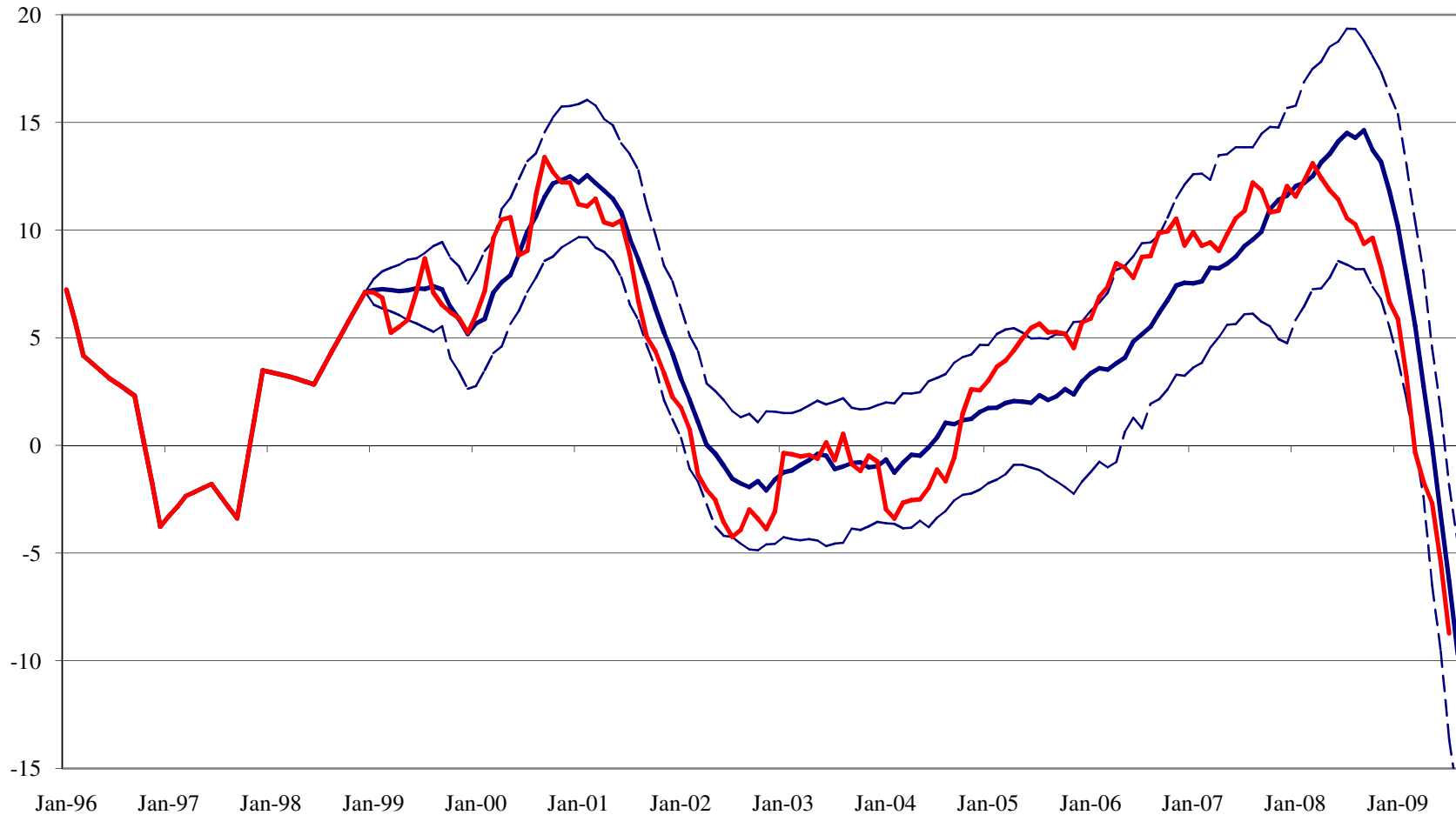
Ask: *what would be the most likely path of Loans conditional to the business cycle shocks and the pre-2007 economic structure of the euro area?*

Conditional expectations from January 1999 to August 2009 of loans given:

- *Past of all the 31 variables (01/1991 – 12/1998)*
- *Full observed path of IP, Unemployment and US IP (01/1991 – 08/2009)*
- *VAR parameters estimated until December 2006 (July 2007)*

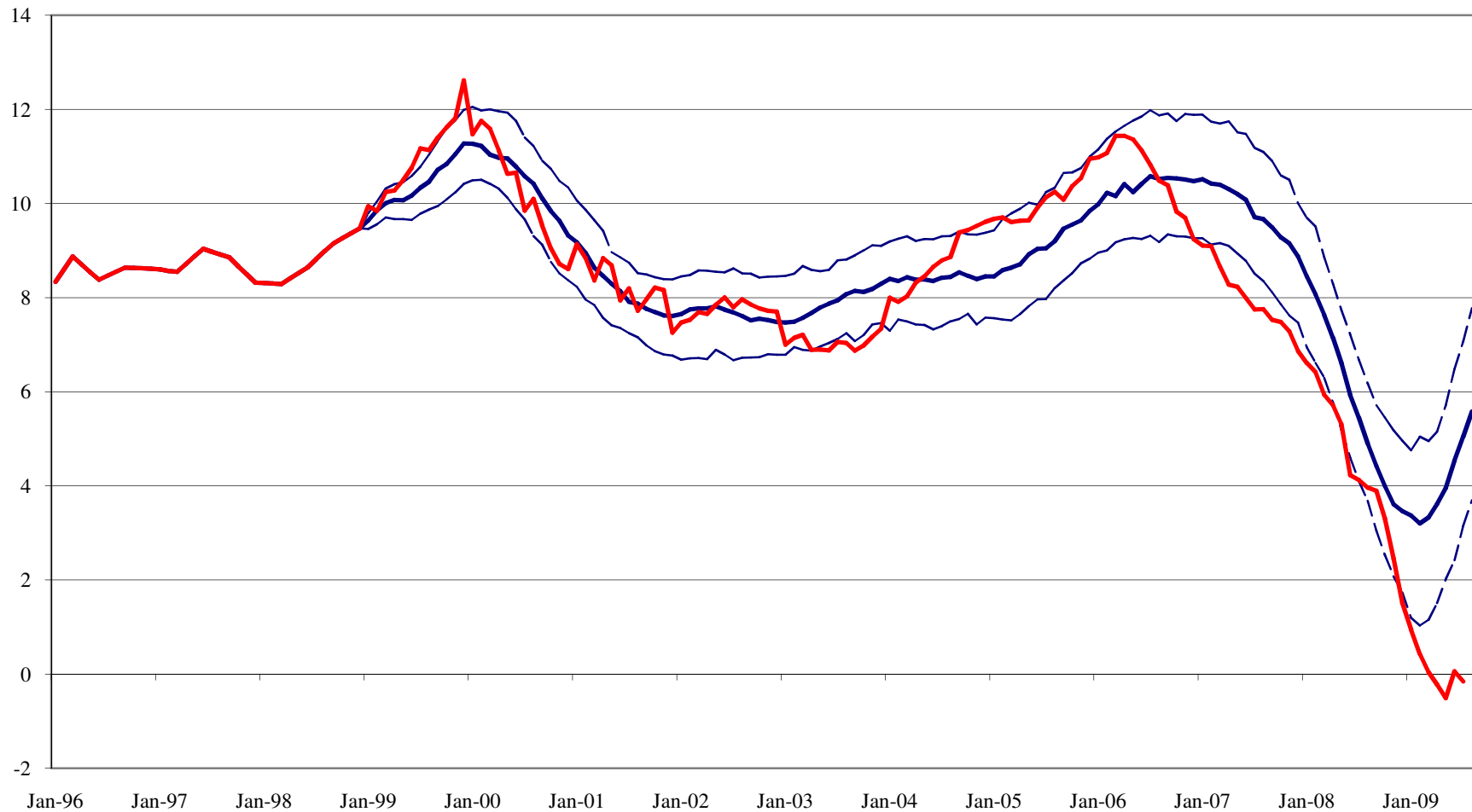
Counterfactual dynamics of loans conditional on “business cycle shocks”

Loans to Non-Financial corporations up to one year



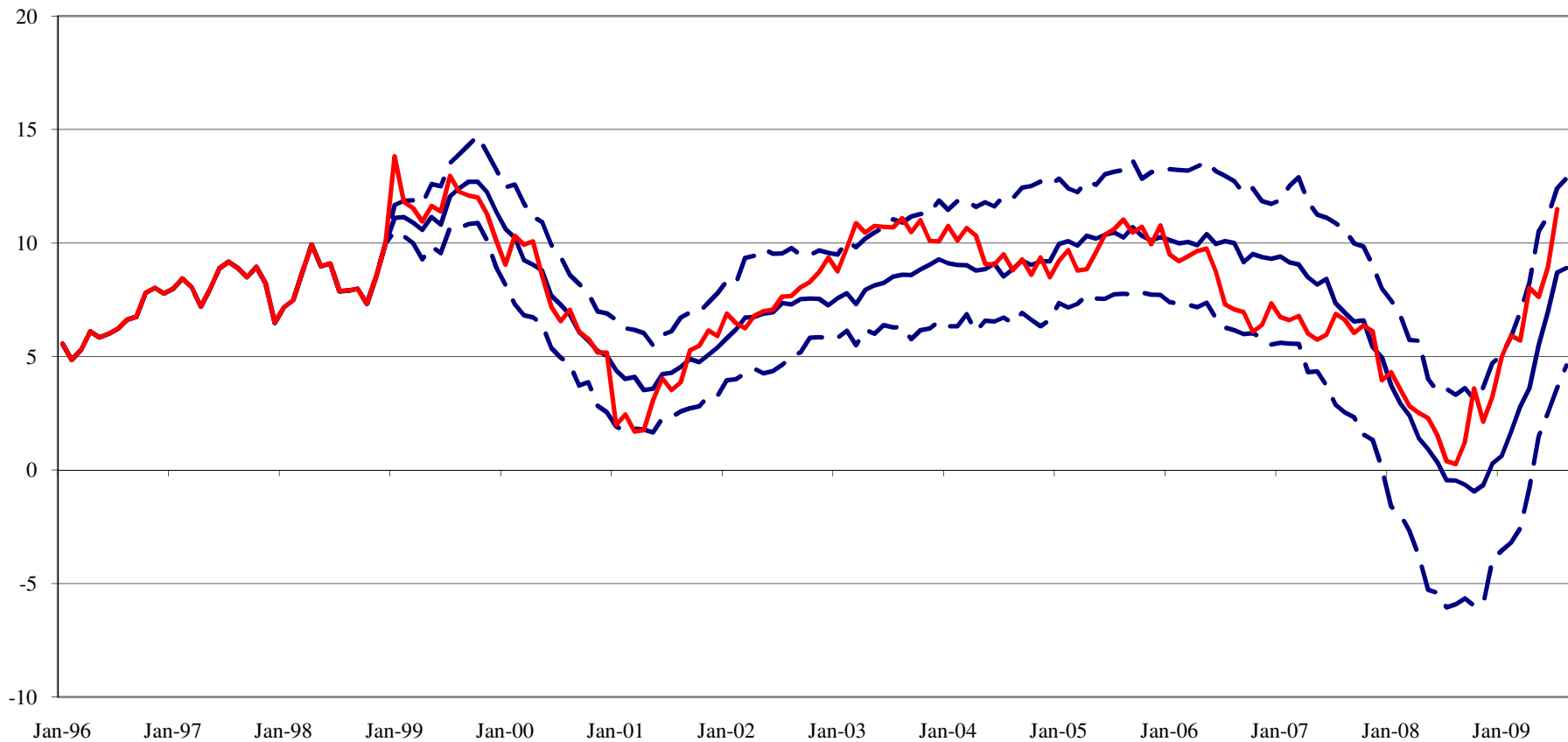
Counterfactual dynamics of loans conditional on “business cycle shocks”

Loans for house purchases



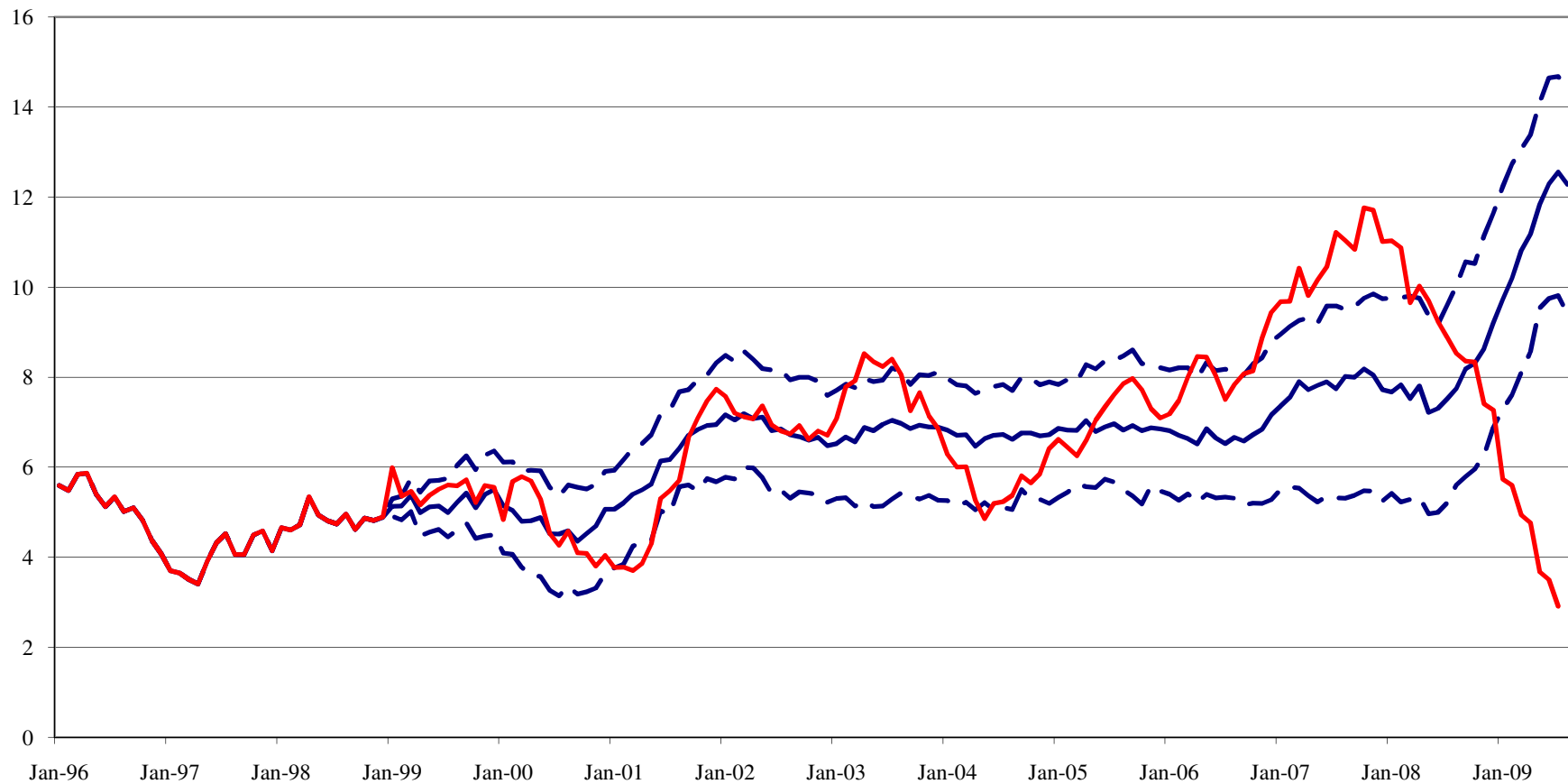
Counterfactual dynamics of M1 conditional on “business cycle shocks”

M1



Counterfactual dynamics of M3 conditional on “business cycle shocks”

M3



Conclusions

- *Encompassing framework*
 - *Dynamic interrelationships between macroeconomic, financial, credit and money variables in the euro area*
- *Study of the transmission mechanism of monetary policy in the euro area. Stylized facts, in particular, on money and credit markets*
 - *Heterogeneity across types of loans and money aggregates*
- *Business cycle properties of credit aggregates.*
 - *Cyclical and lag of short-term credit to NFC*
 - *Evidence of “credit crunch” effects on households, much less on non-financial corporations*
 - *Broad money not strongly affected by cycle and weird behavior in the crisis period*