Chinese Monetary Policy: Dual Shocks on a Dual Market

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Research Seminar @ UniCamp

Outline

Outline

Motivation

Motivation

- With the financial crises and interest rates hitting the zero lower bound in the US and Europe there is renewed interest in

a. how policy affects the entire yield curve rather than just the short end
b. how policy affects quantity measures
c. whether CBs can and should tackle exuberance on (individual) asset markets

- Why is China special?

a. China has traditionally conducted a more involved monetary policy
b. China has traditionally emphasized quantity aggregates more strongly
c. There is some concern about exuberance in the Chinese housing market

Motivation

Our contribution

We provide a model of Chinese monetary policy that accounts for ..

- the main instruments of Chinese monetary policy
- special features of the Chinese financial system
- the impact of monetary policy on the housing market (where the majority of Chinese savings goes to)

Outline

Institutional Background

Chinese bond market

There are two institutionally separate bond markets in China, the interbank market and the exchange market that differ in a number of respects

- participants (Major national commerical banks vs. small-medium-size institutional investors)
- trading rules (OTC vs. Exchange)
- regulation (PBoC vs. SEC)
- different corporate bonds
- PBoC conduct monetary policy in interbank market

But:Chinese government bonds are traded on both!

Institutional Background

Chinese Treasury Bonds

- Chinese treasury bonds are mainly issued and traded domestically
- The maturity of treasury bonds includes 1-year, 3-year, 5-year, 7-year, 10-year, and 50-year
- Chinese central government started only recently to issue treasury bonds on a regular frequency basis in order to pin down the benchmark yield curves rather than meet fiscal needs
- PBoC now emphasizes the control of yield curves to improve the monetary transmission channels and coordinate its action on stabilizing exchange rates

Institutional Background

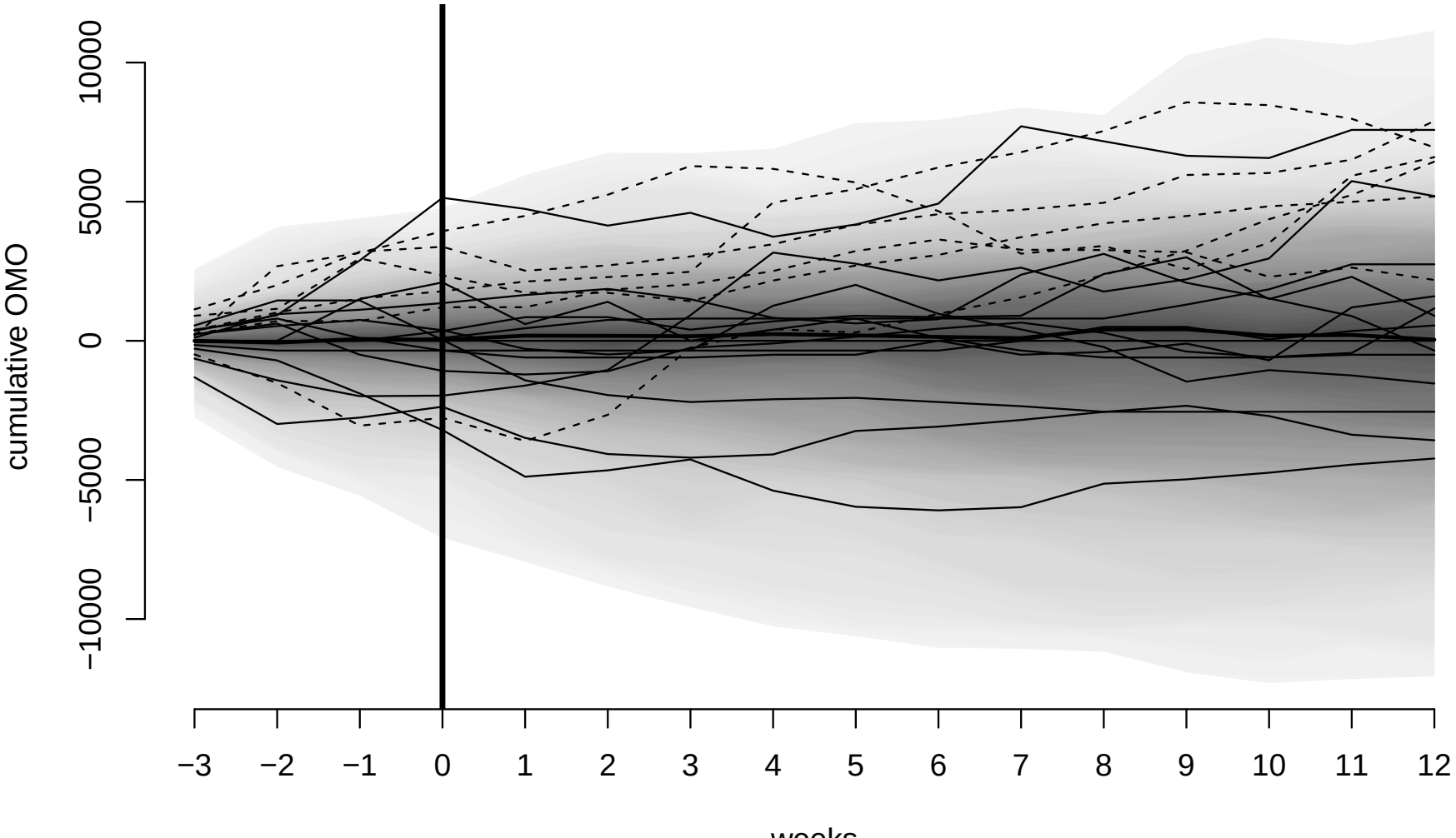
The policy tools of PBoC

The People's Bank of China has a very rich toolbox to implement monetary policies, including:

- reserve ratios and central bank bills
- open market operation on treasury bonds, central bank bills, and even corporate bonds
- repo rate, discount rate, and relending rate
- liquidity facilities such as MLF,SLF and SLO
- benchmark loan and deposit rates
- window guidance and loan growth controls
- special and differentiate reserve ratio

Institutional Background

Benchmark rate changes and open market operations



Outline

Method

Step 1: Estimating the yield curve - Basics

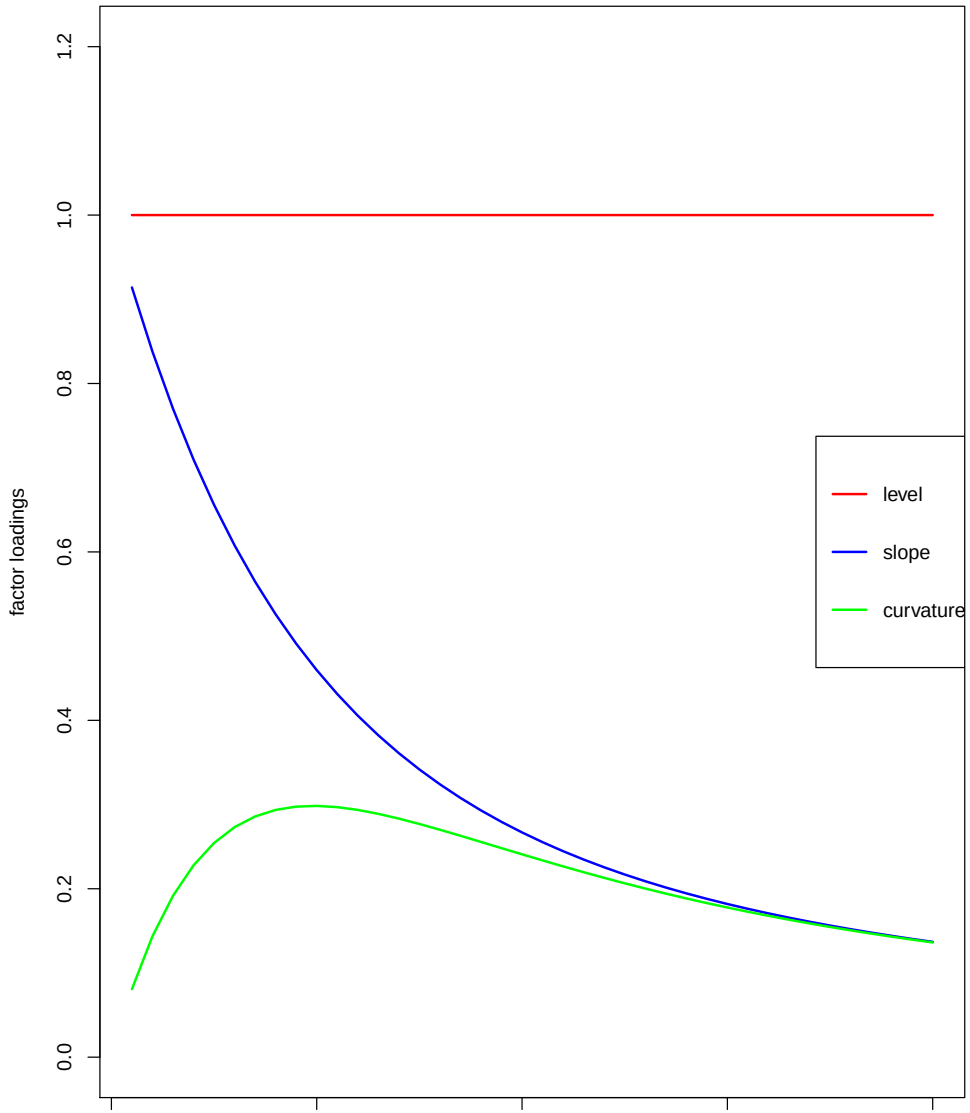
Our yield curve function follows the seminal work Nelson&Siegel 1987.

$$r_t(\tau) = \begin{bmatrix} 1 & \frac{1-e^{-\lambda\tau}}{\tau\lambda} & \frac{1-e^{-\lambda\tau}}{\tau\lambda} - e^{-\tau\lambda} \end{bmatrix} \begin{bmatrix} L_t \\ S_t \\ C_t \end{bmatrix} + \varepsilon_t \qquad (1)$$

- This specification explains yields of different maturities as a function of three underlying parameters, usually level (L), slope (S) and curvature (C) of the yield curve
- When τ goes to infinity, L_t represents the long-term yield; When τ goes to zero, $L_t - S_t$ represents the short-term yield, and C_t determines where the hump is located

Method

Step 1: Estimating the yield curve - Basics



Diebold et al. (2006) propose to assume an autoregressive process for the underlying parameters.
Then, equation 2 works as measurement equation of a state space model with the corresponding state equation 3:

$$r_t(\tau) = \begin{bmatrix} 1 & \frac{1-e^{-\lambda\tau}}{\tau\lambda} & \frac{1-e^{-\lambda\tau}}{\tau\lambda} - e^{-\tau\lambda} \end{bmatrix} \begin{bmatrix} L_t \\ S_t \\ C_t \end{bmatrix} + \varepsilon_t \tag{2}$$

$$\begin{bmatrix} L_t \\ S_t \\ C_t \end{bmatrix} = \begin{bmatrix} \mu_L \\ \mu_S \\ \mu_C \end{bmatrix} + A \begin{bmatrix} L_{t-1} \\ S_{t-1} \\ C_{t-1} \end{bmatrix} + \eta_t. \tag{3}$$

The restriction on the shock ϵ_t and η_t is as below:

$$VarCov\begin{pmatrix}\varepsilon_t\\ \eta_t\end{pmatrix}=\begin{bmatrix}R & 0\\ 0 & Q\end{bmatrix}=\begin{bmatrix}r_1 & 0 & \cdots & 0 & 0 & 0 & 0\\ 0 & r_2 & & \vdots & & \vdots & \\ \vdots & & \ddots & 0 & 0 & 0 & 0\\ 0 & \cdots & 0 & r_M & 0 & 0 & 0\\ 0 & & 0 & 0 & q_{11} & q_{12} & q_{13}\\ 0 & \cdots & 0 & 0 & q_{21} & q_{22} & q_{23}\\ 0 & & 0 & 0 & q_{31} & q_{32} & q_{33}\end{bmatrix} \tag{4}$$

Method

Step 1: Estimating the yield curve - Dual market

measurement equation:

$$\begin{bmatrix} r_{ib,t}(\tau_1) \\ r_{ib,t}(\tau_2) \\ \vdots \\ r_{ib,t}(\tau_M) \\ r_{ex,t}(\tau_1) \\ r_{ex,t}(\tau_2) \\ \vdots \\ r_{ex,t}(\tau_M) \end{bmatrix} = \begin{bmatrix} H_{ib} & 0 \\ 0 & H_{ex} \end{bmatrix} \begin{bmatrix} L_{ib,t} \\ S_{ib,t} \\ C_{ib,t} \\ L_{ex,t} \\ S_{ex,t} \\ C_{ex,t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{ib,t} \\ \varepsilon_{ex,t} \end{bmatrix}, \tag{5}$$

and

$$H(\tau_i) = \begin{bmatrix} 1 & \frac{1-e^{-\lambda\tau_i}}{\tau\lambda} & \frac{1-e^{-\lambda\tau_i}}{\tau\lambda} - e^{-\tau_i\lambda} \end{bmatrix} \tag{6}$$

state equation

$$\begin{bmatrix} L_{ib,t} \\ S_{ib,t} \\ C_{ib,t} \\ L_{ex,t} \\ S_{ex,t} \\ C_{ex,t} \end{bmatrix} = \begin{bmatrix} \mu_{ib} \\ \mu_{ex} \end{bmatrix} + \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} L_{ib,t-1} \\ S_{ib,t-1} \\ C_{ib,t-1} \\ L_{ex,t-1} \\ S_{ex,t-1} \\ C_{ex,t-1} \end{bmatrix} + \begin{bmatrix} \eta_{ib,t} \\ \eta_{ex,t} \end{bmatrix}, \quad (7)$$

A_{11} and A_{22} respectively govern the dynamics of yield curve factors within markets, and A_{12} and A_{21} govern the dynamics of yield curve factors across two market

The restriction on the shock ε_t and η_t is as below:

$$VarCov\begin{pmatrix} \varepsilon_t \\ \eta_t \end{pmatrix} = \begin{bmatrix} R_{ib} & 0 & 0 & 0 \\ 0 & R_{ex} & 0 & 0 \\ 0 & 0 & Q_{ib,ib} & Q_{ib,eX} \\ 0 & 0 & Q_{ex,ib} & Q_{ex,ex} \end{bmatrix} \tag{8}$$

Method

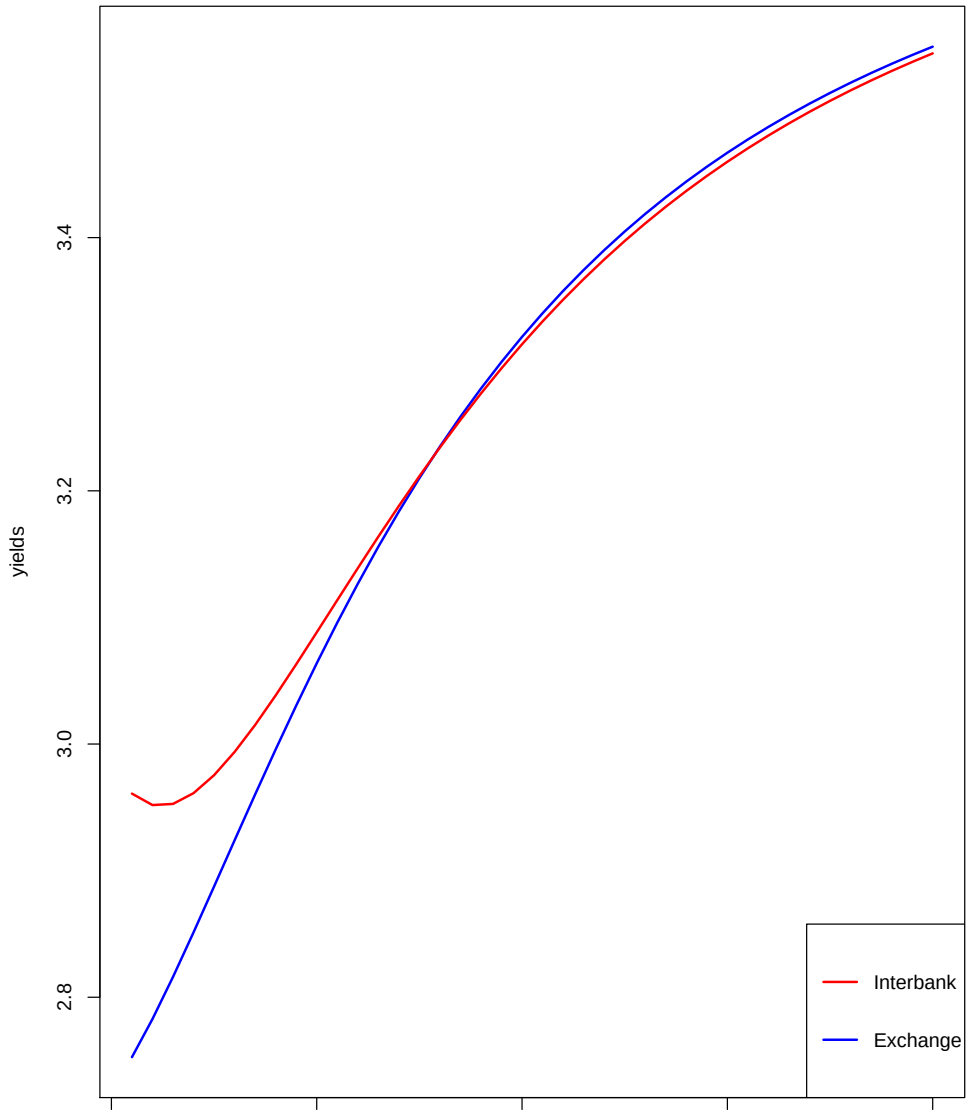
Step 1: Estimating the yield curve - Data

Data:

- The daily treasury bond yields series ranges from Jan 2008 to Dec 2016 in WIND database
- two kinds of weekly alignment, weekly average and Wednesday observation
- discretize the maturity from 0 to 10 year with a step 0.25, that is 3-month, and interpolate the observed yields
- Unfortunately there are still missing observation given the fixed maturity grids especially in the earlier part of period of interest (we have to handle missing variables), because the central government does not issue bonds frequently enough

Method

Step 1: Estimating the yield curve - Equilibrium results



Method

Step 2: The structural VAR

- Recuced form estimated as LASSO VAR (similar to Bayesian VAR with slab and spike priors)
- Structural identification with blockwise recurse identification in the spirit of Christiano/Eichenbaum/Evans (1999)

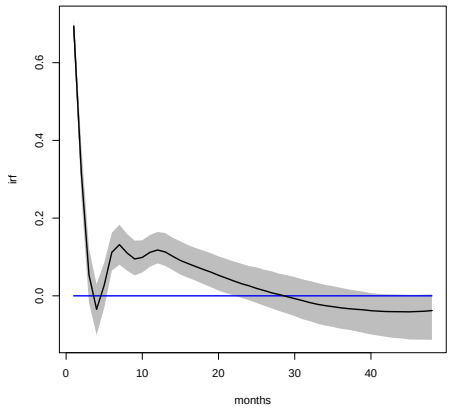
$$\begin{bmatrix} \textbf{macro} \\ brate \\ repo \\ \textbf{liquidity} \\ f_{ib,t} \\ f_{ex,t} \end{bmatrix}_t = \sum_{l=1}^{p} B_l \begin{bmatrix} \textbf{macro} \\ brate \\ repo \\ \textbf{liquidity} \\ f_{ib,t} \\ f_{ex,t} \end{bmatrix}_{t-p} + C\varepsilon_t, \tag{9}$$

- $\textbf{macro} = [ip\ cpi\ hsales]^T$
- $\textbf{liquidity} = [loans\ m2]^T$

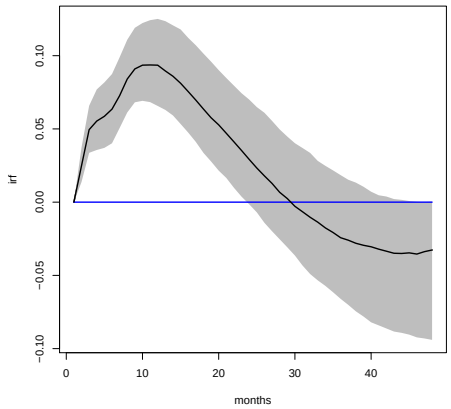
Outline

Results

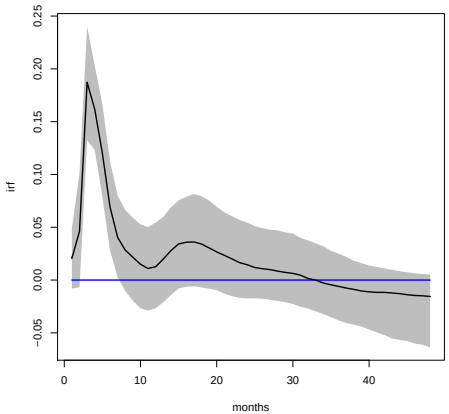
The policy rates



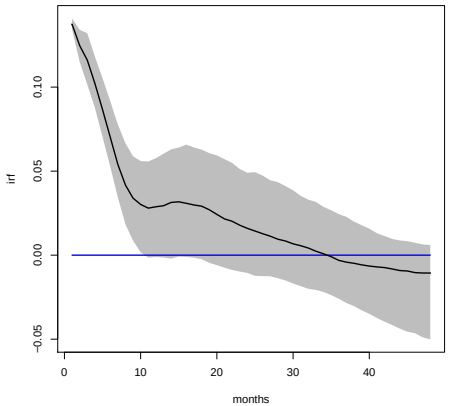
Repo shock on repo



Repo shock on loan rate



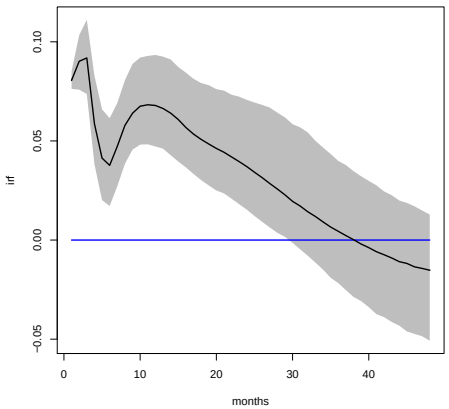
Loan rate shock on repo



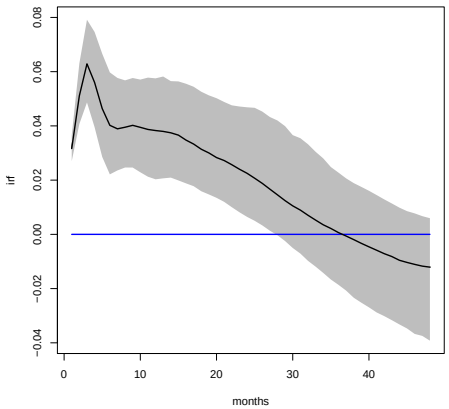
Loan rate shock on loan rate

Results

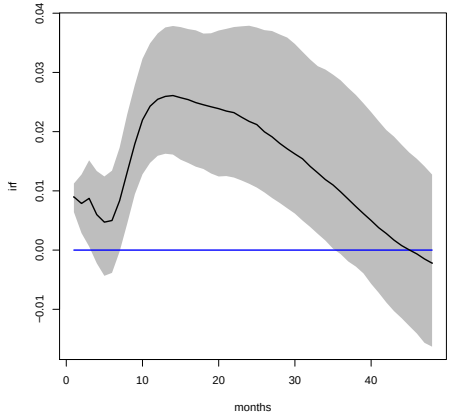
Bond market



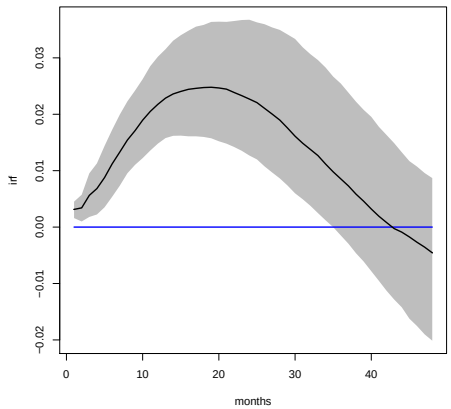
Repo on 1yr IB



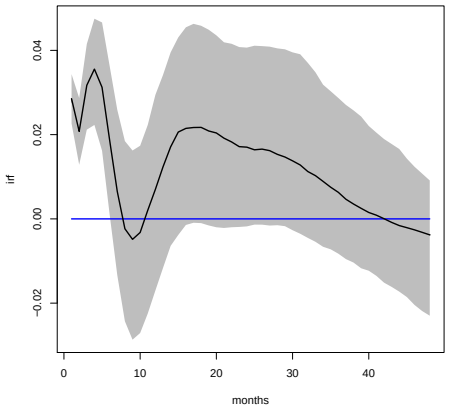
Repo on 10yr IB



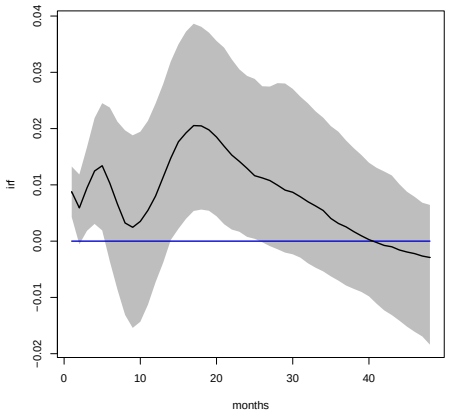
Repo on 1yr EX



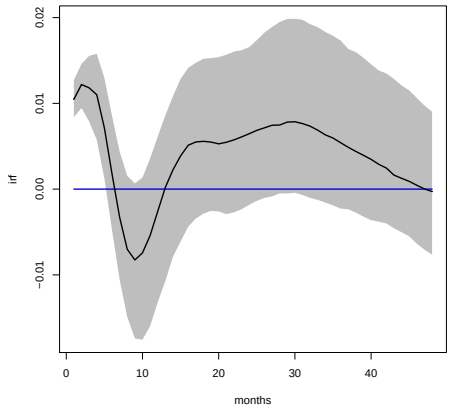
Repo on 10yr EX



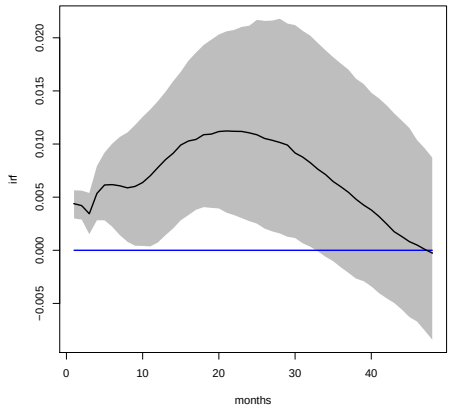
Lrate on 1yr IB



Lrate on 10yr IB



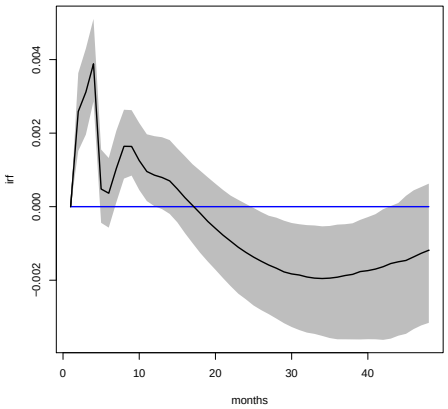
Lrate on 1yr EX



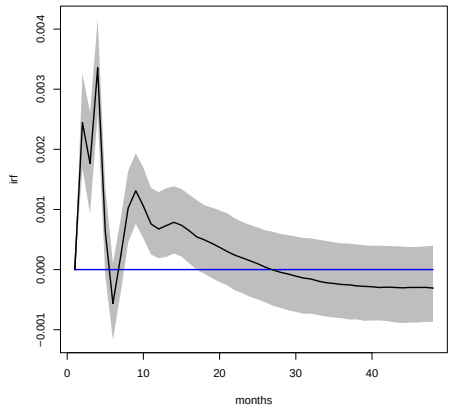
Lrate on 10yr EX

Results

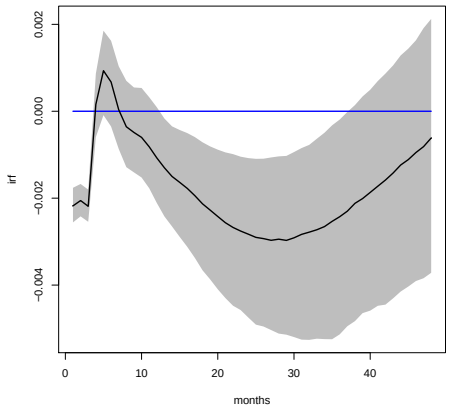
Macro economy



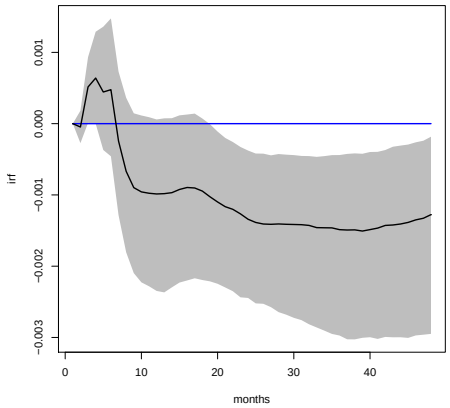
Repo on GDP



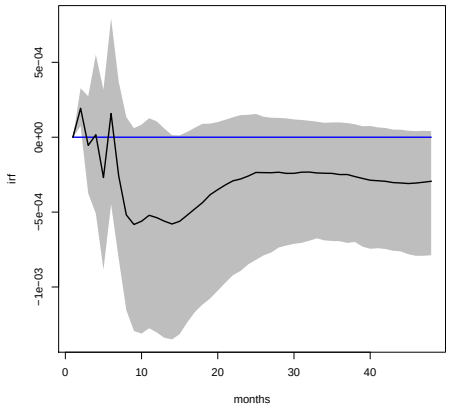
Repo on CPI



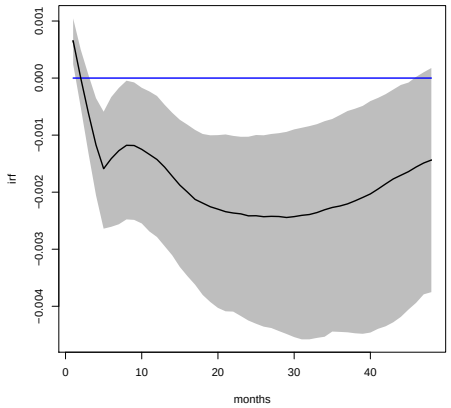
Repo on M2



Lrate on GDP



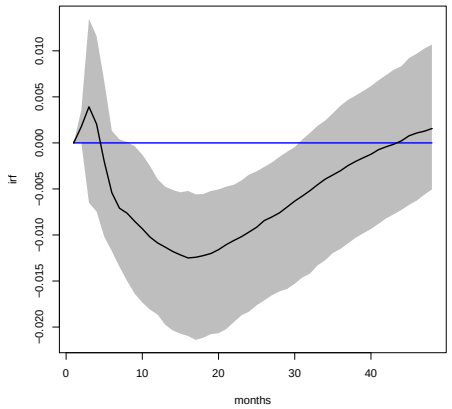
Lrate on CPI



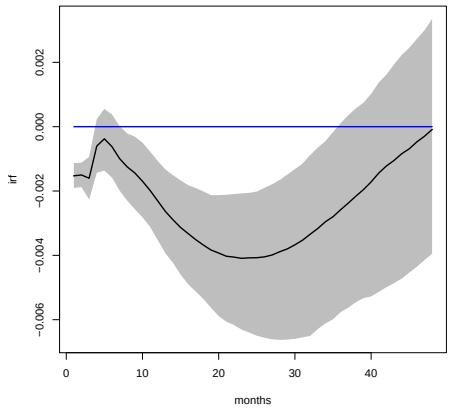
Lrate on M2

Results

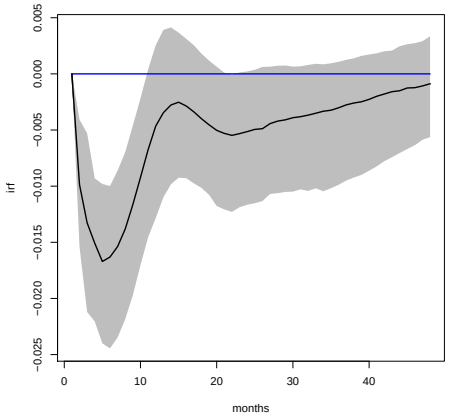
Housing and loans



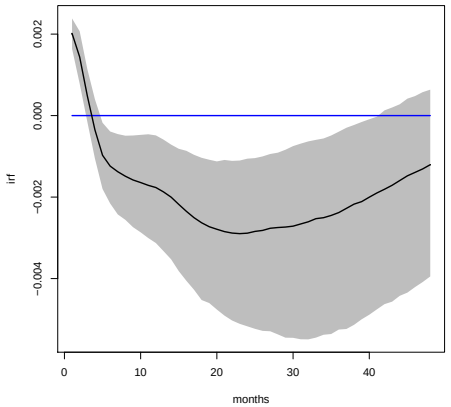
Repo on Loans



Repo on Real estate



Lrate on Loans



Lrate on Real estate

THANK YOU!