Taylor Rule in Turkey (2002-2020)

Lutfi Sun

ECO 395M: Time Series Econometrics

Advisor: Dr. Anastasia Zervou
Monday, April 26, 2021

THE UNIVERSITY OF TEXAS AT AUSTIN

Motivation

- Changes in CPI has been above ten percent in Turkey since early 2017.
- How did the Central Bank respond to the rising inflation rates ?
- What policies helped curbing it and what contributed to its rise ?

Market Background

Central Bank of Republic of Turkey

- *Structural Changes after 2001 Crisis*
  - *Floating Exchange Rate*
  - *Amendment to the Central Bank Law*
- *Implicit Targeting after 2002*
  - *Measures to increase monetary policy effectiveness*
- *Inflation Targeting after 2006*
- *Wide Interest Rate Corridor after 2010*
  - *more than one interest rate is used as an instrument*
  - *new policy instruments : Reserve options mechanism and required reserve coefficient*
- *Not Wide Interest Rate Corridor after 2016*
  - *"makes it difficult to understand the monetary policy stance"*

Taylor Rule

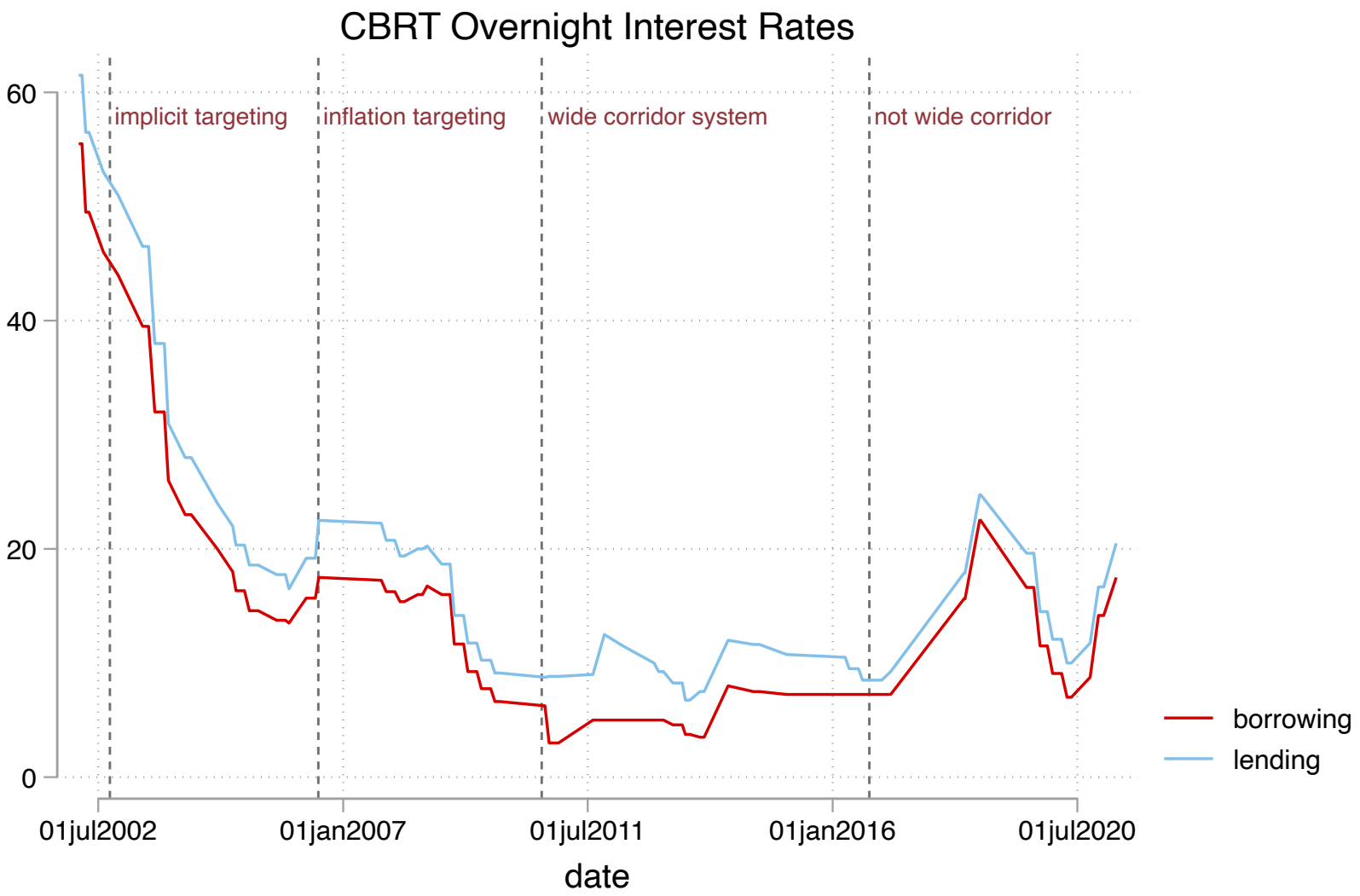
$$i_t = \pi_t + r_t^* + a_\pi (\pi_t - \pi_t^*) + a_y (y_t - \bar{y}_t)$$

Variables

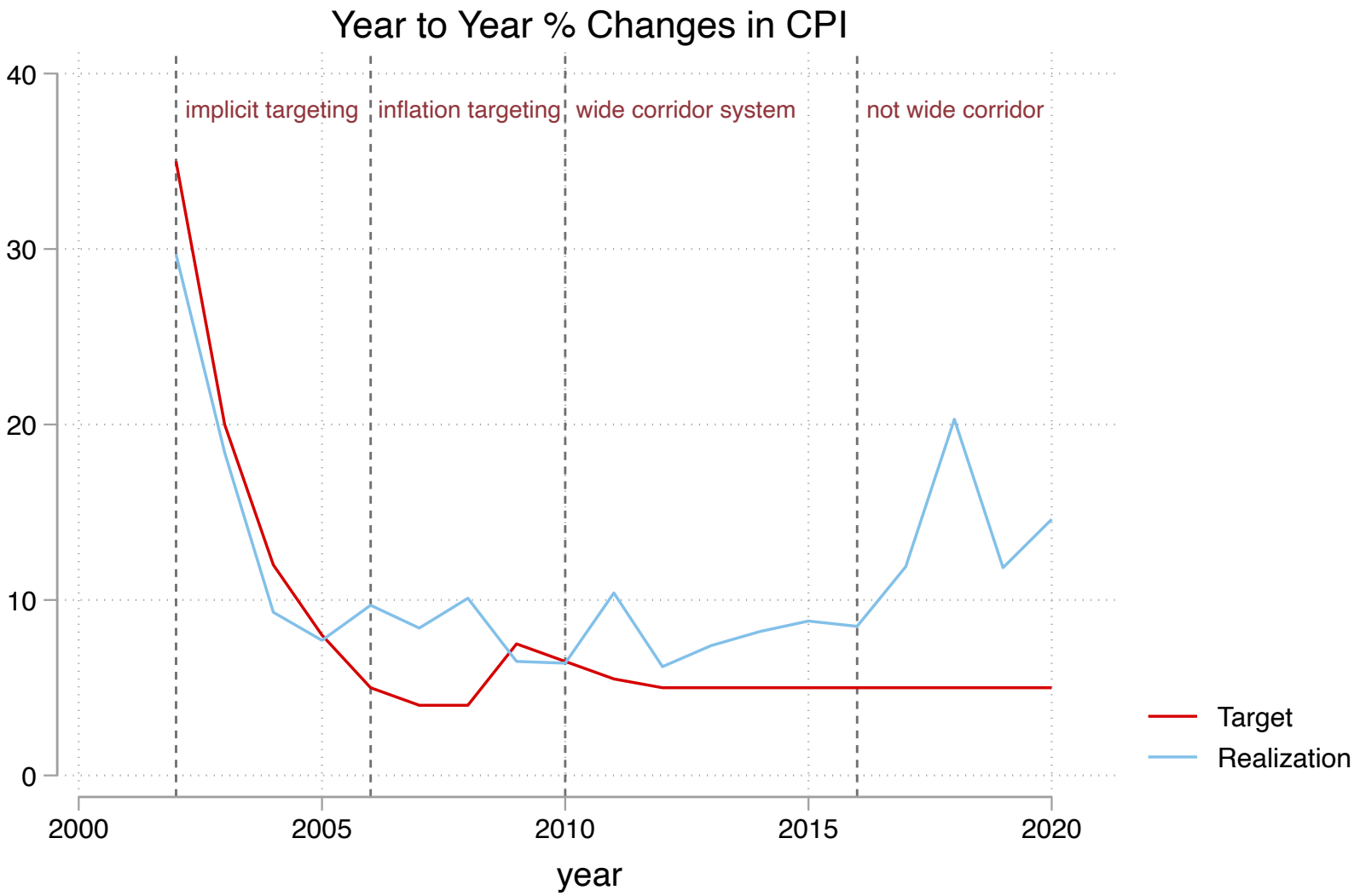
- *Policy Variable*
  - *CBRT's tools have changed over time.*
  - *I take Overnight Interest Rates to be the policy variable.*
- *Output Gap*
  - *detrended and deseasonalized log GDP*
  - *detrended composite leading indicator*
- *Inflation*
  - *Year to year percent change in CPI (2003=100)*
  - *Year to year change in Cost of Living for Wage Earners (1995=100)*

- Data Sources
  - https ://www.hmb.gov.tr/hmb-veri-dagitim-sistemi
  - https ://www.tuik.gov.tr/Kurumsal/
  - https ://www.tcmb.gov.tr/

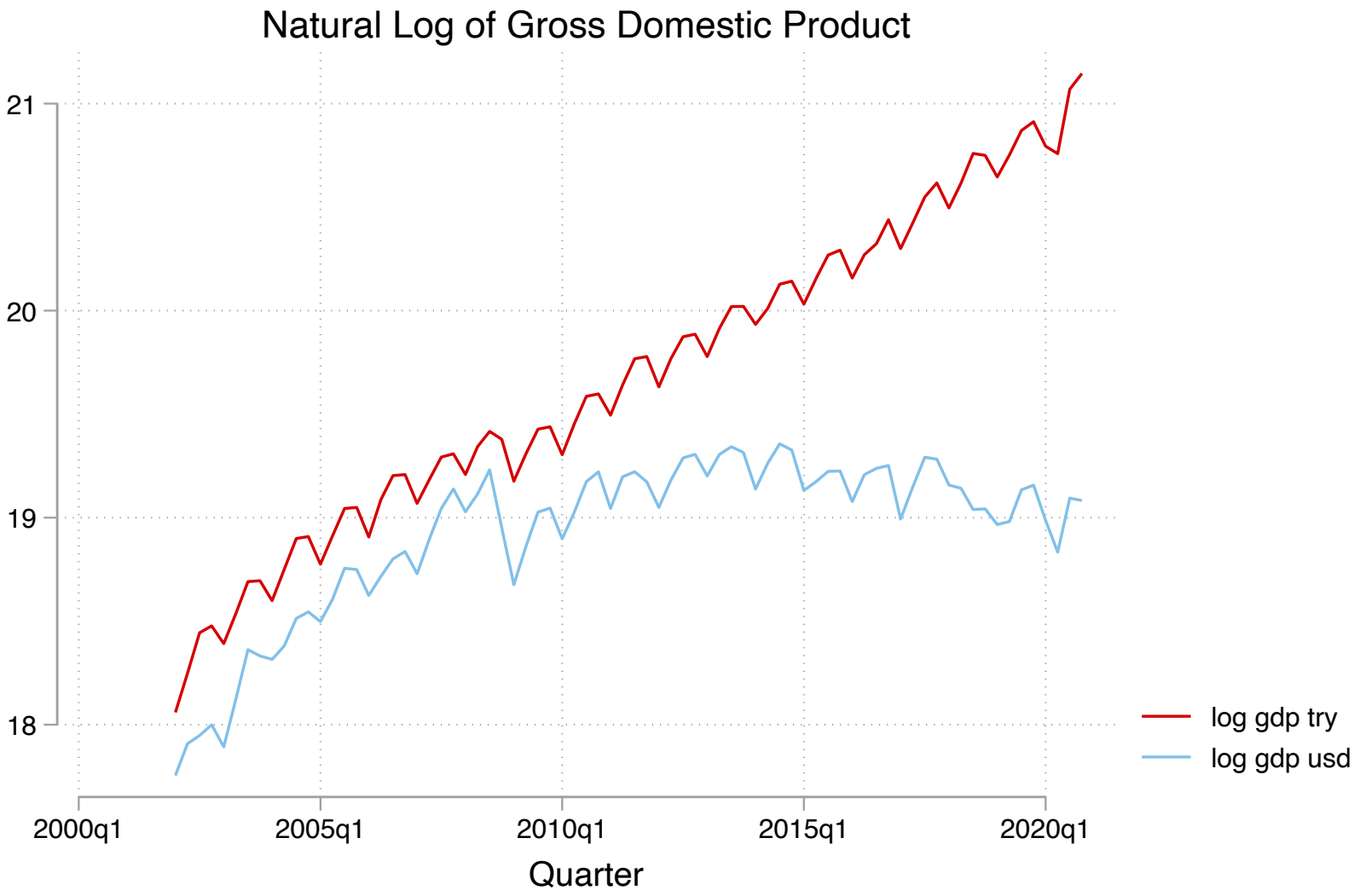
Policy


CBRT Overnight Interest Rates
60
40
20
0
implicit targeting
inflation targeting
wide corridor system
not wide corridor
01jul2002
01jan2007
01jul2011
01jan2016
01jul2020
date
borrowing
lending

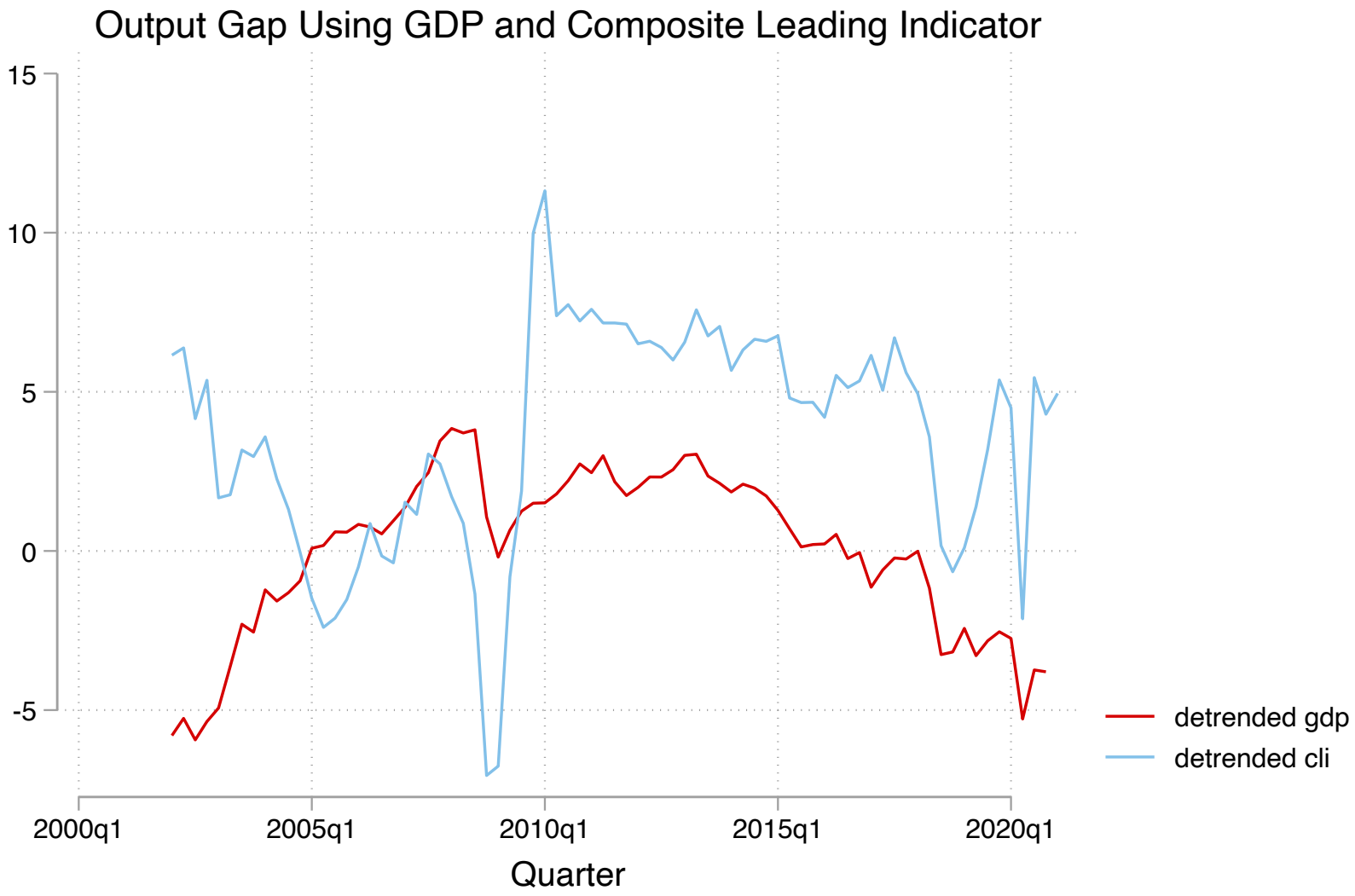
Inflation


Year to Year % Changes in CPI
implicit targeting
inflation targeting
wide corridor system
not wide corridor
40
30
20
10
0
2000
2005
2010
2015
2020
year
Target
Realization

Output Gap


Natural Log of Gross Domestic Product
21
20
19
18
2000q1
2005q1
2010q1
2015q1
2020q1
Quarter
log gdp try
log gdp usd

Output Gap


Output Gap Using GDP and Composite Leading Indicator
15
10
5
0
-5
2000q1
2005q1
2010q1
2015q1
2020q1
Quarter
detrended gdp
detrended cli

Short-Run SVAR

- I take Overnight Interest Rates to be the policy variable in this case.

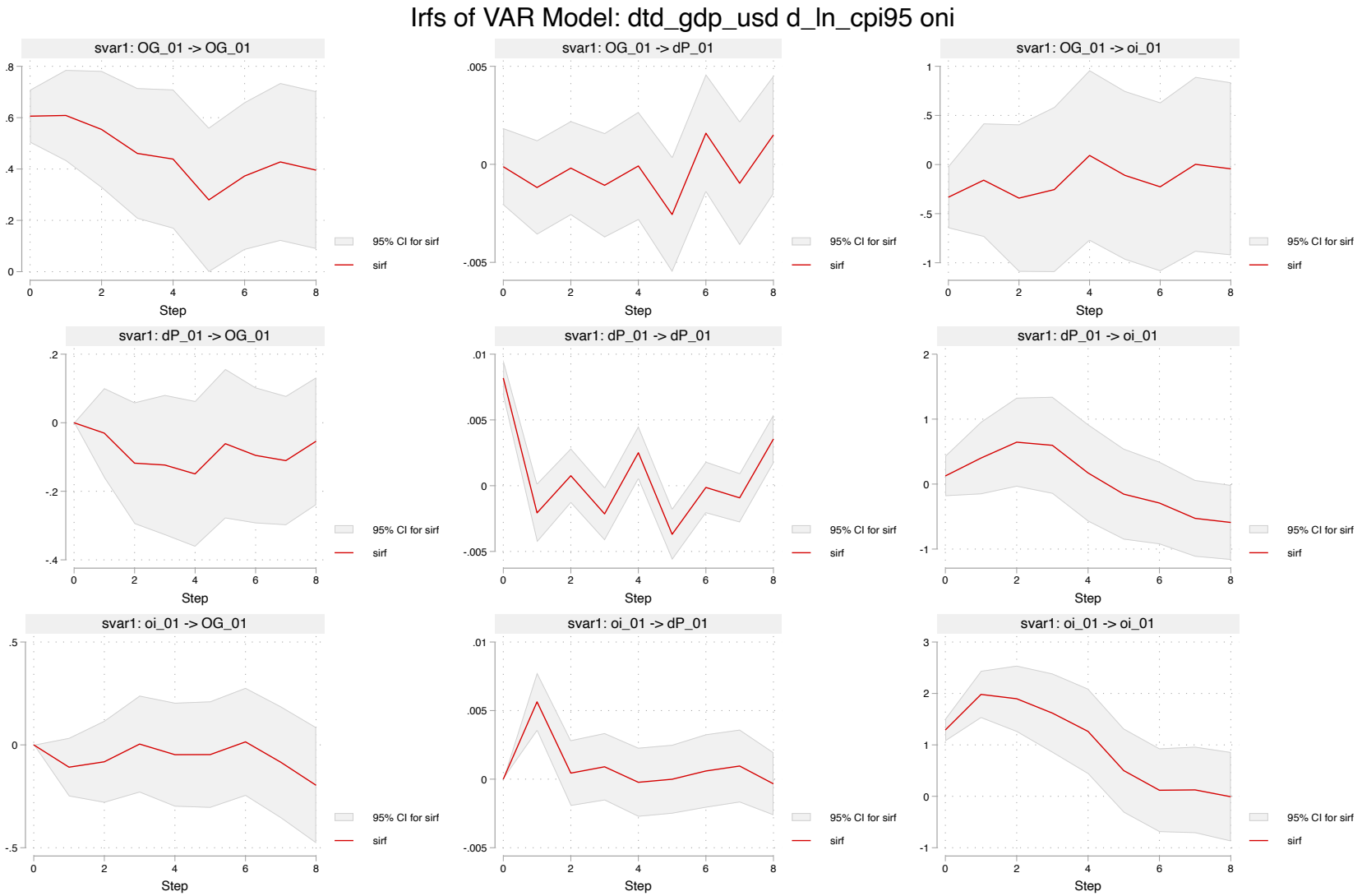
$$
\begin{aligned}
\Delta lny_t &= \alpha_1 + \beta_{12}\pi_t + \beta_{13} i_t + \gamma_{11}\Delta lny_{t-1} + \gamma_{12}\pi_{t-1} + \gamma_{13} i_{t-1} + \cdots + \varepsilon_{1t} \\
&= \alpha_1 + \gamma_{11}\Delta lny_{t-1} + \gamma_{12}\pi_{t-1} + \gamma_{13} i_{t-1} + \cdots + \varepsilon_{1t} \\
\pi_t &= \alpha_2 + \beta_{21}\Delta lny_t + \beta_{23} i_t + \gamma_{21}\Delta lny_{t-1} + \gamma_{22}\pi_{t-1} + \gamma_{23} i_{t-1} + \cdots + \varepsilon_{2t} \\
&= \alpha_2 + \beta_{21}\Delta lny_t + \gamma_{21}\Delta lny_{t-1} + \gamma_{22}\pi_{t-1} + \gamma_{23} i_{t-1} + \cdots + \varepsilon_{2t} \\
i_t &= \alpha_3 + \beta_{31}\Delta lny_t + \beta_{32}\pi_t + \gamma_{31}\Delta lny_{t-1} + \gamma_{32}\pi_{t-1} + \gamma_{33} i_{t-1} + \cdots + \varepsilon_{2t}
\end{aligned}
$$

- In matrix notation,

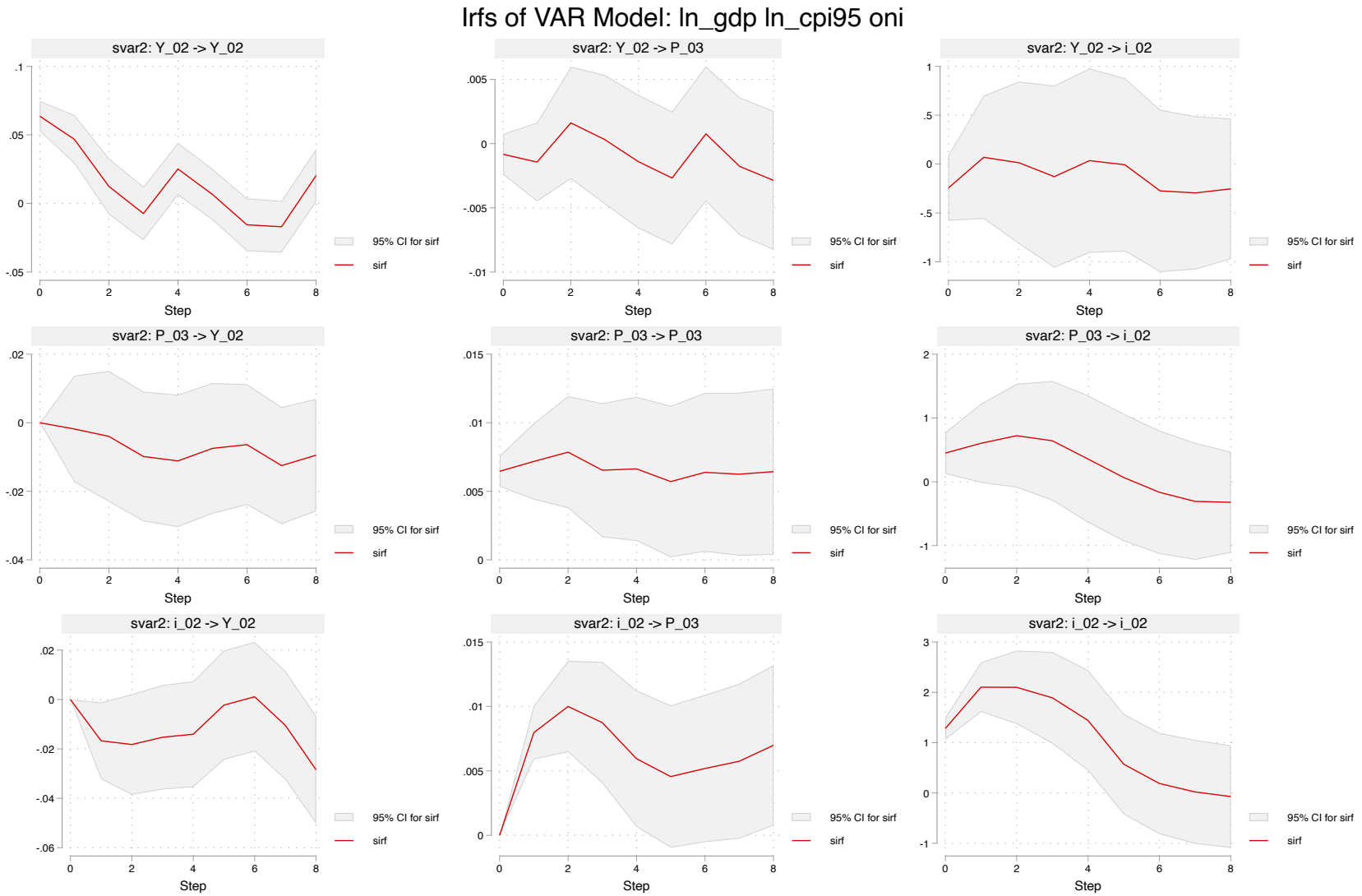
$$
\begin{bmatrix} 1 & 0 & 0 \\ -\beta_{21} & 1 & 0 \\ -\beta_{31} & -\beta_{32} & 1 \end{bmatrix}
\begin{pmatrix} \Delta lny_t \\ \pi_t \\ i_t \end{pmatrix}
=
\begin{pmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{pmatrix}
+ \sum_{i=1}^{8} A_i z_{t-i} + \varepsilon_t
$$

$$
Bz_t = \alpha + \sum_{i=1}^{8} A_i z_{t-i} + \varepsilon_t
$$

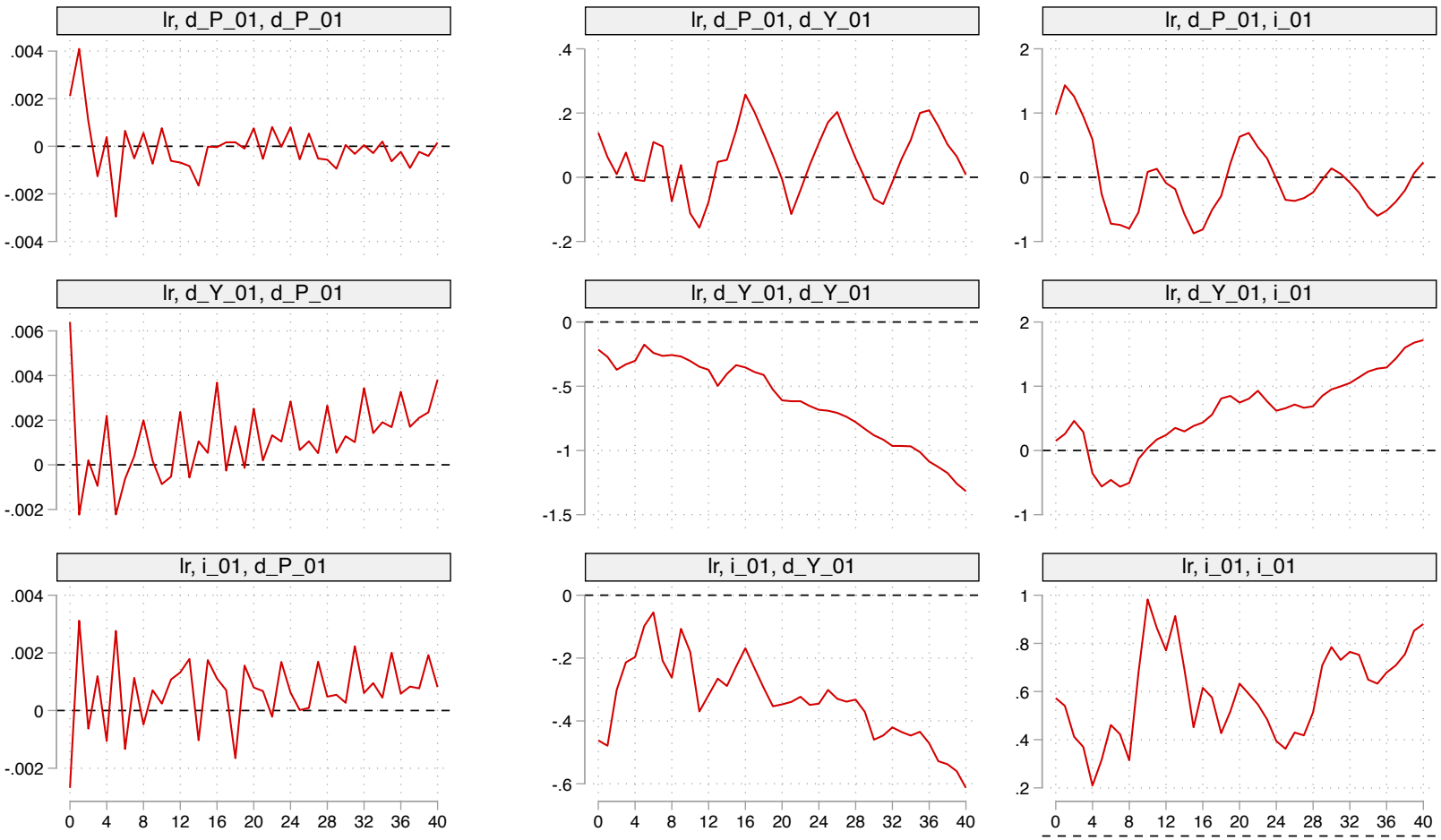
Short-Run SVAR Model 1 (First Difference)



Short-Run SVAR Model 2 (Log)

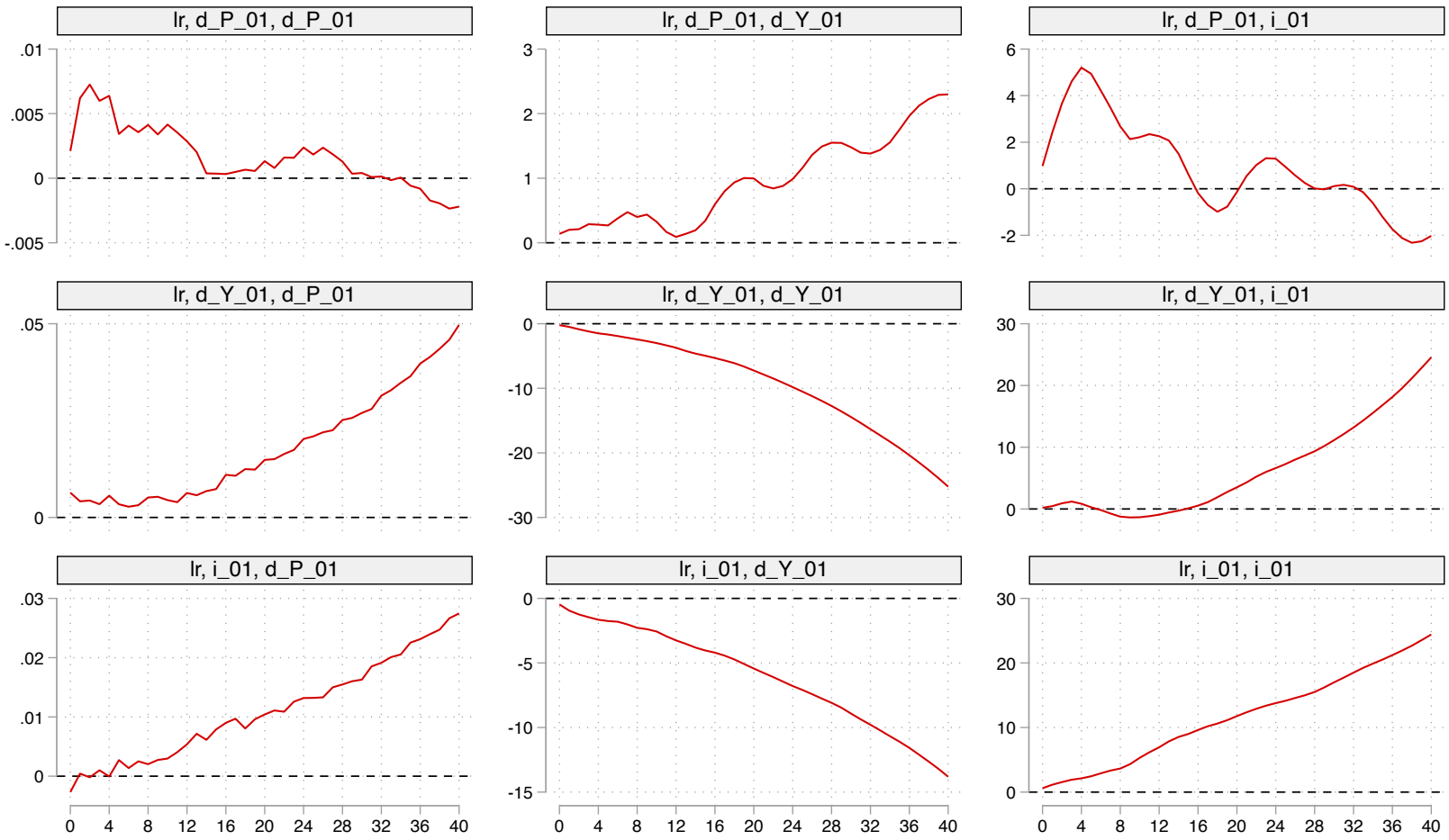


Long-Run SVAR



Graphs by irfname, impulse variable, and response variable

Long-Run SVAR



Graphs by irfname, impulse variable, and response variable

Conclusions

- Shocks to Overnight Borrowing Rates lead to higher and persistent rises in inflation => hot political debate
- Shocks to output leads to higher prices and the effect is persistent => demand driven growth ?
- CBRT responds to growing economy by reducing rates ! (at least in the first few quarters) => what about contractionary policy during booms ?

Thank Y'all ! !

- Dr. Zervou and Zhenghao
- All our friends and colleagues here

References

- https ://www.tcmb.gov.tr/
- Alkan, Buket. Journal of Economics and Political Economy ; Istanbul Vol. 6, Iss. 1, (Mar 2019) : 78-93. DOI :10.1453/jepe.v6i1.1851
- Kara, Hakan, Ogunc, Fethi and Sarikaya, Cagri, (2017), Inflation Dynamics in Turkey : A Historical Accounting, CBT Research Notes in Economics, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.
- Khakimov, O.A. Erdogan, Levent Cağlarirmak, Necla. (2010). Assessing monetary policy rule in Turkey. International Journal of Economic Perspectives. 4. 319-330.
- More Literature Review is on the way