# The role of "extraordinary" monetary policy shocks

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## Motivation

1. Assessing the effectiveness of monetary policy is essential
2. How do research help policymakers estimate the transmission?
3. Large heterogeneity of the transmission estimates:
4. (Semi-)Structural models (QPM and DSGE) correspond to the theory
5. VAR models lead to a price puzzle
6. Recent papers use high-frequency data to identify monetary policy surprises (Gertler & Karadi, 2015; Jarociński & Karadi, 2020)
   - Successful for Advanced Economies and resolve a price puzzle emerged in the previous papers
7. Still observe a price puzzle in Russian data (Bannikova & Pestova, 2021; Tishin, 2019)
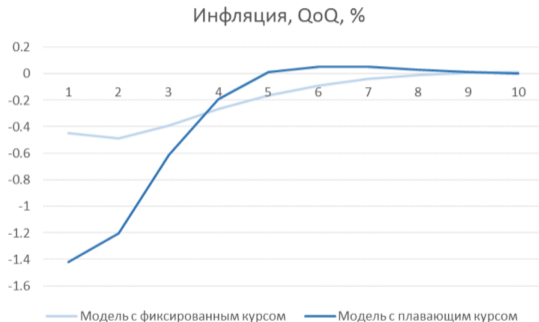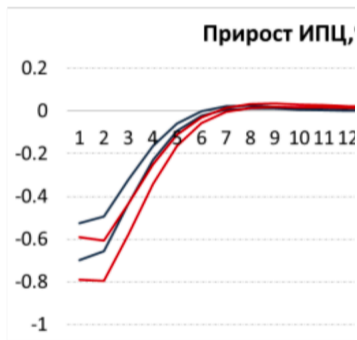
# Stylized facts

- Monetary policy transmission from the policymaker's perspective:
- *По оценкам Банка России, в целом для того, чтобы импульс от изменения ключевой ставки в полной мере транслировался в динамику инфляции, требуется до 3–6 кварталов.*
- Quarterly Projection Model (in levels):
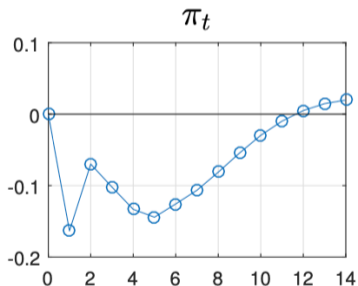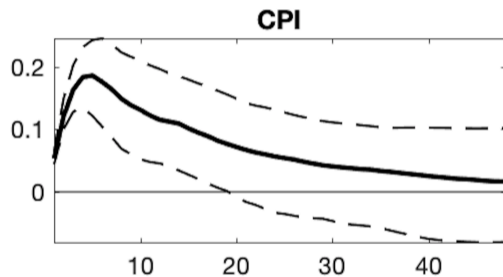


(a) Orlov, 2021

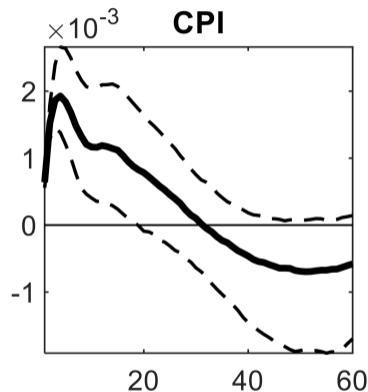# DSGE models

- In growth rates



(a) Kreptsev and Seleznev, 2017 (b) Kreptsev and Seleznev, 2016

# Empirical estimates (high-frequency identification)

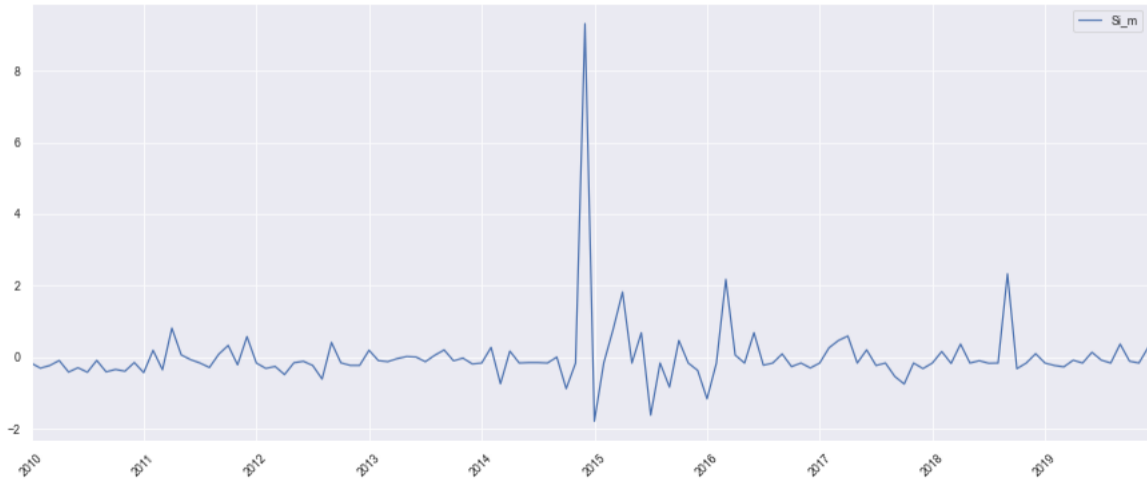Both papers use models similar to Gertler and Karadi, 2015



(a) Tishin, 2019



(b) Bannikova and Pestova, 2021

# Monetary policy surprises (HFI - USD/RUB futures)

# This paper

**What is the role of "extreme" shocks in data?**

- Shows that "extreme" *monetary policy* shocks may shape the form of CPI responses
- Other "extreme" shocks (i.e. oil prices) are less likely to significantly influence responses

- Uses monthly DSGE model of Russian economy (extended Kreptsev and Seleznev, 2017)
  - Monthly dynamics
  - Correlation between shocks
  - Simulate the economy and add "extreme" shocks in simulation

- Evaluate the distribution of high-frequency monetary policy shocks
  - Heavy distribution tails
  - Probably problems with LLN
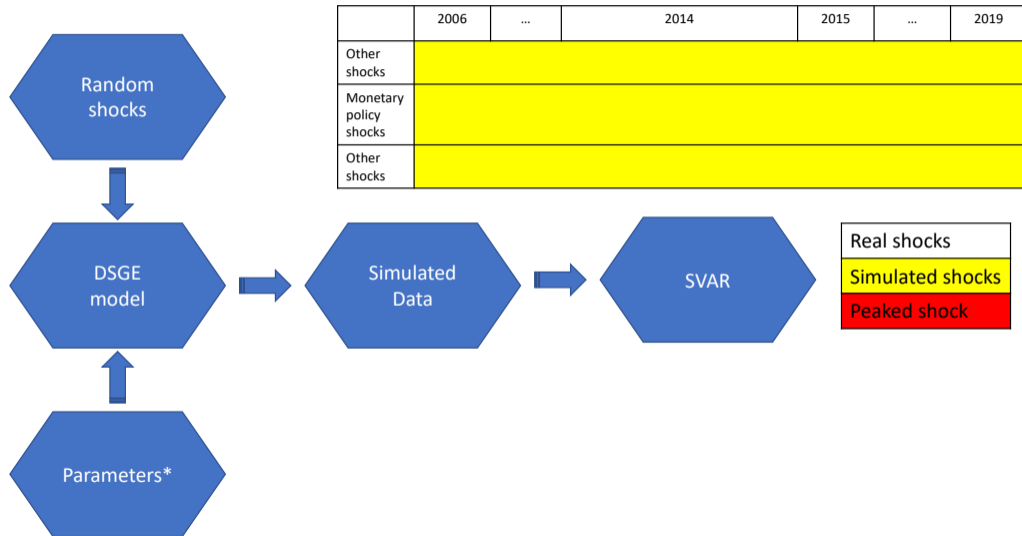  - → Asymptotic does not work?
  - → Inference?

# How model works
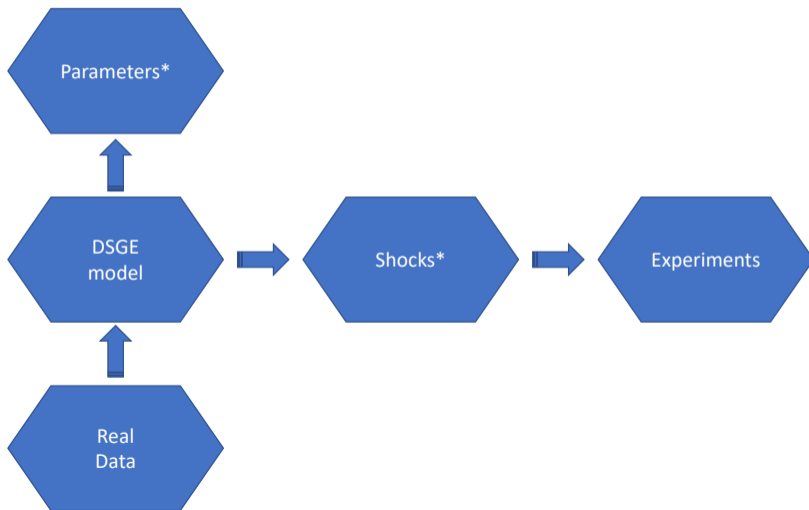
# Experiments

- We use a DSGE model as a workhorse in our simulations
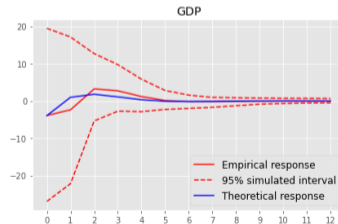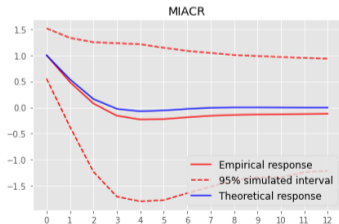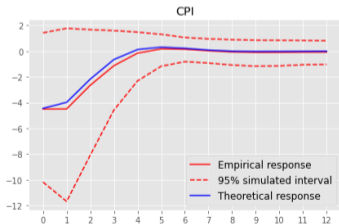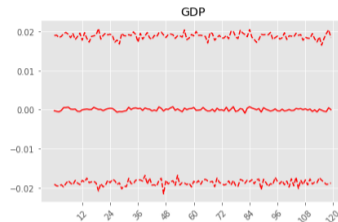- We do not pretend that it best describes the Russian economy
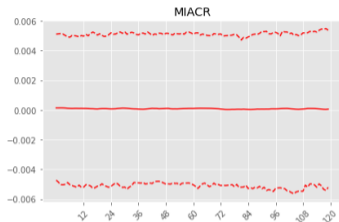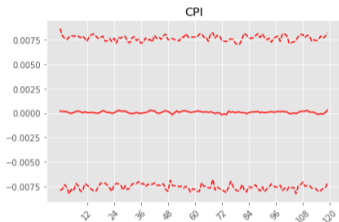
We compare

1. Theoretical responses: according DSGE model

2. Empirical responses: according SVAR model

# Experiment: Artificial simulation



| | 2006 | ... | 2014 | 2015 | ... | 2019 |
|---|---|---|---|---|---|---|
| Other shocks | | | | | | |
| Monetary policy shocks | | | | | | |
| Other shocks | | | | | | |

Random shocks

DSGE model → Simulated Data → SVAR

Parameters*

| Real shocks |
| Simulated shocks |
| Peaked shock |

# "Artificial" simulation

# Experiment: Simulate only monetary policy shock



|  | 2006 | ... | 2014 | 2015 | ... | 2019 |
|---|---|---|---|---|---|---|
| Other shocks |  |  |  |  |  |  |
| Monetary policy shocks |  |  |  |  |  |  |
| Other shocks |  |  |  |  |  |  |

Random shocks → DSGE model → Simulated Data → SVAR

Parameters* → DSGE model

| Real shocks |
| Simulated shocks |
| Peaked shock |

# Real shocks with replaced simulated monetary policy shock
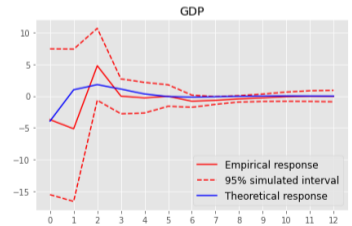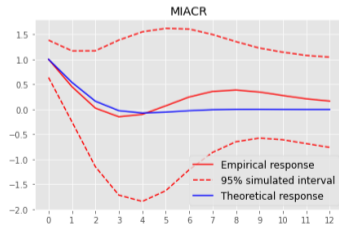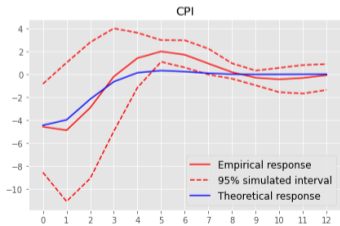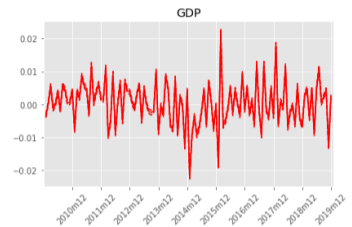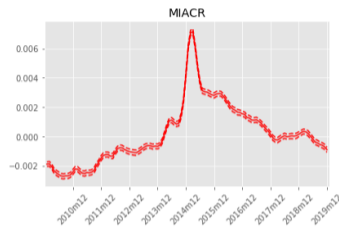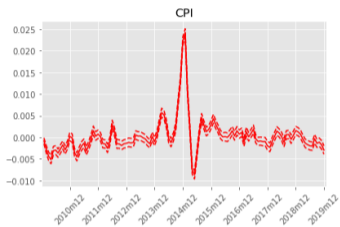
# Experiment: Add peaked monetary policy shock in December, 2014



|  | 2006 | ... | 2014 | 2015 | ... | 2019 |
|---|---|---|---|---|---|---|
| Other shocks |  |  |  |  |  |  |
| Monetary policy shocks |  |  |  |  |  |  |
| Other shocks |  |  |  |  |  |  |

Random shocks → DSGE model → Simulated Data → SVAR

Parameters*
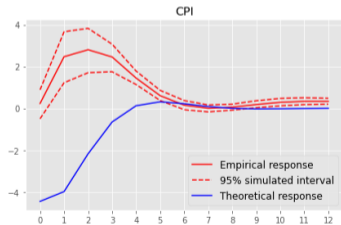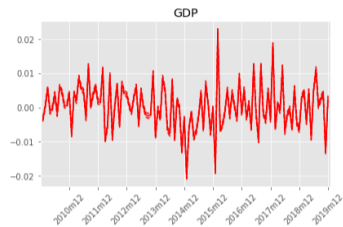
Real shocks
Simulated shocks
Peaked shock
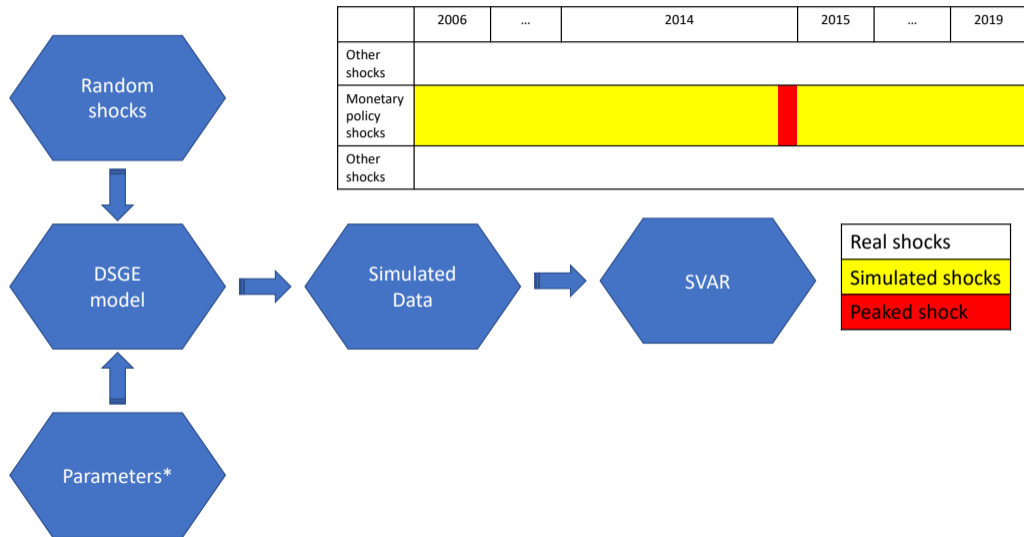
# Real shocks with replaced simulated peaked monetary policy shock
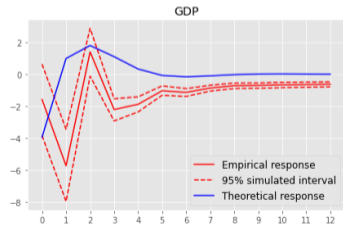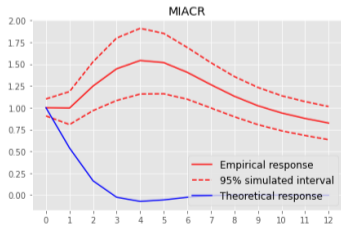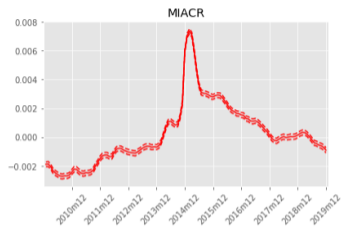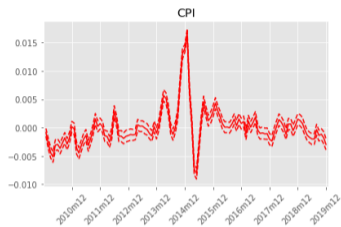
# Experiment: Limit real shocks to 2014m12-2015m12



|  | 2006 | ... | 2014 | 2015 | ... | 2019 |
|---|---|---|---|---|---|---|
| Other shocks | | | | | | |
| Monetary policy shocks | | | | | | |
| Other shocks | | | | | | |

Random shocks → DSGE model → Simulated Data → SVAR

Parameters*
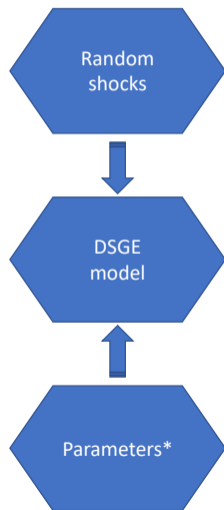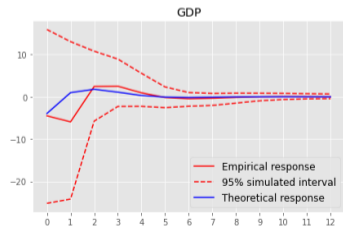
Real shocks
Simulated shocks
Peaked shock

# Real shocks for 2014m12-2015m12 with replaced simulated peaked monetary policy shock

# Experiment: Add peaked monetary policy shock in December, 2014

|  | 2006 | ... | 2014 | 2015 | ... | 2019 |
|---|---|---|---|---|---|---|
| Other shocks | | | | | | |
| Monetary policy shocks | | | | | | |
| Other shocks | | | | | | |

**Random shocks** → **DSGE model** → **Simulated Data** → **SVAR**

**Parameters\***

| Real shocks |
| Simulated shocks |
| Peaked shock |

# Real shocks for 2014m12-2015m12 with replaced simulated peaked monetary policy shock

# How well do we simulate the shocks?
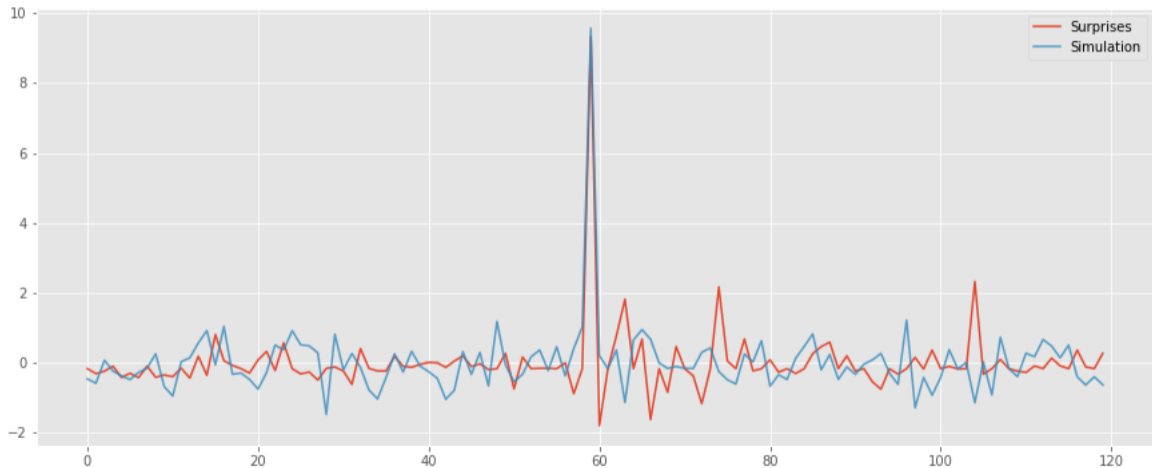
# Shocks and distributions

- Does the distribution of shocks matter?
- Any inference problems?

- Let's look how monetary policy shock behaves in our simulation exercise

- Let's check using high-frequency data:
- Monetary policy surprises in 30-minutes window around policy announcement

# Mean simulated monetary policy shock



Monetary policy shock
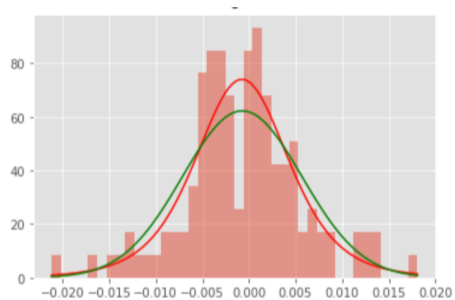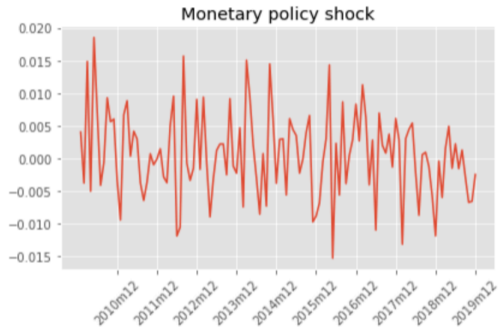
$df \approx 5$

# Mean peaked monetary policy shock



Monetary policy shock
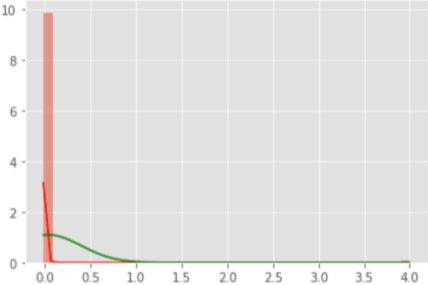
df ≈ 2

# High-frequency identification - 1
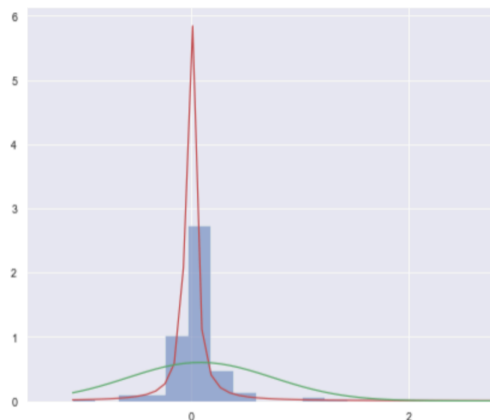


df $\approx 0.84$

# Results

- Indeed, a price puzzle may be caused by peaked monetary policy surprises

- Other shocks, even "extreme" (e.g. oil prices), have less impact on the transmission of monetary policy

- Policy recommendation: pay attention to unusual shocks which may bias the results

- Need to assess the distribution of monetary policy surprises

- Different ways how to attribute surprises to months should be examined

# Thank you for your attention!

## The role of "extraordinary" monetary policy shocks

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