Verifying HANK

Evidence from size-persistence tradeoff.

Alexander Vlasov

NES

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Contents

What is HANK?

$$\text{NK} = \text{New Keynesian} = \text{Monetary Policy is not Neutral}$$

$$\text{RANK} = \text{Representative Agent} + \text{NK}$$

$$\text{TANK} = \text{Two-Agent}^{1} + \text{NK} = \text{One agent is Spender, one is Saver} + \text{NK}$$

$$\text{HANK}^{2} = \text{Heterogeneous Agent+NK} = \text{Heterogenity in saving portfolio+NK}$$

[1] Sometimes referred as Spender-Saver Model

[2] The version by **?**

[2] See **?** for review.

Outcomes of ? model

? HANK model outcomes:

1. **Size-Persistence trade-off:** Cumulative elasticity of aggregate consumption declines with the increase in autocorrelation of monetary shock in a nonlinear manner.
2. **Inflation-Output Tradeoff:** the same Taylor rule shocks lead to the increased effects in Inflation-Output tradeoff.

Contents

Systematic Monetary Policy Identification

Monetary Policy Rule Counterfactuals

- **??** use the identified shocks and impulse responses to them to minimize a loss function.

FOMC Preferences

- **?** use **?** data on preferences of FOMC members and using the FOMC rotation mechanism they are able to construct an IV.

Empirical approach

Systematic Monetary Policy Identification

Based on method of **?**.

I assume that the monetary policy rule is

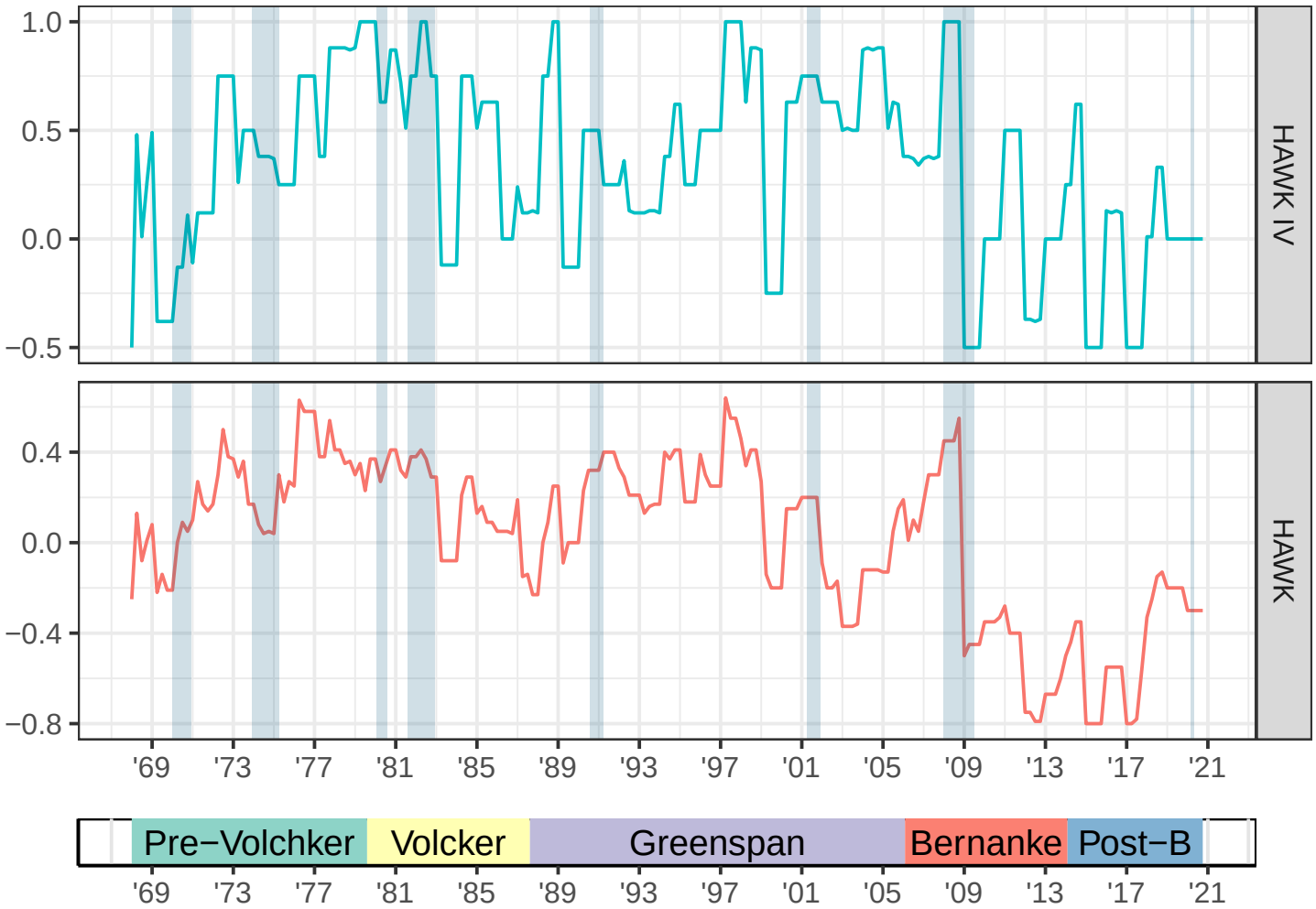
$$(r - r^*)_{t+h} = \phi_t^h \mathbb{E}\left[\pi_{t+1} \mid \mathcal{I}_t\right] + \psi_t^h \mathbb{E}\left[x_{t+1} \mid \mathcal{I}_t\right] + \varepsilon_t.$$

$\mathbb{E}_t \pi_{t+1}$ and $\mathbb{E}_t x_{t+1}$ are the expectations of monetary authority about the inflation and output gap (or unemployment) at quarter $t+1$.

I estimate the following State-Dependent LP-IV.

$$\begin{aligned}(r - r^*)_{t+h} = \alpha^h + \beta_\pi^h \hat{\pi}_t + \gamma_\pi^h \hat{\pi}_t \left(Hawk_t - \overline{Hawk}\right) \\ \beta_u^h \hat{x}_t + \gamma_u^h \hat{u}_t \left(Hawk_t - \overline{Hawk}\right) \\ + \delta^h \left(Hawk_t - \overline{Hawk}\right) + \zeta^h Z + e_{t+h}^h,\end{aligned}$$

Figure: HAWK and HAWK IV indexes from **?**



Contents

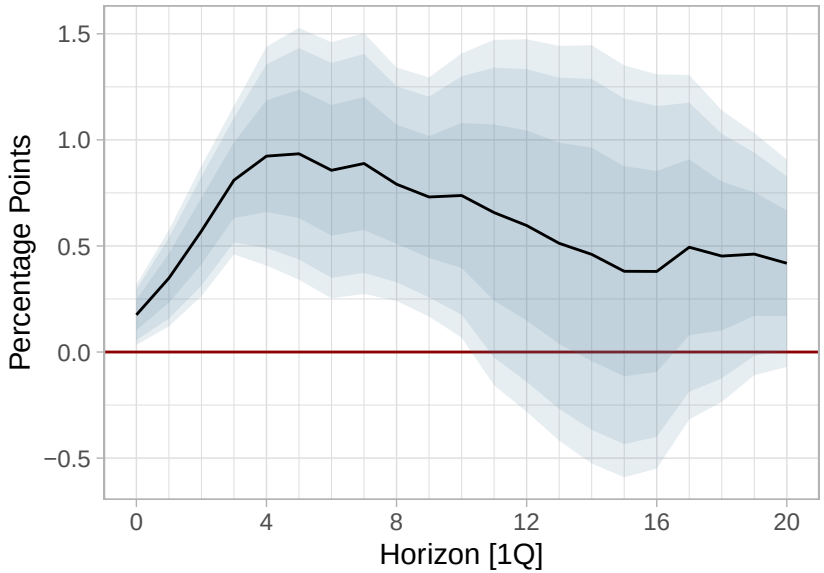
Contents

Results I

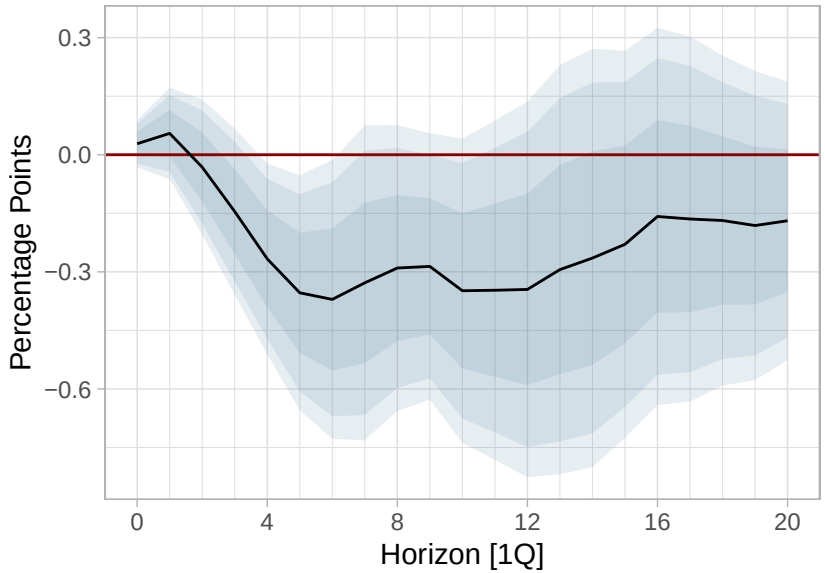
Policy Response to Tealbook GDP Deflator Inflation and FOMC Hawkishness

Figure: Policy Response to Inflation and FOMC Hawkishness. Short Specification

(a) Average Resp. to Projected CPI Inflation



(b) Differential Resp. to Projected CPI Inflation



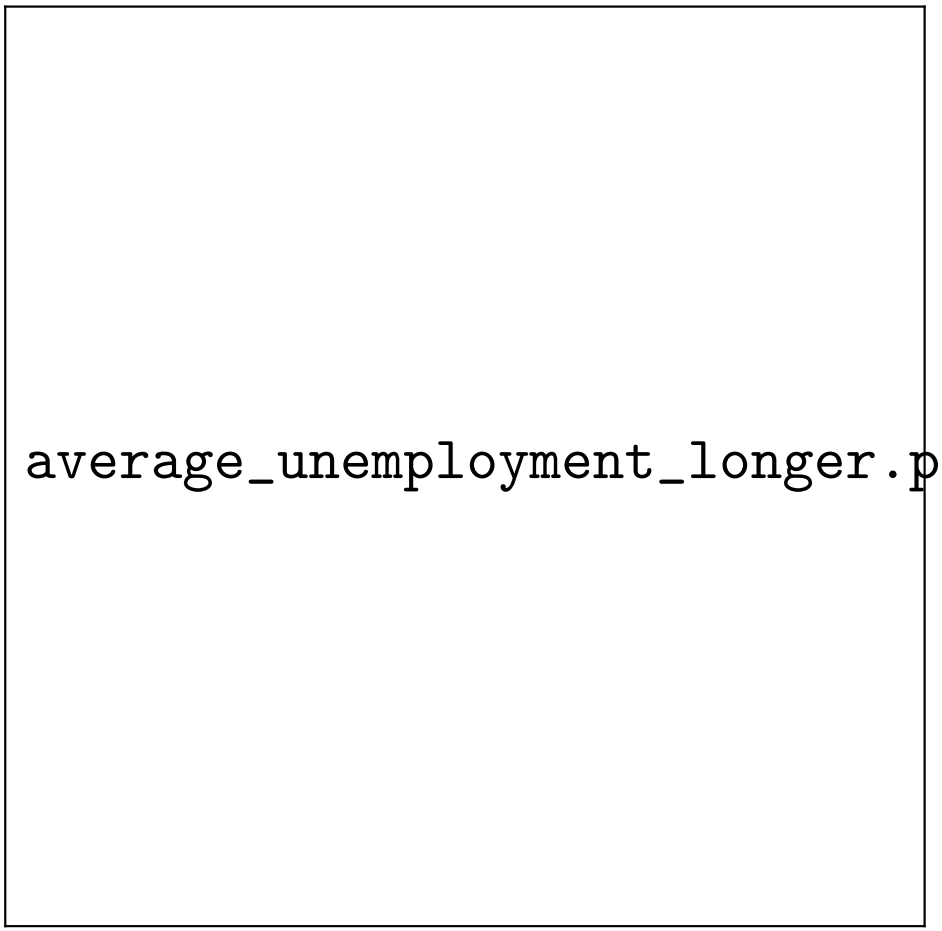
(c) Average Resp. to Projected GDP

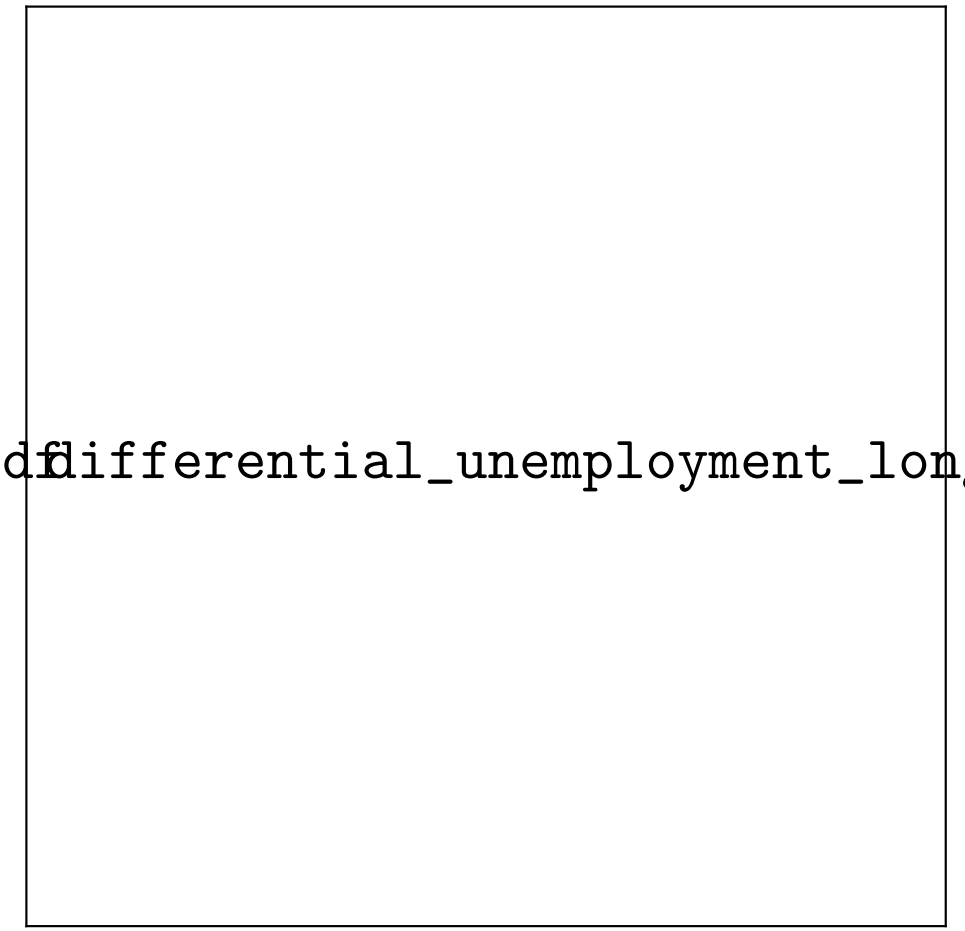
(d) Differential Resp. to Projected

Results I

Policy Response to Tealbook Unemployment and FOMC Hawkishness

(a) Average Response to Unempl. $\left(\beta_u^h\right)$ (b) Differential Response to Unempl. $\left(\gamma_u^h\right)$





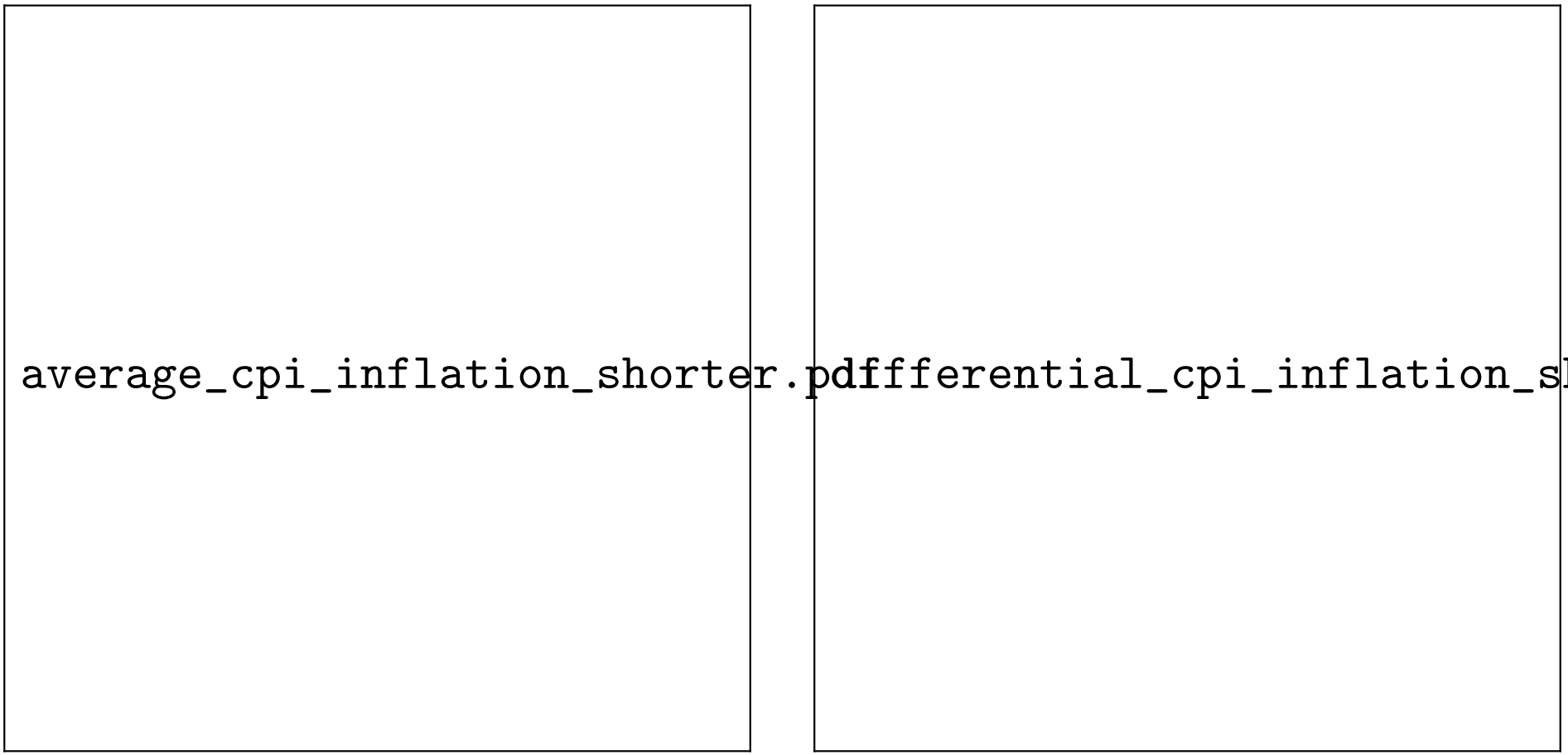
Notes: This figure reports the responses of the $r_t - \rho_t$ to an increase in the Tealbook unemployment forecast of 1 p.p. The subfigure **??** reports the response for the *HAWK* index equal to the sample average and **??** is the addition to the response in case there are 2 (out of 12 in total) additional consistent hawks in the FOMC. The shaded areas correspond to 68%, 90% and 95% confidence bands calculated with Newey-West HAC estimator with Andrews selected truncation parameter.

Results II

Policy Response to Tealbook CIP Inflation and FOMC Hawkishness

(a) Average Response to Inflation $\left(\beta_\pi^h\right)$

(b) Differential Response to Inflation $\left(\gamma_\pi^h\right)$

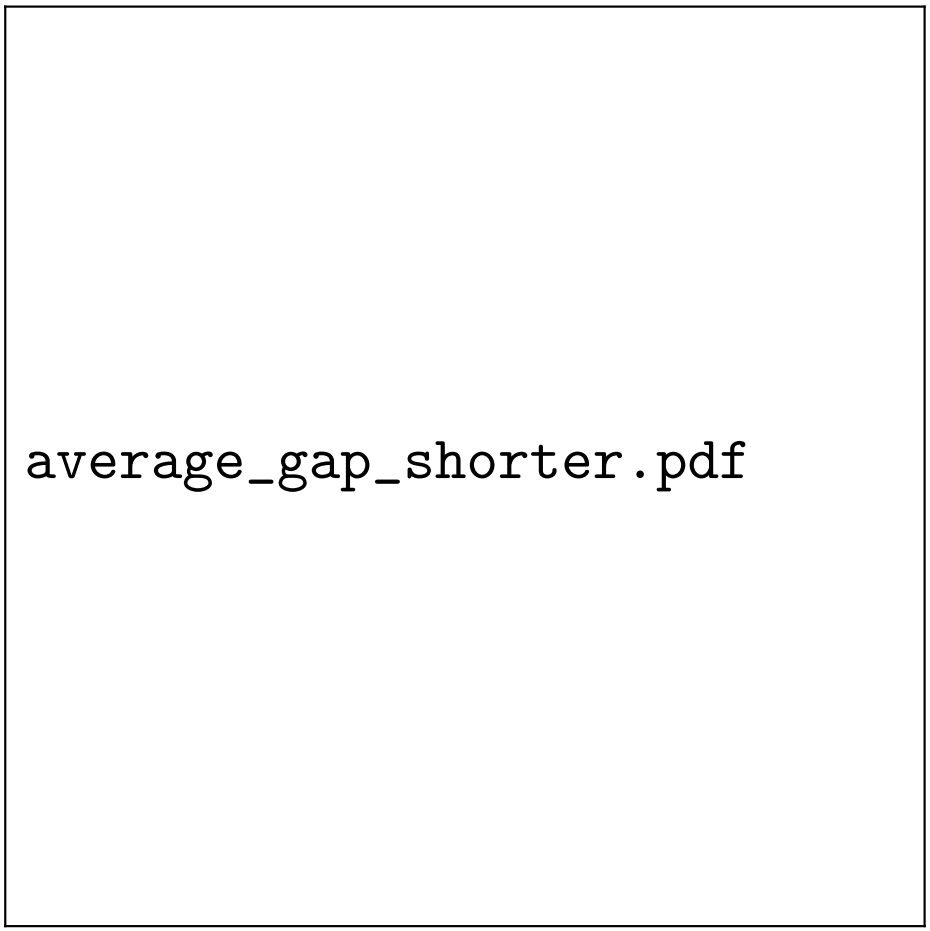


Notes: This figure reports the responses of the $r_t - \rho_t$ to an increase in the Tealbook inflation forecast of 1 p.p. (calculated as a predicted change in GDP deflator). The subfigure **??** reports the response for the *HAWK* index equal to the sample average and **??** is the addition to the response in case there are 2 (out of 12 in total) additional consistent hawks in the FOMC. The shaded areas correspond to 68%, 90% and 95% confidence bands calculated with Newey-West HAC estimator with

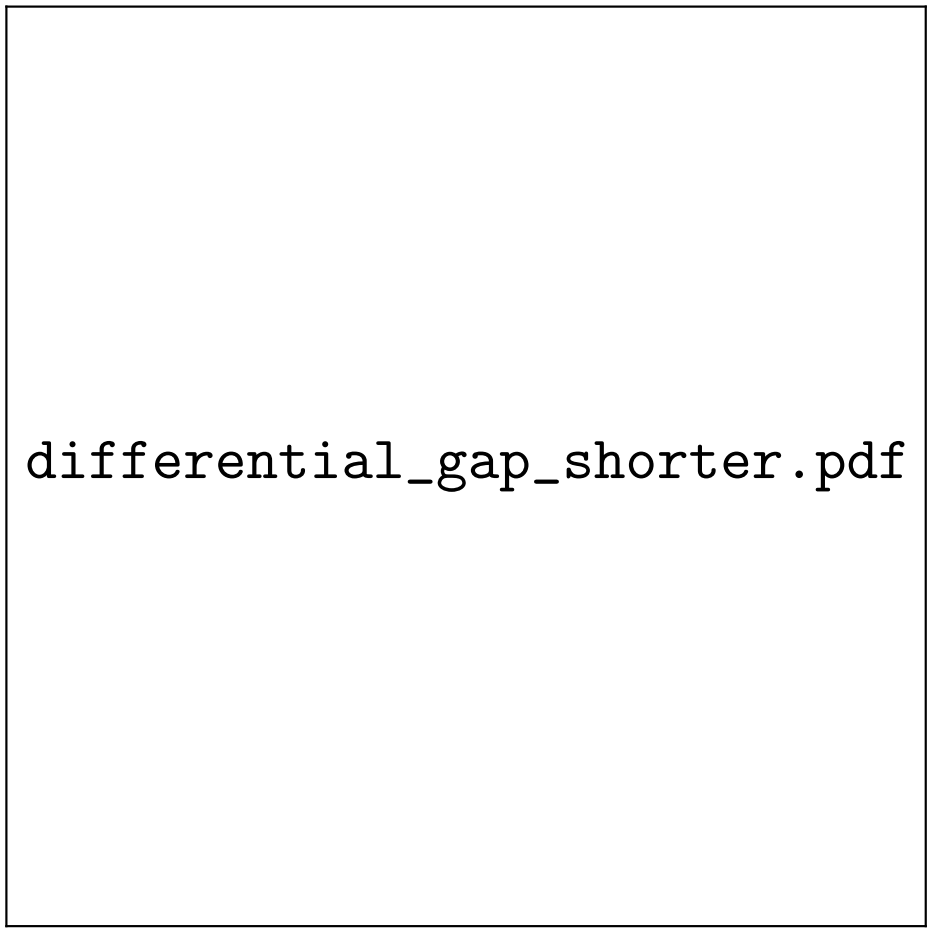
Results II

Policy Response to Tealbook Output Gap and FOMC Hawkishness

(a) Average Response to Output Gap $\left(\beta_u^h\right)$



(b) Differential Response to Gap $\left(\gamma_u^h\right)$



Notes: This figure reports the responses of the $r_t - \rho_t$ to an increase in the Tealbook unemployment forecast of 1 p.p. The subfigure **??** reports the response for the *HAWK* index equal to the sample average and **??** is the addition to the response in case there are 2 (out of 12 in total) additional consistent hawks in the FOMC. The shaded areas correspond to 68%, 90% and 95% confidence bands calculated with Newey-West HAC estimator with Andrews selected truncation parameter.

Results

Predicted IRFs

Figure: Predicted IRFs in each of the state

irfs_plot_longer.pdf	irfs_plot_shorter.pdf

Notes: This figure shows the Impulse Response functions in each state calculated as in equation (**??**).

Size-Persistence in RANK

Rate path:

$$r_t = \rho + e^{-\eta t}(r_0 - \rho).$$

NK policy

$$C_0 = \bar{C} \exp\left(-\frac{1}{\gamma}\int_0^\infty (r_s - \rho)\, ds\right).$$

Size:

$$R_0 = \int_0^\infty (r_s - \rho)\, ds,$$

$$\frac{-d \log C_0}{dR_0} = \frac{1}{\gamma},$$

Picture of Size-Persistence trade-off

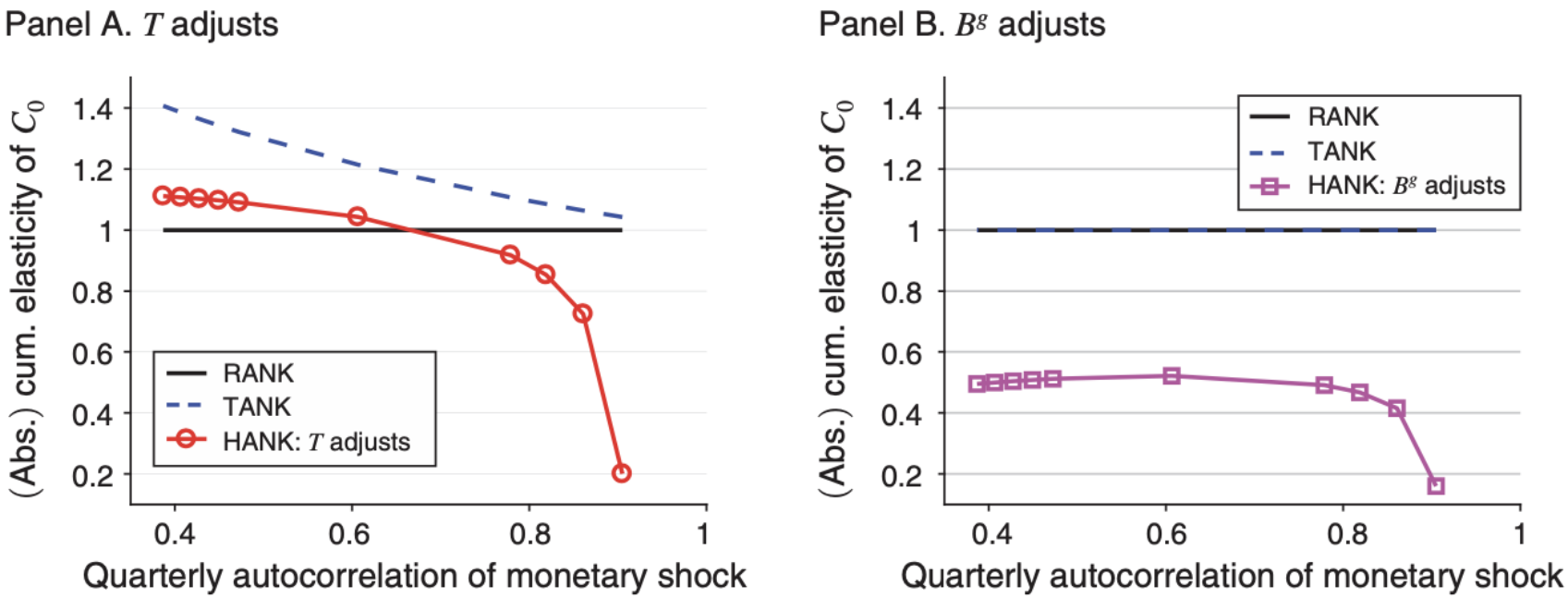


FIGURE 8. CUMULATIVE ELASTICITY OF AGGREGATE CONSUMPTION BY PERSISTENCE OF THE SHOCK

Figure: The difference between the New Keynesian models from **?**

Size-Persistent tradeoff by ?, formally

$$\textit{RANK:} \quad \frac{d}{d\nu}\frac{-d\log C_0}{dR_0} = 0 \tag{1}$$

$$\textit{TANK with } B^g \textit{ adjustment:} \quad \frac{d}{d\nu}\frac{-d\log C_0}{dR_0} = 0 \tag{2}$$

$$\textit{TANK with } T \textit{ adjustment:} \quad \frac{d}{d\nu}\frac{-d\log C_0}{dR_0} < 0 \tag{3}$$

$$\textit{HANK:} \quad \frac{d^2}{d\nu^2}\frac{-d\log C_0}{dR_0} < 0 \tag{4}$$

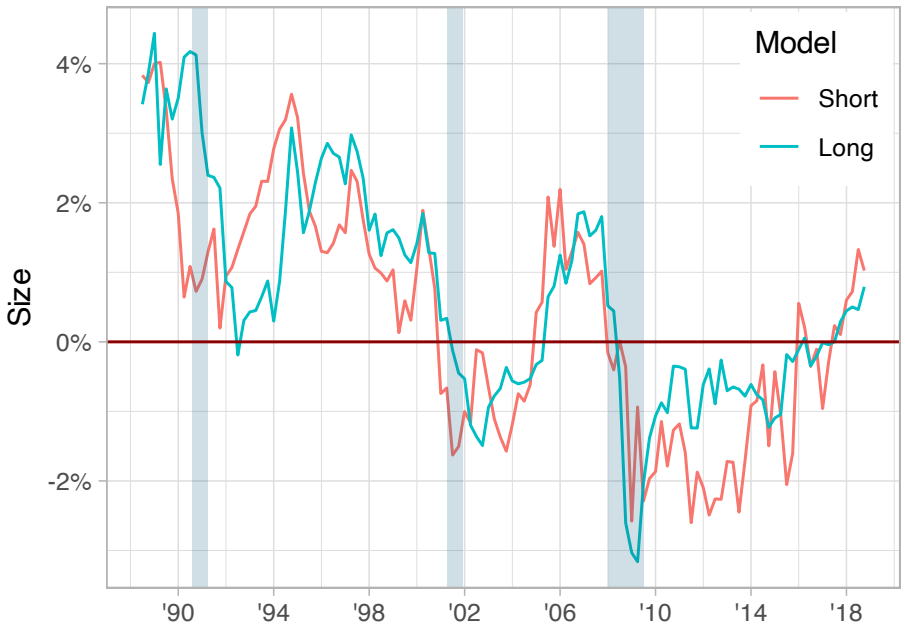
Size-Persistence

Figure: Estimates of Size and Persistence

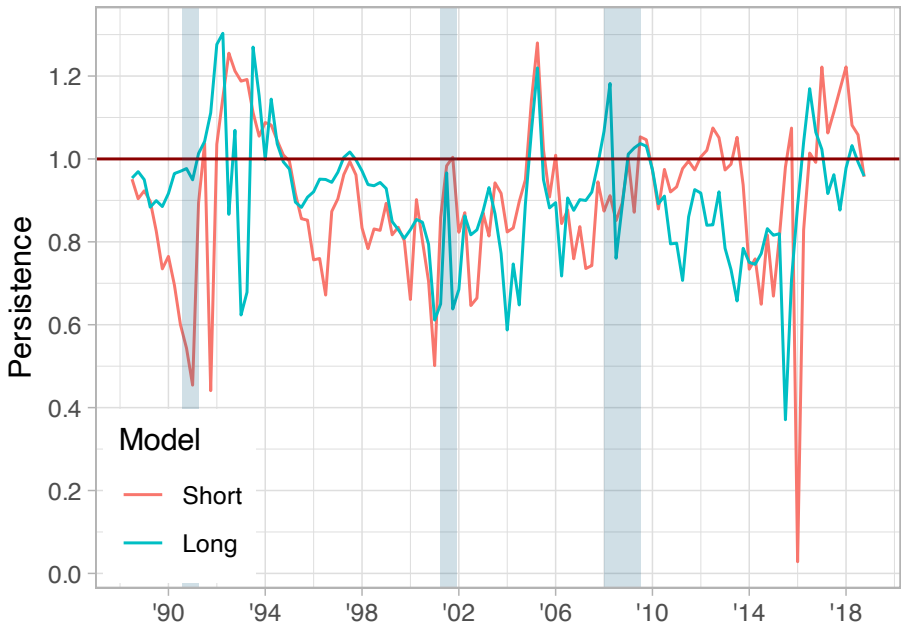
size_vs_persistence.pdf

Size and Persistence Over Time

(a) Size Dynamics



(b) Persistence Dynamics



Notes: This figure presents the size and persistence, calculated as mean and the first autocorrelation of impulse-response function in each state, constructed as described in **??**, over time.

Conclusions

So, should we believe in HANK?

The evidence above suggests that, we should. At least we have found that consumption behaviour in size-persistent tradeoff corresponds to the TANK model.

Place for your suggestions and comments!

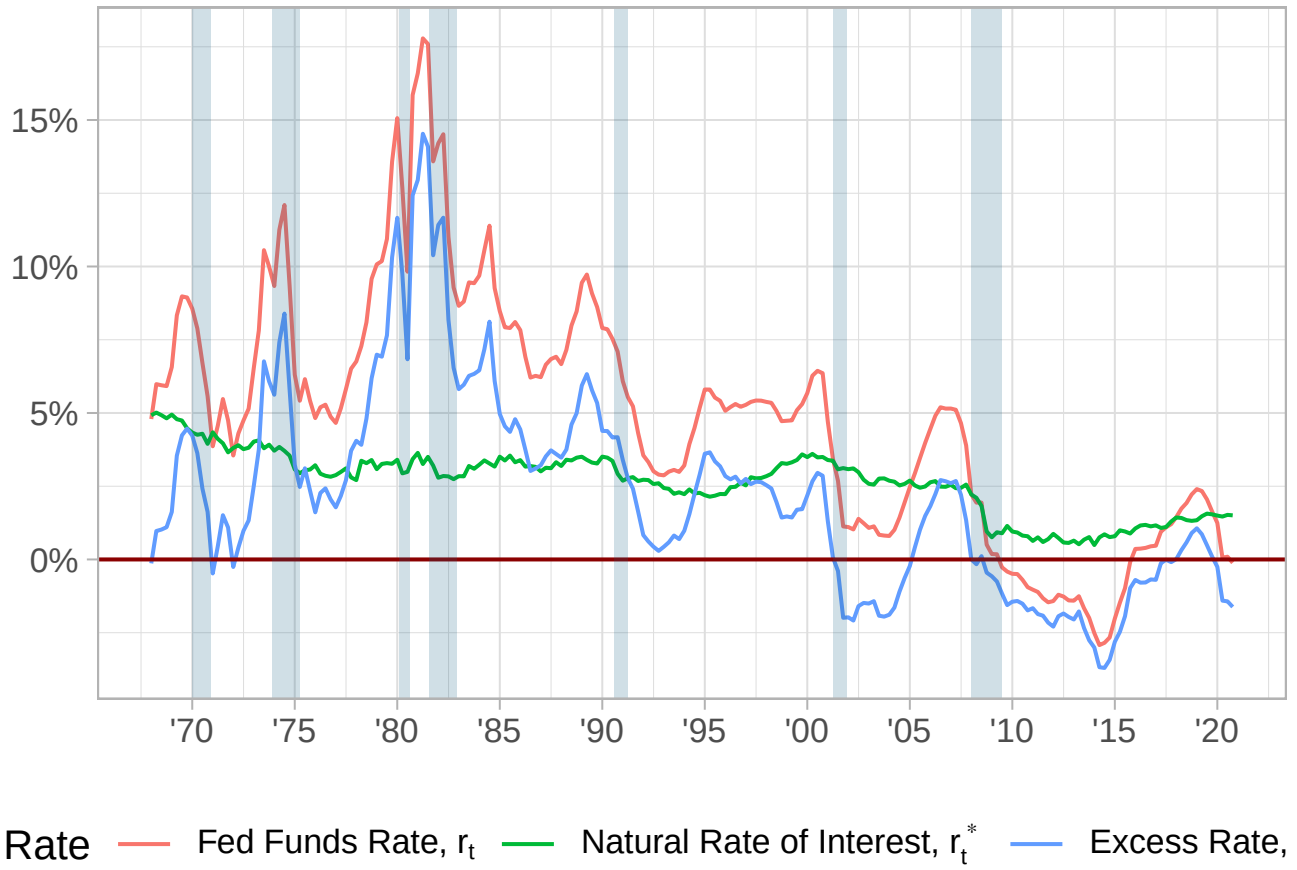
If you have any other suggestions/comments please write avlasov@nes.ru

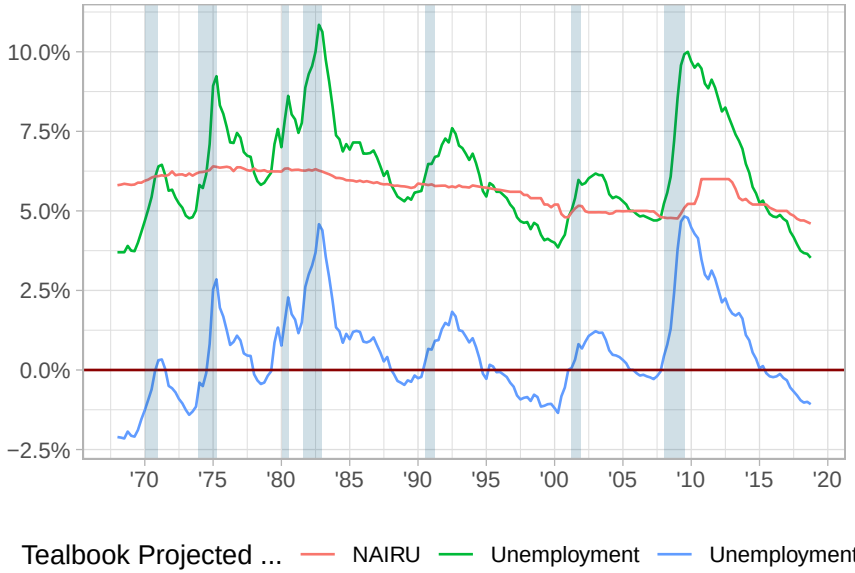
Apendixes

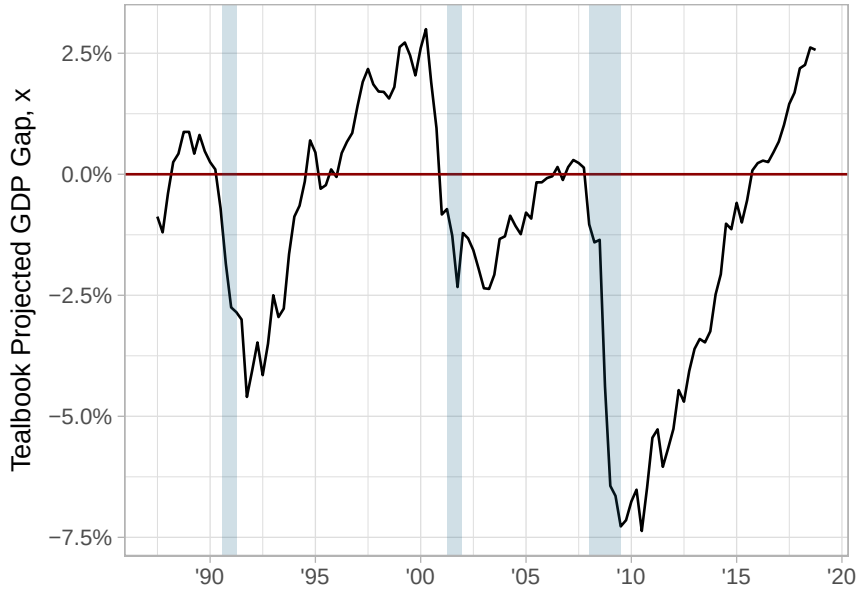
Data

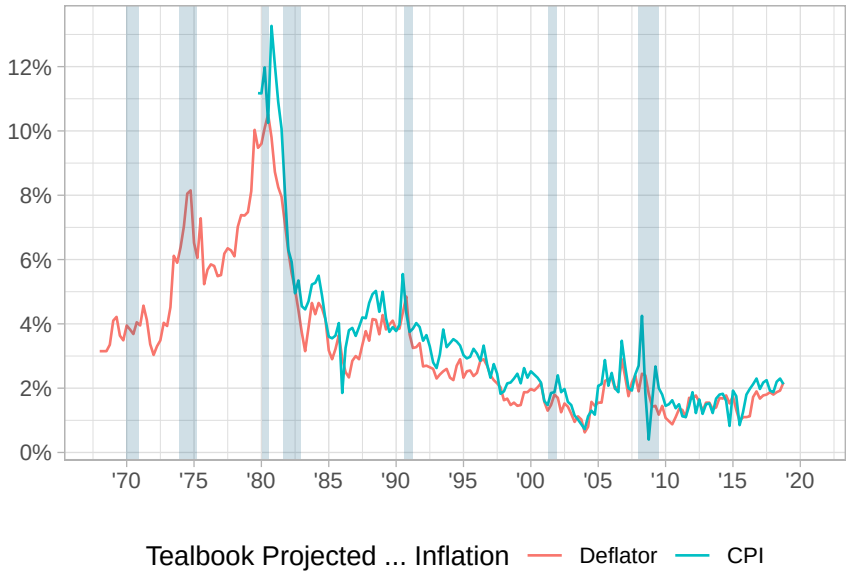
- FED inflation (deflator, and CPI), GDP gap, unemployment forecast and NAIRU are from Tealbook (average of 1 and 2 quarter quarters ahead + averaging of FOMC meetings per quarter).
- HAWK index from **?**.
- Natural rate of interest by **??**
- Short-term rate (r) is by **?** and Fed Funds Rate

Figure: Rates




10.0%
7.5%
5.0%
2.5%
0.0%
−2.5%
'70
'75
'80
'85
'90
'95
'00
'05
'10
'15
'20
Tealbook Projected ...
NAIRU
Unemployment
Unemployment


Tealbook Projected GDP Gap, x
2.5%
0.0%
−2.5%
−5.0%
−7.5%
'90
'95
'00
'05
'10
'15
'20


12%
10%
8%
6%
4%
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'70
'75
'80
'85
'90
'95
'00
'05
'10
'15
'20
Tealbook Projected ... Inflation
Deflator
CPI

References I

Andrews, Donald W K (1991) "Heteroskedasticity and Autocorrelation Consistent Covariance Matrix Estimation," *Econometrica*, 59 (3), 817–858, http://www.jstor.org/stable/2938229.

Barnichon, Regis and Geert Mesters (2023) "A Sufficient Statistics Approach for Macro Policy," *American Economic Review*, 113 (11), 2809–45, 10.1257/aer.20220581.

Gali, Jordi (2018) "The State of New Keynesian Economics: A Partial Assessment," *Journal of Economic Perspectives*, 32 (3), 87–112, 10.1257/jep.32.3.87.

Hack, Lukas, Klodiana Istrefi, and Matthias Meier (2023) "Identification of systematic monetary policy," Working Paper Series 2851, European Central Bank, https://ideas.repec.org/p/ecb/ecbwps/20232851.html.

References II

Holston, Kathryn, Thomas Laubach, and John C. Williams (2017) "Measuring the natural rate of interest: International trends and determinants," *Journal of International Economics*, 108, S59–S75, https://doi.org/10.1016/j.jinteco.2017.01.004, 39th Annual NBER International Seminar on Macroeconomics.

——— (2023) "Measuring the Natural Rate of Interest after COVID-19," Staff Reports 1063, Federal Reserve Bank of New York.

Istrefi, Klodiana (2019) "In Fed Watchers' Eyes: Hawks, Doves and Monetary Policy," Working papers 725, Banque de France, `https://ideas.repec.org/p/bfr/banfra/725.html`.

Kaplan, Greg, Benjamin Moll, and Giovanni L. Violante (2018) "Monetary Policy According to HANK," *American Economic Review*, 108 (3), 697–743, 10.1257/aer.20160042.

References III

McKay, Alisdair and Christian K. Wolf (2023) "What Can Time-Series Regressions Tell Us About Policy Counterfactuals?" *Econometrica*, 91 (5), 1695–1725, https://doi.org/10.3982/ECTA21045.

Wu, Jing Cynthia and Fan Dora Xia (2016) "Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound," *Journal of Money, Credit and Banking*, 48 (2-3), 253–291, https://doi.org/10.1111/jmcb.12300.