Checking HANK.

Evidence from size-persistence tradeoff.

Vlasov Alexander

NES

February 9, 2024

Outcomes of Kaplan et al. (2018) model

Kaplan et al. (2018) 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.

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

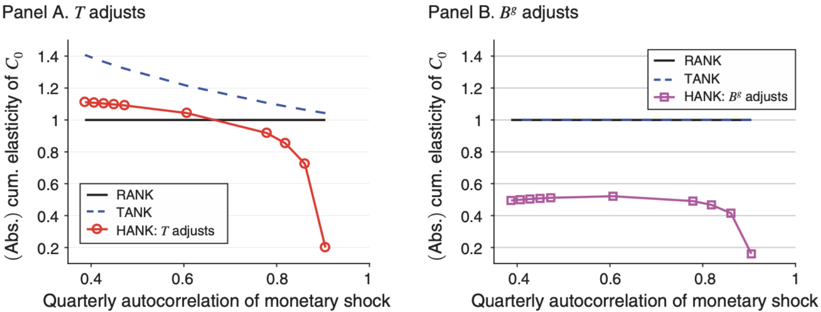


FIGURE 8. CUMULATIVE ELASTICITY OF AGGREGATE CONSUMPTION BY PERSISTENCE OF THE SHOCK

Figure: The difference between the New Keynesian models from Kaplan et al. (2018)

Size-Persistent tradeoff by Kaplan et al. (2018), formally

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

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

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

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

Empirics Related to HANK

Microdata

- Holm et al. (2021) find inconsistent Evidence of HANK – the response is larger than generated by HANK.

MPC

- Estimation of MPC's[a] by Gross et al. (2020): Increase of MPC is higher in 2008 than in 2011.

[a] Actually MPB, but they argue that it doesn't affect the results

Heterogenity in Portfolios

Luetticke (2021) find a heterogeneity in household portfolio responses to MP shocks.

Empirical approach:

Based on method of Hack et al. (2023).

I assume that the monetary policy rule is

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

$\mathbb{E}_t \pi_{t+1}$ is the expectations of monetary authority about the inflation in quarter $t+1$.

I estimate the following State-Dependent LP-IV.

$$\begin{aligned}(r - r^*)_{t+h} = \alpha^h + \beta^h \hat{\pi}_t + \gamma^h \hat{\pi}_t \left(Hawk_t - \overline{Hawk}\right) \\ + \delta^h \left(Hawk_t - \overline{Hawk}\right) + \zeta^h Z + e^h_{t+h},\end{aligned}$$

Empirical approach

$$\tilde{\phi}_{t+h} = \bar{\phi} + \phi_t = \hat{\beta}^h + \hat{\gamma}^h \left(Hawk_t - \overline{Hawk} \right).$$

$$R_{0t} = \frac{1}{H} \sum_{h=1}^{H} \tilde{\phi}_{t+h} = \mathbb{E}_h \tilde{\phi}_{t+h}.$$

$$\nu_t = \mathbb{E}_h \left[\left(\phi_{t+h} - \bar{\phi} \right) \left(\phi_{t+h-1} - \bar{\phi} \right) \right]$$

$$\log Consumption = \alpha_0 + \alpha_1 R_0 + \alpha_2 \nu + \beta_1 R_0 \nu \tag{5}$$

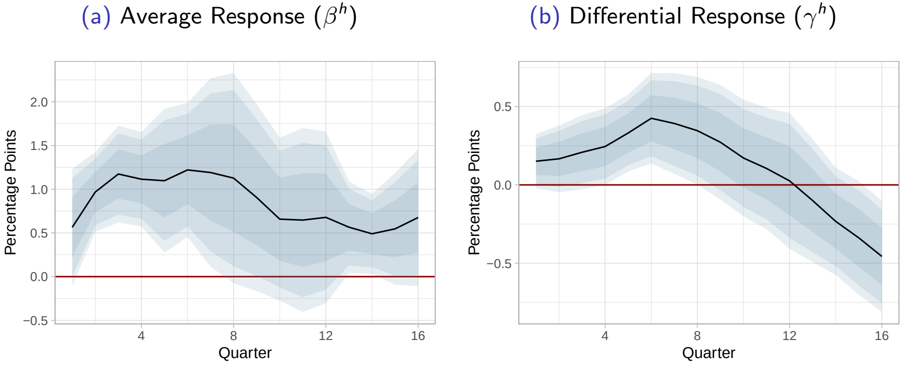
$$\log Consumption = \alpha_0' + \alpha_1' R_0 + \alpha_2' \nu + \beta_1' R_0 \nu + \beta_2' R_0 \nu^2 \tag{6}$$

Data

- Natural rate of interest by Holston et al. (2017, 2023)
- Short-term rate (r) is by Wu and Xia (2016) and Fed Funds Rate
- Consumption is U.S. Bureau of Economic Analysis "Real personal consumption expenditures per capita " (FRED A794RX0Q048SBEA).
- FED inflation forecast is from Tealbook (average of 1 and 2 quarter ahead + average per quarter).

Results I

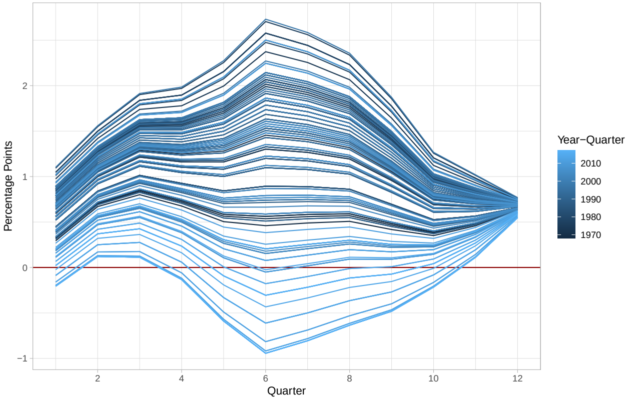
Policy Response to Inflation and FOMC Hawkishness



Notes: This figure reports the responses of the $r_t - \rho_t$ to an increase in the Tealbook inflation forecast of 1 p.p. The subfigure 5a reports the response for the *HAWK* index equal to the sample average and 5b 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

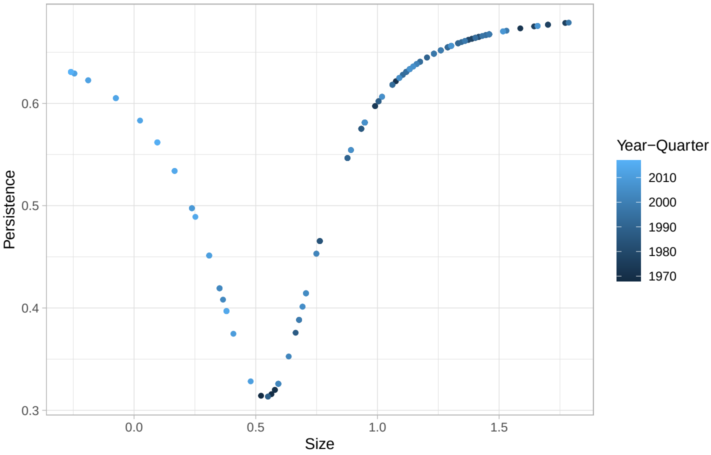
Figure: Predicted IRFs in each of the state



Notes: This figure shows the Impulse Response functions in each state calculated as in equation (3).

Results

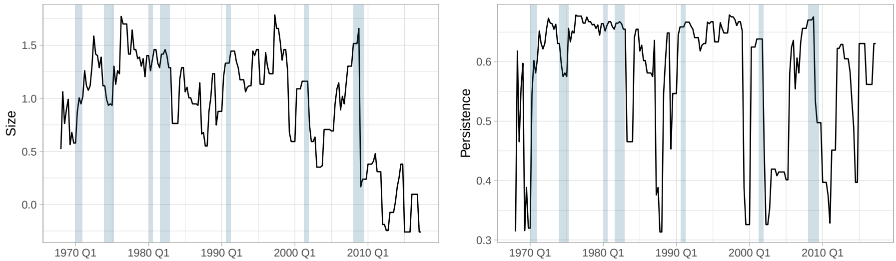
Figure: Estimates of Size and Persistence



Results

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 section 1 on page 3, over time.

Results:

Size-Persistence Tradeoff

	Dependent variable:	
	log(*consumption*)	
	$H = 8$	
	(1)	(2)
Size (R_0)	-0.687	-0.451
	$(-1.149, -0.133)$	$(-1.495, 1.078)$
	$[0.011]\{0.997\}$	$[0.857]\{0.578\}$
Persistence (ν)	-0.100	1.223
	$(-0.693, 0.691)$	$(-3.598, 4.968)$
	$[0.746]\{0.673\}$	$[0.517]\{0.246\}$
ν^2		-1.042
		$(-4.271, 4.336)$
		$[0.517]\{0.766\}$
$R_0 \times \nu$	0.765	-1.628
	$(-0.177, 1.526)$	$(-3.159, 2.748)$
	$[0.0754]\{0.0247\}$	$[0.522]\{0.759\}$
$R_0 \times \nu^2$		2.435
		$(-1.852, 3.838)$
		$[0.340]\{0.145\}$
Constant	10.6	10.5
	$(10.1, 11.0)$	$(9.8, 11.0)$
	$[0.0]\{0.0\}$	$[0.0]\{0.0\}$
Observations	198	198

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

References I

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