

Checking HANK

Evidence from size-persistence tradeoff.

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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

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

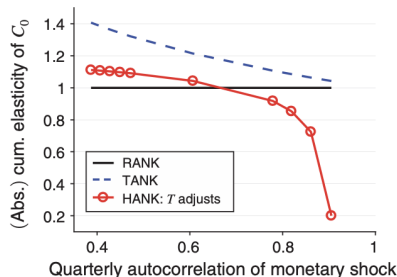
Size:

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

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

Picture of Size-Persistence trade-off

Panel A. T adjusts



Panel B. B^s adjusts

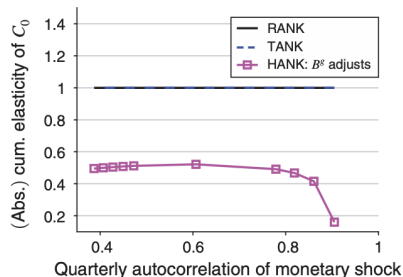


FIGURE 8. CUMULATIVE ELASTICITY OF AGGREGATE CONSUMPTION BY PERSISTENCE OF THE SHOCK

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

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

$$\text{RANK:} \quad \frac{d}{d\nu} \frac{-d \log C_0}{dR_0} = 0 \quad (1)$$

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

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

$$\text{HANK:} \quad \frac{d^2}{d\nu^2} \frac{-d \log C_0}{dR_0} < 0 \quad (4)$$

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.

^aActually MPB, but they argue that it doesn't affect the results

Heterogeneity 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

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

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

I estimate the following State-Dependent LP-IV.

$$(r - r^*)_{t+h} = \alpha^h + \beta^h \hat{\pi}_t + \gamma^h \hat{\pi}_t (Hawk_t - \overline{Hawk}) \\ + \delta^h (Hawk_t - \overline{Hawk}) + \zeta^h Z + e_{t+h}^h,$$

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

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

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

$$\log Consumption = \alpha_0 + \alpha_1 R_0 + \alpha_2 \nu + \beta_1 R_0 \nu \quad (5)$$

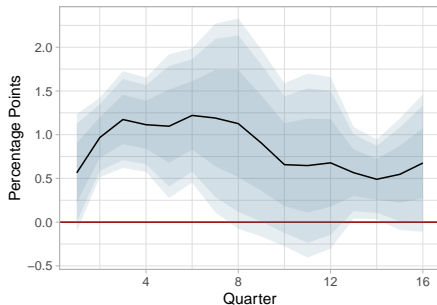
$$\log Consumption = \alpha'_0 + \alpha'_1 R_0 + \alpha'_2 \nu + \beta'_1 R_0 \nu + \beta'_2 R_0 \nu^2 \quad (6)$$

- 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).

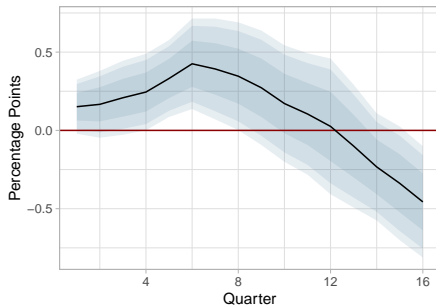
Results I

Policy Response to Inflation and FOMC Hawkishness

(a) Average Response (β^h)



(b) Differential Response (γ^h)

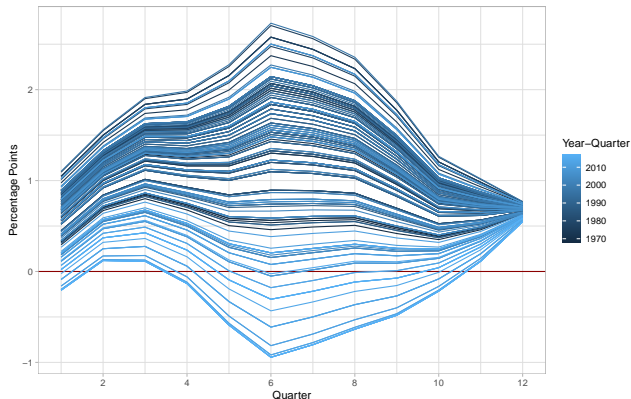


Notes: This figure reports the responses of the $r_t - \rho_t$ to an increase in the Tealbook inflation forecast of 1 p.p. The subfigure 5a reports the response for the *HAWK* index equal to the sample average and 5b is the addition to the response in case there are 2 (out of 12 in total) additional 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

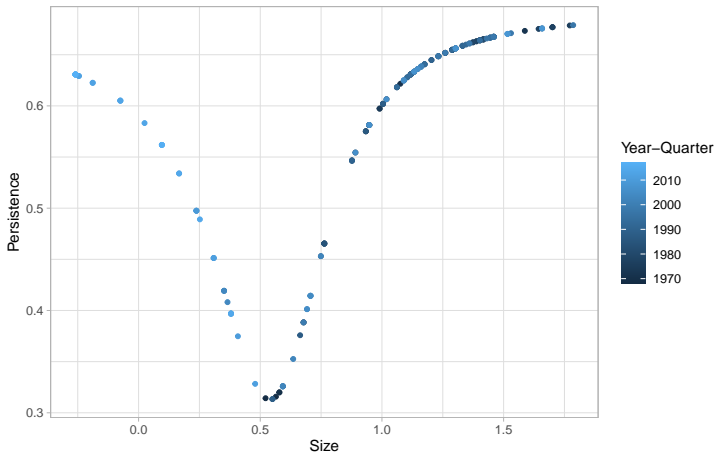
Predicted IRFs

Figure: Predicted IRFs in each of the state



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

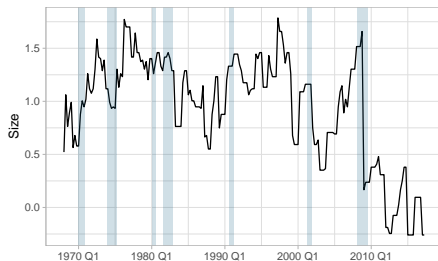
Figure: Estimates of Size and Persistence



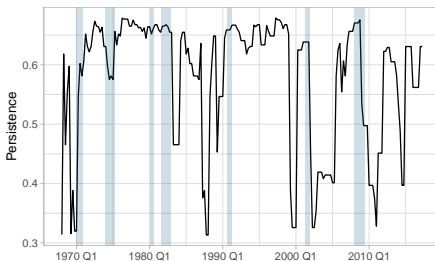
Results

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

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

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

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- Gross, Tal, Matthew J. Notowidigdo, and Jialan Wang (2020) “The Marginal Propensity to Consume over the Business Cycle,” *American Economic Journal: Macroeconomics*, 12 (2), 351–84, 10.1257/mac.20160287.
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