Checking HANK
Evidence from size-persistence tradeoff.

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February 19, 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

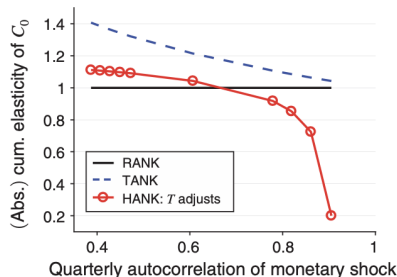$$C_0 = \bar{C} \exp\left(-\frac{1}{\gamma} \int_0^\infty (r_s - \rho)\ ds\right).$$

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

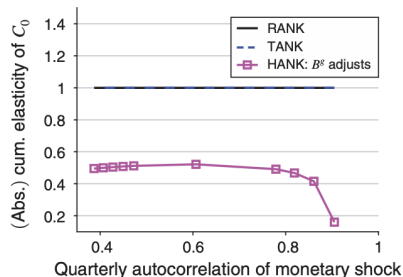Panel A. T adjusts

Panel B. B^g 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

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

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

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

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

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.

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[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.

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

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

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

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

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

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

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).
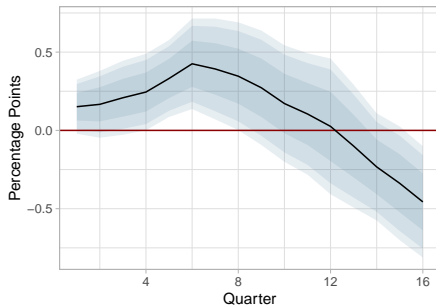
Results I
Policy Response to Inflation and FOMC Hawkishness

(a) Average Response (β^h)
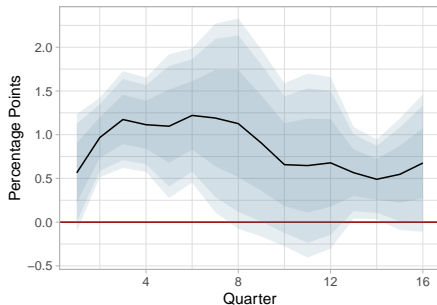
(b) Differential Response (γ^h)

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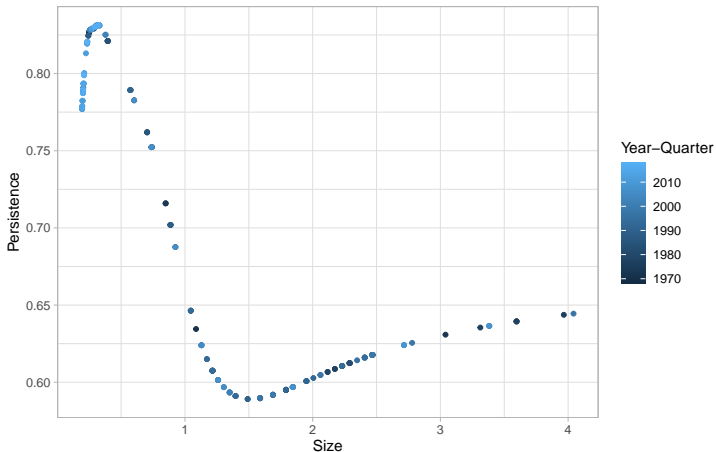
Figure: Predicted IRFs in each of the state
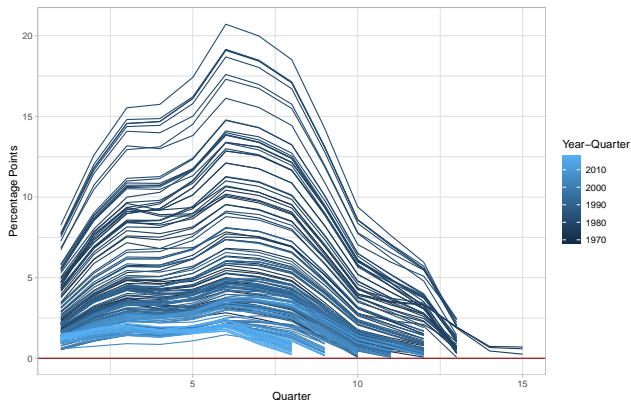
Notes: This figure shows the Impulse Response functions in each state calculated as in equation (3).

Results
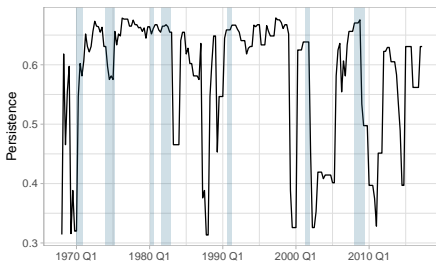
Figure: Estimates of Size and Persistence

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

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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