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

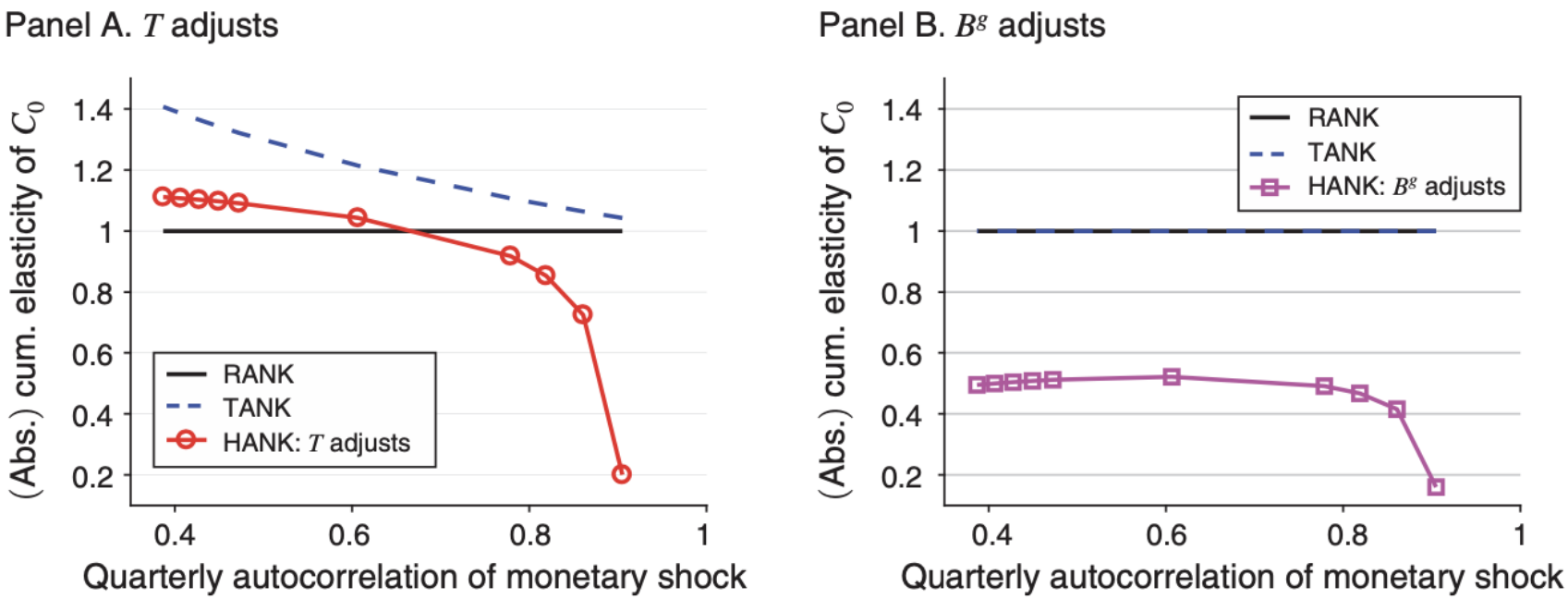

FIGURE 8. CUMULATIVE ELASTICITY OF AGGREGATE CONSUMPTION BY PERSISTENCE OF THE SHOCK

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

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

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

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

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

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

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.

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

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)

Results: Monetary Shock Identification I

Table: Monetary Shock Identification. First step

	Dependent variable:					
	DGS1	DGS5	DGS7	DGS10	DGS20	DGS30
	(1)	(2)	(3)	(4)	(5)	(6)
DGS2	0.727^{***}	1.029^{***}	0.921^{***}	0.743^{***}	0.316^{**}	0.202
	(0.071)	(0.090)	(0.110)	(0.112)	(0.127)	(0.130)
Constant	-0.005^{***}	-0.001	-0.0002	0.0002	-0.001	-0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Observations	382	382	382	382	382	382
R^2	0.634	0.766	0.666	0.583	0.327	0.206
Adjusted R^2	0.633	0.765	0.665	0.582	0.325	0.204
Res. Std. Error	0.028	0.035	0.043	0.044	0.049	0.051
Wald test	103.9^{***}	129.9^{***}	70.49^{***}	43.71^{***}	6.201^{**}	2.406
Wu-Hausman	3.699^{*}	0.002	0.259	0.847	9.345^{***}	8.707^{***}

This table reports first stage of Bu et al. (2021) monetary shock identification procedure for the FOMC announcement from 1994 to the most recent event 2021-04-28 (191 monetary events). OLS standard errors in the parenthesis. F-statistics on instrument insignificance is 44.030^{***}. Wu-Hausman stands for Hausman specification test for the endogeneity of a instrument $\left(\Delta R^{M}_{2,t}, -\Delta R^{NM}_{2,t}\right)'$. *p<0.1; **p<0.05; ***p<0.01.

Results: Elasticity of consumprion

Table: Elasticity of consumption to $(r - r^*)$.

	Dependent variable: log *Consumption*	
	OLS	*IV*
	(1)	(2)
$(r - r^*)$	0.092^{***}	0.197^{***}
	(0.008)	(0.013)
Constant	9.095^{***}	9.050^{***}
	(0.011)	(0.014)
Observations	361	361
R^2	0.255	−0.079
Adjusted R^2	0.253	−0.082
Residual Std. Error	0.207	0.249
F Statistic	122.922^{***}	
Weak instrument		508.1^{***}
Wu-Hausman		622.3^{***}

This table reports the results of estimation of consumption elasticity to the deviation of rate from its neutral (natural) value, $(r - r^*)$. Weak instrument stands for first stage F-statisitic, that indicate, whether the $\hat{R}$ is a strong instrument. Wu-Hausman stands for Hausman specification test for the endogeneity of a instrument $\hat{R}$. *p<0.1; **p<0.05; ***p<0.01

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 HANK model.

Place for your suggestions and comments!

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

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