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

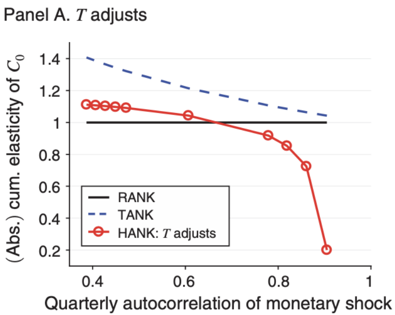

FIGURE 8. CUMULATIVE ELASTICITY OF AGGREGATE CONSUMPTION BY PERSISTENCE OF THE SHOCK

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

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

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

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

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

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

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.

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

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

Monetary Shock identification:

- 1-year, 2-year, 5-year, 7-year, 10-year, 20-year, and 30-year Treasury rates

Size-Persistence Trade-off:

- Consumption as PCECC96 [1] [7]
- Inflation as a change in PCEPILFE[2]
- Natural (neutral) rate of interest by Holston et al. (2017)[3]
- 2-year Treasury rate as the Short-term rate (r).

[1] Real Personal Consumption Expenditures.

[2] Personal Consumption Expenditures Excluding Food and Energy (Chain-Type Price Index).

[3] Cubic spline interpolation to monthly values.

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

References I

Bu, Chunya, John Rogers, and Wenbin Wu (2021) "A unified measure of Fed monetary policy shocks," *Journal of Monetary Economics*, 118, 331–349, https://doi.org/10.1016/j.jmoneco.2020.11.002.

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.

Hack, Lukas, Klodiana Istrefi, and Matthias Meier (2023) "Identification of Systematic Monetary Policy," CEPR Discussion Paper 17999.

Holm, Martin Blomhoff, Pascal Paul, and Andreas Tischbirek (2021) "The Transmission of Monetary Policy under the Microscope," *Journal of Political Economy*, 129 (10), 2861–2904, 10.1086/715416.

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.

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.

Luetticke, Ralph (2021) "Transmission of Monetary Policy with Heterogeneity in Household Portfolios," *American Economic Journal: Macroeconomics*, 13 (2), 1–25, 10.1257/mac.20190064.