Comment

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Heterogeneous Agent New Keynesian (HANK) models have become a mainstay in macroeconomics. They are used to elucidate the role of heterogeneity in monetary policy, fiscal policy, and financial frictions.[1] Recent advances in solution methods notwithstanding,[2] these models are more difficult to solve than traditional representative agent or two-agent New Keynesian models. The additional complexity generally makes it harder to understand the model's workings.

Debortoli and Gali [forthcoming] show how to specify two-agent New Keynesian (TANK) models in a way that captures much of the richness of HANK models, but preserve their relative simplicity and transparency. The lens of the simpler TANK model elucidates which features of the HANK model are quantitatively important for the transmission of monetary policy and technology shocks. And for both models, the authors show that our choice of the monetary policy rule is crucial for how much heterogeneity matters for aggregate outcomes in equilibrium.

My comments center on (1) how we can specify TANK models to approximate HANK models more generally, (2) whether this is something we should strive for, and (3) the broader role of supply in determining the importance of heterogeneity for aggregate outcomes.

[1]For example: (monetary policy) Werning [2015], McKay, Nakamura, and Steinsson [2016], Kaplan, Moll, and Violante [2018], Auclert, Rognlie, and Straub [2020], McKay and Wieland [2021, 2022], (fiscal policy) Mitman, Auclert, Rognlie, and Straub [2023b], Wolf [2021], Angeletos, Lian, and Wolf [2023], (financial frictions) Guerrieri and Lorenzoni [2017].

[2]Reiter [2009], Ahn, Kaplan, Moll, Winberry, and Wolf [2018], Auclert, Bardóczy, Rognlie, and Straub [2021], Bhandari, Bourany, Evans, and Golosov [2023]

1 Approximating HANK with TANK

A key insight of Debortoli and Gali [forthcoming] is that we can successfully approximate a HANK model with a TANK model if the constrained agent in both models are very similar. For example, in their HANK-II model,[3] the consumption function of the borrowing-constrained (hand-to-mouth) agent is

$$C_t^H = \Xi^H W_t N_t + \Theta^H D_t + \psi Y - R_{t-1} B_{t-1|t}^H$$

where C_t^H is consumption, $W_t N_t$ is labor income, Ξ^H is the share on labor income going to constrained agents, D_t are firm dividends, Θ^H is the share ownership by the hand-to-mouth, ψY is new borrowing, and $R_{t-1} B_{t-1|t}^H$ is the repayment of old borrowing. We can directly solve for consumption because the borrowing constraint is binding.

In order to approximate the constrained HANK agent in a TANK model we assume that its permanent hand-to-mouth agent always sits at the same borrowing constraint, owns the same number of shares, and earns the same share of labor income,

$$C_t^H = \Xi^H W_t N_t + \Theta^H D_t - \psi Y (R_{t-1} - 1)$$

where past debt is equal to the borrowing constraint, $B_{t-1|t}^H = \psi Y$.

The success of this approximation tells us that the transmission mechanism in this HANK model is driven by the relative exposure of constrained and unconstrained agents to labor income, divident income, and interest rates. Matching the HANK model on these dimensions is crucial for quantitative success. The standard TANK model with hand-to-mouth consumption function $C_t^H = W_t N_t$ does not capture these and therefore fails to approximate the HANK model.

That modified TANK models, in which agent types are fixed, can well approximate HANK models tells that changes in the number of constrained households in HANK are not important for the transmission of monetary and technology shocks. Similarly, changes in the identity of the constrained households, or changes in the expectations of changes in the number or identity of the constrained do not appear to be quantitatively relevant here.

Thus, we may not lose much by focusing only on a few moments of the infinite dimensional wealth distribution in HANK: the overall fraction constrained and the exposure to different income

[3] Their HANK-II model is a standard one-asset HANK model.

sources and interest rates. This Krusell and Smith-type result is consistent with the findings of Ahn et al. [2018], and suggests that one may not need to carry around the entire wealth distribution, which is the source of computational complexity in HANK models.

That we want to mimic the constrained agent in HANK is an important and novel insight, however implementing this strategy is not straightforward because generally it requires solving the HANK model first. The share of labor income going the constrained Ξ^H is endogenous in HANK models. Approximating the two-asset HANK model (HANK-III in the paper) requires additional knowledge of the endogenous dividend distribution rule. But if we need to solve HANK first how much do we gain by approximating it with TANK?

Finding the right TANK approximation looks even more daunting in models in which one cannot directly solve for consumption of the constrained agent. For instance, in HANK models with durable goods [McKay and Wieland, 2021, 2022], one needs to also solve for the allocation of resources between durable and non-durable goods. This is a much more complex problem than the one solved here.

For these reasons the TANK approximation appears to be most useful in models in which households face a very limited number of choices. But even in more complex environments the TANK approximation may still be useful in elucidating which features of complex HANK model are important in the transmission of shocks.

2 Choosing TANK over HANK?

I next argue that there are instances in which we may want to choose TANK over HANK because TANK matches the data better than HANK. This is not the objective of Debortoli and Gali [forthcoming]. But I think it is useful to comment on since a reader of the paper may be forgiven for thinking that HANK is always correct and we simply argue over the quality of the approximation by TANK. There are of course many other instances in which HANK is clearly preferred, for instance by providing microfoundations for high MPCs, which I will not cover here given the context of the paper.

A distuingishing feature of conventionally calibrated HANK models is that they predict significant intertemporal MPCs out of transitory income shocks [Auclert et al., 2023b]. That is, households consume a large fraction of a transitory income shock not just in the period in which it occurs, but also in future periods. This is in contrast to standard TANK models, in which those intertemporal MPCs are close to zero.

Table 1 shows large variation in whether recent empirical studies estimate significant intertemporal MPCs in the data. The Norwegian lottery study by Fagereng, Holm, and Natvik [2021] finds a large intertemporal MPC of 0.15 in the second year following the lottery and further positive spending in subsequent years. This is the evidence that HANK models are typically calibrated to match. However, other studies find no evidence of intertemporal MPCs, which suggests that TANK models may be more appropriate in those cases. For instance, in Orchard, Ramey, and Wieland [2023b] we use a TANK model to study the aggregate effects of the 2008 rebate since we and Borusyak, Jaravel, and Spiess [2024] find that intertemporal MPCs are zero for this fiscal stimulus.

Table 1 – Contemporaneous and Intertemporal MPCs in the Data

Study	MPC		Frequency
	Contemp.	Intertemp.	
R. Baker, Farrokhnia, Meyer, Pagel, and Yannelis [2023]	0.35	0	Weekly
Boehm, Fize, and Jaravel [2023]	0.23	0	Monthly
Borusyak, Jaravel, and Spiess [2024]	0.3	0	Monthly
Colarieti, Mei, and Stantcheva [2024]	0.17	0.12	Quarterly
Fagereng, Holm, and Natvik [2021]	0.5	0.15	Annual
Golosov, Graber, Mogstad, and Novgorodsky [2024]	0.6	0	Annual
Karger and Rajan [2020]	0.5	0	Biweekly
Orchard, Ramey, and Wieland [2023b]	0.3	0	Quarterly
Parker, Schild, Erhard, and Johnson [2022]	0.1	0	Quarterly

Notes: Contemporaneous MPCs are computed over the period in which the shock occurs. The period length is one unit of the frequencey, e.g., one week or one month. The intertemporal MPC is the measured MPC over the following period.

This suggests that the choice between TANK and HANK models is not just about their computational complexity or the quality of the approximation, but also about the quality of the fit to the data. In some cases, such as those in which intertemporal MPCs are small, TANK models may better describe the data than HANK models.

3 Broader Role of Supply

The paper shows clearly that the specification of the monetary policy rule matters a lot for the importance of heterogeneity in aggregate outcomes. In particular, the differences in the output and inflation IRFs between RANK, TANK, and HANK models shrink towards zero the more aggressive the central bank becomes at closing the output gap.

This is because in the models considered here, heterogeneity only matters in so far as it affects aggregate demand and in turn how aggregate demand affects output. The degree of pass-through from aggregate demand to output is determined by the supply side of the model. The supply side is borrowed from RANK models and specifically set up to be unaffected by heterogeneity. Through a standard New Keynesian Phillips Curve higher aggregate demand raises inflation. The central bank then determines the extent to which it will raise the real interest rate to offset this inflation and the associated shock to aggregate demand.

When monetary policy is relatively accommodating by fixing the real interest rate, then changes in aggregate demand pass-through one-for-one to changes in output. Thus, to the extent that heterogeneity affects aggregate demand it will also matter equally for aggregate output. However, when monetary policy implements an inflation target, then changes in aggregate demand are offset by changes in the real interest rate. In this case aggregate output tracks potential output and heterogeneity is irrelevant.

This is an important insight and suggests that we may want to pay close attention to the specification of monetary policy rules in HANK models. It is very natural to focus on improving the demand block since that is where the heterogeneity is.[4] But far from it being a neutral, the choice monetary rule invokes an implicit stance on how important heterogeneity can be in general equilibrium.

In my view, this conclusion is too narrow since it is based on the premise that "the" real interest rate is the only instrument that determines the pass-through of aggregate demand to output. Of course, standard New Keynesian models works like this. But even slight generalizations of the

[4] A notable exception is Auclert, Bardóczy, and Rognlie [2023a].

model can lead to a much broader view of the role of supply.

My view is informed by Orchard et al. [2023b], in which the supply side plays a broader role in determining the pass-through of aggregate demand to output. In this paper we study the aggregate impact of the 2008 stimulus. Our objective is to reconcile micro and macro data for this episode: We estimate sizeable micro MPCs of 0.3, almost all of it on motor vehicles, but the time series for motor vehicle expenditures is flat. We argue that much of this expenditure must have been dampened in general equilibrium to be consistent with plausible counterfactuals—what would have happened absent the stimulus.[5] But movements in the nominal interest rate are too small to account for quantitatively significant dampening in general equilibrium.

Our paper shows that the relative price of motor vehicles spikes up as rebate checks are spent, so that the real interest rate for durables is high even when monetary policy is passive, which then crowds out expenditure on this interest-sensitive good. In the model we capture this fact with an upward sloping relative supply curve for durables. Our model then predicts that the aggregate effects of the stimulus are modest despite sizeable micro MPCs. Thus, supply plays an important role even when monetary policy is relatively passive.

Thus, I believe there is a broader lesson here that we need to pay attention to the supply side of the model and not only to the monetary rule. This is particularly important in models with interest-rate sensitive goods. In traditional public finance that the incidence of a tax is determined by the relative elasticities of supply and demand. In the same way, the pass-through of aggregate demand to output is determined by the relative intertemporal elasticities of supply and demand. Estimating and disciplining these elasticities on both the demand and the supply side is an important agenda for the HANK literature going forward.

4 Conclusion

Debortoli and Gali [forthcoming] have made an important and valuable contribution by showing how to approximate HANK models with TANK models, and thereby elucidating which features of HANK models are quantitatively important in the transmission of monetary policy and technology shocks. I expect this paper to become a standard reference in the HANK literature. I also expect TANK models continue to be part of our toolkit, both on their own merit and by approximating

[5] The use of macro counterfactuals to evaluate the confluence of micro estimates with macro models is described in detail in Orchard, Ramey, and Wieland [2023a].

HANK features. Reports of the death of TANK models appear to be greatly exaggerated.

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