Addressing G. Violante's Comments

Essays in Dynamic Macroeconomics: from Structural Parameter Estimation to the Evaluation of Central Bank Policies

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Contents

1. Chapter 1: Local Projections vs. VARs for Structural Parameter Estimation

1.1. Extension to HANK Models

This is an interesting suggestion which as you mentioned may increase the potential audience to which this paper is directed to. I have already added it to the conclusion of the paper. I'll be more thorough in my reply below.

As far as I know, HANK models' innovation come from marrying standard Heterogenous Agents models in the tradition of Bewley-Hugget-Aiyagari with New Keynesian models like the Smets and Wouters (2007) model. Hence, there are multiple similarities between these two class of models. In particular, the production side in most HANK models is very similar to that in Smets and Wouters (2007): there are intermediate good producers with monopolistic competition and a perfectly competitive final good producer. Moreover, there is also a monetary authority that sets the nominal interest rate in both model classes. In short, the main difference is in the household problem. This addition, not only allow us to study distributional aspects, but also results in different aggregate responses to policy shocks, despite that a recent paper by Debortoli and Gali (2024) seems to challenge this view.

In any case, and without trying to get into this debate, what I think is very important to highlight is that the results of my paper concern linearized models and that these findings actually arise from the properties of the impulse response estimators (e.g. VARs having high bias and low variance, while LP having low bias but high variance) and those of the structural parameter estimators (e.g. Indirect Inference being robust to misspecification) in these linear settings. Hence, as long as HANK models are also linear at the aggregate, which is usually the case given the solution methods we use, [1] the lessons of this paper should also apply for HANK.

However, this opens an even bigger avenue of future research: non-linearities/state-dependencies. Parallel to the introduction and widespread use of HANK models, there was an increasing interest in the estimation of sate-dependent responses to fiscal and monetary shocks. Hence, studying the performance of a methodology like SMM/Indirect Inference, which was initially developed for non-linear settings, when the DGP is fully non-linear would be extremely exciting!

[1] Reiter's (2009) perturbation algorithm and it's modernized versions use first order approximation for the aggregate shocks.

2. Chapter 2: The Aggregate and Distributional Implications of Credit Shocks on Housing and Rental Markets

2.1. Benefits of macro-prudential policies

The pink elephant in the room is obviously the absence of aggregate uncertainty and mortgage payment delinquency in the model, which as you point out would allow us to talk about the benefits of the macro-prudential policies we analyze. Including these two features into the model would allow us to talk about optimal macro-prudential policies, and hence, we think it would be a great idea for a follow-up paper.

I would like to stress that even as it is, i.e. without the benefits from financial stability, our paper points out to a novel finding in this literature: macro-prudential policies have some unintended consequences as they increase rents and inequality in the housing market. These costs should be taken into account when evaluating these policies and any attempt to look at optimal policy that doesn't consider this angle may lead to biased conclusions.

2.2. Housing law of motion

We should write this part of the model differently as it has led to confusions before. However, I think it is theoretically consistent. You are right that households pay for maintenance costs and hence the housing stock doesn't get depreciated. The term δH_t in the law of motion of the housing stock gets offset by production. In fact, in steady state all production in the construction sector is destined to cover this cost of refurbishing homes. This can be seen from the equilibrium equation (2.17), which in steady state simplifies to $Y_h = (1/J + \delta)H$.

2.3. Constant wedge between mortgage and saving rate?

You are right in pointing out that a constant mortgage spread is not the most realistic assumption, especially for the period around the GFC. I don't have data for Ireland, but in the UK, which is probably a similar mortgage market, the spread spiked in the early 2010s (from 1% to 3%), then decreased substantially and despite a few more spikes in the middle (e.g. mini-budget episode), it has been floating around 1% a decade later. So, there is indeed time-variation!

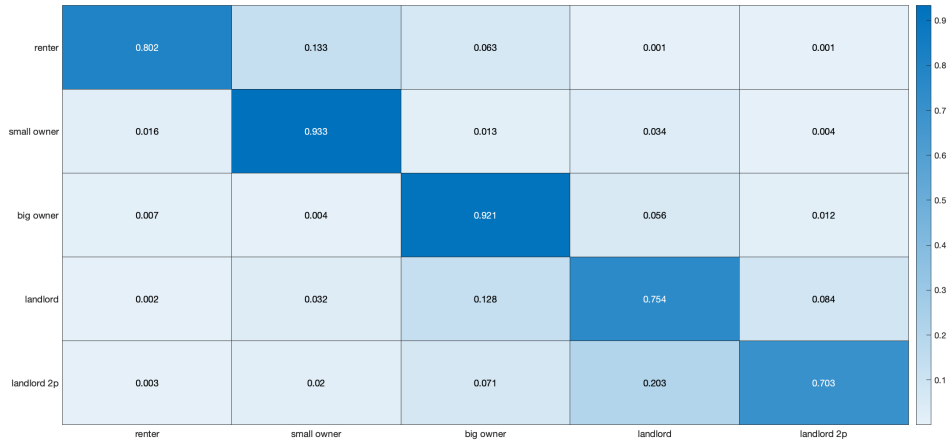
I am aware that, for example as in Kaplan, Mitman, and Violante (2020), the mortgage rate depends on household characteristics and the aggregate state of the economy, which

is indeed a better representation of reality. However, in our model without aggregate uncertainty and with simple financial markets, there are no reasons for an endogenous time-varying mortgage spread to arise. In our planned follow up paper, which will include those features, we would be able to include more realistic mortgage contracts like those mentioned above. All these new elements in the model would help us talk about the benefits of macro-pru, as discussed in Section 2.1.

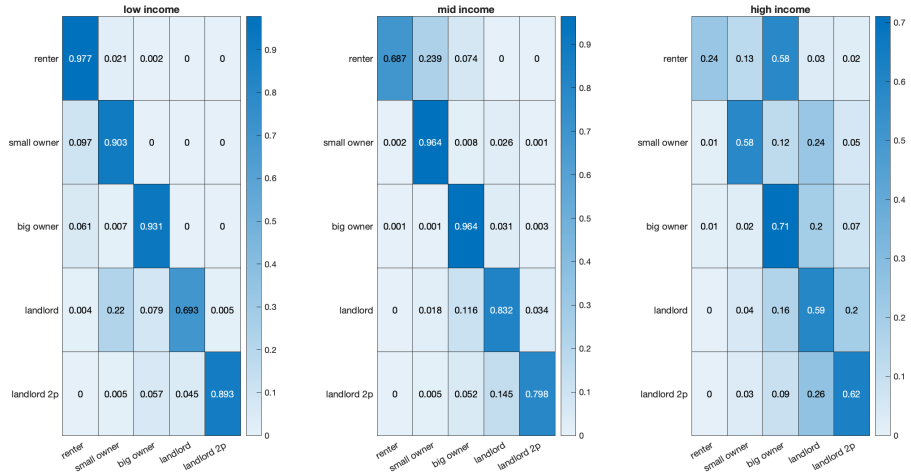
2.4. Realistic housing flows

The variance of the taste shock σ_ε controls to some extent the housing tenure flows and could be internally calibrated. Instead, we set it to a small value following Iskhakov, Jørgensen, Rust, and Schjerning (2017) because we do not have adequate Irish data to check if these flows are consistent with the data: the Irish HSCF doesn't have a panel component, and the SILC is also not great in this regard either. Moreover, our model is not designed to capture moving flows related to life-changing events, like having a child or the death of your spouse, nor work related events like e.g. receiving a job offer in other city. These are often among the main reasons listed on household surveys on why individuals move homes.

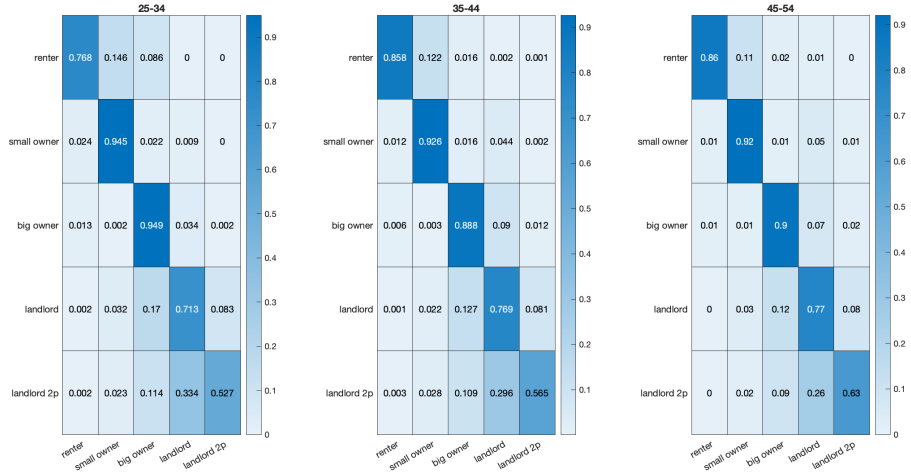
Nonetheless, model housing tenure flows are consistent with economic sense. I have computed the transition probabilities across housing tenure statuses using the pre-reform policy function for housing tenure decisions. These probabilities are depicted in Figure 1. Panel A shows the unconditional probabilities, while Panels B & C show the conditional probabilities depending on income and age, respectively. There is vast heterogeneity in housing tenure decisions. For example, the unconditional probability of staying renter is 0.8, however, it decreases to 0.24 if you have high income. Moreover, it is increasing in age. The average age of first time buyers (FTB) in the model is 30 years old, and consequently, if a household hasn't bought a home by then, it is less likely that they will do so at a later stage in their lives. Downsizing (big to small owner transition) is more likely when the household has low income and is closer to the retirement age (45-54). The opposite is true for upsizing. Small to big transitions are more likely if you are a young household with mid/high income. Becoming a landlord is in 99.9% of the cases associated with being a home-owner. Moreover, it is also more likely if the household has already climb up the housing ladder, has mid/high income or is in the second half of their working stage.



A. Unconditional



B. By income



C. By age group

FIGURE 1. Model Housing Tenure Probabilites

2.5. Bequest motives

We have worked on a version of the model with bequest motives, following De Nardi's (2004) warm-glow motive as you do in Kaplan, Mitman, and Violante (2020). As you mentioned, including this element into the model results in households keeping some of their assets (financial and houses) at the terminal age. As a result, it helped us get closer to the empirical distribution of houses hold at older ages (65+). Importantly, the conclusions arising from this model with bequests were in line with those in the benchmark model and hence we decided to leave it out for simplicity. We completely agree with your comment and we will add it back to the paper, at least as a robustness check.

2.6. Elasticity of housing rental supply

Happy that you like this part of the model. We think it is an important selling point which we would like to highlight even further in the next version of the paper. In particular, we plan to do this by showing that even in the most plain vanilla version of the model (single quality/size for the house), one would still get an upward sloping rental supply curve. In other words, we do not need to assume any degree of segmentation between the two markets as in Greenwald and Guren (2024) to generate movements in the rent-price ratio in response to credit restrictions.

2.7. The interest rate experiment and the mortgage fixation period

We were not clear in our explanation of how we introduced mortgages into the model. We will clarify in the paper that all our mortgages are adjustable rate. Hence, as the interest rate rises, all (new and existing) mortgagors are immediately and unexpectedly affected by the change.

As you pointed out, and as shown in Figure 3.2. (Chapter 3), most mortgage contracts have a fixation period below 5 years in Ireland. Hence, we are probably overstating the effect of the interest rate hike, but at least we are closer to the Irish mortgage market than if we were to assume that all mortgages are fixed-rate.

2.8. Empirically backing up model results from the interest raise experiment

This would clearly strengthen the paper. Nonetheless, we rely on the empirical analysis of Dias and Duarte (2019) to support our model results. Similar to our model findings,

they empirically document that, at least in the US, house prices and the homeownership rate decline whereas rental prices rise in response to a contractionary monetary policy shock.

It is true, though, that given our experiment concerns an unexpected real (rather than policy rate) rate rise, it is difficult to asses to what extend our quantitative results match the data, but at least qualitatively our predictions align with their findings. A potential way of dealing with this problem is to modify the supply side of the economy and embed our household problem into a HANK model and then study a persistent monetary policy shock.

2.9. Institutional investors

That is also a very interesting extension of the model that has previously come up in the conversations with my co-authors. The addition of a corporate rental sector owned by deep pocketed and effectively risk neutral individuals should result in a rental supply curve that is flatter because it would be a mixture of the supply from the price sensitive individual landlords and the perfectly elastic corporate rental sector. In this scenario, a flatter rental supply curve would imply that in response to a negative credit shock, more adjustments would happen via quantities (homeownership) rather than prices (price-rent ratio).

Another important aspect regarding this comments is that in the current model, i.e. without a corporate rental sector, nothing prevents price and rents to move in the same direction. Actually, there are some parameterizations for which that is the case. In that sense, our model is more flexible relative to those in which the rental sector boils down to the use-cost formula that pins down the positive relationship between house prices and rents. That said, I think it would be a great extension to include institutional investors into our framework and towards that goal the first question we would need to address is what really distinguish these two?

Surveying the literature, I have found two papers in which there are both a corporate and non-corporate rental sector. In Muñoz and Smets (2022) rental supply comes from patient households or a real estate investment fund (REIF). The rental services from the REIF operate under monopolistic competition and hence their rental services are more differentiated relative to those of the patient households. In Oosthuizen (2023), there are individual landlords and a corporate rental sector that differ in their ability to maintain and operate the dwellings. In fact, he argues that the rise in institutional investors in the US after the Great Recision was due to an improvement in the management technology

in the corporate sector. So, which one of the two is it? And are there other factors that differentiate these two actors in the rental market?

Results in Gallin and Verbrugge (2019) also point to the fact that rental contracts are more sticky if signed with individual landlords than with institutional investors because during the renegotiation process the latter are more likely to push up nominal rental prices given that the risk of losing the tenant would average out across multiple properties. As a result, market structure not only affects the elasticity of rental supply, but potentially could also have an effect on the dynamics of rental prices in response to shocks.

3. Chapter 3: The Role of Mortgage Fixation Periods for Macro-Prudential and Monetary Policies

3.1. Endogenous refinancing decision

We assume an exogenous refinancing rate because it simplifies the model and it is not that relevant when interest rates rise, as you also recognized in the comments. I agree that the endogenous refinancing decision would strengthen the model and would allow us to look at interest rate drops as well.

Adding a preference shock for refinancing is an interesting suggestion because it should in principle be simpler to add in than the endogenous refinancing choice in Greenwald (2018). In the later case, the pre-payment decision is a function of promised payments, x_t, and hence it depends on the interest fixation period. Although it could be interesting to understand how refinancing decisions vary based on your existing mortgage contract, derivations of FOCs get complicated once you let interest fixation period to be positive $0 < T < \infty$. As a result, we have discarded it for now.

Moreover, I believe that putting our efforts into allowing mortgagors to choose the interest fixation period should be a priority over this choice. It would allow us to understand the time series variation in the share of ARMs and in particular the shift towards shorter fixation periods during the recent tightening cycle.

3.2. Cash flow channel & MPCs

I do not fully understand your point. In our model, borrowers are constrained by either the payment-to-income or the loan-to-value limit. The PIH does not hold in our model because borrowers are constrained and also have no access to the bond market to smooth out their consumption. One could even thought of them as the *wealthy hand-to-mouth* type. Figure 3.4 shows that the borrower's consumption drop is approximately 4 times larger than the fall in saver's consumption after a temporary increase in the nominal rate. Hence, our model is consistent with the larger MPC of mortgagors relative to outright owners. Moreover, the fact that the cash-flow channel is quantitatively less important relative to the General Equilibrium / New Keynesian channel is also consistent with the empirical findings in Cloyne, Ferreira, and Surico (2020).

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