How Should Heterogeneity Affect the Design of Optimal Monetary and Fiscal Policy?

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Heterogeneity in Macroeconomics: Implication for Policy
NY Fed, November 2021

Overview

- **New Keynesian literature** provides us with a framework for thinking about:
  - **positive questions**: how monetary and fiscal policy *work*
  - **normative questions**: how monetary and fiscal policy *should be set*, on average and over the business cycle, if goal is to maximize welfare

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Today: overview of what we do know, my take on the key outstanding issues.

Outline of key issues for optimal policy in HANK

- Three fundamental questions:

1. What is the model?
2. What is our concept of optimal policy?
   - Ad-hoc objective function?
   - Objective function from within the model?
3. How do we solve each of these problems?

Outline of key issues for optimal policy in HANK

- Three fundamental questions:

1. What is the model? **we're getting close**
2. What is our concept of optimal policy?
   - Ad-hoc objective function? **we can do this**
   - Objective function from within the model? **still a lot to do**
3. How do we solve each of these problems?

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- Situation is more complex for HANK:
  1. **no single canonical tractable model**. Instead, a host of useful models that each capture some, but not all the relevant forces in HANK.
  2. **no consensus** on how to set up quantitative models, **details matter** a lot more than for RA models, only a few examples of models estimated on macro data.

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- But, we have made progress on 1 and 2!

Progress with tractable models

- **Two agent models** [Bilbiie 08, Bilbiie 19, Debortoli-Gali]
  - Captures high MPCs, but miss precautionary savings motive
  - Optimal policy: usual loss function, possibly with cons. inequality term added
- **Zero liquidity models** [Challe, Bilbiie, McKay-Reis]
  - Captures extreme precautionary motive, but miss MPC&wealth distribution
  - Usual loss function, natural rates of y and r affected by precautionary motive
- **CARA models** [Acharya-Dogra, Acharya-Challe-Dogra]
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  - Optimal policy “target criterion” stabilizes output to avoid cons. dispersion

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- **Bottom line**: models very useful to understand aggregate transmission (eg, discounted Euler equation) and give sense of shape of loss function.
  Too limited to build on for quantitative purposes.

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2. We now have systematic and fast methods to **get first-order perturbation solution** for realistic models with thousands of idiosyncratic states
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3. We are getting close to having **"plug-and-play" tools** for writing down models, obtaining their solution and estimating them on macro data

What is our concept of optimal policy?

- **NK model**: with relevant constant subsidy from fiscal policy in place, second order approximation to welfare delivers loss function from within the model

$$\mathbb{E}\left[\sum \beta^t \left((y_t - y_t^*)^2 + \lambda \pi_t^2\right)\right] \tag{1}$$

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- Two approaches from here:
  1. Specify an ad-hoc, non-microfounded loss function
  2. Directly solve for optimal policy

Ad-hoc loss function approach

- In this approach, we pre-specify the loss function directly

[e.g. Barnichon-Mesters, McKay-Wolf]

- Akin to using (1), but with something else than $\lambda = \frac{\epsilon}{\kappa}$ and/or arbitrary y_t^*
- Can include explicit consideration of distribution, etc.

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- Pros:
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- Cons:
  1. May miss out on important forces that the model cries for (e.g., insurance role)
  2. No guidance on what measure of distribution to use, or how to trade off any given measure of inequality vs aggregate objectives

Ad-hoc loss function approach: solution

- Suppose for instance that the loss function is

$$L = \frac{1}{2}\left(\mathbf{y}'\mathbf{y} + \lambda\pi'\pi\right)$$

where $\mathbf{y}$, π are $T \times 1$ paths, and the policy tool is the path of the real rate $\mathbf{r}$

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- The first-order perturbation solution in sequence space gives us

$$\mathbf{y} = \mathbf{y}_0 - B \cdot \mathbf{r}$$

$$\pi = \pi_0 - D \cdot \mathbf{r}$$

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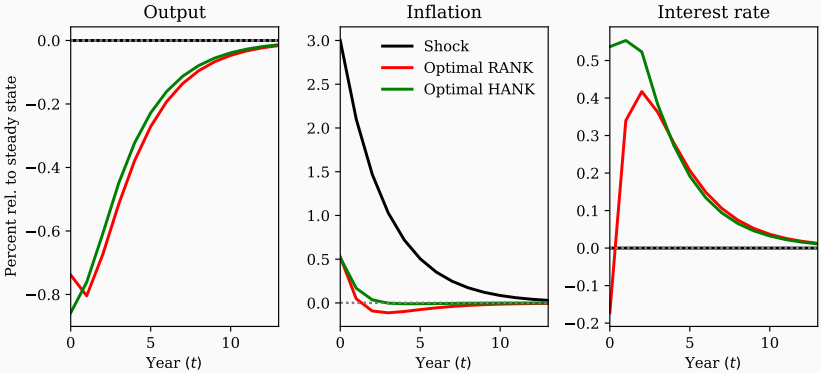
- This is the canonical QP problem with solution

$$\mathbf{r} = \left(B'B + \lambda D'D\right)^{-1}\left(B'\mathbf{y}_0 + \lambda D'\pi_0\right)$$

giving the optimal response of monetary policy to the shocks (cf OLS!)

An example: cost-push shock, optimal monetary policy

- Compare simple HA model vs RA. Solve optimal monetary policy:



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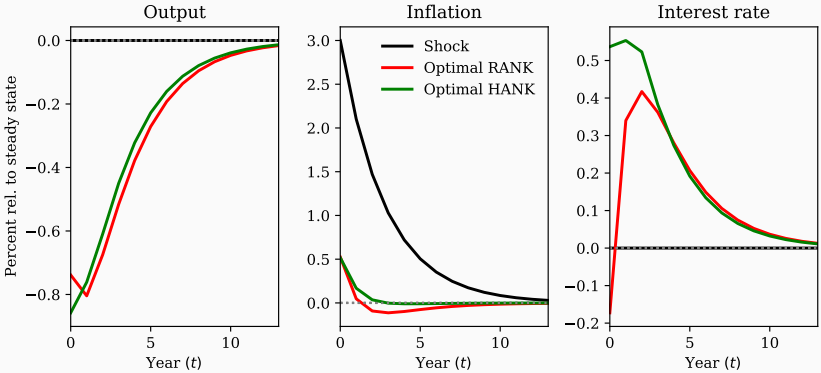

- Open question: when is optimal ad-hoc policy very *different* in HA vs RA?

Objective function from within the model

- **Goal**: solve for optimal policy under commitment in given HANK model
- **First step**: determine the steady state of the optimal Ramsey plan
  - i.e. where the planned economy goes absent any shocks
  - not the same as the “optimal steady state” in macro-PF!

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- Existing approaches here:
  - Parameterized search for optimal transition paths [Dyrda-Pedroni]
  - Lagrangian approach in state space [Hagedorn et al]
  - Perturbation around current point rather than steady-state [Bhandari et al]
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- **Next**: work in progress with Lagrangian approach in sequence space

[Auclert-Cai-Rognlie-Straub]

Simplest steady state problem

- Gov. issues bonds to provide liquidity, levies proportional income tax τ_t
- Labor supply is exogenous; agents solve

$$\mathcal{U}_i\left(\{r_t, \tau_t\}\right) = \max \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_{it})$$

$$\text{s.t. } b_{it} + c_{it} = (1 + r_{t-1}) b_{it-1} + (1 - \tau_t) e(s_{it})$$

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- Sequence-space method gives us $\mathcal{B}_t(\{r_s, \tau_s\})$ and $\mathcal{U}_i\left(\{r_t, \tau_t\}\right)$

Solution to steady-state problem

- Steady state (if exists) solves

$$\tau = rb$$

$$b = \mathcal{B}^{ss}(r, \tau)$$

$$(1 - \beta(1 + r))\, \lambda^{gov} = \lambda^{asset}$$

$$\overline{\mathbb{E}}\left[u'(c_i)\, \frac{e_i}{\overline{\mathbb{E}}[e_i]}\right] - \lambda^{gov} = \lambda^{asset} \lim_{s \to \infty} \sum_{t=0}^{\infty} \beta^{t-s} \frac{\partial \mathcal{B}_t}{\partial \tau_s}$$

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- **Results so far**: steady-state does not exist for this model (b diverges). In endogenous-labor model, exists only for certain $u(c, n)$.

Systematically solving for transitions

- Suppose we have the s.s. of the Ramsey plan. How to solve for dynamics?
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  - specific HANK issues: want to use unexpected policy changes for redistribution

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- **Approach 1**: embrace date-0 reoptimization!
  - solve for transition paths from any s.s. towards the Ramsey steady state
- **Approach 2**: get "timeless perspective" solution
  - write down the full Ramsey problem and take FOCs
  - systematic algorithm still far off (but sequence-space approach does simplify)

What general principles will emerge?

- Existing results from the literature that will certainly generalize:
  - Aggregate shocks have redistributive effects. Optimal Ramsey policy tries to undo these redistributive effects [Bhandari et al]
  - Date-0 planner inflates away nominal assets to redistribute to high $u'(c)$ agents [Nuno-Thomas]
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  - Date-0 planner lowers real rates to redistribute to to high $u'(c)$ agents [Acharya-Challe-Dogra]
- Specific findings from existing papers may or may not generalize:
  - Monetary policy seeks to undo redistribution from markup shocks by creating a demand-induced boom to redistribute back to workers [Bhandari et al]
  - Stabilize output level to stabilize cons. inequality [Acharya-Challe-Dogra]
  - Price stability as continued dominant concern [Legrand-Martin Baillon-Ragot]

Conclusion

- Optimal policy is an exciting frontier research area
- Next decade will likely see enormous progress, the way the past decade has seen progress on the positive front
- Let's reconvene then and take stock at that point!