Fiscal and Monetary Policy with Heterogeneous Agents

Replication of Auclert, Rognlie, and Straub (2024)

Replication Project

December 11, 2025

Outline

1. Research Context & Objectives

From TANK to HANK: The paper aims to extend the Two-Agent New Keynesian (TANK) framework into a canonical **Heterogeneous Agent New Keynesian (HANK)** model.

Three key puzzles to address:

1. Excess Savings: Explaining the accumulation of savings following fiscal shocks.
2. Forward Guidance: Addressing the larger variance in the effects of forward guidance.
3. Distributional Effects: Analyzing how aggregate shocks impact different segments of the population.

2. Specific Mechanisms Under Study

The authors focus on specific transmission channels that standard models overlook:

- Cyclicality of Income Risk:

  How income risk varies over the business cycle and impacts aggregate policy effects.
- Illiquid Accounts & MPCs:

  Modeling the correlation between wealth and Marginal Propensities to Consume (MPCs), specifically through "wealthy hand-to-mouth" households.
- Endogenous Portfolio Choice:

  The role of asset composition in the transmission mechanism.

3. Methodology: Sequence-Space & Shocks

Core Framework:

- New Keynesian Assumptions: Flexible prices and sticky wages.
- Agent Heterogeneity: Mass 1 of agents, ex-ante identical but ex-post different.
- Idiosyncratic Risk: Agents face shocks to labor productivity (e_{it}) and time discount factor (β_{it}).

Analytical Approach:

- Use of Sequence-Space methods for efficient decomposition.
- Focus on first-order **"MIT shocks"**: Unexpected at date 0, perfect foresight thereafter.

4. Main Results

Fiscal Policy Results

- **Fiscal:** Balanced budget is neutral; Deficit-financed is effective (if high-MPC agents benefit).
- **Monetary:** Exhibits "Monetary Equivalence" (same aggregate effects as standard NK).

General Equilibrium Dynamics

- The role of Indirect Effects: In HANK models, indirect general equilibrium effects (income feedback) play a much more critical role than direct substitution effects.

The Consumers' Program

Households maximize expected utility subject to budget and borrowing constraints.
Maximization Problem:

$$\max_{\{c_{it}\}} \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \left(\prod_{s \leq t-1} \beta_{is} \right) \{\log(c_{it}) - v(n_{it})\} \right]$$

Subject to:

$$\begin{aligned} c_{it} + a_{it} &\leq (1 + r_t^p) a_{it-1} + (1 - \tau_t) w_t e_{it} n_{it} \\ a_{it} &\geq 0 \end{aligned}$$

Note: Discount factors β_{is} are idiosyncratic and time-varying. Agents face a zero borrowing limit ($a_{it} \geq 0$).

Firms and Inflation

Firms, Pricing & Dividends

- **Production:** Linear technology implies Marginal Cost = Wage (W_t):

$$Y_t = N_t$$

- **Pricing:** Prices are a constant markup μ over marginal cost:

$$P_t = \mu W_t \implies w_t = \frac{1}{\mu}$$

- **Dividends:** Real post-tax dividends are derived as:

$$d_t = (1 - \tau_t)(Y_t - w_t N_t) = (1 - \tau_t)\left(1 - \frac{1}{\mu}\right) Y_t$$

Wage Phillips Curve

$$\pi_t^w = \kappa \left(v'(N_t) - \frac{1 - \tau_t}{\mu C_t} \right) + \beta \pi_{t+1}^w$$

Inflation is driven by the gap between the marginal cost of working and the marginal utility of consumption.

Government and Market Clearing

Government Policy

- Budget Constraint:

$$G_t + B_t = (1 + r_{t-1})B_{t-1} + \tau_t Y_t$$

- Monetary Policy (Taylor Rule):

$$1 + i_t = (1 + r_t)(1 + \pi_{t+1})$$

Asset Pricing & Market Clearing

- No-Arbitrage Condition (Stock Pricing):

$$1 + r_t = \frac{p_{t+1} + d_{t+1}}{p_t}$$

- Asset Market Clearing: $A_t = p_t + B_t$
- Goods Market Clearing: $C_t + G_t = Y_t$
- Ex-post return: $r^p_{t+1} = r_t$

Calibration of the Baseline HA Model

The model is calibrated to match the US economy (wealth distribution and aggregates).

Variable	**Value**	**Variable**	**Value**
r Real interest rate (annual)	2%	μ Markups	1.11
A Assets to GDP (annual)	500%	(β^L, β^H) Discount factors	$(0.91, 1.00)$
B Bonds to GDP (annual)	100%	ω Share of patient	49%
M_{00} Income-weighted MPC	0.2	q Prob of new β draw	1%
G Gov. spending to GDP	20%	T Taxes to GDP	22%

Table: Parameters matching the steady state targets

The Transmission Mechanism: iMPCs & Fiscal Policy

Aggregate Consumption Function

How does a tax cut (dT) translate into consumption (dC)?

$$dC = \underbrace{(M^r - pmq')}_{\mathcal{M}^r} dr + \underbrace{\left(\frac{1}{\mu}M + \left(1 - \frac{1}{\mu}\right) mq'\right)}_{\mathcal{M}}(dY - dT)$$

Decomposing the Mechanism:

- dT: The fiscal shock. A tax cut increases disposable income directly.
- $\mathcal{M}$ **(The Multiplier Matrix):**
  - Weighted average of MPCs out of labor income (M) and capital gains (m).
- **General Equilibrium:**

$$\text{Tax Cut } (\downarrow dT) \xrightarrow{\mathcal{M}} \text{Spending } (\uparrow dC) \rightarrow \text{Output } (\uparrow dY)$$

Note: High MPCs (M) amplify the impact of tax cuts on aggregate demand.

Replication: Fiscal Policy Shocks

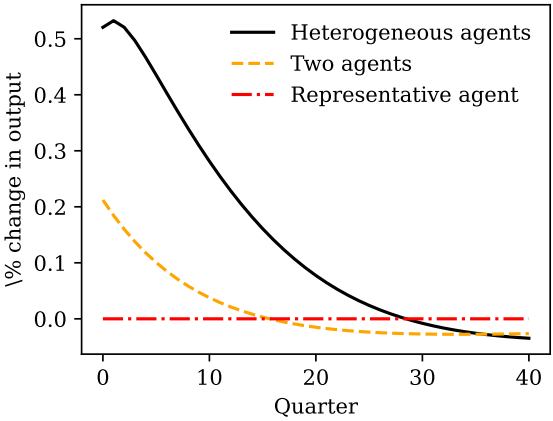

Figure: Deficit-Financed Policy (By Model)

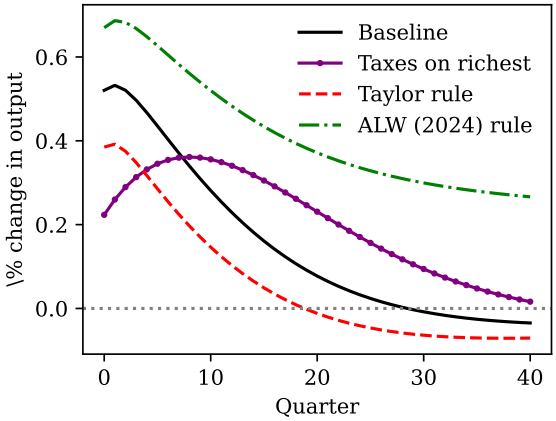

Figure: Deficit-Financed Policy (Alternative Rules)

Extension: Evolution of Inequalities

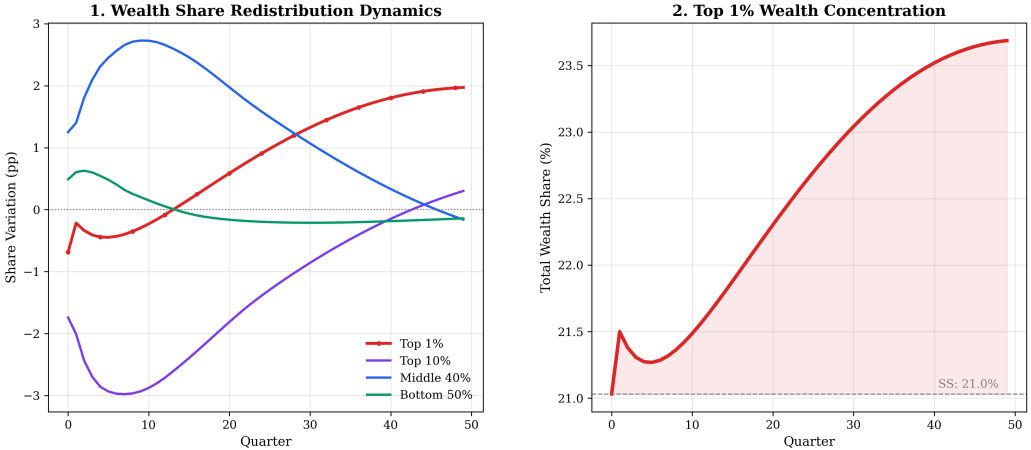

Figure: Inequality IRFs – Deficit-Financed Tax Cuts

Extension: Evolution of Inequalities

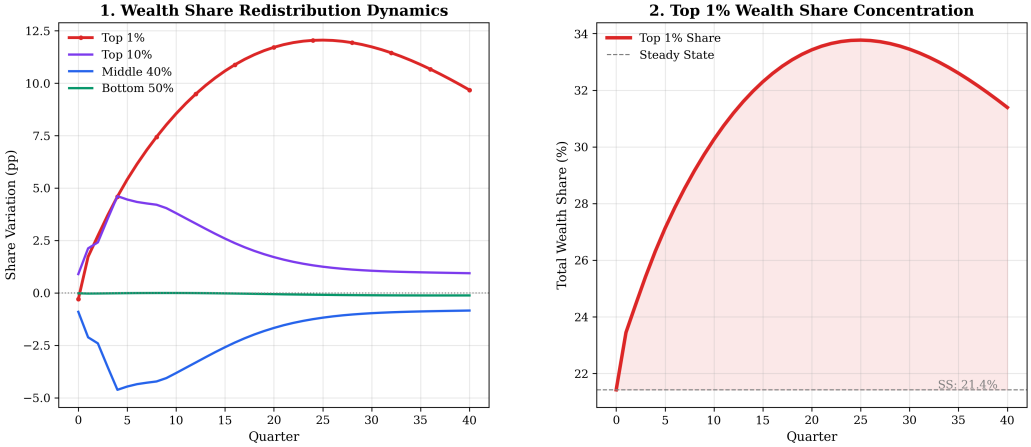

Figure: Inequality IRFs – Deficit-Financed Tax Cuts (Taxes on the Richest)