

**Homework: Computational Economics**  
**ECON 695F**  
**Concordia University**  
**Winter 2026**

1. Micro Jumps, Macro Humps

In a page or less, describe the issue raised by the authors when confronting heterogeneous-agent and representative-agent models with micro and macro data. Specifically, discuss which facets of the data each model can and cannot match, and describe the modification they propose to resolve this incompatibility.

2. Borrowing Constraint and MPC

We model the behavior of a mass one of heterogeneous households in discrete time. The model is in partial equilibrium, without aggregate risk: households face a constant interest rate  $r$  and average labor incomes  $w$ . Each household is indexed by its income state  $z$  and its liquid asset position  $a$ .  $z$  follows a Markov process with transition matrix  $\Pi$ .  $\underline{a}$  is the borrowing limit. Household behavior is characterized by the following dynamic programming problem:

$$V_t(a, z) = \max_{\{c, a'\}} \left\{ \frac{c^{1-\gamma} - 1}{1-\gamma} + \beta E_t[V_{t+1}(a', z') | z] \right\} \quad (1)$$

$$c + a' \leq (1 + r)a + wz \quad (2)$$

$$a' \geq \underline{a} \quad (3)$$

First, solve the model using the structural parameters presented in [Table 1](#). Discretize the AR(1) process for log earnings using the Rouwenhorst method with 7 nodes and discretize liquid assets on an exponential grid with 500 nodes, with a maximum asset value of 100. From the policy function, compute the aggregate MPC and report it. On a single plot with asset holdings on the x-axis, display the MPC for each earnings state, restricting the x-axis to the first 200 grid points.

Table 1: Structural Parameters

Parameter	Interpretation	Value
$\beta$	Discount factor	0.98
$\gamma$	Inverse EIS	1.
$r$	Net interest rate	0.01
$\underline{a}$	Borrowing constraint	0.
$\rho_z$	Autocorrelation of log earnings	0.95
$\sigma_z$	Standard deviation of log earnings	0.156
$w$	Average earnings	1.0

Repeat the same exercise with  $\underline{a} = -10$  and comment.

## References

- [1] Adrien Auclert, Matthew Rognlie, and Ludwig Straub. *Micro jumps, macro humps: Monetary policy and business cycles in an estimated HANK model*. NBER Working Paper No. w26647, 2020.
- [2] Adrien Auclert, Bence Bardóczy, Matthew Rognlie, et Ludwig Straub. *Using the sequence-space Jacobian to solve and estimate heterogeneous-agent models*. *Econometrica*, 89(5):2375–2408, 2021.