Macro III: Problem Set 2
Deadline: Monday, 16/9/2024

Tiago Cavalcanti

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1. **Huggett Model.** Consider the Huggett (1993) economy. Use these parameter values: period length is two months, $\beta = 0.96$ (annual basis) coefficient of relative risk- aversion $\sigma = 1.5$, $e_h = 1$, $e_l = 0.1$, $\pi(e_h|e_h) = 0.925$, $\pi(e_h|e_l) = 0.5$. Set the borrowing constraint equal to one year's average income. Construct an equally-spaced grid on asset holdings, with a maximum value equal to $3\times$ average income. Let the number of grid points $N = 200$. Suppose the interest rate $r = 3.4\%$ (annual basis).

   (a) Solve for optimal decision rules across the grid.

   (b) Imagine one agent, who starts out with zero assets and the high endowment. Simulate the evolution of the agent's wealth, income and consumption for 10,000 periods, each period drawing an endowment according to the Markov process described above. Plot a histogram for asset holdings over this simulation.

   (c) Over the last 1,000 periods of this simulation: (i) What is the average value for asset holdings? (ii) What is the average decline in consumption in response to entering unemployment? (iii) What is the average value for consumption conditional on being (1) employed, (2) unemployed, (3) unemployed in the current period and in each of the previous 5 periods (i.e. unemployed for at least 12 months)? (d) What are the correlations between earnings, income, wealth and consumption?

aumentar tolerância

plottar distribuições no mesmo gráfico

custo de bem-estar da mudança: mudanças na função valor de cada asset-state pair
melhor: qual o aumento percentual do consumo permanente que você tem que dar pro agente pra ele retornar à situação original

plottar a. e, mu em um gráfico tridimensional

   (d) Suppose the net supply of assets is zero. What is the market-clearing interest rate? Repeat the same exercises of (b) and (c).

   (e) Suppose we were to increase the value for the risk aversion coefficient, σ, from 1.5 to 3. What would happen to (i) the equilibrium interest rate? (ii) standard measures for wealth dispersion (e.g. the Gini coefficient)? Explain.

   (f) Suppose we were to decrease the value of the borrowing constraint by half. What would happen to (i) the equilibrium interest rate? (ii) standard measures for wealth dispersion (e.g. the Gini coefficient)? Explain.

$\phi = -1$

$\pi^*(-1)$

$$V^1(a,e) = \text{Max}\left\{ u(c) + \beta E[V(a',e')] \right\}$$

$$c + a' = (1+r)a + e$$

$\phi = -2$

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma}$$

$\pi^*(-2)$

$$V^2(a,e) = \text{Max}\left\{ u(c) + \beta E[V(a',e')] \right\}$$

$$V^1(a,e) \quad \overbrace{\qquad}^{(1+\mu)^{1-\sigma} u(c)}$$

$$V^2(a,e) = u((1+\mu)c) + (1+\mu)^{1-\sigma} \beta E[V(a',e')]$$

$$V^1(a,e) - V^2(a,e) \times (1+\mu)^{1-\sigma} = 0$$

$$(1+\mu) = \left(\frac{V^1(a,e)}{V^2(a,e)} \right)^{\frac{1}{1-\sigma}}$$