Econ 210C Homework 2

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Due: 5/13/2022, 11:59PM PST, on your Github repository.

1. Complementarity of Money and Consumption

Suppose the utility function in our classical monetary model is now

$$U(X_t, L_t) = \frac{X_t^{1-\gamma} - 1}{1 - \gamma} - \chi \frac{N_t^{1+\varphi}}{1 + \varphi}$$

where X_t is a composite of consumption and money,

$$X_t = \left[(1 - \vartheta)C_t^{1-\nu} + \vartheta \left(\frac{M_t}{P_t} \right)^{1-\nu} \right]^{\frac{1}{1-\nu}}$$

(a) Derive the first order conditions for this economy.

(b) Under what conditions does this economy predict that money is neutral? Explain why.

(c) Solve analytically for the steady state of the model (as far as you can), assuming $A = 1$.

(d) Based on your steady state equations describe an algorithm for how to solve for the steady state.

(e) How would you calibrate ϑ given knowledge of ν? (I.e., what moments of the data would you use and how?)

(f) Given knowledge of other parameters, how would you set M such that $P = 1$ in steady state?

(g) Derive the log-linearized model.

(h) Following your calibration strategy for each of $\nu \in \{0.25, 0.5, 1, 2, 4\}$, solve the model using sequence space methods using the following parameters:

$$\gamma = 1, \varphi = 1, \chi = 1, \beta = 0.99, \rho_m = 0.99$$

where $m_t = \rho_m m_{t-1} + \epsilon_t^m$.

Report the IRFs for consumption, prices, the nominal interest rate. Your graph for each variable should contain all five cases, appropriately labelled.

(i) Intuitively explain your results.

(j) If you had evidence that an increase in the money supply increases consumption, which values for ν can you rule out? Explain why.

(k) Make sure your code packet contains a file that produces your graphs with a single click. (It does not need to save the graphs.) Upload it to Github.