Problem Set 1

Econ 210C:
Due Friday May 3, 2019, at 5pm.

April 25, 2019

Question 1.
Log- linearize the following production function:

$$Y = (\alpha K^{\rho_t} + (1-\alpha)L^{\rho_t})^{1/\rho_t}.$$

What does the value of ρ_t say about the relationship between capital, labor and production? Why could this change over time?

Question 2: Investment and the Housing Market
This question is similar to question 1 from Johannes' Homework 2:
Consider the following continuous model of the housing market:

$$\begin{aligned} I &= \phi(P), \phi' > 0, \\ \dot{P} &= P(r+\delta) - R, \\ R &= R(H), R' < 0, \\ \dot{H} &= I - \delta H. \end{aligned}$$

(a) Explain why each of the equations of the model is reasonable.

(b) Rewrite the model in terms of two variables (a state variable H and a costate variable P) and two equations of motion.

(c) In a phase diagram, display the system dynamics.

(d) What is the steady-state effect on H, P, I, and R of an increase in the real interest rate r?

(e) What is the effect on H, P, I, and R over time of an unanticipated, permanent increase in the real interest rate r?

(f) What is the effect of an unanticipated, temporary increase in the real interest rate?

(g) What is the effect of an announced, future, permanent increase in the real interest rate?

(h) Suppose that instead of having rational expectations (here, perfect foresight) about the price of a house, people have static expectations they expect that the price of a house will never change from what it is now. Which equation will this change? Redo part (e) under this new assumption.

(i) How could you use this model to analyze the housing crisis?

Question 3: Government Spending and the RBC model

Consider the Real Business Cycle model with government spending in Johannes Notes and in Lecture (see chapter 1 and pages 31-32).

(a) Explain intuitively why consumption decreases and hours increase following a permanent increase in government spending. What assumptions have we made on utility as it relates to consumption and leisure that achieves this result?

Suppose that instead of a closed economy, we want to model a small open economy with free capital flows. Assume that the discount rate at home β is equal to the discount rate abroad β^w.

(b) How does the real interest rate respond to a change in government spending under the assumption of a small open economy?

(c) Draw two IRF's: (1) the response of consumption following a permanent increase in government spending when the economy is closed: (2) the response of consumption following a permanent increase in government spending when the economy is small and open. Make sure to label the steady state before and after the shock on the Y axis and the time period that the shock occurs.

(d) Give an intuitive explanation of why the response of consumption to a government spending shock is different in a small-open economy.