Problem set 1

This problem set is due on September 26 at 4pm. Drop your assignment into the drop-box located in front of my office door (Purnell 413). No late homework will be accepted.

1. One-Period Model

1) Define a Competitive equilibrium (hereafter CE) formally with a basic economic environment we used in lectures.

2) Imagine that the economy is hit by destructive hurricane Florence, which affects the total factor productivity. What are the equilibrium effects of this? (Determine how equilibrium \( c, n, Y, \) and \( w \) change.) Make assumptions if necessary and clearly state them.

3) Suppose that the substitution effect dominates the income effect when the market price changes. Further suppose that the government increases the spending and use it for the improvement on infrastructure in the economy (i.e., building bridges and constructing roads, etc.). What are the equilibrium effects of this?

4) Suppose that the government adopts a lump-sum tax system under which the total tax amount is \( T \). Further suppose that the government decreases tax amount. What are the effects of a decrease in \( T \) on consumer’s optimal consumption \( (c) \) and leisure \( (l) \)? Explain why.

5) Suppose that the government replaces a lump-sum tax system with a proportional labor income tax system. That is, the government imposes a proportional tax on the representative consumer’s labor income, whose tax rate is \( t \). Further suppose that the government decreases the proportional income tax rate. What are the effects of a decrease in \( t \) on \( c \) and \( l \)? Explain why.

6) Show that the consumer is better off with a lump-sum tax rather than a proportional tax on labor income given that either tax yields the same revenue for the government. Use a diagram to show this.

II. Search and Unemployment

A. One-sided model

1) The job finding rate for the first few months in 2018 hovered around 25 percent. The layoffs and discharges rate was around 3.2 percent. What is the long-run unemployment rate?
2) Suppose that the initial unemployment rate is 4.7 percent. Compute the transition unemployment rates sequentially until period 50 and plot them. (Use Excel to make your life easier.) Do you see that the unemployment rate converges to the long-run unemployment rate you calculated in (1)?

3) Suppose that there is an increase in the total factor productivity (TFP). In the McCall’s (One-sided) model, determine the effects of this on the reservation wage and the steady-state unemployment rate.

4) With an aid of diagrams, state/describe the reservation wage property.

5) We now consider a modification of the McCall’s (One-sided) model in which the worker faces probability $\alpha$ of being fired, where $0 < \alpha < 1$. That is, the worker is now facing uncertainty about her job. Compare the value of employment when the worker faces uncertainty about her job and the one when the workers does not have any uncertainty about her job. Also compare the reservation wage properties of the two cases.