Masters Macroeconomics Fall 2015
Homework Assignment #5 Due: 28 October

1. Suppose that there are one million people in the labor force. Of those unemployed at the beginning of any month, 23.5% find a job during the month. Of those employed at the beginning of a month, 1.5% lose their jobs during the month. At the beginning of October, there are 80 000 people unemployed. (Be sure to show your calculations for each part. Points are awarded not just on getting the right answers, but on following an appropriate method to get them.)

a. What is the steady-state or "natural" unemployment rate for this economy?
b. What is the unemployment rate at the beginning of October?
c. How many people will find jobs in October?
d. How many people will lose jobs in October?
e. How many people will be unemployed at the beginning of November? What is the unemployment rate at the beginning of November?
f. Is the unemployment rate moving toward the natural rate?

2. (You will want access to a scientific calculator for this problem. Visit http://web2.0calc.com/ or another similar Web site if you do not have one.) Consider an economy with the following Cobb-Douglas production function: $Y = K^{1/3}L^{2/3}$. The economy has 1000 units of capital and a labor force of 1000 workers. The size of the labor force is fixed and does not depend on the wage. (As above, be sure to show your calculations for each part so that I can see how you got the numbers.)

a. If labor and capital are fully employed, how much output does this economy produce?
b. Derive an equation for labor demand in this economy as a function of the real wage W/P and the capital stock. (Hint: Review the marginal productivity theory of income distribution in Mankiw's Chapter 3.)
c. If the real wage adjusts to balance labor demand with labor supply, what will be the equilibrium real wage? What is the total amount of wage income earned collectively by all workers?
d. Now suppose that the government, concerned about the welfare of the working class, passes a law requiring firms to pay workers a real wage of 1 unit of output. How does this wage compare to the equilibrium wage?
e. The government cannot force firms to hire workers; firms decide on the level of employment according to their labor-demand equation, which you derived in part b. With the real wage fixed at 1, what will be the level of employment? How much output will be produced? How much wage income will be earned collectively by all workers?
f. Will the government succeed in its goal of helping the working class? Explain.

3. Consider an economy with 1 000 000 people in the labor force. At the beginning of each month, 100 000 people lose their jobs and remain unemployed exactly one month; one month later they find new jobs and become employed. In addition, on 1 January of each year, 40 000 people lose their jobs and remain unemployed for six months before finding new jobs. Finally, on 1 July of each year, 40 000 people lose their jobs and remain unemployed for six months before finding new jobs.

a. What is the unemployment rate in this economy in a typical month? Is it the same for every month or are there seasonal differences?
b. What fraction of unemployment spells lasts for one month? What fraction lasts for six months?
c. On any particular date, what fraction of the unemployed are suffering a long spell (six months) of unemployment?
d. What is the duration of the average unemployment spell? (We calculate this as a weighted average. If there are six spells of one month and four spells of two months, then the average spell is $[(6 \times 1) + (4 \times 2)] / 10 = 1.4$ months.)

4. The paper on the reading list by Nickell, Nunziata, and Ochel presents detailed evidence on the structure of unemployment benefits in many countries at several dates.

a. In general terms, what do we mean by the "replacement rate" for unemployment benefits?
b. How would you expect a higher replacement rate to influence the behavior of unemployed job searchers? How would this affect the natural unemployment rate?
c. Based on the table(s) in the paper, which countries had high and low replacement rates in 1999?
d. The duration of time that benefits are available also varies across countries. How would you expect a longer duration of benefits to influence the behavior of unemployed job searchers? How would this affect the natural unemployment rate?
e. Based on the table(s) in the paper, which countries had the longest and shortest duration of benefits in 1999?
f. Compare your answers to parts c and e with the unemployment rates for these countries shown in the table(s) in the paper. Is there a clear pattern, a weak pattern, or no pattern at all of correlation between the characteristics of unemployment benefits and the rate of unemployment? Use specific examples to support your answer.
g. Under current policies, what are the replacement rate and duration of unemployment benefits in the Slovak Republic? (Use appropriate Internet sources.) Based on your answers above, how, if at all, would you recommend that the Slovak unemployment-benefits program be revised, given that the current unemployment rate of 11.3% is quite high, though it has been falling steadily throughout 2015?