

Economics 302
Spring 2007
Homework #2
Due Tuesday, March 13

Homework will be graded for content as well as neatness. Sloppy or illegible work will not receive full credit.

1. Cowtopia is a small economy in the North. It produces milk with a standard (constant returns to scale) Cobb-Douglas production function with capital share $\frac{1}{2}$ (this is alpha). The technology level, A , is 10; the capital stock, K , is 100, and labor, L , is 400. The households in Cowtopia have aggregate demand for milk which is a linear function of disposable income. In particular, $C = 250 + .75(Y-T)$. The government spends 700 each year and runs an annual deficit of 200. Finally, domestic firms have aggregate investment demand $I = 1000 - 50r$; while the world interest rate is 5%. Initially, Cowtopia's economy is closed to the outside world.

a. What is the equilibrium real interest rate? Include a graph to explain the market clearing condition.

Now, suppose that Cowtopia receives advice from the IMF (The International Monetary Fund) to open its economy to the outside world.

b. Explain what the domestic interest rate will be and why. Use a graph and explain how your answer and the equilibrium condition are different from in part (a). Be sure to explain in particular why the domestic interest rate would *always* be what you say. What do you need to *assume* for this to be the case?

c. What is national savings?

d. What is the trade balance?

e. Suppose a world war breaks out (wolves versus cows). Predict what would happen to the world interest rate. Be sure to clarify what happens in the market in which this interest rate is determined. Suppose the "shock" has the affect of moving the world interest rate by 5 percentage points. What happens to Cowtopia's trade balance?

f. Now extend the model described above so that net exports in Cowtopia are affected by the real exchange rate, ϵ . Specifically, suppose the trade balance is related to the real exchange rate in Cowtopia according to the following equation

$$NX = 250 - 250 \epsilon.$$

Using this information, calculate the equilibrium real exchange rate associated with your answers to (d) and (e) above.

2. Consider an island with a labor force of 10,000. Everyone on the island fishes, but in order to fish you have to be hired by a boat. In any period (think of a period as a month) 1% of all employed fishermen/women lose their jobs (this is the job separation rate). At the same time, in any period, 20% of unemployed workers get hired (the job finding rate).

a. What is the natural rate of unemployment on the island?

b. Suppose that in year zero, 2,000 people are unemployed. What is the unemployment rate in year zero?

c. [For this part, you will need to use Excel.]

Suppose that the job finding rate, f , and the job separation rate, s , are as given at the beginning of the problem. Also, suppose that the labor force is constant over time.

Given these rates s and f , what would be the number of unemployed workers in period 1? [Hint, if $E(0)$ is the number of employed in period 0 and $U(0)$ the number of unemployed, then the number employed in year 1 is given by the formula:

$E(1) = (1-s)E(0) + fU(0)$.] Before using the formula in the “hint,” explain what it says and why you would expect it to hold.

Now, using Excel, repeat the calculation you just did in order to determine the number of employed workers in periods 1 through 50 (use an Excel formula!). Given that $L=10,000$ for every period, calculate also the number of unemployed workers and the unemployment rate in every period, 1 through 50. In other words, fill in the following table of the form:

Year	Labor force	Employed	Unemployed	Unemployment rate
0	10,000		2,000	
1	10,000			
2	10,000			
3	10,000			

. . . (for all 50 years!)

d. What do you notice about the unemployment rate over time? Look at your answer to part (a) before answering. The natural rate of unemployment is sometimes referred to as the steady state unemployment rate. Can you guess why?