Econ305 – Intermediate Macroeconomic Theory and Policy

Midterm Exam Solutions

October 17, 2007

The exam consists of 4 sections. The first section consists of 10 fill-in-the-blanks questions. The second section has 4 short-essay questions. The third section has 10 multiple-choice questions. Finally, the last section has a bonus question. PLEASE ANSWER ALL OF THEM.

The duration of the exam is 1 hr 15 minutes. DO NOT OPEN the exams until you are told to do so and STOP writing when you are told that the exam is over. Failure to comply will result in a 10% loss in the grade.

Do not forget to write your name and university ID number on the exam booklet.

NO PROGRAMMABLE OR FINANCIAL CALCULATORS ARE ALLOWED. Only simple calculators can be used.

GOOD LUCK!

Section A: Fill-in-the-blanks (each question is worth 0.5 points)

1. One of the economic statistics used to measure inflation is GDP deflator/CPI

2. Assume that a rancher sells McDonald's a quarter-pound of meat for $1 and that McDonald's sells you a hamburger made from that meat for $2. In this case, the value included in GDP should be $2

3. If disposable income is 4,000, consumption is 3,500, government spending is 1,000, and tax revenues are 800, national saving is equal to 300 (solution: Y-T=4000, C=3500, G=1000, T=800. Private saving=Y-T-C=400-3500=500. Public saving T-G=800-1000=-200. National saving=Private saving + Public saving=500-200=300)

4. According to the model developed in Chapter 3, when taxes decrease consumption increases

5. Assume that the consumption function is given by $C = 150 + 0.85(Y - T)$. The marginal propensity to consume is 0.85

6. If the money supply increases 12 percent, velocity decreases 4 percent, and the price level increases 5 percent, then the change in real GDP must be 3 percent (solution: $\frac{\Delta M}{M}+\frac{\Delta V}{V}=\frac{\Delta P}{P}+\frac{\Delta Y}{Y}$, $12-4=5+\frac{\Delta Y}{Y}$, $\frac{\Delta Y}{Y}=3$)

7. If there are 100 transactions in a year and the average value of each transaction is $10, then if there is $200 of money in the economy, transactions velocity is 5 times per year. (solution: M*V = P*T, 200*V = 10*100, V = 5) [This question is from PQ2 No 4]

8. If the nominal interest rate is 1 percent and the inflation rate is 5 percent, the real interest rate is -4 percent. (solution: $i = r + \Pi$, 1 = r + 5, r = -4) [This question is from PQ2 No 11]

9. Economists call the changes in the composition of demand among industries and regions sectoral shifts

10. One of the reasons of structural unemployment is wage rigidity/min wages/unions/efficiency wages

Section B: Essay Questions (each question is worth 5 points)

Note: Please show all your work including the intermediate steps and please try to be neat when writing your answers.

1. Assume that apples cost \$0.50 in 2002 and \$1 in 2007, whereas oranges cost \$1 in 2002 and \$1.50 in 2007. 4 apples were produced in 2002 and 5 in 2007, whereas 3 oranges were produced in 2002 and 5 in 2007.
    a. What is the formula for the GDP deflator in 2007, using 2002 as the base year?
    b. Calculate the GDP deflator in 2007, using 2002 as the base year.

SOLUTION:

	2002	2007
P_{apple}	0.50	1
P_{orange}	1	1.5
Q_{apple}	4	5
Q_{orange}	3	5

$$GDPdeflator = \frac{NGDP}{RGDP}$$
$$= \left[\frac{[P(apple2007)*Q(apple2007)]+[P(orange2007)*Q(orange2007)]}{[P(apple2002)*Q(apple2007)]+[P(orange2002)*Q(orange2007)]}\right]$$
$$= \left[\frac{[1*5]+[1.5*5]}{[0.5*5]+[1*5]}\right] = \frac{12.5}{7.5}$$

2. Use the model developed in Chapter 3, but assume that consumption depends positively on the level of real balances, and real balances depend negatively on the nominal interest rate. What happens to consumption and the level of investment when money growth rate increases? Explain your answer using the equilibrium condition.

SOLUTION: [This question is from PQ2 No 21]
The new equilibrium condition is given by

$$\overline{Y} - C\left(\frac{M}{P}(i), \overline{Y} - \overline{T}\right) - \overline{G} = I(r).$$

Using the Fisher equation and the quantity equation, we can link the equilibrium condition to money growth rate.

According to the quantity equation

$$\frac{\Delta M}{M}+\frac{\Delta V}{V}=\frac{\Delta P}{P}+\frac{\Delta Y}{Y}$$

$$\frac{\Delta M}{M}+\frac{\Delta V}{V}=\Pi$$

because according to the model developed in Chapter 3 output is constant. So when the money growth rate increases, there is higher inflation. According to the Fisher equation

$$i=r+\Pi$$

which states that higher inflation leads to higher nominal interest rates. Since real balances depend negatively on the nominal interest rate, higher money growth rate is then associated with lower real balances, and since consumption depends positively on real balances this implies a fall in consumption. Finally since consumption is less, the level of savings and investment are higher at the equilibrium.

3. Suppose velocity is constant, money is growing 5% per year; output is growing 2% per year, and the real interest rate 4 percent.
    a. What is the nominal interest rate?
    b. If the Fed increases the money growth rate by 2 percentage points per year, how does the nominal interest rate change?
    c. Suppose the money growth rate is still 5% per year but the growth rate of Y falls to 1% per year and the Fed wishes to keep the inflation rate constant. What should be the monetary policy in this case?

SOLUTION: [This question is from the lecture notes]

a. According to the quantity equation:

$$\frac{\Delta M}{M}+\frac{\Delta V}{V}=\frac{\Delta P}{P}+\frac{\Delta Y}{Y}$$

$$\frac{\Delta M}{M}+\frac{\Delta V}{V}=\Pi+\frac{\Delta Y}{Y}$$

We have: $5+0=\Pi+2$ so $\Pi=3$

According to the Fisher equation $i=r+\Pi$. This means $i=4+3=7$

b. If the Fed increases the money growth rate by 2 percentage points, with constant velocity and 2 percent output growth, the new inflation rate becomes 5 percent, i.e. a one-for-one increase in inflation. This implies a nominal interest rate of 9 percent, i.e. an increase of 2 percentage points.

c. With money growth rate at 5 percent and constant velocity, when output growth falls to 1 percent per year, without any intervention, inflation rate (via quantity equation) increases to 4 percent. If the Fed wants to keep the inflation at 3 percent, it should decrease the money growth rate by 1 percentage point to 4 percent.

4. Suppose the rate of job separation is 0.02 and the rate of job finding is 0.08 and the current unemployment rate is 0.10. How will the unemployment rate change in the next period (increase or decrease) and why?

SOLUTION:

We are given that $s = 0.02$ and $f = 0.08$. The steady state of unemployment rate is described by:

$$sE = fU$$
$$s(L - U) = fU$$
$$sL - sU = fU$$
$$sL = sU + fU$$
$$sL = (s + f)U$$
$$s = (s + f)\left[\frac{U}{L}\right]$$
$$\left[\frac{U}{L}\right] = \left[\frac{s}{s + f}\right] = \left[\frac{0.02}{0.02 + 0.08}\right] = 0.2$$

Since the current unemployment rate (0.10) is below the equilibrium unemployment rate, in the next period unemployment rate will increase and move toward the equilibrium level. [Note that unemployment will not double in the next period, this is about transition to the equilibrium when you are off the equilibrium].

Section C: Multiple Choice Questions (each question is worth 0.5 points)

1. Okun's law is the _____ relationship between GDP and the _____.
   A) negative; unemployment rate
   B) negative; inflation rate
   C) positive; unemployment rate
   D) positive; inflation rate

2. *All* of the following are measures of GDP *except* the total:
   A) **expenditures of all businesses in the economy.**
   B) income from all production in the economy.
   C) expenditures on all final goods produced.
   D) value of all final production.

3. In the classical model with fixed income, if the demand for goods and services is greater than the supply, the interest rate will:
   A) increase.
   B) decrease.
   C) remain unchanged.
   D) either increase or decrease, depending on whether consumption is greater or less than investment.

4. According to the model developed in Chapter 3, when government spending increases but taxes are not raised, interest rates:
   A) increase.
   B) are unchanged.
   C) decrease.
   D) can vary.

5. If the consumption function is given by the equation $C = 500 + 0.5Y$, the production function is $Y = 50K^{0.5}L^{0.5}$, where $K = 100$ and $L = 100$, then C equals:
   A) 1,000.
   B) 2,500.
   C) 3,000.
   D) 5,000.

[This question is from PQ1 No 17]

6. When the demand for money parameter, k, is large, the velocity of money is _____ and money is changing hands _____.
   A) large; frequently
   B) large; infrequently
   C) small; frequently
   D) small; infrequently

7. Assume that creditors and debtors have symmetric expectations of inflation. In the case of an unanticipated increase in inflation:
    A) creditors with an unindexed contract are hurt because they get less than they expected in real terms.
    B) creditors with an indexed contract gain because they get more than they contracted for in nominal terms.
    C) debtors with an unindexed contract do not gain because they pay exactly what they contracted for in nominal terms.
    D) debtors with an indexed contract are hurt because they pay more than they contracted for in nominal terms.

[This question is from PQ2 No 17]

8. The costs of reprinting catalogs and price lists because of inflation are called:
    A) menu costs.
    B) shoe-leather costs.
    C) variable yardstick costs.
    D) fixed costs.

[This question is from PQ2 No 15]

9. When insiders have a much greater impact on the wage bargaining process than do outsiders, the negotiated wage is likely to be _____ the equilibrium wage.
    A) much greater than
    B) much less than
    C) almost equal to
    D) about one-half of

10. Which of the following is an example of frictional unemployment?
    A) Dave searches for a new job after voluntarily moving to San Diego.
    B) Elaine is willing to work for less than the minimum wage, but employers cannot hire her.
    C) Bill is qualified and would like to be an airline pilot, but airlines do not find it profitable to hire him at the wage established by the airline pilot's union.
    D) Joan is willing to work at the going wage, but there are no jobs available.

Section D: Bonus Question (5 points)

Use the model developed in Chapter 3, but assume that consumption also depends on the real interest rate. Other things being equal, consumption decreases when the interest rate rises. Graphically illustrate the impact of an increase in investment demand. Be sure to label: the axes, the curves, the initial equilibrium values, the direction curves shift, and the terminal equilibrium values.

SOLUTION: In this adjusted model, since consumption depends on the real interest rate besides the disposable income, savings become a function of the real interest rate, as well. Since, all else equal, consumption decreases when the interest rate rises, savings given by $\overline{Y} - C(r, \overline{Y} - \overline{T}) - \overline{G} = I(r)$ increase when the interest rate rises. In order to get any point in this bonus question, you had to realize that the savings curve is now positively sloped. If you did put an upward sloping savings curve, the total amount of points earned depended on whether you put the axes, the initial equilibrium values, the direction curves shift, and the terminal equilibrium values right.