

ECON 222
Macroeconomic Theory I
Fall Term 2010

Assignment 4

*Due: Drop Box 2nd Floor Dunning Hall by **noon November 26th 2010***

No late submissions will be accepted
No group submissions will be accepted
No “Photocopy” answers will be accepted

*Remarks: Write clearly and concisely. Present graphs, plots and tables in a format that is easy to understand. The way you present your answers will be reflected in the final grade. Even if a question is mainly analytical, **briefly** explain what you are doing, stressing the economic meaning of the various steps.*

Question 1: Deriving and Solving the IS-LM Model (closed economy) (30 Marks)

Desired consumption, desired investment, and government spending in a closed economy are

$$C^d = 360 - 200r + 0.1Y$$

$$I^d = 120 - 400r$$

$$G = 120$$

1. Find an equation for desired national saving, S^d in terms of output Y and the real interest rate r . What value of the real interest rate clears the goods market when $Y = 550$? When $Y = 600$? When $Y = 650$? Use the goods market equilibrium condition to derive the IS curve. Graph the IS curve.

In the same economy, the real money demand function is

$$\frac{M^d}{P} = 100 + 0.2Y - 2000i$$

Assume that $M = 300$, $P = 2.0$, and $\pi^e = 0$.

2. What is the real interest rate r that clears the asset market when $Y = 550$? When $Y = 600$? When $Y = 650$? Use the asset market equilibrium condition to derive the LM curve. Graph the LM curve.

Now suppose that the full employment level of output is $\bar{Y} = 640$. Add the FE line to your graph with the IS and LM curves. If there is no point where all three curves intersect, the economy must not be in general equilibrium. One of the assumptions of the IS-LM framework is that the price level P adjusts to restore general equilibrium.

3. To what price level P does the economy converge in order to restore general equilibrium in this economy? During this time of price level adjustment, by how much does the actual rate of inflation exceed the expected rate of inflation, $\pi^e = 0$?

Question 2: Shocking to the IS-LM Model (closed economy) (25 marks)

Consider the following economy:

$$C^d = 200 + 0.5Y - 500r$$

$$I^d = 200 - 500r$$

$$L = 0.5Y - 250(r + \pi^e)$$

$$\pi^e = 0$$

$$G = 150$$

$$M = 4900$$

$$\bar{Y} = 1000$$

1. What are the general equilibrium levels of the real interest rate r , the price level P , desired aggregate consumption C^d , and desired investment I^d ?
2. Suppose that the majority of economic activity in this economy is wine-making. Because vineyards are highly sensitive to the climate, let's imagine that the weather this year is unusually conducive to growing grapes. In the IS-LM framework, this situation represents a beneficial supply shock. Specifically, suppose the full-employment level of output $\bar{Y}$ increases temporarily to $\bar{Y}' = 1050$. Show what happens to the economy in a graph. What will be the new long-run equilibrium value of r and how will the new general equilibrium come about? What is the new price level P ?
3. Consider again the positive supply shock from part 2. The Bank of Canada does not want the price level to fall. To prevent this from happening, the Bank of Canada conducts open market operations to adjust the supply of money in the economy, M . By how much does the money supply M have to change in order to prevent the price level from changing? Does this involve an open market purchase or an open market sale?

Question 3: Deriving the AD Curve (closed economy) (20 marks)

Consider an economy with the following IS and LM curves:

$$Y = 4350 - 800r + 2G - T \quad (\text{IS})$$

$$\frac{M}{P} = 0.5Y - 200r \quad (\text{LM})$$

1. Suppose that $T = G = 450$ and that $M = 9000$. Find an equation for the aggregate demand curve. [Hint: Use the IS and LM equations to find a relationship between Y and P]. If the full-employment level of output is $\bar{Y} = 4600$, what are the equilibrium values for r and P ? Illustrate the long-run equilibrium in the AD-AS diagram.
2. Repeat part 1 for $T = G = 330$ and $M = 9000$ with $\bar{Y}$ fixed. Repeat part 1 for $T = G = 450$ and $M = 4500$ with $\bar{Y}$ fixed. You don't have to draw more AD-AS graphs.

Question 4: IS-LM model in an open economy : the case of the UK (25 marks)

The economy of the United Kingdom can be characterized by the following set of equations :

$$\begin{aligned}
 \bar{Y} &= 2400 \\
 \frac{M^D}{P} &= 1470 + 0.4Y - 10000(r + \pi_e) \quad (\pi_e = 0.03) && \text{(Real money demand)} \\
 \frac{M^S}{P} &= 2000 && \text{(Real money supply)} \\
 C^d &= 388 + 0.6(1 - t)Y - 50000r \quad (t = 0.4) && \text{(Desired consumption)} \\
 I^d &= 600 - 12000r && \text{(Desired savings)} \\
 NX &= 300 - 0.2Y + 0.01Y_{for} + 10000(r - r_{for}) && \text{(Net exports)} \\
 Y_{for} &= 12000 && \text{(Foreign real output)} \\
 r_{for} &= 0.02 && \text{(Foreign real interest rate)} \\
 G &= 900 && \text{(Government spending)} \\
 TR &= 200 && \text{(Government transfers)}
 \end{aligned}$$

where the relevant numbers are measured in (real) billions of pounds sterling. Answer the following questions:

1. Find the IS equation, the LM equation, the short-run equilibrium values of interest rate and output. Is the economy above or below its full output?
2. Suppose the debt of the public sector is of 68% of GDP. Compute the annual interest payment the government must pay to service their debt, as well as the government budget deficit. Express the government deficit as a percentage of GDP?
3. Assume now that transfers are given to consumers so that the above equations is actually :

$$C^d = 188 + TR + 0.6(1 - t)Y - 50000r, \quad (t = 0.4) \quad \text{(Desired consumption)}$$

Moreover, the rest of the world recovers from the recession. Hence, Y_{for} will increase to 14000 and r_{for} reaches 0.04 in the current period.

A new elected government thinks that the public deficit is unsustainable. It decides to perform two changes in its fiscal policy :

1. it increases the tax rate from 0.4 to 0.42;
2. it decreases spending and transfers by 20%.

Assuming these changes are true and that Ricardian equivalence does not hold, what are the new short-run equilibrium values for the interest rate and output? Will there be a *double-dip* recession in the United-Kingdom?