

PROBLEM SET 2
14.02 Principles of Macroeconomics
February 23, 2005
Due March 2, 2005

I. Answer each as True, False, or Uncertain, providing a few sentences of explanation for your choice.

1. For a bond which promises a fixed payment in one year, the lower its price the higher the nominal interest rate.
2. During recessions, governments can always choose to revive the economy through monetary expansion.
3. Investment decreases if government spending increases.
4. In equilibrium, an increase in money supply (M^s) may lead to an increase in the interest rate. It is because the goods market can still be in equilibrium given that investment ($I(Y, i)$) is responsive enough to an increase in output.
5. According to the efficiency wage theories, a lower unemployment rate leads to higher real wages.
6. The real wage decreases if the number of unemployed increases.

II. Short questions

1. Money Market

Consider an economy without private banks. Suppose that the money demand function is $\left(\frac{M}{P}\right)^d = 15 - 100i$

The money supply M is 10 billion dollars and the price level P is 2.

- a. Graph the supply and demand for real money balances.
- b. What is the equilibrium interest rate?
- c. Assume that the price level is fixed. What happens to the equilibrium interest rate if the money supply is raised from 10 to 24.
- d. If the Fed wishes to stimulate business investment by lowering interest rate from that in (b) to 2%, what money supply should it set? How much bonds should it buy from the public?

2. ISLM

Consider the following stylized economy.

Good Market

Goods Demand: $Z = C + I + G$

Consumption: $C = 30 + 0.5Y_D$

Investment: $I = 10 + 0.25Y - 200i$

Government Exp.: $G = 30$

Financial Market

Money Supply: $\frac{M^s}{P} = 36$

Money Demand: $\frac{M^d}{P} = 0.2Y - 240i$

- a. Assume a balanced budget. Derive the IS relation.
- b. Derive the LM relation.
- c. Solve for the equilibrium interest rate, equilibrium output, equilibrium private consumption and equilibrium investment.

3. Labor Market

Consider a small economy with total population 20 million, 16 million of them are noninstitutional civilians, 6 million of them are *not* looking for jobs and 9.2 million of them are employed.

- a. Find the participation rate and the unemployment rate in this economy.
- b. After a long recession (5 years), 0.2 million of them retired and 0.1 million gave up looking for jobs. Total number of employed decreased to 9 million. What is the unemployment rate now?
- c. The wage-setting relation is $\frac{W}{P} = k - u$, where $0 \leq k \leq 1$ is a measure of the level of unemployment benefits. (Don't worry about $\frac{W}{P}$ being negative.) The price-setting relation is $\frac{P}{W} = 1 + \mu$, where μ captures the competitiveness of the goods market. Express the natural rate of unemployment as a function of μ and k .
- d. What happens if unemployment benefits increase? Provide some intuition. Suppose that the government has to raise unemployment benefits because of political pressure, what else can it do in order to reduce u_n ?

III. Long question (Policy Mix)

Suppose the goods market is described as follows :

c_0 is the consumer confidence.

c_1 is the marginal propensity to consume.

Y is the output or income.

I is the investment, which is equal to K_0 when the interest rate $i = 0$ and output $Y = 0$. If i is positive, I decreases by a for each *unit* increase in i . If Y is positive, I increases by b for each unit increase in output.

G is government spending, exogenously given at G_0 .

There is no tax for this economy.

$\frac{M^s}{P}$ is the real money supply. Assume that $P = 1$ and $M^s = M_0$.

$\frac{M^d}{P} = gY - hi$.

Assume $c_1 + b < 1$.

1. Write down the equations for consumption, investment and aggregate demand in the economy.
2. Derive the equation for the IS curve.
3. Derive the equation for the LM curve.
4. Draw IS and LM curves on an i - Y space with correct labels. Also label the intercepts.

Now you have a short-run framework for policy studies.

5. Assume that there is a decrease in business confidence in period 1 (K_0 decreases to $K_1 < K_0$). Assume that the government cares only about output, nothing else. If you were an economic advisor to the government, would you suggest the government to revive the economy in period 2 (restore Y_2^* back

to Y_0^*) through fiscal expansion (an increase in G), monetary expansion (an increase in money supply) or both? Show your results graphically.

6. If the government chooses monetary expansion, find an analytical expression for $\Delta M_2 = M_2 - M_1$ such that Y_2^* is restored to Y_0^* .

7. Suppose the government now cares about the composition of output as well as its level. Like before, it wants to restore the output level to Y_0^* . Can the government be indifferent between fiscal and monetary policy? Explain.