

**PROBLEM SET 2**  
**14.02 Macroeconomics**  
**March 1, 2006**  
**Due March 6, 2006**

I. Answer each as True, False, or Uncertain, and explain your choice.

1. The IS relation is a behavioral relation, telling us how the suppliers of output respond to changes in the interest rate.
2. In an expansionary open market operation, the central bank sells bonds so as to make consumers wealthier.
3. Expanding government spending leaves less saving available for private investment, so investment necessarily decreases. This is known as the crowding-out effect of fiscal expansion.
4. In the last 40 years, the ratio of money to nominal income and the interest rate have moved in opposite directions.
5. Since the Fed can change the federal funds rate when it wants, monetary policy works almost instantly.

II. Short Questions

1. Consumption, investment, and the recession of 2001

Examine the movements of consumption, investment and the response of monetary policy before, during and after the recession of 2001.

- a. Download the 2005 *Economic Report of the President* from the 14.02 course website. Now track consumption and investment around 2000 and 2001. Table B-4 in the statistical appendix shows the percentage change in real GDP and its components. Which variable, gross private consumption or private nonresidential investment, had the bigger percentage change in year 2001? Table B-5 weighs the percentage change of the components of GDP by their size and shows the contribution of each component to the overall percentage change in real GDP. Calculate the change in the contribution of each variable for 2001 (i.e. subtract the contribution of gross private consumption in 2000 from that in 2001, and do the same for private nonresidential investment). Which variable had the bigger fall in contribution to growth? What do you think was the proximate cause of the recession of 2001? (A fall in investment demand or a fall in consumption demand?)
- b. The Federal Reserve Board of Governors posts the recent history of the federal funds rate at [www.federalreserve.gov/fomc/fundsrates.htm](http://www.federalreserve.gov/fomc/fundsrates.htm). When did the Fed launch the latest monetary expansion? How long did this monetary expansion last? Can you explain why? (Hint: refer to Table B-4 of the *Economic Report of the President* for overall economic performance before, during and after the recession of 2001.)

## 2. IS-LM

Consider the following IS-LM model:

$$\begin{aligned}C &= c_0 + c_1(Y - T) \\I &= b_0 + b_1Y - b_2i \\ \left(\frac{M}{P}\right)^d &= d_1Y - d_2i \\ \left(\frac{M}{P}\right)^s &= \frac{M}{P}\end{aligned}$$

where  $(b_1 + c_1) < 1$ ;  $G$ ,  $T$  and  $M$  are constant and given exogenously.

- Derive the IS relation. What is the slope of the IS curve? Derive  $\frac{dY}{di}$ . (Note:  $\frac{dY}{di}$  is not precisely the slope of the curve, since  $i$  is on the vertical axis and  $Y$  is on the horizontal axis. You should think of the IS relation as how  $Y$  is determined in the goods market for a given  $i$ .) What is the sign of the slope? Discuss what determines the steepness of the IS curve.
- Derive the LM relation. What is the slope of the LM curve, i.e.,  $\frac{di}{dY}$ ? The sign of the slope? Discuss what determines the steepness of the LM curve.
- Now assume that money demand is independent of interest rate, i.e., a vertical LM curve,

$$\left(\frac{M}{P}\right)^d = d_1Y$$

Solve for the equilibrium output and the equilibrium interest rate. How does output change with changes in  $T$ ?

- Now assume that money demand is independent of output, i.e., a horizontal LM curve,

$$\left(\frac{M}{P}\right)^d = d_1 - d_2i$$

Solve for the equilibrium output and the equilibrium interest rate. How does output change with changes in  $T$ ? Compare your answers to (c) and (d), and explain the difference.

## III. Long Question (Policy Mix)

Assume the economy starts at an equilibrium  $(Y^*, i^*)$ . Suggest a policy mix to achieve the following objectives:

- Increase  $Y$  while keeping  $i$  constant.
  - Plot the IS-LM curves. Show the effects of your proposed policy mix in the IS-LM diagram, and explain.
  - What happens to each component of aggregate output, i.e.,  $C$ ,  $I$  and  $G$ ?
- Decrease the fiscal deficit while keeping  $Y$  constant.

- a. Plot the IS-LM curves. Show the effects of your proposed policy mix in the IS-LM diagram, and explain.
- b. What happens to each component of aggregate output, i.e.,  $C$ ,  $I$  and  $G$  ?
- c. Would you recommend such a policy mix to the Japanese economy? (Hint: Check out the current short-term interest rate in Japan at the OECD website ([www.oecd.org/dataoecd/55/60/18624750.pdf](http://www.oecd.org/dataoecd/55/60/18624750.pdf)) . Will people want to hold bonds or money if the interest rate on bonds is negative? Think about the limits of monetary policy.)