

## Economics 101b; Fall 2000; Problem Set 7

*Due in class October 31*

1. What are the *qualitative* effects, in the IS-LM model, of...

...an increase in firms' optimism about future profits? **Shifts the IS curve to the right, raises real GDP, and (if the LM curve is upward sloping) raises interest rates**

...a sudden improvement in banking technology that makes checks clear two days faster? **Shifts the LM curve to the right. If the LM curve is upward sloping, raises real GDP and lowers interest rates.**

...a wave of credit card fraud that leads people to use cash for purchases more often? **Shifts the LM curve to the left. If the LM curve is upward sloping, lowers real GDP and raises interest rates.**

...a banking crisis that diminishes banks' willingness to accept deposits? **Shifts the LM curve to the left. If the LM curve is upward sloping, lowers real GDP and raises interest rates.**

...a sudden military spending program? **Shifts the IS curve to the right, raises real GDP, and (if the LM curve is upward sloping) raises interest rates**

2. Explain why the LM curve—money supply equals money demand with the money stock held constant, plotted with the interest rate on the vertical and real GDP on the horizontal axis--slopes upward. **Because people demand to hold a larger share of their wealth in the form of money when total income rises. Thus for a constant level of the money stock the “price” of money—the interest rate—rises when total income**

**rises.** What changes in the economic environment can you think of that would increase its slope? **Anything that makes money demand less responsive to interest rate changes would increase the slope of the LM curve. Paying interest on checking account deposits, for example.**

3. Suppose that the expected rate of inflation suddenly jumped. What would happen--with no other changes in the economic environment--to the IS-LM equilibrium? Would equilibrium real GDP go up or down? Would the equilibrium real interest rate go up or down? **If the vertical axis plots the real interest rate  $r$ , an increase in expected inflation shifts the LM curve downward. Thus real interest rates fall, and real GDP rises.**

4. In 2000 the unemployment rate averaged 4.0 percent, and the rate of growth of potential output was 3.5 percent per year. Assuming that the rate of growth of potential output remains unchanged and that Okun's law holds, how much higher would you expect real GDP to be in 2002 than in 1999 if in year 2002 the unemployment rate averages 6 percent? **If unemployment remained the same, GDP would grow by 7% between 2000 and 2002. A 2% rise in unemployment reduces output relative to potential by 5%, according to Okun's law. So 2002 real GDP would be 2% higher than year-2000 real GDP.**

5. Suppose that the Federal Reserve is wondering whether it should follow a policy of stabilizing the money stock or one of stabilizing the real interest rate. Suppose that all shocks to the economy are shocks to autonomous spending: which policy leads to smaller shifts in real GDP in response to shocks? **If all shocks are shocks to autonomous spending, stabilizing the money stock leads to less variation in output.** Suppose that

all of the shocks to the economy are shocks to the parameters of money demand--to the parameters  $V_0$  and  $V_i$  in the money demand equation:

$$\frac{M^d}{P} = \frac{Y}{(V_0 + V_i \times (r + \pi))}$$

and in the LM equation:

$$Y = (V_0 + V_i \times (r + \pi)) \times \frac{M}{P}$$

which policy is now best in terms of leading to smaller shifts in real GDP? **If all shocks are shocks to money demand and the LM curve, then stabilizing interest rates leads to more stable output.** Suppose that the only shocks to the economy are changes in assessments of expected inflation  $\pi$ . Now what is your answer? **Stability in output is achieved by stabilizing real interest rates—by making nominal interest rates fluctuate one-for-one with expected inflation.**

6. Suppose that the government and central bank together want to keep GDP constant but raise the rate of investment. What policies can they follow to achieve this? **Big budget surpluses to move the IS curve to the left accompanied by large-scale interest rate reductions.**

7. Suppose that the level of investment spending does not depend at all on the interest rate. Does this mean that the IS curve is vertical? **No—there is still the international sector: changes in interest rates affect aggregate demand because they change the exchange rate and thus change exports.** If not, how can it be that central bank changes in the real interest rate affect the equilibrium level of real GDP?

8. Suppose that the consumption, investment, net exports, and exchange rate are:

$$Y = C + I + G + NX$$

$$C = C_0 + C_y(1 - t)Y = \$3000 + 0.5(1 - .4)Y$$

$$I = I_0 - I_r r = \$1200 - \$100r$$

$$GX = X_f Y^f + X_\varepsilon \varepsilon = 0.1Y^f + \$4\varepsilon$$

$$IM = IM_y Y = .2Y$$

$$NX = GX - IM$$

$$\varepsilon = 100 + 10(r^f - r)$$

Derive the IS curve for this economy: real GDP as a function of all the unspecified variables in the economy.

**Non-interest-sensitive autonomous spending  $A_0 = 4600 + 0.1Y^f + 40 r^f + G$**

**The MPS is 0.1**

**So the IS curve is  $(4600 + 0.1Y^f + 40 r^f + G)/0.9 - [(140)/0.9]r$**

Suppose that the foreign interest rate  $r^f$  is 5%, that total foreign income  $Y^f$  is \$10000, and that government spending  $G$  is \$3000. What then is equilibrium annual real GDP if the central bank sets the real interest rate at 3%? At 5%? At 7%?

**Then the IS curve is  $8800/.9 - [140/.9]r$ . At an interest rate of 3%  $Y = \$9310$ ; at an interest rate of 5%  $Y = \$9000$ ; at an interest rate of 7%  $Y = \$8690$**

9. Suppose that the consumption, investment, net exports, and exchange rate functions are:

$$Y = C + I + G + NX$$

$$C = C_0 + C_y(1 - t)Y = \$3000 + 0.5(1 - .4)Y$$

$$I = I_0 - I_r r = \$1200 - \$100r$$

$$GX = X_f Y^f + X_\varepsilon \varepsilon = 0.1Y^f + \$4\varepsilon$$

$$IM = IM_y Y = .2Y$$

$$NX = GX - IM$$

$$\varepsilon = 100 + 10(r^f - r)$$

Suppose further that the government follows a balanced budget rule: government purchases  $G$  are equal to government tax collections  $tY$ . Derive the IS for this economy: real GDP as a function of all the unspecified variables in the economy. Is the level of real GDP along the IS curve more or less sensitive to changes in interest rates than in problem 8? Why or why not?

**The IS curve is:**

**$Y = (4600 + .1Y^f + 40r^f + .5G)/.7 - [140/.7]r$  The IS curve is more sensitive to changes in interest rates because the balanced budget requirement means that the economy's fiscal automatic stabilizers have been eliminated...**