

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?

Boosts investment and shifts the IS curve out and to the right by making businesses more optimistic about the profits from investment projects.

Equilibrium real GDP Y rises, equilibrium real interest rate r rises as well.

...a sudden improvement in banking technology that makes checks clear two days faster?

An outward shift in the LM curve as the velocity of money increases.

Equilibrium real GDP rises; equilibrium real interest rate r falls.

...a wave of credit card fraud that leads people to use cash for purchases more often?

An inward shift in the LM curve as the velocity of money falls. Equilibrium real GDP falls; equilibrium real interest rate rises.

...a banking crisis that diminishes banks' willingness to accept deposits?

Decline in the money stock. An inward shift in the LM curve as the velocity of money falls. Equilibrium real GDP falls; equilibrium real interest rate rises.

...a sudden military spending program?

Raises government spending. Shifts the IS curve out and to the right.

Equilibrium real GDP Y rises, equilibrium real interest rate r rises as well.

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. What changes in the economic environment can you think of that would increase its slope?

Because a higher real interest rate r means a higher nominal interest rate, and a higher nominal interest rate makes it more expensive to hold wealth in the readily-spendable form of money balances. Hence the velocity of money V rises, and if M and P are fixed then real GDP Y must rise as well.

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?

A jump in expected inflation raises the nominal interest rate that corresponds to any given value of the real interest rate. Hence on the (Y, r) IS-LM diagram, a jump in expected inflation shifts the LM curve downward. Hence real GDP rises as the economy moves down and to the left along the IS curve. The real interest rate r falls as the economy moves down and to the left along the IS curve. But the nominal interest rate i 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?

Two years of potential output growth would boost real GDP by 7%. But with an Okun's law coefficient of 2.5, a two percentage point rise in the

unemployment rate would be associated with a 5% fall in real GDP. Adding these two effects together gives us a 2002 level of real GDP 2% higher than the 2000 level of 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 spending, then keeping the money stock constant damps fluctuations in output somewhat: those times when the IS curve shifts right are the times when interest rates rise; those times when the IS curve shifts left are the times when interest rates fall. Therefore if the principal shocks are shocks to autonomous spending and thus to the location of the IS curve, stabilizing the money stock is the better policy.

Suppose that all of the shocks to the economy are shocks to the parameters of money demand--to the parameters L_0 and L_i in the money demand equation:

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

and in the LM equation:

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

which policy is now best in terms of leading to smaller shifts in real GDP? Suppose that the only shocks to the economy are changes in assessments of expected inflation π . Now what is your answer?

In this case, stabilizing the money stock leads to fluctuations in interest rates. Stabilizing the interest rate keeps interest rates constant. With an unmoving IS curve, the second minimizes the variability of real GDP.

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?

Tight fiscal policies—shifting the IS curve to the left by reducing government spending or increasing taxes—coupled with loose monetary policies—low interest rates to stimulate investment.

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? If not, how can it be that central bank changes in the real interest rate effect the equilibrium level of real GDP?

Remember: exports. Reducing the interest rate raises the value of foreign currency, boosts exports, and raises real GDP. In an open economy changes in interest rates affect more than just the level of investment.

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. 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%?

The multiplier for this economy is 1.111...

The slope of the IS curve is 140 x 1.111...

Baseline autonomous spending is $4600 + G + 0.1Y^f + 40 r^f$...

So for the parameters shown, the IS curve is:

$$Y = 1.111 \times (8800) - 155 \times r = 9777 - 155 \times r$$

$$\text{For } r=3\%, Y = 9312$$

$$\text{For } r=5\%, Y = 9002$$

$$\text{For } r=7\%, Y = 8692$$

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

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

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

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

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

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

$$NX = GX - IM$$

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

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?

It is more sensitive to interest rates because the fiscal automatic stabilizers have been removed from the economy.

The tax rate with the balanced-budget requirement is: $t = Y/G$

The multiplier is 1.429

Baseline autonomous spending is $4600 + .1Y^f + 40r^f + .5G$

The slope of the IS curve is 200

So for the parameter values of the problem above, the IS curve would be

$$Y = 10429 - 200 \times r$$

And not:

$$Y = 9777 - 155 \times r$$