

## Economics 101b; Fall 2001; Problem Set 6

*Due in class October 31*

1. 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?

**The less interest-elastic is money demand, the steeper the LM curve will be. So anything that makes money-holders care less about what the interest rate is in deciding how much to hold in real money balances will make the LM curve steeper.**

2. 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?

**The higher inflation rate shifts the LM curve downward. The new equilibrium has a higher level of real GDP, a lower real interest rate, and a higher nominal interest rate.**

3. 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 in percentage terms would you expect real GDP to be in 2002 than in 2000 if in year 2002 the unemployment rate were to average 6 percent?

**Growth in potential GDP would make potential output in 2002 7% above potential output in 2000. The 2 percentage-point rise in unemployment would depress real GDP by  $2.5 \times 2 = 5$  percent. Adding these two together, real GDP in 2002 will be 2% higher than in 2000.**

4. 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?

**Tighter fiscal policies—tax increases or spending cuts—coupled with looser monetary policies—lower interest rates—will raise investment while keeping real GDP constant.**

5. 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?

**Changes in interest rates change the exchange rate, which changes net exports. Thus even if investment is completely insensitive to interest rates, it is still the case that increases in interest rates reduce equilibrium real GDP because they reduce net exports..**

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

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

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

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

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

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

$$NX = GX - IM$$

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

Suppose further that the government follows a balanced budget rule: government purchases G are equal to government tax collections:

$$T = tY = G$$

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

**The fact that the economy is following a balanced budget rule means that the tax rate  $t = G/Y$ . Substituting this into the consumption function gives:**

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

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

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

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

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

$$NX = GX - IM$$

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

The multiplier is then:

$$\mu = \frac{1}{1 - (0.5 - 0.2)} = 1.429$$

And autonomous spending is then:

$$A = \$3000 - 0.5G + \$1200 - 100r + 0.1Y^f + 400 + 40(r^f - r)$$

$$A = 4600 - 0.5G + 0.1Y^f + 40r^f - 140r$$

And the IS Curve is:

$$Y = \mu A$$

7. Suppose that the economy's Phillips curve is given by:

$$u = u^* - \beta(\pi - \pi^e)$$

with  $\beta$  equal to 0.4 and the natural rate of unemployment  $u^*$  equal to .06--six percent. Suppose that the economy has for a long time had a constant inflation rate  $\pi$  equal to 3% per year. Suddenly the government announces a new policy: it will use fiscal policy to boost real GDP by 5% relative to potential--enough by Okun's law to push the unemployment rate down by 2%--and promises it will keep that expanded fiscal policy in place indefinitely.

Suppose, further that the dominant way of forming expectations in the economy is such that people have *adaptive expectations* of inflation--so that this year's expected inflation is equal to last year's actual inflation. What will be the course of inflation and unemployment in this economy in the years after the shift in fiscal policy? Track the economy out twenty years, assuming that there are no additional shocks.

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Suppose that for each one percentage point that the inflation rate rises above three percent, the central bank raises nominal interest rates by two percentage points--and that each one percentage point increase in real GDP moves the economy along the IS curve sufficiently to shrink real GDP by one percent.

Suppose that agents in the economy have *rational expectations* of inflation--so that this year's expected inflation is what an economist knowing the structure of the economy and proposed economic policies would calculate actual inflation was likely to be. What will be the course of inflation and unemployment in this economy in the years after the shift in fiscal policy? Track the economy out twenty years, assuming that there are no additional shocks.

Suppose that agents in the economy have *adaptive expectations* of inflation--so that this year's expected inflation is equal to last year's actual inflation. What will be the course of inflation and unemployment in this economy in the years after the shift in fiscal policy? Track the economy out twenty years, assuming that there are no additional shocks.