

Problem Set 3 (rev 3/21)

Due *in lecture* on Monday, March 26th. Be sure to put your name on your problem set. Put “boxes” around your answers to the algebraic questions.

1. Given the following closed economy:

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| (1) | $Y = Z$ | Output equals aggregate demand, an equilibrium condition |
| (2) | $Z = C + I + G$ | Definition of aggregate demand |
| (3) | $C = c_o + c_1 Y_D$ | Consumption function, c_1 is the mpc |
| (4) | $Y_D \equiv Y - T$ | Definition of disposable income |
| (5) | $T = t_0$ | Tax function; t_0 is lump sum taxes, exogenous |
| (6) | $I = b_0 - b_2 i$ | Investment function |
| (7) | $G = GO_0$ | Government spending on goods and services, exogenous |
| (8) | $\frac{M^d}{P} = \frac{M^s}{P}$ | Equilibrium condition |
| (9) | $\frac{M^s}{P} = \frac{M_0}{P}$ | Money supply |
| (10) | $\frac{M^d}{P} = \mu_0 + Y - hi + j \left(\frac{\$wealth}{P} \right)$ | Money demand |

Note further that the budget deficit is linked to bond supply:

$$(11) \quad -BuS \equiv BuD \equiv G - T = \Delta(B/P)$$

1.1 Derive equilibrium income (for period 0).

1.2 Analyze the implications of running a budget surplus for one period (in period 1) induced by decreasing government spending by ΔGO , *starting from budget balance*. Draw an IS-LM diagram clearly indicating what happens.

1.3 Suppose after that period of running the **deficit surplus**, government spending is increased (in period 2) so as to balance the budget. Show what happens, in an IS-LM diagram. What is true about output relative to what it was before the government spending increase?

2. Suppose that we are operating under the old system (pre-October 2008), where the Fed does *not* pay interest on reserves, and the required reserve ratio is 0.12 for deposits and there are no excess reserves. Suppose also that the total demand for currency is equal to 0.2 times **deposits money demand**.

2.1 If central bank money is \$40 billion, what is the level of the money supply?

2.2 By how much does the money supply change if the Fed increases the required reserve ratio to 0.20? Assume that total central bank money is unchanged at \$40 billion.

2.3 By how much does the money supply change if the Fed buys \$1 billion of government bonds in the open market? (Keep the required reserve ratio at 0.12).

3. Consider an economy with a “credit channel”, i.e., one with a banking system. This economy is described in the handout “The Financial and Economic Crisis...”. The CC curve is given by:

$$Y = \bar{\alpha}(A_0 - dR - \gamma\rho)$$

(5)

$$\rho = \varphi_0 + \varphi_1 R + \varphi_2 Y - \varphi_3 [m(Res)(1-r)] + \varphi_4 Z \quad (7)$$

Notice that an increase in $[m(Res)]$ will decrease ρ and hence shift out the CC curve; and an increase in Z will increase ρ and hence shift in the CC curve.

The LM curve is given by:

$$R = \frac{\mu_0}{h} - \frac{1}{h} \left(\frac{m(Res)}{P} \right) + \frac{k}{h} Y \quad (4)$$

Notice that like the standard IS-LM model, the LM curve is shifted out by anything that increases $[m(Res)]$.

- 3.1 Show graphically what happens when government spending is increased.
 - 3.2 Show graphically what happens if all physical investment projects are suddenly perceived to be more risky than they previously were.
 - 3.3 Show graphically what happens if the Fed increases the amount of reserves in the economy by undertaking open market operations. You can assume the interest rate paid on reserves is zero, and the money multiplier is constant.
4. Suppose the markup of goods over wages is 10% (0.1) and the wage setting equation is $W = P(1 - 2u + z)$, where u is the unemployment rate, and z is also 10% (0.1).
 - 4.1 What is the real wage, as determined by the price setting equation?
 - 4.2 Solve for the natural rate of unemployment.
 - 4.3 Solve for the natural rate of unemployment if z falls to 5% (0.05).
 5. Textbook Chapter 7, Problem 5.
 6. Textbook Chapter 7, Problem 11.
 7. Textbook Chapter 8, Problem 3.