14.02: Principles of Macroeconomics, Fall 1999
3 pages

Problem Set 4
Due: Wednesday, October 13.

Answers

Question 1 True, false or uncertain
(5 points each)

1. True. As in the problem set 3, ATMs lead to an increase in money supply. So the effect is pretty much the same as when there is monetary expansion.

2. Uncertain. Increase in budget deficit leads to higher income and higher interest rates. The former encourages investment, while the former discourages it. The overall effect is ambiguous..

3. True. Since the adjustment in the money market is almost instantaneous, the economy stays on LM always (interest rate jumps to restore imbalance between the demand for and supply of liquidity). The output, though, adjusts only gradually.

4. False. Higher price of bonds implies lower interest rate.

5. False. In contraction, IS curve shifts downward. Since the LM does not move, the economy stays on the old LM, gradually sliding down to the new equilibrium. Interest rate is falling throughout.

6. False. Increasing taxes and spending by the same amount still raises output due to c_1 term, for any given interest rate. Therefore, IS shifts up. Output and interest rate go up.

Question 2

1. (5 points) $(M/P)^s = \frac{H}{\theta} = 5 * 8 = 40$
   LM: $\frac{Y}{i+6.1} = 40 \Leftrightarrow Y = 40\,(i + 6.1)$

2. (5 points) IS: $Y = 120 - 54i + 0.4\,(Y - T) + 40 + 20 = 180 - 44i + .4Y - .4T$
   $Y = \frac{1}{0.6}\,(180 - 54i - .4 * 45) = 270 - 90i$

3. (5 points) $\begin{cases} Y = 270 - 90i \\ Y = 40\,(i + 6.1) \end{cases} \Rightarrow Y = 252$

4. (5 points) $i = Y/40 - 6.1 = 0.2$;
   $C = 202.8$, $I = 29.2$

5. (15 points) Only IS changes: $Y = \frac{1}{0.6}\,(120 - 24i - 0.4 * 21 + 40 + 38) = 316 - 40i$
   The equilibrium is now found from
   $\begin{cases} Y = 316 - 40i \\ Y = 40\,(i + 6.1) \end{cases} \Rightarrow Y = 280,\ i = 0.9,\ C = 223.6,\ I = 18.4$
   A simple comparison with initial equilibrium demonstrates that output and consumption have gone up, but investment has shrunk. Thus the policy did not ultimately promote investment. The reason is the increase in government spending. It boosted aggregate demand and pushed up the interest rate, which led to investment drop. This effect was stronger than the opposite effect of the tax credit.

6. (15 points) The following recursive formulae must be used:

$$\begin{aligned} C_t &= 120 + 0.4\,(Y_t - T) \\ I_t &= 40 - 24i_t \\ G_0 &= 20, G_t = 38, t \geq 1 \\ T_0 &= 45, T_t = 21, t \geq 1 \\ Y_{t+1} &= C_t + I_t + G \\ i_t &= Y/40 - 6.1 \end{aligned}$$

   This gives the following evolution:

t	Y	C	I	T	G	i
0	252	202.8	29.2	45	20	0.2
1	252	212.4	35.2	21	38	0.2
2	285.6	225.84	15.04	21	38	1.04
3	278.88	223.152	19.072	21	38	0.872
4	280.224	223.69	18.2656	21	38	0.9056

7. (10 points) To find the desired M^s, consider the equilibrium IS-LM system $\begin{cases} Y = 316 - 40i \\ M^s = \frac{Y}{(i+6.1)} \end{cases}$. The solution is $Y = 560 - \frac{40Y}{M}$. Equate this to the initial output $Y = 560 - \frac{40Y}{M} = 252$ to get $(M/P)^s = 32.727$.

Question 3

(10 points)

IS is vertical line, LM is horizontal line. Nothing in the goods market depends on i, and money demand is independent of income.