

## Solution to Homework 2 – EE212 Section 2 (From Case, Fair, Oster)

### Question 2

2. Expert econometricians in the Republic of Yuck estimate the following:

Real GNP ( $Y$ ) . . . . . 200 billion Yuck dollars  
 Planned investment spending . . . . . 75 billion Yuck dollars

Yuck is a simple economy with no government, no taxes, and no imports or exports. Yuckers (citizens of Yuck) are creatures of habit. They have a rule that everyone saves exactly 25 percent of income. Assume that planned investment is fixed and remains at 75 billion Yuck dollars.

You are asked by the business editor of the *Weird Herald*, the local newspaper, to predict the economic events of the next few months. By using the data given, can you make a forecast? What is likely to happen to inventories? What is likely to happen to the level of real GDP? Is the economy at an equilibrium? When will things stop changing?

### Question 4

4. The following questions refer to this table:

AGGREGATE OUTPUT/INCOME	CONSUMPTION	PLANNED INVESTMENT
2,000	2,100	300
2,500	2,500	300
3,000	2,900	300
3,500	3,300	300
4,000	3,700	300
4,500	4,100	300
5,000	4,500	300
5,500	4,900	300

- At each level of output, calculate saving. At each level of output, calculate unplanned investment (inventory change). What is likely to happen to aggregate output if the economy produces at each of the levels indicated? What is the equilibrium level of output?
- Over each range of income (2,000 to 2,500, 2,500 to 3,000, and so on), calculate the marginal propensity to consume. Calculate the marginal propensity to save. What is the multiplier?
- By assuming there is no change in the level of the  $MPC$  and the  $MPS$  and planned investment jumps by 200 and is sustained at that higher level, recompute the table. What is the new equilibrium level of  $Y$ ? Is this consistent with what you compute using the multiplier?

### Question 5

5. Explain the multiplier intuitively. Why is it that an increase in planned investment of \$100 raises equilibrium output by more than \$100? Why is the effect on equilibrium output finite? How do we know that the multiplier is  $1/MPS$ ?

### Solution

5. Think of the adjustment that occurs when, with the economy at the equilibrium level of output, an increase in planned investment occurs. Inventories are drawn down, and output increases. If firms increase output by the amount of the increase in planned investment, equilibrium will not be reestablished. The increased output (income) will also increase consumption. Thus, there will have been an increase in  $Y$  of  $\Delta I$ , but an increase in aggregate expenditure of more than  $\Delta I$ .  $Y$  must increase further to establish equilibrium. The multiplier is finite because a fraction of income is saved. Thus, as  $Y$  grows,  $S$  grows: so we will eventually reach a level of  $Y$  at which the new planned investment just offsets the leakage into savings. This will be a new equilibrium. At this point,  $\Delta S = \Delta I$ . Because  $\Delta S = MPS \times \Delta Y$ , we can solve for  $\Delta Y$ :

$$\Delta Y = \frac{1}{MPS} \times \Delta I.$$

### Solution

2. We know that  $C = .75Y = 150$  billion.  $C + I = 150 + 75 = 225$  billion. Thus,  $C + I > Y$ . Aggregate spending is greater than aggregate output. Inventories will fall (which firms will take as a signal to increase production) and in the coming months  $Y$  (real GDP) will rise. GDP will stop rising when  $C + I = Y$ . That is when  $.75Y + 75 = Y$  or  $75 = .25Y$  or  $Y = 300$  billion Yuck dollars.

### Solution

4. (a)

Aggregate Output/Income	Consumption	Planned Investment	Saving	Unplanned Inventory
2,000	2,100	300	-100	-400
2,500	2,500	300	0	-300
3,000	2,900	300	+100	-200
3,500	3,300	300	+200	-100
4,000	3,700	300	+300	0
4,500	4,100	300	+400	+100
5,000	4,500	300	+500	+200
5,500	4,900	300	+600	+300

Equilibrium Output  $Y^* = 4,000$ . When  $Y < 4,000$ , inventories are lower than desired (unplanned investment is negative). Firms will increase production to increase their inventories, causing aggregate output/income to rise. When  $Y > 4,000$ , the opposite will happen, causing output/income to fall.

- (b) Over all ranges  $MPC = 400 / 500 = .80$  and  $MPS = 100 / 500 = .20$ . The multiplier is  $1/MPS = 1/.20 = 5$ .

(c)

Aggregate Output/Income	Consumption	Planned Investment	Saving	Unplanned Inventory
2,000	2,100	500	-100	-600
2,500	2,500	500	0	-500
3,000	2,900	500	+100	-400
3,500	3,300	500	+200	-300
4,000	3,700	500	+300	-200
4,500	4,100	500	+400	-100
5,000	4,500	500	+500	0
5,500	4,900	500	+600	+100

If  $I$  increases by 200 to 500,  $Y^*$  goes up by  $5 \times 200 = 1,000$ . Thus, the new equilibrium level of output (income) is 5,000. Yes, the two are consistent.

### Question 6

6. You are given the following data concerning Freedonia, a legendary country:
- (1) Consumption function:  $C = 200 + 0.8Y$
  - (2) Investment function:  $I = 100$
  - (3)  $AE \equiv C + I$
  - (4)  $AE = Y$
- a. What is the marginal propensity to consume in Freedonia, and what is the marginal propensity to save?
  - b. Graph equations (3) and (4) and solve for equilibrium income.
  - c. Suppose equation (2) is changed to (2')  $I = 110$ . What is the new equilibrium level of income? By how much does the \$10 increase in planned investment change equilibrium income? What is the value of the multiplier?
  - d. Calculate the saving function for Freedonia. Plot this saving function on a graph with equation (2). Explain why the equilibrium income in this graph must be the same as in part b.

### Question 7

7. This chapter argued that saving and spending behavior depended in part on wealth (accumulated savings and inheritance), but our simple model does not incorporate this effect. Consider the following model of a very simple economy:

$$\begin{aligned} C &= 10 + .75Y + .04W \\ I &= 100 \\ W &= 1,000 \\ Y &= C + I \\ S &= Y - C \end{aligned}$$

If you assume that wealth ( $W$ ) and investment ( $I$ ) remain constant (we are ignoring the fact that saving adds to the stock of wealth), what are the equilibrium levels of GDP ( $Y$ ), consumption ( $C$ ), and saving ( $S$ )? Now suppose that wealth increases by 50 percent to 1,500. Recalculate the equilibrium levels of  $Y$ ,  $C$ , and  $S$ . What impact does wealth accumulation have on GDP? Many were concerned with the very large increase in stock values in the late 1990s. Does this present a problem for the economy? Explain.

### Solution

7.  $Y = 110 + .75Y + .04(1000) = 150 + .75Y$   
 $.25Y = 150$   
 $Y = 600$   
 $C = Y - I = 600 - 100 = 500$   
 $S = Y - C = 600 - 500 = 100$  (which is equal to  $I$ )

When wealth increases by 50 percent to 1,500:

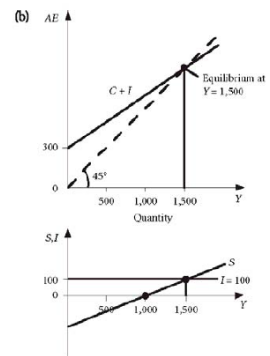
$$\begin{aligned} Y &= 110 + .75Y + .04(1500) = 170 + .75Y \\ .25Y &= 170 \\ Y &= 680 \\ C &= Y - I = 680 - 100 = 580 \\ S &= Y - C = 680 - 580 = 100 \text{ (which is equal to } I) \end{aligned}$$

Wealth accumulation increases  $Y$ . If the stock market gets overvalued, it inflates GDP on the way up and could deflate it on the way down adding to cyclicalities.

### Solution

6. (a)  $MPC = .8$ ;  $MPS = .2$ .  
 (b)  $Y^* = AE = C + I = [(200 + 0.8Y) + 100] = 300 + 0.8Y$   
 $0.2Y = 300$   
 $Y^* = 1,500$ .  
 (c)  $\Delta Y = (1/MPS) I$   
 Multiplier =  $1/MPS = 1/(.2) = 5$ . In this case, with the multiplier equal to 5 and an increase in investment of 10,  $\Delta Y = (5)(10) = 50$ . Equilibrium  $Y$  increases from 1,500 to 1,550.

- (d)  $S = Y - C = Y - (200 + .8Y)$   
 $= -200 + .2Y$   
 The equilibrium must be the same in both graphs because  $Y = C + I$  and  $S = I$  are the same condition. To see this, remember that  $Y = C + S$  always. Substitute  $C + S$  for  $Y$  in the equilibrium condition  $Y = C + I$  to obtain  $C + S = C + I$ , which simplifies to  $S = I$ .



Good luck on your midterm exam : )