

## Chapter 8

# AGGREGATE DEMAND AND ECONOMIC FLUCTUATIONS

*Macroeconomics in Context (Goodwin, et al.)*

### Chapter Overview

This chapter first presents the analysis of business cycles, and introduces you to the two stylized facts of the business cycle. The chapter then presents the Classical theory of savings-investment balance through the market for loanable funds. Next, the Keynesian aggregate demand analysis in the form of the traditional "Keynesian Cross" diagram is developed. You will learn what happens when there is an unexpected fall in spending, and the role of the multiplier in moving to a new equilibrium.

### Chapter Objectives

After reading and reviewing this chapter, you should be able to:

1. Describe how unemployment and inflation are thought to normally behave over the business cycle.
2. Model consumption and investment, the components of aggregate demand in the simple model.
3. Describe the problem that "leakages" present for maintaining aggregate demand, and the classical and Keynesian approaches to leakages.
4. Understand how the equilibrium levels of income, consumption, investment, and savings are determined in the Keynesian model, as presented in equations and graphs.
5. Explain how, in the Keynesian model, the macroeconomy can equilibrate at a less-than-full-employment output level.
6. Describe the workings of "the multiplier," in words and equations.

### Key Terms

Okun's "law"

"full-employment output" ( $Y^*$ )

aggregate expenditure ( $AE$ )

accounting identity

behavioral equation

marginal propensity to consume

marginal propensity to save

paradox of thrift

## Active Review

### Fill in the Blank

1. The macroeconomic goal that involves keeping the rate of unemployment and inflation at acceptable levels over the business cycle is the goal of \_\_\_\_\_.
2. The \_\_\_\_\_ economists believe that aggregate expenditure needs active guidance, whereas the \_\_\_\_\_ economists believe that aggregate expenditure can take care of itself.
3. The recurrent fluctuations in the level of national production is called the \_\_\_\_\_.
4. When economic activity declines, usually measured by a fall of real GDP for two consecutive quarters, the economy is said to be in a \_\_\_\_\_.
5. The equation that expresses the inverse relationship between the unemployment rate and the rapid growth of real GDP is known as \_\_\_\_\_.
6. The level of output that occurs when the economy is not suffering from an unemployment problem (that is, when any unemployment that exists is just transitory), is called \_\_\_\_\_ output.
7. In the traditional macro model (with no government or foreign sector), what households and firms intend to spend on consumption and investment is called \_\_\_\_\_.
8. The equation  $AE = C + I$  is a(n) \_\_\_\_\_, because it reflects a theory about the behavior of one or more economic agents or sectors. The equation  $Y = C + I$  is a(n) \_\_\_\_\_, because it represents the actual level of aggregate spending that in fact occurs.
9. In the Keynesian consumption function,  $C = \bar{C} + mpc Y$ ,  $\bar{C}$  represents \_\_\_\_\_, the  $mpc$  is the \_\_\_\_\_, and  $Y$  represents \_\_\_\_\_.
10. The \_\_\_\_\_ is the portion of every dollar of aggregate income that is saved, and can be expressed as  $\Delta S/\Delta Y$ .
11. The formula  $1/(1-mpc)$  is the formula for the “income/spending \_\_\_\_\_” in a simple closed economy with no government.

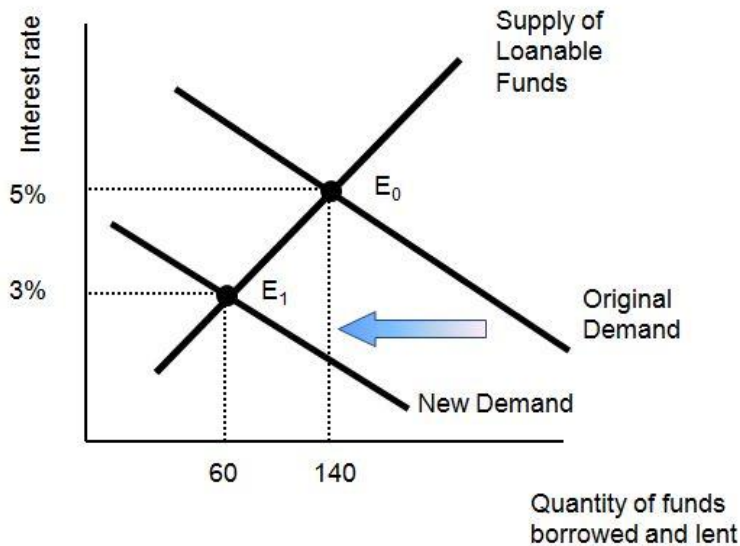
### True or False

12. The two “stylized facts” of the business cycle are always corroborated by the historical evidence.
13. According to Okun’s Law, as originally formulated in the early 1960s, a 1% drop in the unemployment rate is associated with an approximately 3% increase in real GDP.

14.  $Y = AE$  only when actual investment equals intended investment.
15. In a situation with insufficient aggregate expenditure,  $C + I_t < C + I$
16. According to the classical economists, a sudden fall in investment spending would cause a fall in the interest rate, and the lower interest rate would then stimulate investment spending again and return it to its original level.

*Short Answer*

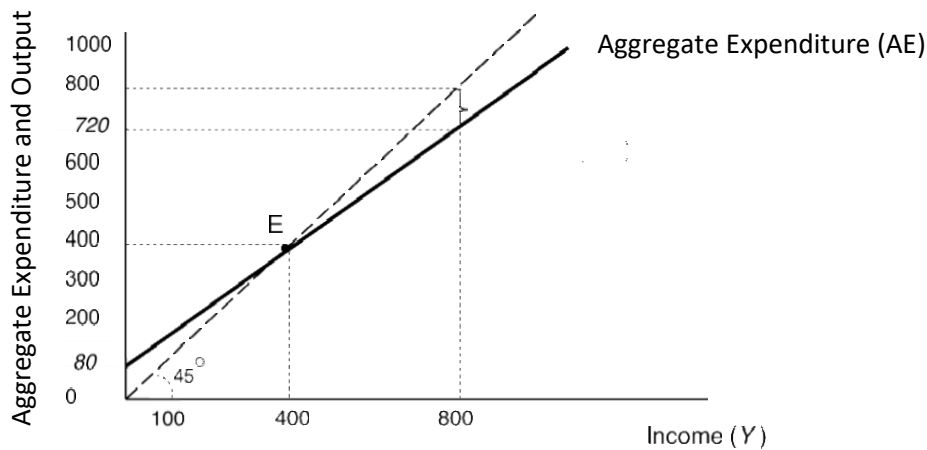
17. Explain the two “stylized facts” of the business cycle.
18. What was the response to the Great Depression of economists trained in the classical school?
19. Explain the difference between the behavioral equation  $AE = C + I_t$ , and the accounting identity  $Y = C + I$  (in a simplified economy with no government or foreign sector).
20. Given the following Figure below (Figure 8.8 in your textbook), explain what the classical school predicts will happen when there is a sudden drop in intended investment spending.



21. What are the determinants of investment spending in the Keynesian model, and which factor plays the most important role (especially in a recession)?

22. In the Keynesian model, what happens to investment and inventories when there is insufficient aggregate expenditure?

23. In the figure below:



- a. What is this diagram called?
- b. What does the 45 degree line represent?
- c. At an income level of 800, what is the level of spending? Is there any unintended investment? If so, what will be the response of producers?

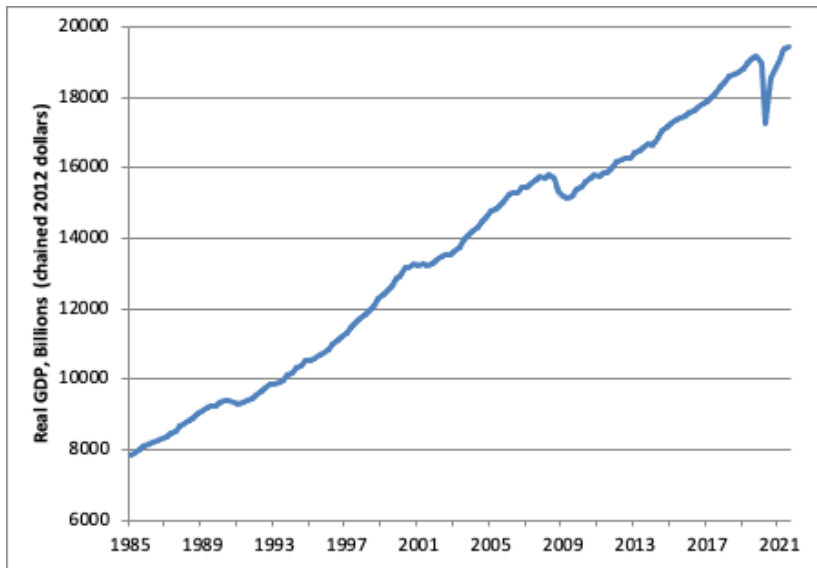
24. In the figure in the above question, if 800 represents full employment output, would the equilibrium where income = 400 be desirable? Is there unemployment at this equilibrium? And according to Keynes, would there be forces automatically moving the economy back to the full employment output level?

25. Explain what is meant by “the multiplier,” and describe it in words.

26. (In appendix): What are the basic steps to deriving the multiplier algebraically?

## Problems

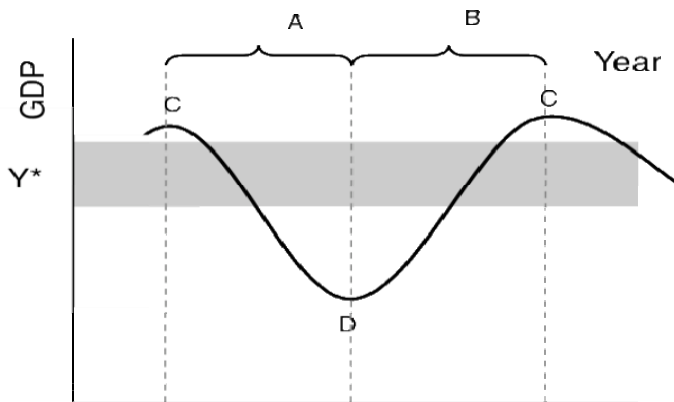
1. Given this graph of real GDP for the U.S. in the years 1960 – 2021:



Source: [www.bea.gov](http://www.bea.gov)

Identify approximately what years the economy went into a recession.

2. Use the graph below to answer the following questions:



a. Label the phases of the “stylized” business cycle graph.

- A: \_\_\_\_\_  
 B: \_\_\_\_\_  
 C: \_\_\_\_\_  
 D: \_\_\_\_\_

b. What does  $Y^*$  refer to?

3. Use the table below (for a simple economy with no foreign sector or government) to answer the questions that follow.

| (1)<br>Income<br>( $Y$ ) | (2)<br>Consumption<br>( $C$ ) | (3)<br>Intended<br>Investment<br>( $I_I$ ) | (4)<br>Aggregate Expenditure<br>$AE = C + I_I$<br>$= \text{column (2)} + \text{column (3)}$ |
|--------------------------|-------------------------------|--|---|
| 0                        | 30                            | <b>(a)</b>                                 | 50  |
| 300                      | 300                           | 20   | <b>(b)</b>  |
| 400                      | <b>(c)</b>                    | 20   | 410   |
| 500                      | 480                           | 20   | 500   |
| 600                      | <b>(d)</b>                    | 20   | <b>(e)</b>  |

Fill in the missing numbers in the spaces marked (a)-(c).

Determine the consumption function, and use the result to fill in the remaining missing numbers (d)-(e).

(f) Determine the equilibrium output level.

4. Use the Keynesian cross diagram, and illustrate how the  $AE$  would shift in each scenario. Indicate whether the economy would end up at a higher or lower equilibrium output.

a. Households experience a decline in wealth as the value of housing drops when the housing bubble bursts.

b. The nation’s leaders tell consumers it is their patriotic duty to save the economy by consuming more, and consumers do so

c. The same national leaders pass policies favoring the wealthy, which leads to a more unequal distribution of income.

5.

a. Assume a simple, closed economy with no government. The marginal propensity to consume ( $mpc$ ) = 0.8. Assume that firms expect the future sales and profits to fall, and they suddenly cut back (unintended) investment spending ( $I$ ) by 50 million. By how much will output eventually fall?

b. Now assume the same as above, except that now the  $mpc = 0.9$ . How much will output fall when unintended investment spending drops by 50 million?

### Self Test

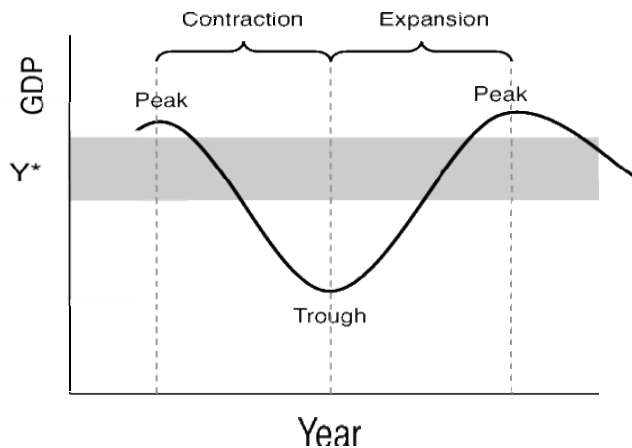
1. Keeping the economy balanced with acceptable levels of unemployment and inflation is the key aspect of the goal of:

- A. growth in living standards
- B. stabilization
- C. sustainability
- D. trade expansion
- E. equal income distribution

2. Two stylized facts of the business cycle are that:

- A. during an economic contraction, unemployment falls and inflation rises, while during an expansion, unemployment rises and inflation falls.
- B. during an economic contraction, unemployment rises and inflation falls, while during an expansion, unemployment falls and inflation rises.
- C. during an economic contraction, both unemployment and inflation fall, while during an expansion, both unemployment and inflation rise.
- D. during an economic contraction, both unemployment and inflation rise, while during an expansion, both unemployment and inflation fall.
- E. none of the above

Refer to the Figure below for the next two questions.



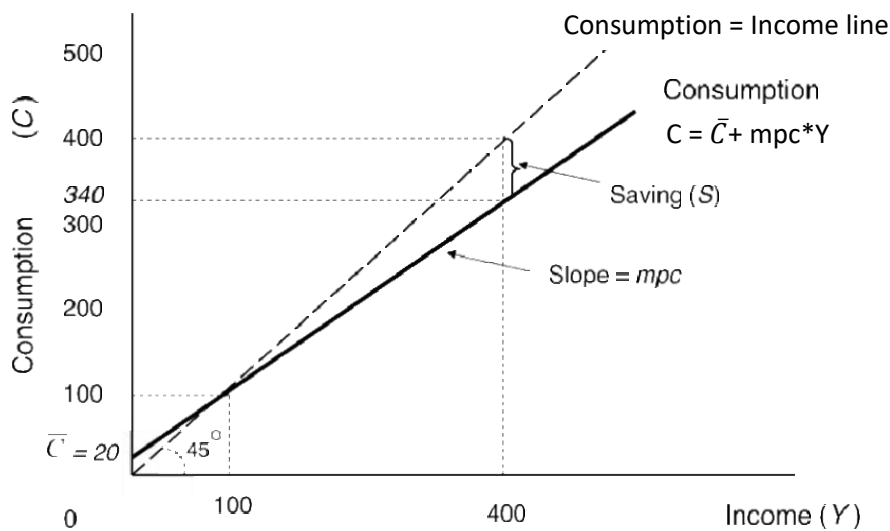
3. When is inflation and unemployment most likely to be a problem?
- A. Inflation and unemployment will be a problem in the grey area representing the range of full employment output.
  - B. Inflation will be a problem during the peak of an expansion, and unemployment will be a problem during the trough of the contraction.
  - C. Inflation will be a problem during the trough of the contraction, and unemployment will be a problem during the peak of the expansion.
  - D. Inflation will be a problem during both the peak and the trough of the business cycle.
  - E. Unemployment will be a problem during both the peak and trough of the business cycle.
4. What is the goal of stabilization policy?
- A. To keep the economy as close to the peak as possible, where unemployment remains very low.
  - B. To keep the economy as close to the trough as possible, where inflation remains low.
  - C. To keep the economy in the grey area, to avoid the threats of both excessive unemployment and inflation.
  - D. To enable the economy to move freely from peak to trough.
  - E. None of the above.



5. Which of the following best describes the meaning of aggregate expenditure in the traditional macro model (with no government and a closed economy)?
- The amount firms and households intend to spend on consumption and investment.
  - The actual level of spending done in the economy by firms and households on consumption and investment.
  - The summing up of all the spending on goods and services in the economy by firms and households.
  - The average level of demand for all goods and services in the economy by firms and households.
  - The actual level of savings and investment by households and firms.
6. According to the simplified macro model (with no government and no foreign sector), which of the following characterizes an economy in equilibrium?
- When leakages = injections
  - When saving ( $S$ ) = intended investment ( $I_i$ )
  - When  $Y = AE$
  - When actual consumption and investment spending equals the intended consumption and investment spending.
  - All of the above
7. In the classical model:
- flexible markets will keep the economy at a full-employment level of spending and output.
  - both households' saving activity and firms' investment activity are quite sensitive to changes in the interest rate.
  - adjustments in the interest rates quickly correct any imbalances between saving and investment.
  - a sudden fall in investment spending would cause a fall in the interest rate, which would dampen saving and stimulate consumption, quickly returning the economy to full employment.
  - all of the above.
8. Which of the following can describe the meaning of autonomous consumption?
- The part of consumption that is not related to income.
  - That which, when it changes, shifts the consumption schedule up or down.
  - A minimum level of income that people feel required to spend for survival.
  - The amount of consumption spending people will undertake no matter what their current incomes are, reflecting their long-term plans, their commitments and habits, and their place in the community.
  - All of the above.

9. The marginal propensity to consume ( $mpc$ ):
- stands for the portion of every additional dollar of aggregate income that goes to consumption spending.
  - is equal to the change in consumption ( $C$ ) divided by the change in aggregate income ( $Y$ ).
  - is equal to  $1 - mps$ .
  - theoretically should be less than 1
  - all of the above.

Use the Figure below to answer the next two questions:



10. In the figure above, what is the level of autonomous consumption?
- 0
  - 20
  - 100
  - 340
  - 400
11. In the figure above, when income = 400, what is the level of saving?
- 400
  - 340
  - 60
  - 20
  - 0

12. Which of the following factors will *not* cause a shift in the consumption function (or schedule)?

- A. Wealth
- B. Consumer confidence
- C. Cultural attitudes toward spending and saving
- D. A change in income
- E. Changes in the distribution of income

13. In the Keynesian model:

- A. Households only save and lend, and do not borrow.
- B. Consumption spending is more sensitive to the interest rate than to income.
- C. Investment spending is highly sensitive to the interest rate, especially in a recession,.
- D. Investment spending is highly sensitive to investors' confidence and expectations of future sales and profits (or "animal spirits").
- E. All of the above

14. Which of the following will not cause a shift in the investment function (or schedule) in the Keynesian model?

- A. A change in investors' confidence and expectations of the future
- B. A change in the interest rate
- C. A change in household disposable income
- D. A change in prices of investment goods
- E. A change in the willingness of lenders to lend

15. If aggregate expenditure falls below aggregate output ( $AE < Y$ ), according to the Keynesian model, what happens to unintended inventories?

- A. There is a depletion of unintended inventories.
- B. There is an accumulation of unintended inventories.
- C. Unintended inventories remain unchanged.
- D. Unintended inventories fall to zero (0).
- E. None of the above.

16. Unlike the Classical economists, Keynes thought that after a sudden fall in investment spending:

- A. the economy would quickly return to full-employment equilibrium.
- B. the economy could contract by even more than the initial fall in spending, and get stuck there.
- C. the market forces would automatically pull an economy out of a recession.
- D. a rise in consumption spending would counteract the fall in investment spending, keeping the economy at full employment.

- E. None of the above.
17. Which of the following expresses the value of the income/spending multiplier (in a simple closed economy with no government)?
- A.  $1/mpc$
  - B.  $1/(1+mpc)$
  - C.  $1/(1-mpc)$
  - D.  $1+mpc$
  - E.  $1-mpc$
18. Assume a simple, closed economy with no government. The marginal propensity to consume ( $mpc$ ) = 0.75. Then the value of the multiplier is:
- A. 1.34
  - B. 0.57
  - C. 4
  - D. 1.75
  - E. 0.25
19. Which of the following best describes the relationship between the  $mpc$  and the multiplier?
- A. The higher the  $mpc$ , the higher the multiplier.
  - B. The higher the  $mpc$ , the lower the multiplier.
  - C. The lower the  $mpc$ , the higher the multiplier.
  - D. There is no relationship between the  $mpc$  and the multiplier.
  - E. There is a one to one relationship between the  $mpc$  and the multiplier – the multiplier will increase by the same amount as the increase in the  $mpc$ .
20. Assume a simple, closed economy with no government. The marginal propensity to consume ( $mpc$ ) = 0.8. Assume there's a sudden drop in investment spending by 100 million. By how much will output eventually fall?
- A. 20 million
  - B. 100 million
  - C. 125 million
  - D. 500 million
  - E. None of the above.

## Answers to Active Review Questions

1. stabilization
2. Keynesian, classical
3. business cycle
4. recession
5. Okun's "Law"
6. full employment output
7. aggregate expenditure
8. behavioral equation, accounting identity
9. autonomous consumption, the marginal propensity to consume, aggregate income.
10. the marginal propensity to save
11. multiplier
12. False. The two stylized facts are not always true. There are periods when the economy has gone into recession and the inflation rate has increased. And there are periods when the economy has gone into an expansion, and the inflation rate has not increased.
13. True.
14. True.
15. True
16. False. The lower interest rate would primarily dampen saving and stimulate consumption spending, and the economy would return to equilibrium with a higher composition of consumption spending and less investment spending than before.
17. As GDP falls during a contraction, unemployment rises because producers are producing less goods and services and need fewer workers. And during an expansion, producers need more workers as they increase production, so the unemployment rate falls (stylized fact #1). As producers increase their production, however, there is more competition for the limited supply of workers and other inputs, which bids up wages and prices and results in an increase in the rate of inflation. Whereas during an economic contraction, there is less pressure on wages and prices and the rate of inflation slows down or becomes negative (stylized fact #2).
18. Classical economists thought that the economy would recover by itself, so there was no need for the government to intervene.
19. The behavioral equation  $AE = C + I_i$  expresses the spending intentions by firms and households. They may not actually spend the amount that they intended to. The accounting identity  $Y = C + I$  expresses the actually spending that has occurred (which can be tallied up in the national accounts and is theoretically equal to GDP – at least in the simplified economy with no government or foreign sector).
20. A sudden fall in investment spending would cause a fall in the interest rate, which would dampen saving and stimulate consumption, quickly returning the economy to full employment. The full employment level will now have somewhat more consumption spending and less investment spending.
21. The determinants of investment spending are: the interest rate, prices of investment goods, accumulated assets and debt, the willingness of lenders to lend, but most important for Keynes was the level of confidence and expectations about the future.
22. When there's insufficient aggregate expenditure, there will be unintended investment and excess inventory accumulation.

23. a. The diagram is called the Keynesian cross diagram.  
 b. The 45 degree line represents the situation of equilibrium where output = income.  
 c. At an income of 800, spending equals 720, so spending is less than income ( $AE < Y$ ), and there's unintended investment (i.e. inventory accumulation) of 80. Producers will cut back production, so income, consumption and saving all drop, and the economy will eventually move to the equilibrium at 400, where  $AE = Y$ .
24. The equilibrium would not be a desirable one, as there is persistent unemployment there (of the cyclical kind). Unlike the classical economists, Keynes thought the economy could get stuck at an equilibrium below the full employment output, and there would be no forces that would automatically move the economy back to full employment output.
25. When spending drops by a certain amount, output drops by *more* than that amount, i.e. by a multiplied amount. This is because the drop in spending has a feedback or echo effect on the economy. As firms cut back production and lay off workers, those workers now have a lower income, and cut back their own consumption. This affects additional firms, who see their inventories pile up and cut back production. Thus more workers are laid off and incomes fall further, leading to a vicious circle of higher unemployment, lower income, and lower investment.
26. To solve the multiplier algebraically, first substitute the consumption function into the equation for  $AE$  ( $AE = C + I_I$ ). Then set  $Y = AE$ , and solve for  $Y$ .  
 $AE = C + I_I$  and  $C = \bar{C} + mpc * Y$   
 So,  $AE = \bar{C} + mpc * Y + I_I$   
 At equilibrium,  $Y = AE$   
 $Y = \bar{C} + mpc * Y + I_I$   
 $Y - mpc * Y = \bar{C} + I_I$   
 $Y (1 - mpc) = \bar{C} + I_I$   
 $Y = (\bar{C} + I_I) / (1 - mpc)$

### Answers to Problems

1. It appears the U.S. economy went into recession in the years 1973-75, 1979-80, 1981-82, 1990-91, 2007-9, and 2020 because these are the periods when it the level of real GDP actually goes down. (There was also a relatively mild recession during 2001, which is not apparent except as a slight flattening on the GDP per capita graph, since it occurred entirely within 2001; by 2002 GDP was growing once again). The recession in 2020 was the deepest one during this period but the recovery from this was rather swift because the recession was mainly caused by the COVID-19 pandemic related shutdowns, and the economy rebounded quickly as businesses re-opened.

2.

a.

A: contraction

B: expansion

C: peak

D: trough

b.  $Y^*$ : full employment output

3.

| (1)<br>Income<br>( $Y$ ) | (2)<br>Consumption<br>( $C$ ) | (3)<br>Intended<br>Investment<br>( $I_I$ ) | (4)<br>Aggregate Expenditure<br>$AE = C + I_I$<br>$= \text{column (2)} + \text{column (3)}$ |
|--------------------------|-------------------------------|--|---|
| 0                        | 30                            | <b>20</b>                                  | 50  |
| 300                      | 300                           | 20   | <b>320</b>  |
| 400                      | <b>390</b>                    | 20   | 410   |
| 500                      | 480                           | 20   | 500   |
| 600                      | <b>570</b>                    | 20   | <b>590</b>  |

Using  $AE = C + I_I$ ,

(a)  $50 = 30 + \mathbf{20}$

(b)  $\mathbf{320} = 300 + 20$

(c)  $410 = \mathbf{390} + 20$

Deriving the consumption function:

Autonomous consumption = 30 (from the first row where  $Y = 0$ ).

To find the  $mpc$ , calculate a change in  $C$  (e.g.  $390 - 300 = 90$ ), and divide by the corresponding change in  $Y$  ( $400 - 300 = 100$ ). So the  $mpc = \Delta C / \Delta Y = 90 / 100 = 0.9$

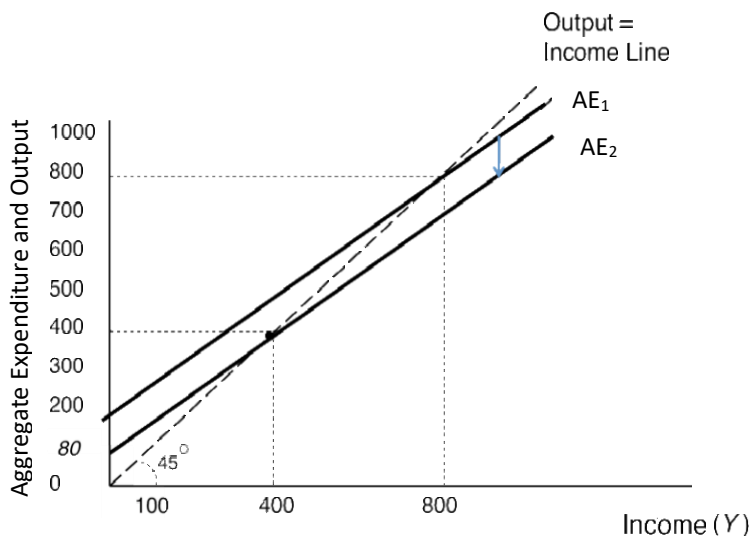
Hence, the consumption function is  $C = \mathbf{30 + 0.9Y}$

To fill in (d),  $C = 30 + .9(600) = 30 + 540 = \mathbf{570}$ .

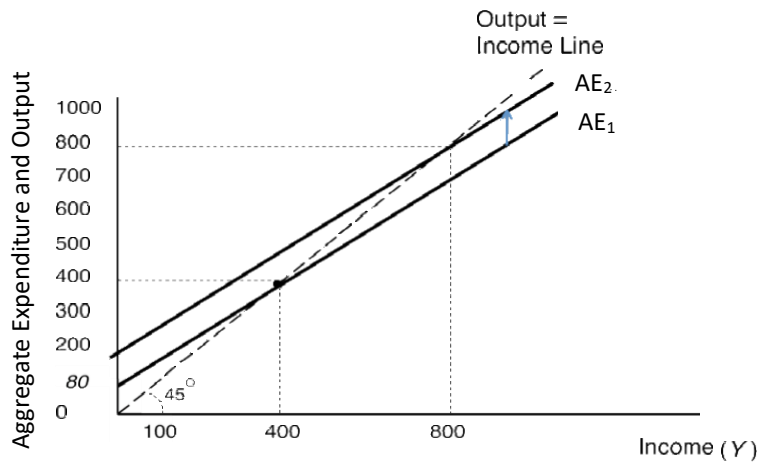
(e) follows from  $\mathbf{590} = 570 + 20$ .

f. Equilibrium is where  $Y = AE$ , which is at  $\mathbf{500}$  (see shaded row).

4. a. Households experience a decline in wealth as the value of housing drops when the housing bubble bursts:  $AE$  would shift down, and the new equilibrium would be at a lower level of output.



b. The nation's leaders tell consumers it is their patriotic duty to save the economy by consuming more: If consumers act on this, AE would shift up, and the new equilibrium would be at a higher level of output.



c. The same national leaders pass policies favoring the wealthy, which leads to a more unequal distribution of income: Since the rich tend to have much lower marginal propensity to consume than the poor, a greater share of income going to the rich would lower overall consumption levels and increase savings. Hence, AE would shift down and the new equilibrium would be at a lower level of output. The graph would look like the one in part a above.

5 a. Since the marginal propensity to consume ( $mpc$ ) = 0.8, the multiplier = 5. With a  $\Delta I$  of 50 million, using the formula:

$$\Delta Y = mult \Delta I$$

$$\Delta Y = 5 \times 50 \text{ million} = 250 \text{ million}$$

b. Now with an  $mpc$  = 0.9, the multiplier = 10. With a  $\Delta I$  of 50 million,

$$\Delta Y = mult \Delta I$$

$$\Delta Y = 10 \times 50 \text{ million} = 500 \text{ million.}$$

### Answers to Self Test Questions

- |       |       |
|-------|-------|
| 1. B  | 11. C |
| 2. B  | 12. D |
| 3. B  | 13. D |
| 4. C  | 14. C |
| 5. A  | 15. B |
| 6. E  | 16. B |
| 7. E  | 17. C |
| 8. E  | 18. C |
| 9. E  | 19. A |
| 10. B | 20. D |