CHAPTER 7
EQUILIBRIUM NATIONAL INCOME

Chapter in a Nutshell

Two very different groups of people are always at work making decisions concerning spending, saving, and investment that affect each other. The income households earn is spent and saved: \( Y = C + S \). Producers produce an equivalent value of goods and services in the form of consumption and investment:

\[ Y = C + I \]

By definition, \( C + I = C + S \). But the \( I \) (investment) in this last equation is actual investment. It's what producers end up investing, not necessarily what they intended to invest, \( I_i \). Sometimes they end up with more actual investment than they intended (creating unwanted inventories) and so cut output. At other times, their actual investment is less than what they intended to produce, and as a result, they increase output. How they respond to their actual investments and why they do it is what this chapter's about.

The total of what people spend on consumption, businesses spend on investment, government spends on its purchases, and foreigners spend on net exports is described as aggregate expenditures. Are these expenditures greater than, less than, or equal to the total income earned in the economy? The answer determines whether national income increases, decreases, or is in equilibrium. In any case, if the economy is not in equilibrium, it is always on its way there. Why is this so?

Suppose that consumers spend on consumption an amount less than what producers produced for consumption. Some consumer goods remain unsold as unwanted inventories. Actual investment is greater than intended investment. Producers lay off workers, employment declines, and national income declines until it reaches the equilibrium level of national income where aggregate expenditures equal national income at a lower level.

Now suppose that consumers spend on consumption an amount greater than what producers produced for consumption. Wanted inventories (investment goods) are converted into consumption goods. Actual investment is less than intended investment. Producers hire more workers to restore their inventories, causing both national income and employment increase. Aggregate expenditures and national income rise toward a higher equilibrium level of national income. Only when producers produce for consumption an amount equal to what consumers purchase for consumption will producers’ intended investment be equal to saving by consumers. When producers’ intended investment is equal to consumers’ saving, the economy is in equilibrium.

Changes in intended investment cause the equilibrium level of national income to change. The relationship between these two changes is explained by the income multiplier. An increase in intended investment leads to an increase in income, a fraction of which is consumed (the marginal propensity to consume multiplied by the initial increase in investment) and becomes income for other people. Repeated rounds of income increases and consumption increases occur, with each round being smaller than the previous one. The multiplier, equal to \( 1/(1 - MPC) \), gives the factor by which the initial round of investment is multiplied into new income. Just as an increase in investment causes a multiple expansion in national income, a decrease in investment will cause a multiple decrease in national income.

The consumers' and producers' behavior that leads the economy to equilibrium also produces a rather surprising consequence known as the paradox of thrift. It says: The more people try to save, the more national income will fall, leaving them with no more, and perhaps less, saving in the end. Why? An increase in saving is really the same as a decrease in consumption, which is a decrease in aggregate expenditures. It sets
in motion a fall in national income to a new and lower level of equilibrium. There, saving is the same or less than it was at the original level of income.

After you study this chapter, you should be able to:

- Explain why consumption spending and intended investment spending decisions are independent.
- Define aggregate expenditure and graph the aggregate expenditure curve.
- Show how changes in inventories move the economy toward an equilibrium level of national income.
- Explain the relationship between saving and investment.
- Create an example to show the logic of the income multiplier.
- Illustrate the paradox of thrift with a numerical example.

Concept Check — See how you do on these multiple-choice questions.

This question asks you to think about what aggregate expenditures includes.

1. Aggregate expenditure is equal to
   a. spending by consumers on consumption goods
   b. spending by businesses on investment goods
   c. spending by government
   d. spending by foreigners on net exports
   e. the sum of a, b, c, and d

What determines the size of the income multiplier?

2. The income multiplier is larger when
   a. the marginal propensity to consume is larger
   b. the marginal propensity to save is larger
   c. spending by government is larger
   d. the change in income is smaller
   e. the marginal propensity to consume is smaller

What is the impact of an increase in saving on aggregate expenditures and the equilibrium level of national income?

3. An example of the paradox of thrift is
   a. consumers who attempt to save more but find they cannot go without basic consumption goods
   b. an increase in saving that leads to a lower equilibrium level of national income and the same or lower saving
   c. a high marginal propensity to save that is matched by a high marginal propensity to consume
   d. an increase in saving that leads to more investment, higher income, and higher consumption
   e. an increase in interest rates that leads to lower investment and lower saving
The economy moves automatically toward equilibrium. Will national income rise or fall in order to move toward equilibrium in the case described in this example? How does it happen?

4. If the level of national income is above the **equilibrium level of national income**, then
   a. autonomous consumption will fall and the economy will move toward equilibrium
   b. inventories will accumulate and production will fall, moving the economy toward equilibrium
   c. intended investment is equal to saving
   d. consumption spending is greater than the value of consumption goods produced
   e. the marginal propensity to save is too low to achieve equilibrium

When do unwanted inventories become part of actual investment? When does the decrease in wanted inventories decrease actual investment?

5. When **actual investment** is equal to intended investment,
   a. saving is zero
   b. unwanted inventories are increasing
   c. unwanted inventories are decreasing
   d. unwanted inventories are zero
   e. the economy is below the equilibrium level of national income

**Am I on the Right Track?**

Your answers to the questions above should be e, a, b, b, and d. The consumption spending decisions by consumers and the production decisions by producers will match each other only by accident. Therefore, the level of national income that is produced is unlikely to be the equilibrium level of national income. If consumption spending is less than the production of consumption goods, unwanted inventories accumulate, production decreases, and national income declines toward its equilibrium level. If consumption spending is greater than the production of consumption goods, wanted inventories are converted to consumption goods, production increases, and national income rises toward its equilibrium level. The mechanics of these adjustments toward equilibrium will be explored in the graphing tutorial.

**Key Terms Quiz** — Match the terms on the left with the definitions in the column on the right.

1. aggregate expenditure  _____ a. goods produced for consumption that remain unsold
2. aggregate expenditure (AE) curve  _____ b. the more people try to save, the more income falls, leaving them with no more, and perhaps with even less, saving
3. equilibrium level of national income  _____ c. the multiple by which income changes as a result of a change in aggregate expenditure
4. income multiplier  _____ d. spending by consumers on consumption goods, by businesses on investment goods, by government, and by foreigners on net exports
5. unwanted inventories  _____ e. a curve that shows the quantity of aggregate expenditures at different levels of national income or GDP
6. paradox of thrift  _____ f. investment spending that producers actually make — that is, intended investment plus or minus unintended changes in inventories
7. actual investment  _____ g. the level of national income where saving is equal to intended investment
Graphing Tutorial

This chapter presents a new graph that combines the consumption curve and the investment curve to show the equilibrium level of national income. Let’s continue with the example presented in the graphing tutorial for Chapter 21 of the study guide to examine how the consumption curve and the investment curve are used to generate the aggregate expenditure curve in order to graph the equilibrium level of national income.

The consumption equation from the previous graphing tutorial is \( C = 100 + 0.75Y \). and autonomous investment is \( I_i = 75 \). Autonomous investment is intended investment. These two equations are presented as curves along with the income line (45-degree line) in the graph below.

The aggregate expenditure curve can be drawn by adding the investment curve to the consumption curve. This will shift the consumption curve up by a constant $75 billion in the graph. The graph below shows the consumption curve and the aggregate expenditure curve that lies above and parallel to the consumption curve.
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How do we locate the equilibrium level of national income in this diagram? We have defined the equilibrium level of national income as the level where $I_i = S$. In the graph, $C + I_i$ is the aggregate expenditure curve and $C + S$ is the income curve. Aggregate expenditure is equal to income where the two curves intersect at the $700$ billion level of national income, so this is the equilibrium level of national income. At $700$ billion, $I_i = S$.

Let’s check our graph by calculating the equilibrium level of national income algebraically.

In equilibrium 

\[ Y = C + I_i \]

and 

\[ C = 100 + .75Y \]

and 

\[ I_i = 75 \]

then 

\[ Y = (100 + .75Y) + 75. \]

Subtracting $.75Y$ from both sides of the equation and combining the constant terms gives us

\[ .25Y = 175. \]

Finally, dividing both sides by $.25$ reduces the equation to

\[ Y = 700. \]

This confirms our graph — the equilibrium level of national income is $700$ billion.

What if we start at a level of national income other than the equilibrium level of national income? After all, it would be a chance event for the economy to automatically start out in equilibrium. How can we show the adjustment toward the equilibrium level of national income on the aggregate expenditure, national income graph? Consider the graph below, which shows just the aggregate expenditure curve and the income line.

Suppose we start at a level of national income below the equilibrium, say, at $500$ billion. The
aggregate expenditure curve is above the income curve at $500 billion. Aggregate expenditure is greater than income so inventories decline. Wanted inventories are converted to consumer goods. Let’s check our interpretation of the graph algebraically. Aggregate expenditure equals $C + I = 175 + .75Y = 175 + .75(500) = 550$ billion. Aggregate expenditure exceeds national income by $50$ billion. Therefore, producers increase output to restore their inventories, so employment and national income both increase as the economy moves toward the $700$ billion level.

Suppose we start at a level of national income above the equilibrium, say, at $900$ billion. The aggregate expenditure curve is below the income curve at $900$ billion. Aggregate expenditure is less than national income so unwanted inventories accumulate. Checking our interpretation of the graph algebraically, we have $AE = 175 + .75Y = 175 + .75(900) = 850$. Now aggregate expenditure falls short of national income by $50$ billion. Therefore, producers reduce output to rid themselves of unwanted inventories, so both employment and national income decrease as the economy moves toward the $700$ billion level.

**Graphing Pitfalls**

When you add the investment curve to the consumption curve in order to draw the aggregate expenditure curve, make sure the aggregate expenditure curve is parallel to the consumption curve. Otherwise, you’ll end up with the wrong equilibrium level of national income. It is tempting, perhaps, to draw the aggregate expenditure curve through the intersection of the consumption curve and the income curve, as depicted in the graph below. Don’t make this mistake. Check to make sure that the consumption curve and the aggregate expenditure curve are parallel with the vertical distance between them equal to the amount of autonomous investment.

The aggregate expenditure curve should be parallel to and above the consumption curve by a vertical distance equal to autonomous investment. The two curves should not intersect, as drawn above.
True-False Questions — If a statement is false, explain why.

1. The amount that people intend to save will automatically equal the amount that investors intend to invest. (T/F)

2. Actual investment exceeds intended investment when inventories accumulate. (T/F)

3. If inventories are less than intended (or wanted) inventories, then production, employment, and national income will increase. (T/F)

4. Assuming there is no government spending and no foreign trade, then aggregate expenditure is equal to consumption plus saving. (T/F)

5. Spending by consumers on consumption goods is equal to consumption goods production at the equilibrium level of national income. (T/F)

6. When autonomous investment increases by $100, national income will increase by $100. (T/F)

7. A decrease in autonomous investment will have a smaller effect on national income than an equal increase in autonomous investment. (T/F)

8. The paradox of thrift states that if everyone decided to save more, consumption spending would fall, which would decrease national income, and with less income, people would end up saving no more than they did before. (T/F)

9. If the marginal propensity to consume increases, the income multiplier decreases. (T/F)

10. A decrease in the price level along an aggregate demand curve is reflected by an upward shift in the aggregate expenditure curve. (T/F)

11. Intended investment equal to saving is a signal for firms to reduce their inventories. (T/F)

12. An upward shift in the aggregate expenditure curve, caused by an increase in autonomous investment, appears as a rightward shift in the aggregate demand curve. (T/F)

13. The multiplier effect of an increase in investment is a new round of spending equal to the new investment followed by successive rounds of increased income with each one larger than the preceding round. (T/F)
14. The multiplier is the reciprocal of the marginal propensity to consume.  (T/F)

15. J. M. Keynes believed that aggregate supply was more important than aggregate demand in determining the equilibrium level of national income.  (T/F)

Multiple-Choice Questions

1. If actual investment is greater than intended investment, then  
   a. the economy is in equilibrium  
   b. national income must rise  
   c. inventory investment is negative  
   d. consumers are purchasing fewer goods and services than are produced  
   e. unemployment will decrease

2. In the aggregate expenditure model of equilibrium national income determination,  
   a. aggregate supply is vertical  
   b. aggregate demand increases as the price level decreases  
   c. the price level is assumed to be constant  
   d. investment is a function of income  
   e. the economy may move away from the equilibrium level of national income

3. If you read in the paper that intended investment hasn't changed but inventories are accumulating, then it is likely that  
   a. the economy is about to experience a period of rapid growth  
   b. the price level will rise dramatically  
   c. the economy will experience a drop in production, employment, and income  
   d. the economy will experience a rise in productivity  
   e. intended investment will change

4. The income multiplier means that changes in autonomous investment will lead to  
   a. a quick end to recessions  
   b. even larger changes in national income  
   c. a larger marginal propensity to consume  
   d. a larger marginal propensity to save  
   e. lower autonomous consumption

5. Suppose that the consumption function is given by \( C = 500 + .8Y \) and investment is \( I = 500 \). The equilibrium level of income is  
   a. 2,500  
   b. 1,000  
   c. 5,000  
   d. 4,000  
   e. 7,500

6. Using the information given in question 5, if the level of national income is actually $6,000, then  
   a. inventories will accumulate and production and income will fall  
   b. inventories will accumulate and production and income will rise  
   c. inventories will decline and production and income will rise  
   d. inventories will decline and production and income will fall  
   e. the economy will adjust to a new equilibrium
7. The graph below shows that if national income equals $800,
   a. inventories will decline and national income will increase
   b. inventories will decline and national income will decrease
   c. inventories will increase and national income will decrease
   d. inventories will increase and national income will increase
   e. intended investment and savings are equal

8. The income multiplier is the process whereby
   a. an increase in spending leads to exactly the same increase in equilibrium national income
   b. an increase in spending is multiplied into a larger increase in equilibrium national income
   c. an economy can automatically return to full employment during a recession
   d. the price level increases by multiples during periods of high inflation
   e. an economy can increase its GDP through increases in saving

9. Given a marginal propensity to consume of 0.90, an increase in net exports equal to $100 will lead to a(n)
   a. decrease in national income of $1,000
   b. increase in national income of $1,000
   c. increase in national income of $100
   d. increase in national income of $900
   e. decrease in national income of $900

10. The basic idea behind the paradox of thrift is that
    a. by saving more people end up with higher incomes in the future
    b. it takes money to make money
    c. an increase in saving decreases national income so much that saving is, at best, unchanged
    d. it is impossible for savers to increase saving because somebody will always increase spending by
        an equivalent amount
    e. saving only benefits producers who invest, not the actual savers
11. When aggregate expenditures (consumption plus investment) are less than national income
   a. inventories will decline
   b. inventories will increase
   c. intended investment is greater than saving
   d. savings will decline
   e. real GDP will decrease

12. When consumption goods production is $2,400 billion and consumers purchase $2,000 billion of
   consumer goods, it is clear that
   a. not enough consumer goods are being produced
   b. to move toward equilibrium, national income must increase
   c. actual investment will be equal to intended investment
   d. the economy is in equilibrium
   e. actual investment will be higher than intended investment

13. The main reason why changes in the equilibrium level of national income should be expected is that
   a. consumption changes frequently
   b. saving changes frequently
   c. investment is fairly volatile
   d. the multiplier is quite large
   e. the rounds of spending in the multiplier keep increasing

14. If net exports decreases by $20 billion and the marginal propensity to consume is 0.75,
   then national income will
   a. rise by $20 billion
   b. fall by $20 billion
   c. fall by $15 billion
   d. rise by $15 billion
   e. fall by $80 billion

15. An increase in the marginal propensity to save from 0.20 to 0.50 means that
   a. the marginal propensity to consume falls from 0.80 to 0.50
   b. less is saved at every level of national income
   c. more is consumed at every level of national income
   d. the marginal propensity to consume increases as well from 0.20 to 0.50
   e. intended investment increases by 30 percent

16. An increase in saving will generate a decrease in aggregate expenditures such that
   a. national income will increase
   b. consumption will increase
   c. saving is the same at a lower level of equilibrium national income
   d. investment increases as the level of national income increases
   e. the saving curve eventually decreases

17. The effect of an increase in the price level on the position of the aggregate expenditure curve is to
   a. shift the curve up parallel to the original curve
   b. shift the curve down parallel to the original curve
   c. increase the slope of the curve
   d. decrease the slope of the curve
   e. shift the curve down and decrease the slope of the curve
18. The equilibrium level of national income will not be reached automatically by pure chance because
   a. firms typically produce excessively so unwanted inventories accumulate
   b. firms typically produce less than is needed satisfy demand so wanted inventories are consumed
   c. the consumption goods production decisions by firms are unlikely to match the consumption spending
      decisions by households
   d. the price level cannot adjust to equate the quantity supplied and the quantity demanded
   e. autonomous investment is volatile

19. When the income multiplier works in reverse (is negative),
   a. the change in investment must have been negative
   b. the marginal propensity to consume must have fallen
   c. the marginal propensity to save must have fallen
   d. the consumption curve must have risen
   e. employment must increase

20. If the level of consumption equals the level of national income,
   a. the economy is in equilibrium
   b. autonomous consumption must be zero
   c. aggregate expenditure is equal to intended investment
   d. saving is zero
   e. saving equals consumption

The following questions relate to the applied, interdisciplinary, and global perspectives in the text.

21. According to Irving Gottheil, the author’s brother who produces hats in Canada, his biggest problem from
    year to year in the hat business is
   a. determining price
   b. finding a retailer for his hats
   c. adopting new technology to lower per unit labor costs
   d. choosing new styles for hats
   e. determining how many hats consumers will want to purchase

22. When Keynes suggested that pyramid-building might serve to increase wealth, the modern lesson is that
    a. governments should focus spending on wondrous projects
    b. societies value monuments enormously
    c. the act of spending to construct the pyramids set in motion more spending that increased income
    d. Keynes was referring to the use of low-cost slave labor
    e. government spending creates wealth for a small elite in society

23. When investment spending shifts location as, for example, when firms in southern Italy moved to
    northern Italy, the effect of this change was to
   a. open up new opportunities for new firms in southern Italy
   b. benefit northern Italy without hurting southern Italy
   c. encourage workers in southern Italy to become entrepreneurs
   d. cause a multiplier increase in income in the north and a multiplier decrease in income in the south
   e. equalize incomes in Italy between the poorer south and the richer north
24. Upstream and downstream linkages associated with investment in a business enterprise refer to links between
   a. firms that are located along a waterway producing similar goods and services
   b. firms and their suppliers and the retailers who sell the finished goods to consumers
   c. workers for firms who earn income from the firm and the government which taxes income
   d. countries that produce goods for export overseas and the importing countries
   e. workers for firms, their managers, and the stockholders in the company

Fill in the Blanks

1. If consumers purchase just as much as producers produce for consumption, then the ____________________ that producers intend to make will equal the __________________ consumers make.

2. If wanted inventories are converted into consumption goods, then producers will increase ___________________ and ___________________ to replenish their inventory stock.

3. J. M. Keynes believed that __________________________ was primarily responsible for determining the equilibrium level of national income.

4. Actual investment is equal to intended investment plus or minus _____________________________ in inventories.

Discussion Questions

1. What is the difference between actual and intended investment?

2. Why doesn't an increase in aggregate expenditures cause the price level to increase in the aggregate expenditure model of equilibrium national income determination?
3. Explain the logic of the multiplier.

4. Do Keynesian economists think that saving is a bad thing?

Problems

1. a. Suppose that the consumption function is \( C = 80 + 0.8Y \) and the income level is $1,400 billion. Calculate what consumers intend to consume and save at this income level.

b. Continue with the information in part a. Now suppose that at an income level of $1,400 billion producers intend to produce $1,300 billion of consumption and intend to invest $100 billion. Is the economy in equilibrium? Explain, using a graph to aid discussion.

c. If this economy is not in equilibrium, what would the equilibrium level of national income be, assuming that intended investment remains at $100 billion? How does the economy adjust to the new equilibrium?

2. Suppose an economy is described by the following equations: \( C = 100 + 0.75Y \) and \( I = 300 \).
a. Calculate the equilibrium level of income.

b. Graph the aggregate expenditures curve and the 45-degree line.

c. Suppose saving increases by $50 at every level of national income. How would the aggregate expenditures curve you drew be affected? Explain. Calculate the new equilibrium level of national income.

d. Calculate the level of saving at the original equilibrium and at the new equilibrium. Does this example demonstrate the paradox of thrift? Explain.
3. Illustrate the original equilibrium level of national income and the change in the equilibrium level of national income due to the increase in saving from problem 2 above using the saving and investment graph. Explain your graph carefully.

Everyday Applications

Have you worked in a business where inventory management was a key part of the job? Even if you have not, you can imagine the sequence of events once inventories build up to unwanted levels or fall to levels below those that are desired. When inventories begin to pile up, the inventory manager calls the producers telling them to stop sending so much. What else could happen but a cut in production? It’s just the opposite when inventories are drawn down. The manager gets on the phone, says send us some more, and production, employment, and income all rise.

Economics Online

The Bureau of Economic Analysis, an agency of the U. S. Department of Commerce, is the nation’s economic accountant. The agency prepares estimates of future levels of key economic variables. Visit its Web site (http://www.bea.gov/) to learn more about how the agency makes estimates for key regional, national, and international economic variables.

Answers to Questions

Key Terms Quiz

a. 5  
e. 2  
b. 6  
f. 7  
c. 4  
g. 3  
d. 1
True-False Questions

1. False. Only by accident will intended investment be equal to saving because different groups make investment and saving decisions independent of each other.
2. True
3. True
4. False. Aggregate expenditure is equal to consumption plus intended investment.
5. True
6. False. An increase in autonomous investment causes national income to increase by a multiple of that amount.
7. False. Changes in autonomous investment that are equal in magnitude will have equal and opposite effects on the equilibrium level of national income.
8. True
9. False. As the marginal propensity to consume increases, so does the income multiplier.
10. True
11. False. If intended investment is equal to saving, then the economy is at the equilibrium level of national income, and there are no unwanted inventories.
12. True
13. False. The multiplier effect of an increase in investment is an initial increase in income equal to the increase in investment followed by successive increases in spending and income that diminish in each round.
14. False. The income multiplier is equal to $1/(1 - MPC)$.
15. False. Keynes believed that aggregate expenditure was more important than aggregate supply as a determinant of the equilibrium level of national income.

Multiple-Choice Questions

1. d  6. a  11. b  16. c  21. e
2. c  7. a  12. e  17. b  22. c
3. c  8. b  13. c  18. c  23. d
4. b  9. b  14. e  19. a  24. b
5. c  10. c  15. a  20. d

Fill in the Blanks

1. investment; saving
2. production; employment
3. aggregate expenditure
4. unintended changes

Discussion Questions

1. Intended investment includes the purchases of new plant and equipment and inventories that businesses plan to make. Intended investment is the same as autonomous investment. Actual investment includes unintended changes in inventories. For example, if consumers don’t purchase all of the consumption goods that producers produce, there will be unintended inventory investment. On the other hand, if consumers purchase more consumption goods than producers produce, wanted inventories will be turned into consumption goods. Investment in inventories will be less than was intended.

2. The price level is assumed to be constant in the aggregate expenditure model for national income.
determination. An increase in aggregate expenditure causes output to increase via the income multiplier. The model assumes implicitly that ample supplies of resources are available to use for increased production.

3. The logic behind the multiplier is that an increase in autonomous expenditure becomes income for people, who then spend a fraction of the increase as determined by the marginal propensity to consume. In turn, this increase in consumption becomes income for another group of consumers who spend a fraction of the increase. These rounds of spending go on and on, with each successive round becoming smaller. The multiplier process can also work in reverse, starting with a decrease in autonomous expenditure.

4. Keynesian economists don’t believe that saving is a bad thing. Increased saving accompanied by increased investment is good and necessary because this is how society accumulates more capital to promote economic growth. The problems with saving arise when an increase in saving is not coupled with an increase in intended investment. Under such circumstances, the paradox of thrift is observed, national income declines, and at the new equilibrium, saving may be no more or even less than it was originally.

**Problems**

1. a. Consumers intend to consume $1,200 billion and save $200 billion.

b. This economy is not in equilibrium because $100 billion of unwanted inventories will accumulate. As shown in the graph below, at an income level of $1,400 billion, aggregate expenditure falls short of national income. Consumer spending is $1,200 billion and investment spending is $100 billion. Unwanted inventories accumulate in the amount of $100 billion.

c. The equilibrium is $900 billion. Aggregate expenditure is equal to $C + I = (80 + .8Y) + 100$. Solving for the equilibrium level of national income, we have $Y = 180 + .8Y$, which gives $Y = 900$. The economy adjusts to $Y = 900$ because inventories increase at the $1,400$ level, causing firms to cut production and employment so that income falls to the $900$ billion level.
2. a. The equilibrium level of income is calculated by setting \( Y = (100 + 0.75Y) + 300 \) and solving for \( Y \).

The equation reduces to \( Y = 400 + 0.75Y \). This becomes \( 0.25Y = 400 \), so \( Y = 1600 \).

b. 

c. An increase in saving is represented by a downward shift in the aggregate expenditures curve by $50.

The equilibrium level of income decreases to $1,400. These changes are shown in the graph. Aggregate expenditures falls from \( AE = 400 + 0.75Y \) to \( AE' = 350 + 0.75Y \), and the equilibrium level of income falls to $1,400 showing the multiplier effect. These changes appear in the graph below.
d. When \( Y = 1,600 \), \( C = 100 + .75(1,600) = 1,300 \). \( S = Y - C = 1,600 - 1,300 = $300 \).
When \( Y = 1,400 \), \( C = 50 + .75(1,400) = 1,100 \). \( S = Y - C = 1,400 - 1,100 = $300 \). Even though saving increased at the $1,600 level, the income multiplier caused national income to fall by $200 to $1,400, and the level of saving at this income level was the same as at the $1,600 level. This shows the paradox of thrift.

3. The saving and investment graph that corresponds to problem 2 is shown below. Because autonomous consumption is $100, we know that the vertical intercept for the saving curve is –$100. The saving curve, labeled \( S \), intersects the investment curve at the $1,600 level of national income. Both saving and investment are equal to $300 in equilibrium. An increase in saving equal to $50 shifts the saving curve up by $50 parallel to the original curve. The new saving curve is labeled \( S' \). At the $1,600 level of national income, saving is greater than investment on \( S' \). Therefore, unwanted inventories accumulate, production decreases, employment decreases, and national income decreases along \( S' \) until the new equilibrium level of national income is achieved at $1,400. \( S = I = $300 \) at the new equilibrium, illustrating the paradox of thrift.
Homework Questions

True-False Questions — If a statement is false, explain why.

1. The accumulation of unwanted inventories in the economy suggests that actual investment is greater than intended investment. (T/F)

2. After an increase in autonomous investment, national income will increase by exactly the same amount. (T/F)

3. Actual investment and intended investment are equal when the economy is in equilibrium. (T/F)

4. If autonomous consumption decreases, then autonomous saving increases and national income decreases by a multiple of the initial decrease in consumption. (T/F)

5. As the marginal propensity to consume increases, the value of the income multiplier increases. (T/F)

Multiple-Choice Questions

1. Suppose that the consumption equation is $C = 50 + 0.75Y$ and $I = 200$. The equilibrium level of national income is
   a. $10,000
   b. $1,000
   c. $100
   d. $750
   e. $333.33

2. Using the information presented in question 1, suppose that national income is 800. We would expect that
   a. inventories will accumulate and production and income will fall
   b. inventories will accumulate and production and income will rise
   c. inventories will decline and production and income will rise
   d. inventories will decline and production and income will fall
   e. the economy will adjust to a new equilibrium

3. A decrease in autonomous investment will
   a. lead to an equal decrease in national income
   b. lead to an even larger decrease in national income
   c. cause the marginal propensity to save to fall
   d. cause saving to decrease due to the increase in borrowing in the economy
   e. lead to an equivalent increase in aggregate expenditures

4. The “paradox of thrift” suggests that as people try to save more
   a. aggregate expenditures decrease, income decreases, and saving stays the same
   b. national income increases
   c. investment decreases
   d. investment increases to match the higher level of saving
   e. interest rates decrease and investment increases
5. If the marginal propensity to consume is 0.75, then the income multiplier is
   a. 0.75
   b. 4
   c. 2
   d. 1.25
   e. 1.75

**Discussion Questions/Problems**

1. Suppose that consumption is $C = 600 + 0.75Y$ and $I = 400$. Write an equation for aggregate expenditures, calculate the equilibrium level of national income, and sketch a graph of the aggregate expenditure curve to show the equilibrium level of national income.

2. Explain how the economy adjusts to the equilibrium level of national income when the actual level of national income is below and above the equilibrium level of national income? What assumption is made about prices in this analysis?