Chapter 10: The Keynesian Aggregate Expenditure Model

Learning Objectives

After studying this chapter, you should be able to

10.1 Explain the difference between aggregate expenditure (*AE*) and aggregate demand (*AD*) and the difference between aggregate output (*AO*) and aggregate supply (*AS*)

10.2 State the assumptions of the simple Keynesian expenditure model and explain the difference between ex ante and ex post concepts.

10.3 Explain the aggregate expenditure–aggregate output and the injections–withdrawals approaches to the simple Keynesian model.

10.4 Integrate the aggregate expenditure–aggregate output and the injections–withdrawals approaches.

10.5 Derive the *AD* curve from the Keynesian expenditure model.

10.6 Reconcile the *AE–AO* model with the *AD–AS* model.

10.7 Discuss the limitations of the simple Keynesian model

Assess Your Knowledge

Indicate whether each of the following is true (T) or false (F).

1. In a closed economy without government, aggregate expenditure is the sum of consumer spending and investment spending.

2. If total income increases, we expect total consumption to increase also.

3. Given a certain level of income, if consumption increases, saving must also increase.

4. If income increases, saving will likely decrease.

Aggregate Expenditure (*AE*) and Aggregate Output (*AO*)

LO 10.1 Explain the difference between aggregate expenditure (*AE*) and aggregate demand (*AD*), and the difference between aggregate output (*AO*) and aggregate supply (*AS*)

Aggregate Expenditure vs. Aggregate Demand

Many textbooks treat aggregate expenditure and aggregate demand as interchangeable concepts, but this text draws a clear distinction. Aggregate demand refers to the total quantity of real GDP demanded across various price levels, it shows how demand changes as the price level varies. In contrast, aggregate expenditure represents the **actual** total spending on goods and services at a specific price level. While both measure overall demand in the economy, aggregate demand traces a relationship across different price levels, whereas aggregate expenditure corresponds to one price level.

> ***aggregate expenditure*** *the total expenditure on the economy's output of goods and services*

Aggregate Output vs. Aggregate Supply

Although related, aggregate output and aggregate supply are not the same. Aggregate supply refers to the different quantities of real GDP that firms are willing to produce at various price levels; it represents a schedule of potential output. Aggregate output, by contrast, is the actual level of GDP produced in the economy at a given time. In other words, aggregate supply shows what could be produced under varying price conditions, while aggregate output reflects what is being produced in reality.

> ***aggregate output*** *the total amount of goods and services produced in an economy*

Assumptions of the Simple Keynesian Expenditure Model

LO 10.2 State the assumptions of the simple Keynesian expenditure model and explain the difference between ex ante and ex post concepts

Simplifying Assumptions

To understand how equilibrium income is determined in the product market, this model relies on several simplifying assumptions. These assumptions help isolate the core relationships in the economy. In later chapters, the model will be expanded by relaxing these assumptions. For now, we assume the following:

Reading Comprehension

1. What is aggregate expenditure? How does it differ from aggregate demand?
2. What is aggregate output? How does it differ from aggregate demand?
3. Is there any relationship between aggregate output and GDP?

1. The economy is closed, meaning it does not engage in international trade: there are no exports or imports. All goods and services are produced and consumed domestically.

closed economy an economy that does not engage in foreign trade

2. There is no government sector, no government spending, taxation, or transfer payments.
3. Households base their spending and saving decisions entirely on their income.
4. Firms invest a constant amount each period, regardless of income levels. This fixed investment is called **autonomous investment.**

autonomous investment investment that does not vary with income

5. The economy has unused resources; there is unemployment of labor and idle productive capacity.
6. The overall price level is assumed to remain constant. While relative prices may vary across individual markets, the average price level does not change.

Because assumptions 5 and 6 resemble the situation in which the economy is operating in the Keynesian (i.e., horizontal) range of the aggregate supply (AS) curve, we call this framework the Keynesian expenditure model.

The Keynesian aggregate expenditure model is a macroeconomic model that emphasizes aggregate expenditure, **assuming fixed prices and unemployed resources.**

Ex Ante and Ex Post Concepts

In analyzing the forces that lead to macroeconomic equilibrium, it is important to distinguish between what economic agents plan to do and what actually happens. This distinction is captured by the concepts of *ex ante* and *ex post*. The Latin phrase *ex ante* means "before the fact" and refers to planned or intended actions—such as intended consumption or investment. In contrast, *ex post* means "after the fact" and refers to actual outcomes—what consumers and firms spend or produce. Recognizing the difference between these planned and realized values is essential for understanding how and when the economy reaches equilibrium.

ex ante before the fact; planned or intended

Reading Comprehension

1. What is meant by a closed economy?
2. Explain why planned investment might be different from realized investment.
3. What is the difference between ex-ante and ex post concepts, such as saving and investment?

ex post after the fact; actual or realized

In an ex post sense, the identity between aggregate expenditure and aggregate output holds true. Total spending on the economy's goods and services must equal the value of the output produced. This gives us the accounting identity:

Total expenditure ≡ Value of total output

or

AE ≡ AO

This equality applies at all levels of income or output because it reflects recorded outcomes. However, in an ex ante sense, planned or intended spending may not match actual output. Households and firms may plan to spend either more or less than what the economy produces. Since actual outcomes may diverge from intentions, macroeconomic equilibrium is determined by ex-ante values, specifically, the level at which planned aggregate expenditure equals the economy's output.

Approaches to the Simple Keynesian Expenditure Model

LO 10.3 Explain the aggregate expenditure-aggregate output and the injections–withdrawals approach to the simple Keynesian model.

Two Approaches

To explain equilibrium income in the Keynesian model, we use two complementary frameworks: the Aggregate Expenditure–Aggregate Output (AE–AO) approach and the Investment–Savings (IS) approach. Both help illustrate how output is determined when spending plans align with production. The AE–AO approach emphasizes the relationship between planned spending and actual output, while the IS approach highlights the conditions under which planned investment equals planned saving. We will use arithmetic examples, tables, and graphical tools to clarify how equilibrium is reached in each case.

AE–AO Approach

Under the simplified assumptions of a closed economy with no government spending, taxation, or foreign trade, aggregate expenditure (AE) consists only of consumption (C) and investment (I). In this case, the total planned spending in the economy is given by:

$$AE = C + I$$

All other components of aggregate expenditure—government purchases, net exports, and transfers—are excluded by assumption. This framework allows us to focus on the basic relationship between household consumption, business investment, and the resulting level of output.

Arithmetical Approach

The arithmetical approach uses simple numerical examples to demonstrate how equilibrium income is determined in the Keynesian model. It focuses on the relationship between planned aggregate expenditure (AE) and actual aggregate output (AO).

Consider an example where the current level of output is $70 million. Households plan to spend $65 million on consumption, and firms plan to invest $10 million. This gives a total planned expenditure of $75 million, which exceeds the current output by $5 million. The result is an unintended depletion of inventories or unmet demand in the market. Given the presence of unemployed resources, firms are likely to respond by increasing production.

This approach illustrates a key Keynesian insight:

- If **AE > AO**, firms experience excess demand and raise output, causing income to rise.
- If **AE < AO**, inventories accumulate, firms reduce output, and income falls.
- Equilibrium occurs when **AE = AO**, meaning planned spending equals actual output and there is no pressure for output to change.

By using basic arithmetic examples, this method shows how income adjusts toward equilibrium in response to mismatches between planned expenditure and actual output.

Consider the scenario where desired aggregate expenditure falls short of aggregate output. For instance, at an output of $90 million, if consumers intend to spend $75 million on consumer goods and services, while firms plan to invest $10 million, the total desired expenditure amounts to $75 million + $10 million = $85 million. However, this total desired expenditure falls short of the total output, leading to a situation where firms are unable to sell their entire production. Consequently, there will be an accumulation of unplanned inventories of unsold goods. In response, firms will reduce their levels of output, thereby causing income to decrease. Thus, we can conclude the following:

When desired aggregate expenditure falls short of aggregate output (AE < AO), inventories rise above planned levels. Firms cut production, and income declines.

Consider a scenario where the total output of goods and services in the economy amounts to $80 million. At this output level, if desired consumption expenditures total $70 million and investment expenditures reach $10 million, the desired aggregate expenditure aligns precisely with the aggregate output, totaling $80 million. Consequently, there will be no unintentional accumulation of unsold goods or reduction in inventories. Firms will lack any incentive to modify their production levels. As a result, income, or output, will stabilize at its equilibrium level. From this, we draw the following conclusion:

Income attains its equilibrium level when desired aggregate expenditure equals aggregate output (AE = AO). At this point, there is no pressure for output or income to change.

Equilibrium Using a Table

Tabular analysis helps illustrate how equilibrium income is determined by comparing planned aggregate expenditure with actual output across different income levels. Table 10.1 presents various levels of output, alongside the corresponding levels of consumption and investment.

At any output level below $80 million, planned aggregate expenditure exceeds actual output, signaling excess demand. For example, at an output level of $50 million, households plan to spend $55 million on consumption, and firms plan to invest $10 million, for a total planned expenditure of $65 million. Because demand exceeds supply, firms reduce inventories and respond by increasing production. Income rises.

At output levels above $80 million, the opposite occurs. Take $100 million output as an example. Planned expenditure consists of $80 million in consumption and $10 million in investment, totaling $90 million. Firms find that output exceeds demand, leading to unplanned inventory buildup. In response, they scale back production. Income falls.

Equilibrium occurs when planned aggregate expenditure equals aggregate output. At $80 million, consumption is $70 million, and investment is $10 million, totaling $80 million in planned expenditure. Since output matches demand, there is no pressure for output to change—income remains stable at this level.

Graphical Analysis

To proceed graphically, we first introduce new tools, beginning with the consumption–income relation.

The Consumption–Income Relation

Look at the first two columns of Table 10.1. They give us a consumption schedule, which shows the relationship between total income and total consumption. Because, by assumption, there are no taxes and no government transfer payments, total income is the same as disposable income.

> ***consumption schedule*** *a table showing the relationship between total consumption and total income.*

Table 10.1 Consumption, Investment, and Aggregate Expenditure (hypothetical data)

Income (Y)	Consumption (C)	Investment (I)	Aggregate Expenditure (AE = C + I)
0	150	50	200
100	230	50	280
200	310	50	360
300	390	50	440
400	470	50	520
500	550	50	600
600	630	50	680
700	710	50	760
800	790	50	840
900	870	50	920

1000	950	50	1000

Average and Marginal Propensity to Consume

We will introduce other analytical tools at the appropriate time as we continue our analysis. For now, we focus on four concepts: the average propensity to consume, the average propensity to save, the marginal propensity to consume, and the marginal propensity to save.

These terms are not complex. Let us take the time now to clearly explain each of these terms. Remember that propensity means tendency, which is a less daunting term.
The average propensity to consume (APC) is defined as the fraction of total income allocated to consumption. That is, average propensity to consume the fraction of total income that goes into consumption.

$$APC = \frac{C}{Y}$$

where *C* is consumption and *Y* is income. The average propensity to consume is the ratio of total consumption to total income. If, out of an income of $100 million, total consumption is $80 million, then.

$$Y = \frac{80}{100} = 0.8$$

The **average propensity to save** (*APS*) is defined as the fraction of total income that is saved. That is,

average propensity to save the fraction of total income that is saved

$$APS = \frac{S}{Y}$$

where *S* is saving and *Y* is income. The average propensity to save is the ratio of total saving to total income. If, out of an income of $100 million, total saving is $20 million, then.

$$APS = \frac{20}{100} = 0.2$$

The APC and APS

If your friend consumes three-fifths of his or her disposable income, it follows that he or she saves two-fifths. If you consume two-thirds of your disposable income, it means that you save one-third of your disposable income. Clearly then, APC + APS = 1.

This fact can be shown by simple algebra. Disposable income is either consumed or saved. Hence,

$$Y = C + S$$

Dividing both sides by income gives APC + APS = 1.

By dividing each term by *Y*, we obtain

$$\frac{Y}{Y} = \frac{C}{Y} + \frac{S}{Y}$$

That is,

$$1 = APC + APS$$

The **marginal propensity to consume** (*MPC*) is defined as the fraction of extra income allocated to consumption. That is,

marginal propensity to consume the fraction of extra income allocated to consumption.

$$MPC = \frac{\Delta C}{\Delta Y}$$

where *ΔC* is the change in consumption and *ΔY* is the change in income. The marginal propensity to consume is the ratio of the change in consumption to the change in income. If an increase in income of $10 million causes consumption to increase by $7 million, then

$$MPC = \frac{7}{10} = 0.7$$

*The **marginal propensity to save** (MPS) is defined as the fraction of extra income allocated to saving. That is,*

marginal propensity to save the fraction of extra income allocated to saving

$$MPS = \frac{\Delta S}{\Delta Y}$$

where *ΔS* is the change in saving and *ΔY* is the change in income. The marginal propensity to save is the ratio of the change in saving to the change in income. If an increase in income of $10 million results in an increase in total saving of $3 million, then

$$MPS = \frac{3}{10} = 0.3$$

The sum of *MPC* and *MPS* equals 1, just as with *APC* and *APS*. Right?

Right! And again, this result can be derived algebraically as follows:

$$Y = C + S$$

$$\Delta Y = \Delta C + \Delta S$$

Dividing by *ΔY*, we obtain

$$\frac{\Delta Y}{\Delta Y} = \frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y}$$

That is,

$$1 = MPC + MPS$$

Using a Table

Table 10.2 shows marginal propensity to consume, marginal propensity to save, average propensity to consume, and average propensity to save for a hypothetical economy. Income and consumption data are also provided in the first two columns. At an income level of $60 million, households spend exactly $60 million on consumer goods and services. This means, of course, that saving is zero. This income level is called the break-even point, where consumption equals income and saving is zero.

break-even level of income the level of income at which consumption equals income or saving is zero.

Note that at the break-even level of income, the APC equals 1 because consumption and income are equal. Below the break-even level, APC > 1 because consumption is greater than income; above the break-even level, APC < 1 because consumption is less than income. Even when income is zero, households spend $30 million. The amount of consumption that takes place when income is zero is called autonomous consumption. In the present case, autonomous consumption is $30 million. Autonomous consumption refers to spending that does not vary with income.

autonomous consumption consumption that does not depend on income.

Autonomous Spending and Dissaving

Consumers can still make purchases even if their current income is zero through borrowing or utilizing past savings, a phenomenon known as dissaving. Dissaving arises when current consumption surpasses current income, resulting in negative savings. This occurs when consumers spend more than what they currently earn on consumption. Borrowing or using credit increases purchasing power beyond income, enabling spending that exceeds earnings.

Table 10.2

Table 10.2 Consumption Schedule with *MPC, MPS, APC*, and *APS*

Income ($ mil)	Consumption ($ mil)	MPC	MPS	APC	APS
0	30				
		0.50	0.50		
40	50			1.25	−0.25
		0.50	0.50		
50	55			1.10	−0.10
		0.50	0.50		
60	60			1.00	0.00
		0.50	0.50		
70	65			0.93	0.07
		0.50	0.50		
80	70			0.88	0.12
		0.50	0.50		
90	75			0.83	0.17
		0.50	0.50		
100	80			0.80	0.20
		0.50	0.50		
110	85			0.77	0.23
		0.50	0.50		
120	90			0.75	0.25

While a portion of consumption is autonomous, meaning it occurs regardless of income level, the remaining portion is influenced by income and is termed induced consumption. Induced consumption reflects the portion of spending that varies with changes in income. When consumers finance spending through credit or savings, this behavior contributes to dissaving and links consumption more closely to income fluctuations.

induced consumption the portion of consumption that depends on the level of income.

Graphing the Consumption–Income Relation

The data in the first two columns of Table 10.2 are plotted in Figure 10.1, which is a graphical representation of the consumption–income relation. Note that as income increases, consumption also increases. **The curve showing this relationship is called the consumption curve.**

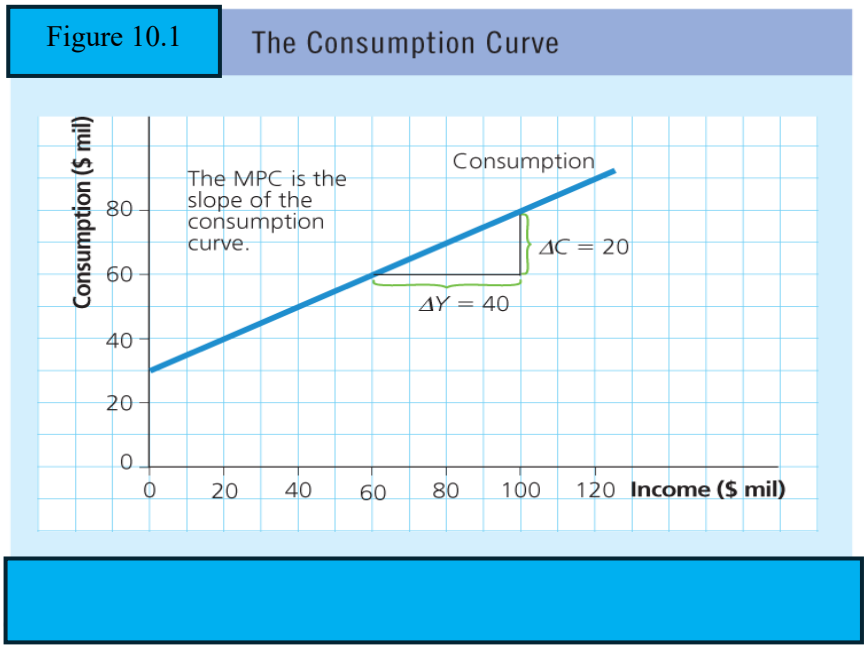
consumption curve a curve that shows the relation between consumption and income.

The Slope of the Consumption Curve

ΔC and ΔY are specifically indicated on Figure 10.1. The slope of the consumption curve, ΔC / ΔY, represents the marginal propensity to consume. This measure captures how much consumption changes in response to a change in income. The consumption curve in Figure 10.1 is linear, but this is a simplifying assumption used for clarity, not a reflection of actual consumption patterns.

Before we can use the AE–AO approach to determine the equilibrium level of income graphically, we need to introduce one more piece of analytical equipment. That is the 45-degree line. **This line serves as a useful reference for identifying equilibrium.** Figure 10.2 shows a 45-degree line. Note that if aggregate expenditure and income are on the axes (as in Figure 10.2), any point on the 45-degree line represents the equality of aggregate expenditure and aggregate output or income. Thus, at point E, aggregate expenditure ($70 million) equals income ($70 million). The same $70 million is shown on both axes, so the point lies on the 45-degree line. For this reason, the 45-degree line can be labelled AO for aggregate output.

Figure 10.1 The Consumption Curve



Bringing the Model Together

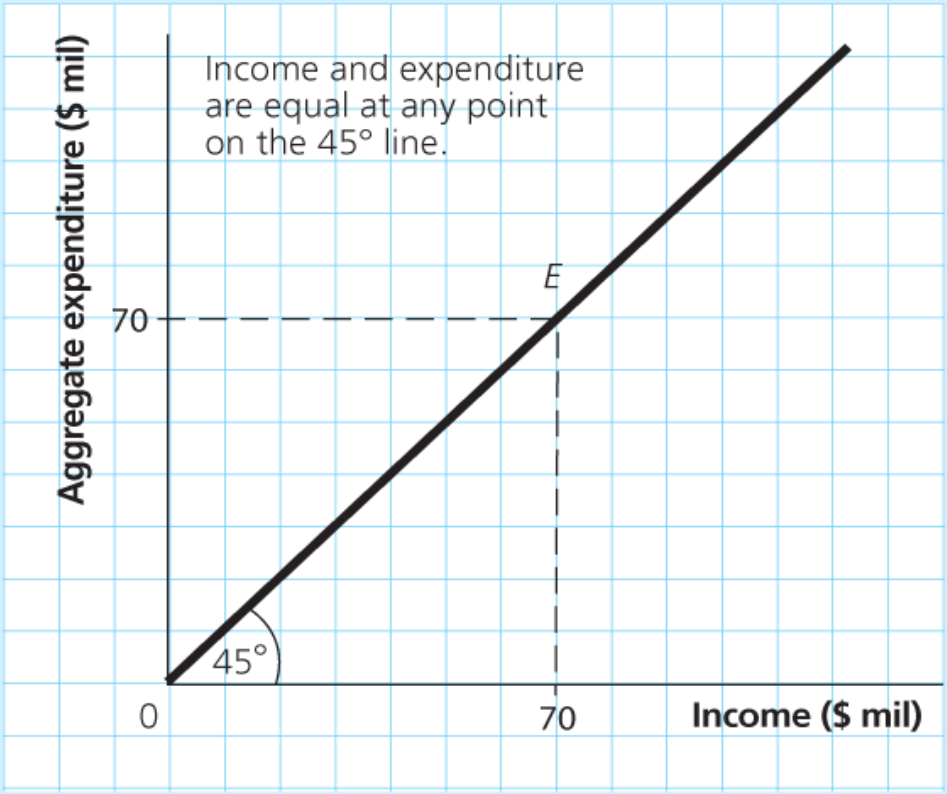
Let us bring the pieces together now. We know that for equilibrium to exist, AE and AO must be equal. But AE and AO are equal only along the 45-degree line. Hence equilibrium must occur along the 45-degree line. Figure 10.3, known as the Keynesian cross, illustrates this condition graphically. The Keynesian cross diagram is the 45-degree diagram showing aggregate expenditure and aggregate output.

Keynesian cross the 45-degree diagram showing aggregate expenditure and aggregate output.

The consumption curve, C, and the line C + I, representing the sum of consumption and investment (AE in this case), are derived from Table 10.1. The C + I line is parallel to the consumption curve because fixed investment has been added to consumption. Equilibrium occurs at $80 million, where intended spending equals output. At any other level of income, there would be an imbalance between desired aggregate expenditure and aggregate output. Such imbalances trigger adjustments, so these income levels are not sustained.

Introducing the 45-Degree Line

Figure 10.2 The 45-Degree Line

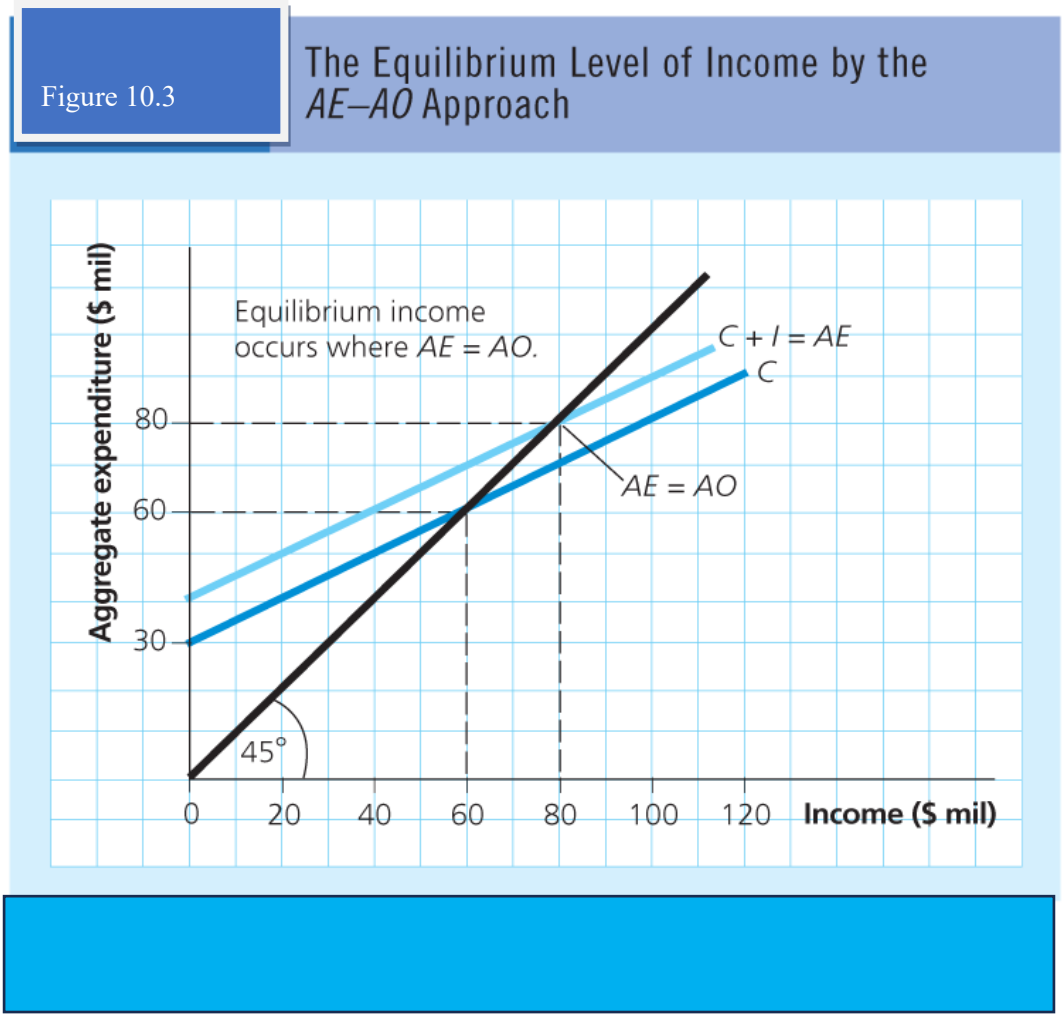


BUSINESS SITUATION 10.1

Select Printers is a manufacturer of a specific brand of electronic printers that are sold mainly to retailers. What signs can Select Printers look for to determine when an increase in production is warranted?

The answer to this Business Situation can be found in Appendix A.

Figure 10.3 The Equilibrium Level of Income by the *AE–AO* Approach



The Investment–Saving Approach (I—S)

The Investment–Saving (IS) approach to income equilibrium is a macroeconomic framework that analyzes the equilibrium level of national income based on the relationship between aggregate saving and investment in an economy. This approach is often used in conjunction with the Keynesian theory of income determination. **National income is determined at the point where planned saving equals planned investment.**

1. **Aggregate Saving (S):**
   Aggregate saving represents the total amount of income that households, businesses, and the government save rather than consume. It includes both private saving (households and businesses) and public saving (government saving or dissaving). The formula for aggregate saving is:
   S = Y - C - T
   Where:
   Y is the total national income or output
   C is total consumption expenditure
   T is total taxes

2. **Aggregate Investment (I):**

Aggregate investment refers to the total spending by businesses on capital goods—machinery, equipment, and infrastructure. Investment is influenced by factors such as interest rates, business expectations, and government policies. The investment function shows the relationship between investment and the real interest rate:
I = I(r)
Where *r* is the real interest rate.

3. **Equilibrium Level of Income**
   The economy reaches equilibrium when aggregate saving equals aggregate investment (S = I). At this point, there are no unplanned inventory changes, and output remains stable.

4. **The IS Curve**
   The IS curve illustrates combinations of national income and the real interest rate where the goods market is in equilibrium. It slopes downward because higher income increases saving, which puts downward pressure on interest rates to restore balance.

   Shifts in the IS Curve
   Several factors can shift the IS curve:

   - Changes in autonomous consumption, investment, or government spending

- Fiscal policy changes, including taxation or public expenditure
- Variations in the marginal propensity to save or invest

Arithmetical Analysis

Suppose that the economy produces a total output of $70 million. Suppose also that at that level of output, households decide to save $5 million, while firms plan to invest $10 million. Clearly, if households save $5 million out of a total disposable income of $70 million, they must be consuming $65 million. The current level of output is not enough to allow both households and firms to realize their plans to spend $75 million ($65 million for consumption plus $10 million for investment). Firms will therefore tend to increase their output, which will cause income to rise. **This outcome illustrates that when planned investment exceeds planned saving, income rises.**

> *In a closed economy in which the government neither spends nor taxes, if planned investment exceeds planned saving, the level of income rises.*

Let us now suppose that at an output of $100 million, consumers intend to save $20 million while firms plan to invest $10 million. This means consumers aim to spend $80 million on goods and services. The total planned expenditure—$80 million in consumption and $10 million in investment—adds up to $90 million, which is less than the total output. Because planned spending falls short of production, firms face unsold inventories. They respond by reducing output, and as a result, income falls. This illustrates that when planned saving exceeds planned investment, income falls.

> *In a closed economy in which there is neither government spending nor taxes*, if intended investment is less than intended saving, the level of income will fall.

If, however, the level of output is $80 million, and households plan to save $10 million while firms plan to invest $10 million, then both households and firms will be able to realize their plans, and there will be no incentive for firms to produce a different level of output. In this case, planned saving equals planned investment, and income remains stable at $80 million. This leads to the following conclusion:
Income is in equilibrium when planned saving equals planned investment.

> *A closed economy, in which there is neither government spending nor taxes, will be in equilibrium when intended saving equals intended investment.*

Using Y to denote the level of income, we can summarize the discussion above as follows:

$$\text{If } I > S, \text{ then } Y \uparrow.$$

If $I < S$, then $Y\downarrow$.

If $I = S$, then Y will be at equilibrium.

The arrows indicate the direction of the change in income.

Tabular and Graphical Analyses

Let us deal with the tabular analysis first. Table 10.3 shows various possible levels of income and the amounts that consumers desire to save at each level of income.

Table 10.3

Table 10.3 Saving and Investment Schedules (hypothetical data)

Income ($ mil) (1)	Consumption ($ mil) (2)	Saving ($ mil) (3)	Investment ($ mil) (4)	Pressure on Income (5)	
0	30	–30	10	upward	↓
40	50	–10	10	upward	↓
50	55	–5	10	upward	↓
60	60	0	10	upward	↓
70	65	5	10	upward	↓
80	70	10	10	none	—
90	75	15	10	downward	↑
100	80	20	10	downward	↑
110	85	25	10	downward	↑
120	90	30	10	downward	↑

Columns 1 and 3 give the relationship between income and saving, which is the saving schedule. The saving schedule is drawn on the assumption that as income increases, saving also increases. At an income level of $40 million, consumers will be dissaving (consumption is greater than income or saving is negative). At an income level of $60 million, saving will be zero; hence, the break-even level of income is $60 million. This point marks the transition from dissaving to positive saving.

saving schedule *a table that shows the relationship between saving and income.*

At any level of income below $80 million, the amount that firms want to invest exceeds the amount that households want to save. For example, at an income level of $70 million, the amount that firms want to invest is $10 million. The amount that households want to save, however, is only $5 million. Because investment exceeds saving, income rises.

Conversely, if income is at a level of $90 million, the withdrawal by households ($15 million) will exceed the injection by firms ($10 million). Since saving exceeds investment, income falls. Only at an income level of $80 million will the saving decisions of households coincide with the investment decisions of firms. This balance defines the equilibrium level of income.

The Saving Curve

The Saving–Income Relation Columns (1) and (3) of Table 10.3 give us a saving schedule. If we plot this information on a graph, we obtain the saving curve shown in Diagram A of Figure 10.4**. This curve shows how saving changes as income increases.**

The **saving curve** is a graph that shows the relationship between saving and income. Note that the slope of the of the saving curve is

saving curve a graph that shows the relationship between saving and income.

$$\frac{\Delta S}{\Delta Y}$$

which is the marginal propensity to save.

You should note that the linear saving curve results from our simplifying assumption that the MPS is constant. This simplification does not imply that the real-world relationship between saving and income is linear.

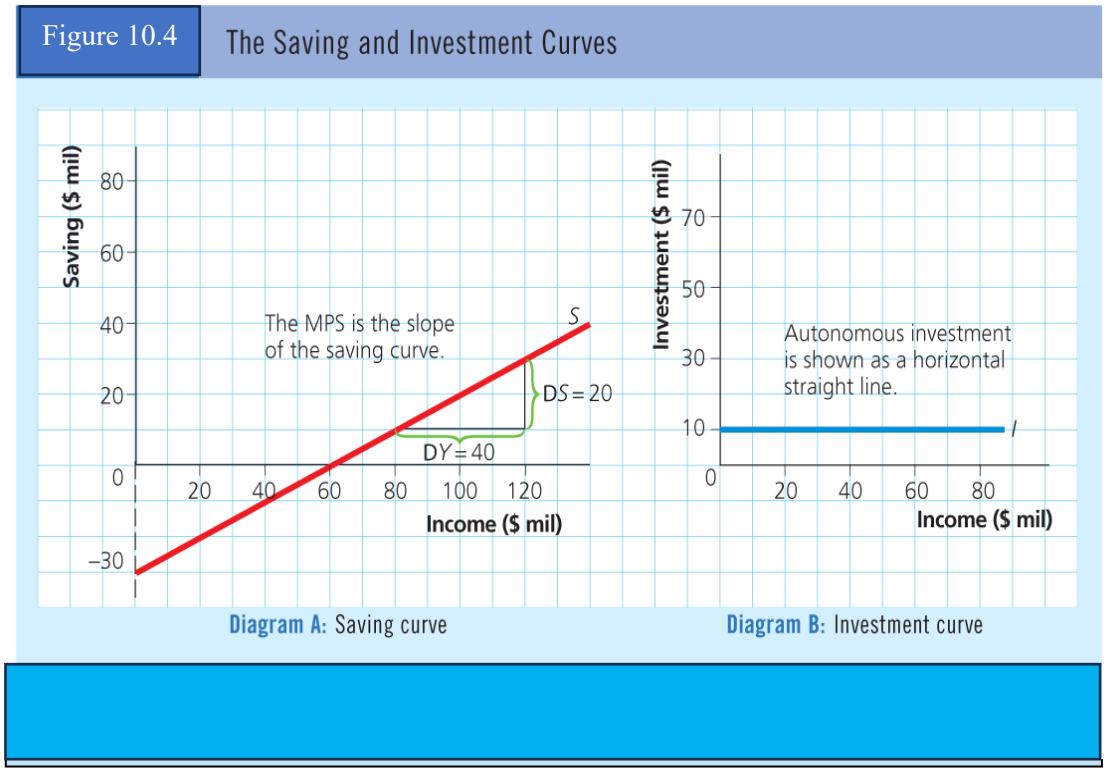
Investment as an Exogenous Variable

Investment is often assumed to be exogenous, meaning that it is not directly influenced by changes in income. Instead, investment decisions are typically assumed to be driven by factors such as the rate of interest, expectations about future profitability, technological advancements, business confidence, and government policies. In this context, the investment function is often depicted as a horizontal line, indicating that investment remains constant regardless of changes in income.

Figure 10.4 The Saving and Investment Curves

Diagram A: Saving curve

Diagram B: Investment curve



The marginal propensity to save is the slope of the saving curve.

This assumption simplifies analysis but does not capture investment's full responsiveness. Higher income may raise demand, prompting firms to expand their capacity. Favorable conditions can also increase investment, even without interest rate changes. More advanced models treat investment as endogenous, allowing it to vary with income and economic conditions.

Combining the investment savings functions

Figure 10.5 helps to tell the story. Saving and investment are measured along the vertical axis and income is measured along the horizontal axis. The equilibrium level of income is determined by the intersection of the saving curve and the investment line. This occurs at an

output level of $80 million.

In a closed economy without government, income reaches equilibrium where saving equals investment—at the point where the saving curve intersects the investment line.

BUSINESS SITUATION 10.2

Explaining the Impact of a Rising Saving Rate

Your uncle, who has had no training in business or economics, operates a small convenience store. One morning, while listening to the radio, he hears a report from Statistics Canada that the saving rate in Canada will rise considerably over the next two years. Knowing that you are taking a course in economics, your uncle calls on you to explain the implications of the report for his business.

What would you tell him?

The answer to this Business Situation can be found in Appendix A.

Integrating the Aggregate Expenditure–Aggregate Output and the Injections–Withdrawals Approaches

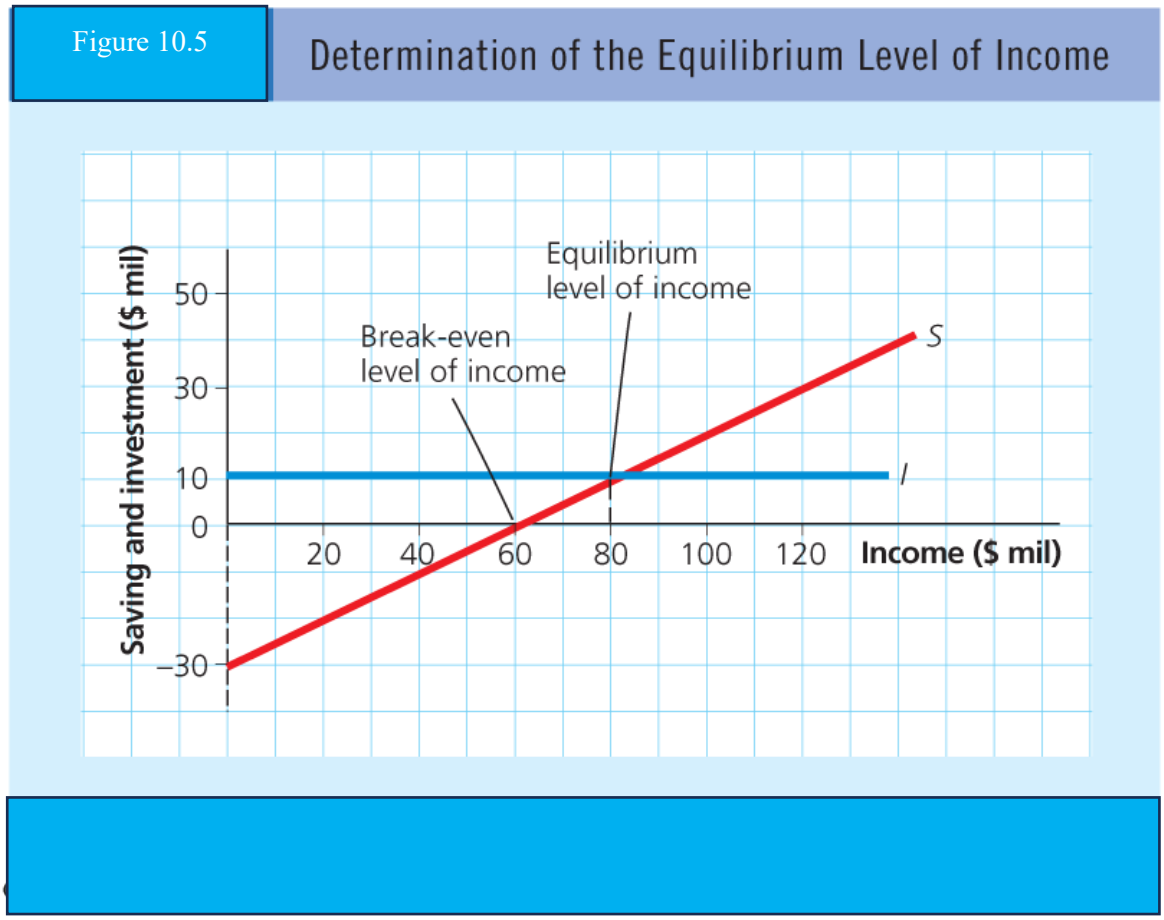
LO 10.4 Integrate the aggregate expenditure–aggregate output and the injections–withdrawals approaches.

Integrating the AE–AO and I–S Approaches

The two diagrams can be lined up to illustrate their relationship to the determination of equilibrium income.

Figure 10.5 Determination of the Equilibrium Level of Income

Diagram A of Figure 10.6 shows the AE–AO approach, while Diagram B shows the J–W approach. Both depict equilibrium income using different but consistent variables. A positive consumption when income is zero implies negative saving when income is zero. When income is zero, Diagram A shows that consumption is $30 million. Diagram B shows that saving is –$30 million when income is zero. The break-even level of income ($60 million) is shown in Diagram A, where consumption and income are equal, and in Diagram B, where saving is zero. The intersection of the AE line with the 45-degree line occurs at



the same income level where saving equals investment.

Reading Comprehension

1. How is it possible for current consumption to exceed current income? What is this phenomenon called?

2. Define aggregate expenditure and aggregate output. Are they always equal? Can they ever be equal?

3. What is the difference between the aggregate expenditure (*AE*) curve and the aggregate demand (*AD*) curve?

4. What is the relation between (a) the marginal propensity to consume (*MPC*) and the marginal propensity to save (*MPS*)? (b) the average propensity to consume (*APC*) and the average propensity to save (*APS*)?

5. In the *AE*–*AO* approach to income determination, equilibrium income will always occur along the 45-degree line. Is this true or false? Explain.

6. Explain the relationship between saving and consumption.

7. In the income–expenditure stream, what is an injection? Give an example of an injection. What is a withdrawal? Give an example.

8. How do injections and withdrawals affect the level of income in the income–expenditure stream?

10. If saving is on the vertical axis and income is on the horizontal axis, what is the shape of the saving curve?

10. What is the meaning of autonomous investment? What is the shape of the autonomous investment line if investment is on the vertical axis and income is on the horizontal axis?

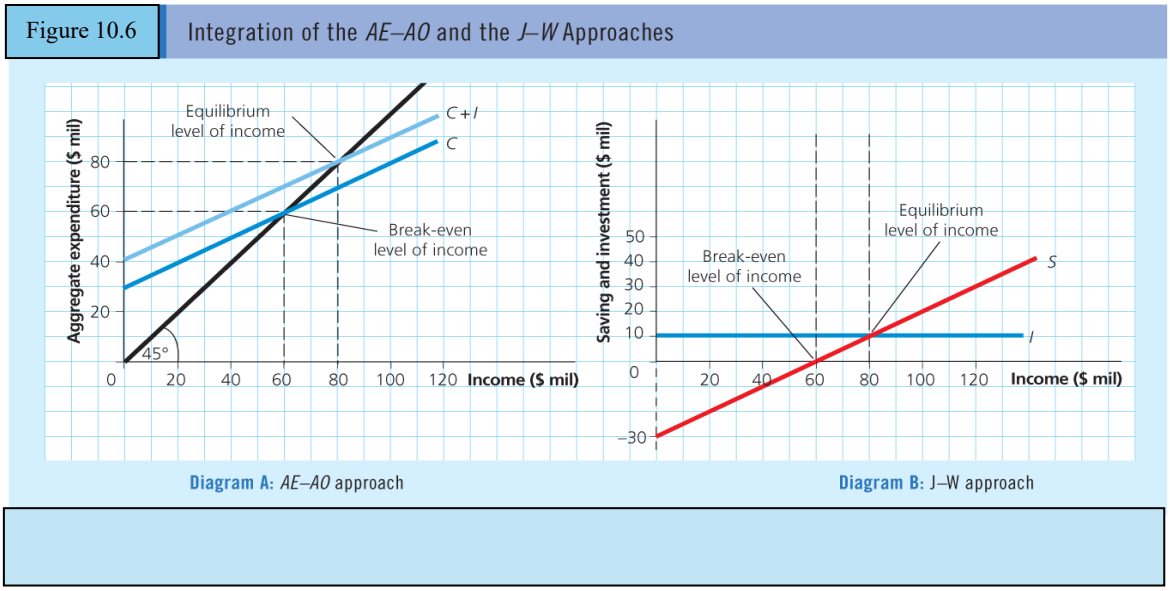
11. What is meant by the break-even level of income?

12. "In a closed economy without government spending and taxes, the equilibrium level of income occurs where saving and investment are equal." Explain why.

Figure 10.6 Integration of the *AE–AO* and the *J–W* Approaches

Diagram A: *AE–AO* approach

Diagram B: I–*S* approach



Derivation of the *AD* Curve

LO 10.5 Derive the *AD* curve from the Keynesian expenditure model.

Deriving the AD Curve from the AE–AO Model

The AD curve can be derived from the Keynesian AE–AO model of income determination. In deriving the AD curve, we will assume that AE and AO are in real terms.
(Earlier we discussed the AE–AO model in nominal terms, and the AD–AS model in real terms.) Let us consider Figure 10.7.

In Diagram A of Figure 10.7, AE and AO (the 45-degree line) intersect at point A to determine the equilibrium level of real GDP, y. This equilibrium occurs at some price level, say, P. This price level of P, and the equilibrium level of real GDP of y, are illustrated in Diagram B by point A. (Diagrams A and B are lined up for convenience.)

Now suppose that the price level rises from P to P1, as shown in Diagram B. This increase in the price level will shift the AE curve down from AE to AE0, as shown in Diagram A. Equilibrium now occurs at point B, where real GDP is y0. The combination of P1 and y0 is shown in Diagram B as point B.

Higher prices reduce real balances, which lowers AE and output.

Reading Comprehension

1. In what sense are the *AE–AO* approach and the I–*S* approach just different ways of looking at the same thing?
2. What is the significance of the fact that the aggregate expenditure line intersects the 45-degree line at the same level of income at which the saving and investment lines intersect?

Let us return to the initial price level of P. If the price level falls from P to P0, as shown in Diagram B, aggregate expenditure will rise from AE to AE1, as shown in Diagram A. The equilibrium real GDP will rise from y to y1. This combination of P0 and y1 is shown as point C in Diagram B.

Lower prices raise real expenditure, increasing output.

By connecting points B, A, and C in Diagram B we obtain a curve that expresses the relationship between the price level and real GDP. This downward-sloping curve is the AD curve.

Reconciliation of *AE–AO* with *AD–AS* Analysis

LO 10.6 Reconcile the *AE–AO* model with the *AD–AS* model.

Reconciling AE–AO and AD–AS Analyses

Reading Comprehension

1. Indicate whether the following statement is true or false:
2. "A change in the price level shifts the *AD* curve but not the *AE* curve."

There is a close relationship between the AE–AO analysis and the AD–AS analysis. The answer to the question is yes, and we will formally reconcile the AE–AO and AD–AS analyses. The Keynesian cross diagram presented in Diagram A of Figure 10.8 shows the equilibrium level of income occurring at the point where the AE line crosses the 45-degree line. The equilibrium level of real GDP is y. According to this analysis, firms adjust their output levels to suit aggregate expenditure at the existing price level. Recall

our assumption that the price level is constant. If AE exceeds AO, real GDP expands. If AE is less than AO, real GDP contracts.

This adjustment reflects the firm's willingness to meet demand without price changes when resources are underutilized.

The fact that firms can increase their production levels without any increase in the price level suggests that the economy is operating in the Keynesian (horizontal) section of the AS curve. Diagram B of Figure 10.8 shows the AD curve intersecting the AS curve in the horizontal range. The two diagrams are lined up to emphasize the relation between the two approaches.

Figure 10.7 Derivation of the *AD* Curve

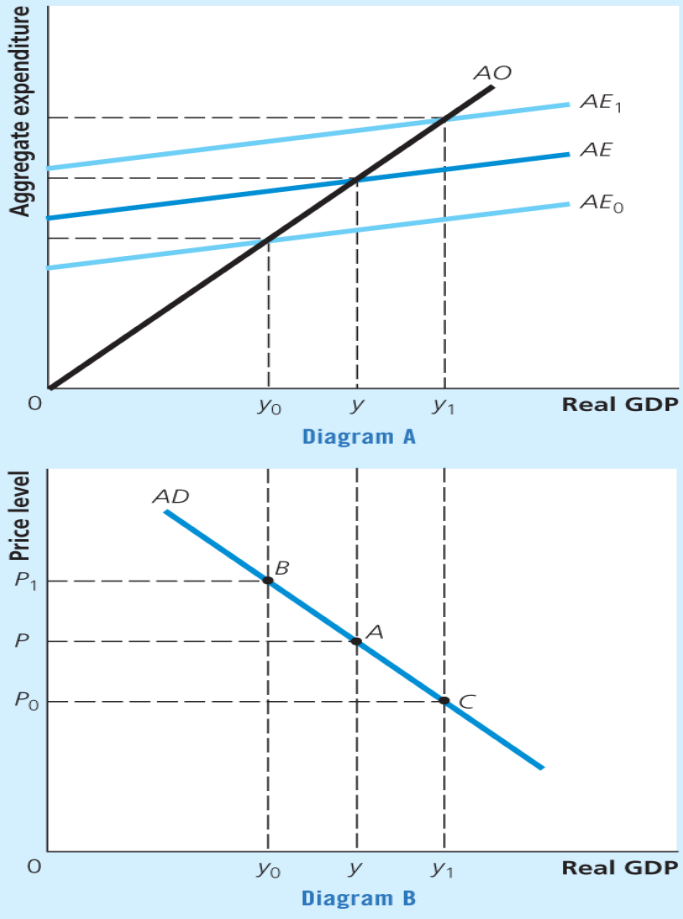


Diagram A: The equilibrium level of GDP
Diagram B: A movement along the *AD* curve because of changes in prices

Figure 10.7 Derivation of the *AD* Curve

Diagram A: The equilibrium level of GDP

Diagram B: A movement along the *AD* curve because of changes in prices

Figure 10.8 Reconciliation of *AE–AO* with *AD–AS*

Diagram A: Effect of *AE* shifts

Diagram B: Effect of *AD* shifts

In Diagram A, we assume that the price level is P. The equilibrium level of real GDP is y, where desired aggregate expenditure equals aggregate output. This is the same level of real GDP shown in Diagram B, where aggregate demand equals aggregate supply at a price level of P.

Figure 10.8

Reconciliation of *AE*–*AO* with *AD*–*AS*

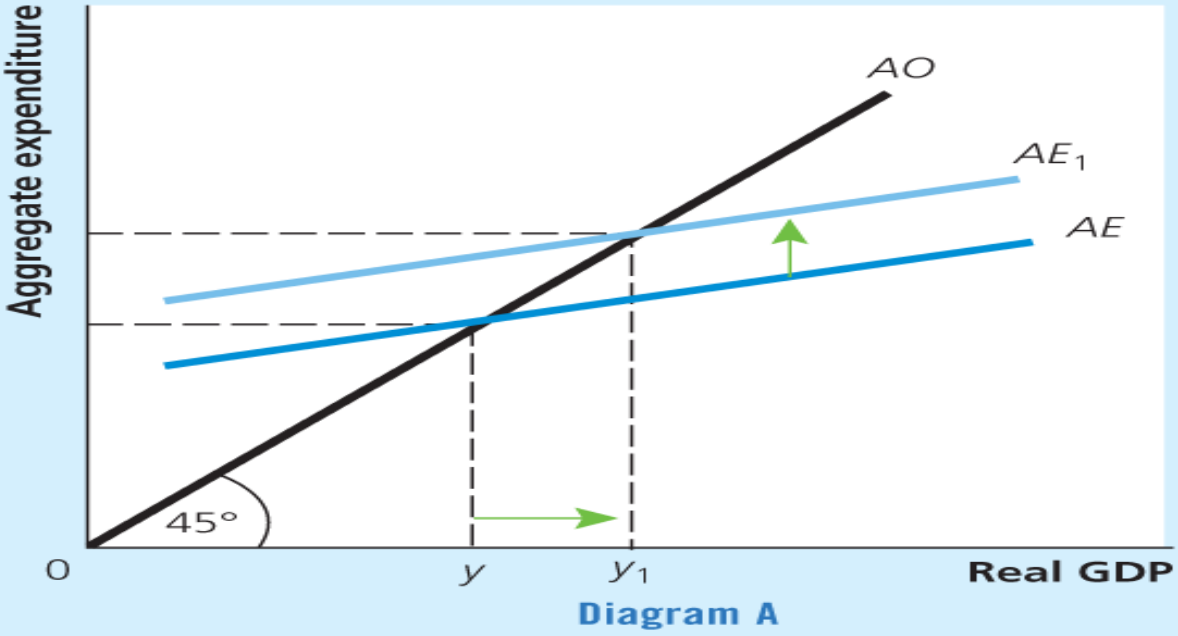


Diagram A

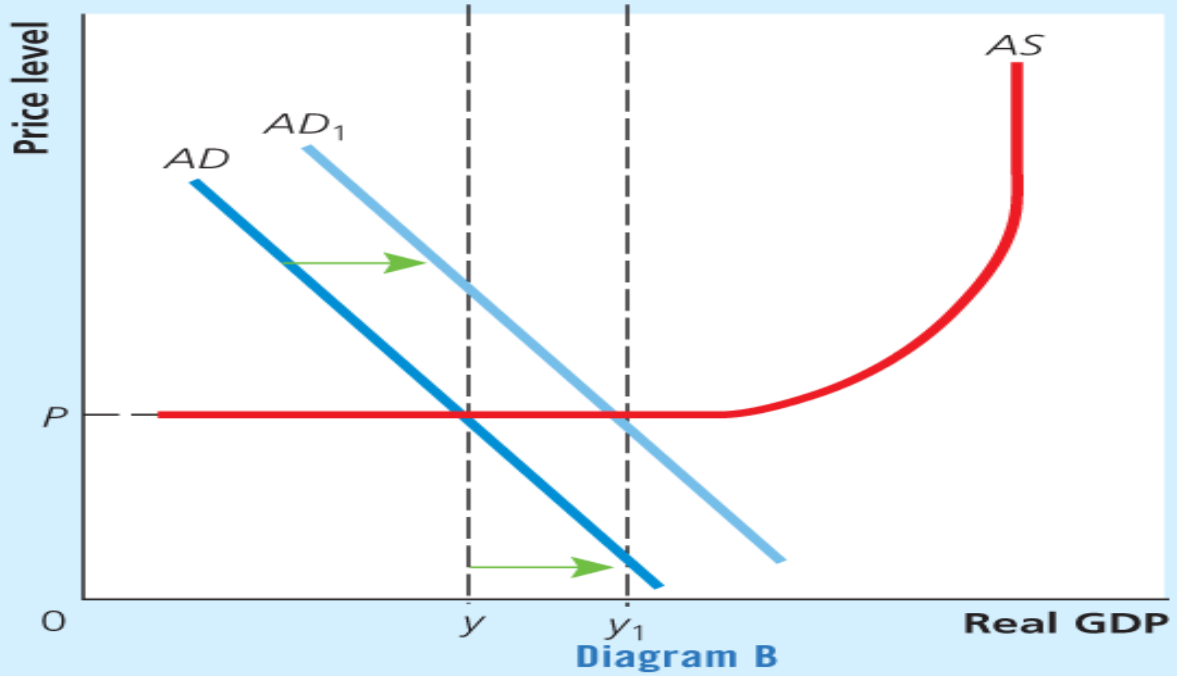


Diagram B

Diagram A: Effect of *AE* shifts
Diagram B: Effect of *AD* shifts

Limitations of the Simple Keynesian Model

LO 10.7 Discuss the limitations of the simple Keynesian model.

Limitations of the Simple Keynesian Model

Economic models, including the simple Keynesian model, inevitably have limitations due to the assumptions upon which they are built. Specifically, three significant limitations can be identified within the simple Keynesian model.

First, the simple Keynesian model is not comprehensive in its depiction of the macroeconomy. It primarily focuses on the product market—the market for goods and services—while neglecting the analysis of other crucial markets such as the money market and the labor market. By omitting these sectors, the model fails to capture the broader interactions that shape economic outcomes. For example, the money market determines interest rates, which affect investment; the labor market influences employment, wages, and consumption—all factors central to macroeconomic performance.

Second, the model is a demand-side model in the sense that the level of output (income) is determined exclusively by aggregate expenditure. If aggregate expenditure increases, aggregate output will increase. If aggregate expenditure falls, aggregate output will fall. In this framework, spending drives production, and demand generates supply.

Reading Comprehension

1. What is the effect of an increase in aggregate expenditure on aggregate demand, other things being equal? (If the *AE* curve shifts up, what happens to the *AD* curve?)

2. If an increase in *AD*, other things being equal, has no effect on the price level, what can you conclude about the state of the economy?

Third, this simple model assumes that the price level is fixed and that the economy is operating with idle human and non-human resources that can be employed if there is enough expenditure to purchase the goods and services produced. In other words, the economy is assumed to be operating along the

horizontal portion of the aggregate supply curve, where it is possible to increase production without increasing prices. But price levels are not constant in real economies, and a more realistic model must allow for inflationary pressure as output expands.

Reading Comprehension

1. What are the limitations of the simple Keynesian model of income determination presented in this chapter?

2. In what sense can it be said that the simple Keynesian model is a demand-side-only model?

Review

1. Review the learning objectives listed at the beginning of the chapter.

2. Have you accomplished all the objectives? One way to determine this is to answer the Reading Comprehension Questions at the end of each section. This will help you assess the extent to which you have accomplished the learning objectives.

3. If you have not accomplished an objective, review the relevant material before proceeding

Key Points to Remember

1. **LO 10.1** Aggregate expenditure and aggregate demand are not identical, and aggregate output and aggregate supply are not identical.

2. **LO 10.3** The consumption curve shows the direct relationship between current consumption and current disposable income. A portion of consumption is autonomous while a portion is induced.

3. **LO 10.3** The average propensity to consume is the ratio of consumption to income. The average propensity to save is the ratio of saving to income.

4. **LO 10.3** The marginal propensity to consume is the ratio of the change in consumption to the change in income. The marginal propensity to save is the ratio of the change in saving to the change in income.

5. **LO 10.3** In a closed economy in which the government neither spends nor taxes, equilibrium income (output) occurs when desired aggregate expenditure equals aggregate output.

6. **LO 10.3** In the injections–withdrawals approach, when government neither spends nor taxes, and when there is no foreign trade, equilibrium income occurs where the saving curve and the investment line intersect.

7. **LO 10.5** The *AD* curve can be derived from the *AE*–*AO* model.

8. **LO 10.7** The limitations of the simple Keynesian model of income determination include the fact that the model concentrates only on the product market, it focuses only on the demand side, and it does not allow for changes in the price level.

Problems and Exercises

Basic

1. **LO 10.1** Indicate which of the following is a component of aggregate expenditure:

   a. Wages and salaries

   b. Consumption