FACULTY OF BUSINESS, HUMANITIES & HOSPITALITY

MASTER IN BUSINESS ADMINISTRATION

BANKING AND FINANCE

BM4404
MANAGERIAL ECONOMICS

SELF INSTRUCTIONAL MATERIALS

ACADEMIC YEAR 2021

Table of Contents

Welcome

Managerial economics (BM4404) is the "application of the economic concepts and economic analysis to the problems of formulating rational managerial decisions". Managerial Economics introduces students to the use of economic analysis for business decision-making. Economic theory and quantitative methods are applied to managerial decision involving prices, production, and profit maximization. It is an important module for this MBA as the module encourages critical understanding of economics in the field of business.

Description of the Course

Managerial Economics introduces students to the use of economic analysis for business decision-making. Economic theory and quantitative methods are applied to managerial decision involving prices, production, and profit maximization. It is an important module for this MBA as the module encourages critical understanding of economics in the field of business.

Aim of the Course

Upon completion of the course, students should be able to familiarize with the concepts and tools of economic analysis as applied by management in various market environments. Managerial Economics involves decision making for optimal results after consideration of alternative strategies.

Course Learning Outcome

After the successful completion of this module, students should be able to:

- to build upon the microeconomic models learned in basic economics so as to apply them to “real world” managerial problems and solutions;
- explain the underlying theories of microeconomics and understand how these theories apply to managerial problem solving techniques;
- apply demand theory and demand estimation as they relate to management decision making in product pricing;
- apply production theory as it relates to management decision making in determining product production levels;
- evaluate various techniques of decision making faced by managers operating under different types of competition;
- critically assess the role of government and regulation in the economy.

Support and Contact Details

Name:	:	Dr.Chandramalar Munusami
Email	:	chandramalar@nilai.edu.my
Tel	:	068502338 (208)

Assessment

This module is assessed by both coursework and examination.

Coursework Percentage: 60%
Examination Percentage: 40%

Coursework Details

TASKS	PERCENTAGE
Mid-Term	10%
Group assignment	20%
Presentation	10%
Individual assignment	20%

Formative Assessment

1. Managers and Economics
   Knowledge check activity

2. Demand, Supply, and Equilibrium Prices
   Knowledge check activity

3. Demand Elasticities
   Knowledge check activity

4. Production and Cost Analysis in the Short Run
   Knowledge check activity

5. Measuring Macroeconomic Activity
   Knowledge check activity

6. The Role of Money in The Macro Economy
   Knowledge check activity

7. The Aggregate Model of the Macro Economy
   Knowledge check activity

Summative Assessment

1. Market Structure: Perfect Competition
   Knowledge check activity

2. Market Structure: Monopoly and Monopolistic Competition

Knowledge check activity

3. Market Structure: Oligopoly
   Knowledge check activity

Text

Main reference supporting the course:

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Additional reference(s):

Keat, P. and Young, K. 2009. *Managerial Economics*. 6th edn. Pearson.

Topic 1: Managers and Economics

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain the concepts of Economics.
2. Discuss the importance of managers need to understand both microeconomics and macroeconomics as they make decisions.
3. Discuss the insights from economics for a real-world problem such as congestion.

Introduction

Chapter 1 introduces students to economics and how managerial decisions are affected by both microeconomics and macroeconomic factors. Microeconomics is the study of how consumers, firms and industries make decisions regarding the products that they buy and sell. Macroeconomics is the study of the overall level of economic activity, including topics such as changes in the price level, unemployment and economic growth. The case study on the global automobile industry demonstrates how managerial decisions are influenced by changing microeconomic and macroeconomic variables. Microeconomic influences include how consumer behavior affects revenues, and how technology and the market structure affect the costs of production. Macroeconomic influences include changes in aggregate spending in the economy, monetary and fiscal policies as well as outside influences in the rest of the world.

1.1 Microeconomics and Macroeconomics

Two Perspectives: Microeconomics and Macroeconomics

A. Microeconomics: Branch of economics that analyses the decisions of individual consumers, firms and industries. Microeconomics is analogous to viewing a detailed picture of the economy under the microscope.

   1. Prices, amounts of money charged for goods and services in the economy, influence the behavior of consumers and producers.

   2. Prices of outputs and inputs (land, labor capital, raw materials, entrepreneurship) affect production decisions of firms.

   3. Managerial Economics: Microeconomics applied to managerial decisions of businesses.

B. Macroeconomics: Macroeconomics is the branch of economics that focuses on the overall level of economic activity, changes in the price level, and the amount of unemployment by analyzing group or aggregate behavior in different sectors of the economy.

1.2 Microeconomic Influences on Managers

A. Relative Price: The price of one good in relation to the price of another good.

1. Consumers respond to relative prices (prices of Japanese cars relative to those of their US competitors)

2. Businesses choose their input combinations based on the relative prices of the inputs (wages in Japan relative to wages in the US; the price of one material versus the price of a substitute material and so on)

3. Non-price factors and their impact on the cost to the consumer (the cost of financing a car purchase)

B. Product specifications and the consumer preferences (Chinese market versus US market)

C. The strategic decisions of managers depend on the market structure.

1. Markets: The mechanisms used for the buying and selling of products. There are four markets used in microeconomics, ranging from perfect competition, monopolistic competition, oligopoly, to monopoly.

2. Perfect Competition: Market structure characterized by a large number of firms that sell an undifferentiated product, with easy entry into the market and complete information available for all participants.
   (a) Each firm is considered a "price-taker" that has no influence on the market price of the product.
   (b) Profits signal new firms to enter the market until all profits are competed away as new firms enter the market to capture the excess profit.
   (c) Profit: Total revenue to the firm from the sales of its product minus the total cost of production.

3. Market Power: Ability of a firm to influence the market price of its product and strategies to earn large profits over time.

4. Imperfect Competition: Market structures of monopoly, oligopoly and monopolistic competition in which firms have some market power.

5. Monopoly: Market structure characterized by a single firm producing a good with no close substitutes.
   (d) Barriers to entry (structural, legal or regulatory) exist that prevent other firms from entering the market easily.
   (e) A firm with market power is considered a "price maker" and has to lower prices to sell more output.

6. Monopolistic Competition: Market structure in which many firms have some degree of market power and produce differentiated products.

7. Oligopoly: Market structure in which a small number of large firms dominate the market. These firms have market power but must consider their rivals' actions into account when developing strategies.

8. In the case of analysis, Ford, GM, Honda, Toyota and their major competitors are multinational firms that have significant market power and are not perfectly competitive.

D. The goal of firms is profit maximization. Firms develop strategies to earn the highest profits possible.

1.3 Macroeconomic Influences on Managers

A. The circular flow model demonstrates the flow of expenditures between households and firms at the aggregate level.

1. Consumers buy goods and services produced by firms in the output market.

2. Consumers supply inputs (land, labor, capital equipment and entrepreneurship) to firms in the resource market. They receive payments for these inputs in the form of wages, rent, interest and profits.

3. Absolute Price Level: Measure of the overall price level in the economy.

B. The circular flow model is used to analyze spending behavior in the economy.

1. Gross Domestic Product (GDP): The comprehensive measure of the total market value of all currently produced final goods and services

within a country in a given period of time by domestic and foreign supplied resources:

(a) Personal Consumption Expenditures (C) by households on durable and non-durable goods and services.

(b) Gross Private Domestic Investment Spending (I) on non-residential structures, equipment, and software in addition to residential structures and inventories.

(c) Government Consumption Expenditures and Gross Investment (G) at the federal, state and local levels.

(d) Net Export Spending (F), or Export Spending (X) minus Import Spending (M).

2. GDP=C+I+G+F or GDP=C+I+G+(X-M)

C. Factors affecting macro spending behavior.

1. Changes in consumption and investment behavior in the private sector.

2. Monetary policy and fiscal policy.
   (e) Monetary Policy: Policies adapted by the country's central bank that influence the money supply, interest rates, and the amount of funds available for loans, which, in turn, influence consumer and business spending.
   (f) Fiscal Policy: Changes in taxing and spending by the executive and legislative branches of a country's national government that can be used to either stimulate or restrain the economy.

3. Changes in the foreign sector including the exchange rate (the US dollar exchange rate against the Japanese yen and the implications on the behavior of the Japanese auto makers).

SELF CHECK 1

1) Explain the basic distinction between microeconomic analysis and macroeconomic analysis. Describe the types of issues that each branch of analysis focuses on.
2) Assume an individual is considering opening a new car dealership in a medium-sized metropolitan area (population = 200,000). Provide a list of economic variables you would recommend that the person consider in making his decision whether to open the business, and explain your rationale for including each variable.
3) List and describe the sources of spending in the economy by focusing on the four major sectors of the economy.
4) Many analysts have argued that the federal government should stop spending money on programs such as agricultural price supports and should redirect that spending to such things as improvements in the nation's roads and bridges. Construct an economic argument that supports this proposed change in policy.

Points to Ponder/Takeaways

Why Study Economics?

Identify three key reasons to study economics. Think of an example from your life in which understanding opportunity costs or the principle of efficient markets could make a difference in your decision making.

The Scope of Economics

Describe microeconomics, macroeconomics, and the diverse fields of economics.

Scarcity, Choice, and Opportunity Cost

Understand why even in a society in which one person is better than a second at all tasks, it is still beneficial for the two to specialize and trade.

Economic Systems and the Role of Government

Understand the central difference in the way command economies and market economies decide what is produced.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 2: Demand, Supply, and Equilibrium Prices

Learning Outcomes

Upon completion of the course, students should be able to:

1. Describe and explain the law of demand and supply.
2. Explain the role of price in reaching a market equilibrium.
3. Elaborate the effect of a change in demand on the equilibrium price.

Introduction

This chapter introduces students to the important concepts of demand and supply. The chapter uses examples to illustrate how changes in non-price factors impact demand, supply, and the resulting market equilibrium. Demand is the relationship between price and the quantity demanded of a good by consumers in a given period of time, all other factors held constant. Supply is the relationship between price and the quantity supplied of a good by producers in a given period of time, all other factors held constant. The discussion uses graphical and algebraic methods.

2.1 Demand

A. Demand: Functional relationship between the price and quantity demanded of goods and services by consumers in a given period of time, all else held constant.

B. Non-price factors influence demand, causing either an increase or a decrease in demand. These factors are the following.

1. Tastes and Preferences

(a) A favorable change in the taste for good X increases its demand.

2. Income

(a) Normal Good: A product whose demand will increase with an increase in income.
(b) Inferior Good: A product whose demand will decrease with an increase in income.

3. Prices of Related Goods

(a) Substitute Goods: Products that can be used in place of one another. An increase in the price of a substitute good, Y, causes an increase in the demand for good X.
(b) Complementary Goods: Products that are used together. A decrease in the price of a complementary good, Y, causes an increase in the demand for good X.

4. Future Expectations

(a) An expected increase in the future price of good X will increase its current demand.
(b) This was demonstrated in the world grain prices in 2007 and in steel prices in 2011.

5. Number of Consumers

C. Demand Function: Function represented by $Q_{XD}= f (P_X, T, I, P_Y, P_Z, EXC, NC, ...)$ where:

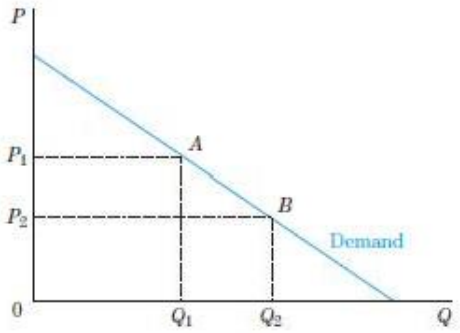
Q_{XD}= quantity demanded of X
P_X= price of X
T= variables representing an individual's tastes and preferences
I= income
P_Y, P_Z= prices of goods Y and Z, which are related in consumption to good X
EXC= consumer expectations about future prices
NC= number of consumers

1. Individual Demand Function: Function that shows the variables that affect an individual consumer's quantity demanded of a particular product.

2. Market Demand Function: Function that shows the variables that affect all consumers' quantity demanded of a particular product in the market.

D. Demand Curve: The graphical relationship between the price of a good (P) and the quantity demanded by consumers (Q), with all other factors influencing demand held constant.

FIGURE 2.1
The Demand Curve for a Product
A demand curve shows the relationship between the price of a good and the quantity demanded, all else held constant.



1. Demand Shifters: The variables in a demand function that are held constant when defining a given demand curve. If their values change, the demand curve would shift.

2. Price is on the vertical axis and quantity demanded is on the horizontal axis.

3. Demand curves are generally downward sloping.

4. Price and quantity demanded have a negative relationship.

E. Change in Quantity Demanded and Change in Demand

1. Change in Quantity Demanded: Movement along a demand curve when consumers react to a change in the price of the product, all other factors held constant. This is illustrated in Figure 2.1.

2. Change in Demand: Movement of the entire demand curve when consumers react to a change in factors other than the price of the product changing. This is illustrated in Figure 2.2.

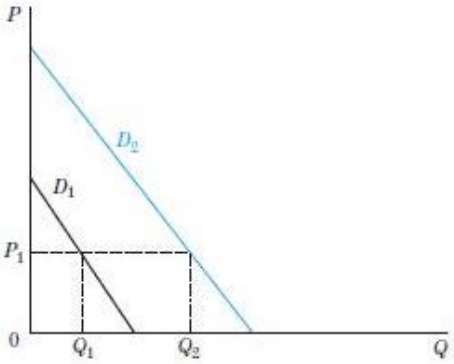
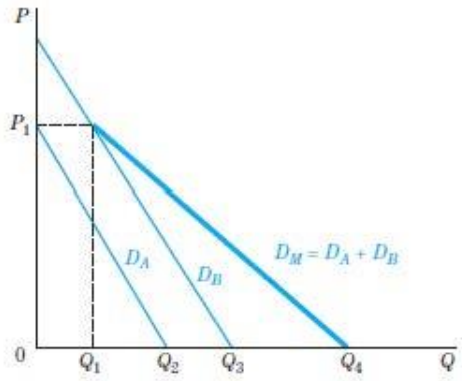


FIGURE 2.2
Change (Increase) in Demand
A change in demand occurs when one or more of the factors held constant in defining a given demand curve changes.

F. The market demand curve can be derived by horizontal summation of the individual demand curves.

1. Horizontal Summation: For every price, add the quantity that each individual in a market demands.
2. A simple example is when there are two individuals in a market. This is illustrated in Figure 2.3.

FIGURE 2.3
Individual Versus Market Demand Curve
A market demand curve is derived from the horizontal summation of individual demand curves; that is, for every price, add the quantity each individual demands at that price to determine the market quantity demanded at that price.



G. Linear Demand Function and Curves

1. Linear Demand Function: Mathematical relationship in which all terms are added or subtracted.

2. The graph of a linear demand curve is a straight line.

H. Math Example of a Demand Function (for copper at the beginning of 2010)

1. Equation 2.2: $Q_D=3-2P_C+0.2I+1.6TC+0.4E$

where:

Q_D= quantity demanded of copper (millions of pounds)
P_C= price of copper ($ per pound)
I= consumer income index
TC= telecom index showing uses or tastes for copper in the telecommunications industry
E=expectation index representing purchaser's expectations of a lower price over the following six months

2. The negative coefficient on P_C shows an inverse relationship between price and quantity demanded for copper.

3. The positive coefficient on I shows that copper is a normal good.

4. The positive coefficient on TC shows that improved technology and greater demand for telecom services lead to higher demand.

5. The negative coefficient on E shows that expectations of lower price leads to an increased demand for copper in the future but a decreased demand for copper for the current period.

6. Equation 2.3: $Q_D=15-2P_C$ is the alternative demand equation that is derived after substituting values for I, TC and E. It illustrates the meaning of the expression, "all else equal."

2.2 Supply

A. Supply: Functional relationship between the price and quantity supplied of goods and services by producers in a given period of time, all else equal.

B. Non-price factors influence the cost of production, causing either an increase or a decrease in supply. These factors are the following.

1. State of Technology

   (a) Better technology allows for a more efficient use of resources, increasing supply.

2. Input Prices

   (a) Lower prices of inputs (labor, capital, land and raw materials) lead to a reduction in the production cost and an increase in supply.

3. Prices of Goods Related in Production

   (a) Substitute Goods: The same inputs can be used to produce one good over another. An increase in the price of a substitute good, Y, causes an increase in the production of good X.
   (b) Complementary Goods: Products that are produced together. A decrease in the price of a complementary good, Y, causes an increase in the production of good X.

4. Future Expectations

   (a) An expected decrease in the future price of good X will increase its current supply.

5. Number of Producers

   (a) An increase in the number of sellers of good X will increase its supply.

   (b) Changes in laws or regulations including trade barriers (quotas and tariffs) can also achieve the same result.

C. Supply Function: Function represented by Q_{XS}= f (P_X, TX, P_I, P_A, P_B, EXP, NP, ...) where:

Q_{XS}= quantity supplied of X
P_X= price of X
TX=state of technology
P_I= prices of inputs of production
P_A, P_B= prices of goods A and B, which are related in production of good X
EXP= producer expectations about future prices
NP= number of producers

D. Supply Curve: The graphical relationship between the price of a good (P) and the quantity supplied by producers (Q), with all other factors influencing supply held constant.

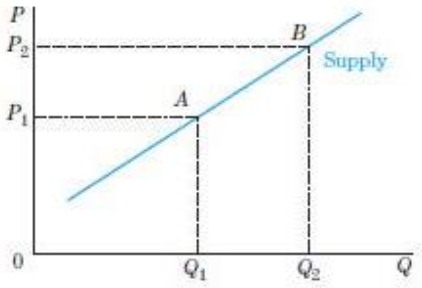


FIGURE 2.4
The Supply Curve for a Product
A supply curve shows the relationship between the price of a good and the quantity supplied, all else held constant.

1. Supply Shifters: The variables in a supply function that are held constant when defining a given supply curve. If their values change, the supply curve would shift.

2. Price is on the vertical axis and quantity supplied is on the horizontal axis.

3. Supply curves are generally upward sloping.

4. Price and quantity supplied have a positive relationship.

E. Change in Quantity Supplied and Change in Supply

1. Change in Quantity Supplied: Movement along a supply curve when producers react to a change in the price of the product, all other factors held constant. This is illustrated in Figure 2.4.

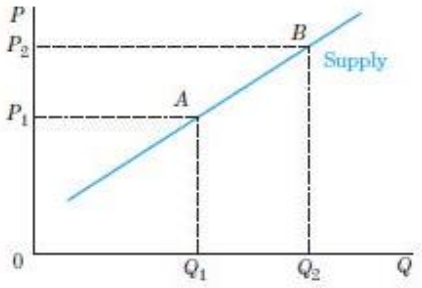
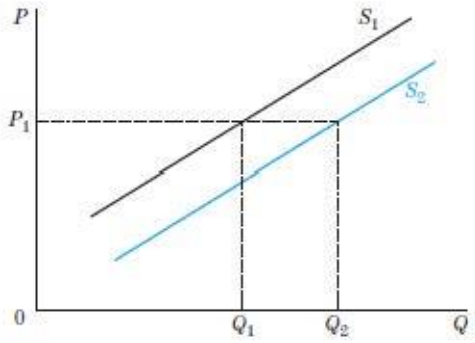


FIGURE 2.4
The Supply Curve for a Product
A supply curve shows the relationship between the price of a good and the quantity supplied, all else held constant.

2. Change in Supply: Movement of the entire supply curve when producers react to a change in factors other than the price of the product changing. This is illustrated in Figure 2.5. Factors capable of shifting a supply curve (changes in supply) include technological changes that increase input productivity, changes in input costs, changes in the prices of related in production goods, changes in producer's expectations.

FIGURE 2.5
Change (Increase) In Supply
A change in supply occurs when one or more of the factors held constant in defining a given supply curve changes.



F. Math Example of a Supply Function

1. Equation 2.5: $Q_S = -5+8P_C-0.5W+0.4T+0.5N$

where:

Q_S= quantity supplied of copper (millions of pounds)
P_C= price of copper ($ per pound)
W= an index of wage rates in the copper industry
T= technology index
N= number of active mines in the copper industry.

2. The positive coefficient on P_C shows a positive relationship between price and quantity supplied of copper.

3. The negative coefficient on W shows that as the input price increases, supply decreases due to costly production.

4. The positive coefficient on T shows that an increase in technology increases the supply of copper.

5. The positive coefficient on N shows that an increase in the number of active mines increases the supply of copper.

6. Equation 2.6: $Q_S = -25+8P_C$ is the alternative supply equation that is derived after substituting values for W, T and N. It illustrates the meaning of the expression, "all else equal."

G. Summary of Demand and Supply Factors

1. Table 2.1 provides a summary of the discussion

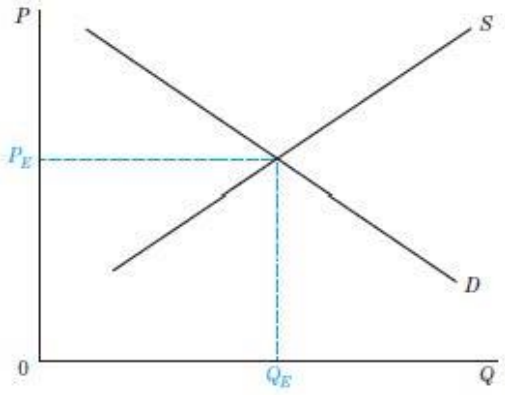
TABLE 2.1 Factors Influencing Market Demand and Supply

DEMAND	SUPPLY
Price of the product	Price of the product
Consumer tastes and preferences	State of technology
Consumer income:	Input prices
Normal goods	
Inferior goods	
Price of goods related in consumption:	Prices of goods related in production
Substitute goods	Substitute goods
Complementary goods	Complementary goods
Future expectations	Future expectations
Number of consumers	Number of producers

2.3 Demand, Supply and Equilibrium

A. When the market is in equilibrium, there is an equilibrium price and quantity. This is illustrated in Figure 2.6.

FIGURE 2.6
Market Equilibrium
Market equilibrium occurs at that price where the quantity demanded by consumers equals the quantity supplied by producers.



7. Equilibrium Price (P_E): The price that actually exists in the market (or toward which the market is moving) where the quantity demanded by consumers equals the quantity supplied by producers.

8. Equilibrium Quantity (Q_E): The quantity of a good, determined by the equilibrium price, where the amount of output that consumers demand is equal to the amount that producers want to supply.

B. Lower-than-equilibrium prices would result in a shortage of the good, as the quantity demanded exceeds the quantity supplied. This is illustrated in Figure 2.7.

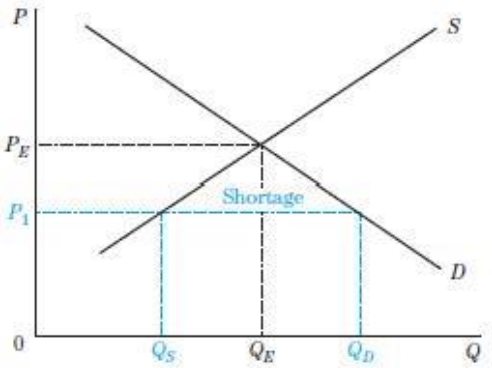
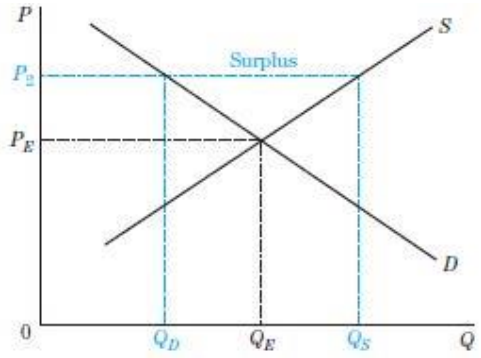


FIGURE 2.7
A Lower-Than-Equilibrium Price
A shortage of a good results when the market price, P_1, is below the equilibrium price, P_E.

C. Higher-than-equilibrium prices would result in a surplus of the good, as the quantity supplied exceeds the quantity demanded. This is illustrated in Figure 2.8.

FIGURE 2.8
A Higher-Than-Equilibrium Price
A surplus of a good results when the market price, P_2, is above the equilibrium price, P_E.



D. Math Example of Equilibrium

1. Equation 2.3: $Q_D = 15-2P_C$

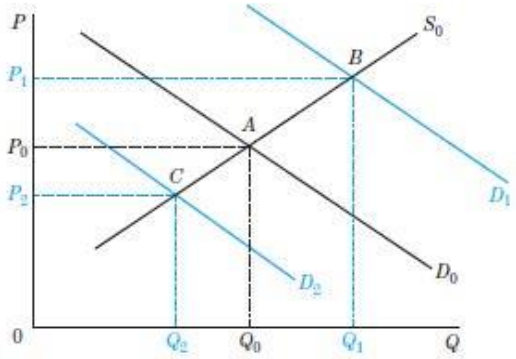
2. Equation 2.6: $Q_S = -25+8P_C$

3. In equilibrium, there is only one quantity where $Q_D=Q_S$. Equating the two equations lead to an equilibrium price of $4.00 and an equilibrium quantity of 7 million pounds.

E. Changes in Equilibrium Prices and Quantities

1. A change in demand results from a change in tastes and preferences, income, prices of related goods, expectations or the number of consumers. This alters the market equilibrium in the following ways.

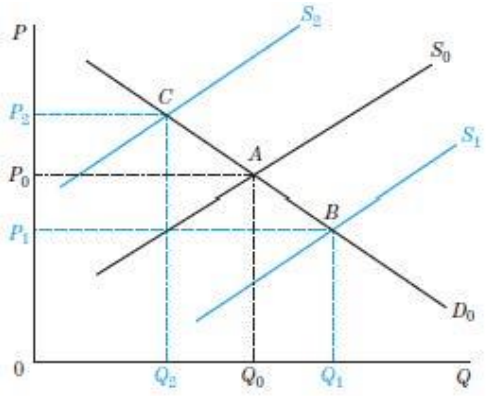
FIGURE 2.9
Change in Demand
A change in demand, represented by a shift of the demand curve, results in a movement along the supply curve.



(a) An increase in demand (D_0 to D_1) raises the equilibrium price and raises the equilibrium quantity. This is illustrated in Figure 2.9.
(b) A decrease in demand (D_0 to D_2) lowers the equilibrium price and lowers the equilibrium quantity. This is illustrated in Figure 2.9.

2. A change in supply results from a change in technology, input prices, prices of goods related in production, expectations, or the number of suppliers. This alters the market equilibrium in the following ways.

FIGURE 2.10
Change in Supply
A change in supply, represented by a shift of the supply curve, results in a movement along the demand curve.



(a) An increase in supply (S_0 to S_1) lowers the equilibrium price and raises the equilibrium quantity. This is illustrated in Figure 2.10.
(b) A decrease in supply (S_0 to S_2) raises the equilibrium price and lowers the equilibrium quantity. This is illustrated in Figure 2.10.

3. The effects of changes in both sides of the market on the equilibrium price and quantity depend on the sizes of the shifts of the demand and supply curves.

4. An increase in demand and a decrease in supply raise the equilibrium price but the effect on the equilibrium quantity is indeterminate. This is illustrated in Figures 2.11 and 2.12.

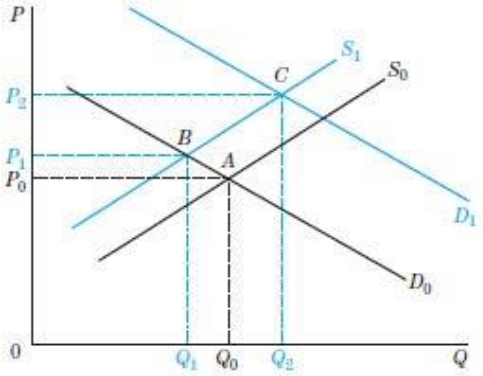


FIGURE 2.11
Decrease in Supply and Increase in Demand: Increase in Equilibrium Quantity
These changes in demand and supply result in a higher equilibrium price and a larger equilibrium quantity.

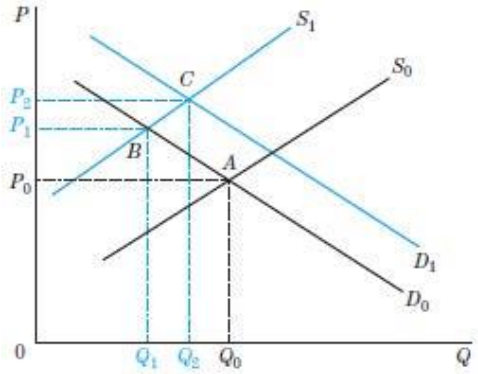


FIGURE 2.12
Decrease in Supply and Increase in Demand: Decrease in Equilibrium Quantity
These changes in demand and supply result in a higher equilibrium price and a smaller equilibrium quantity.

5. An increase in demand and an increase in supply raise the equilibrium quantity but the effect on the equilibrium price is indeterminate. This is illustrated in Figures 2.13 and 2.14.

FIGURE 2.13
Increase in Supply and Increase in Demand: Lower Equilibrium Price
These changes in demand and supply result in a lower equilibrium price and a larger equilibrium quantity.

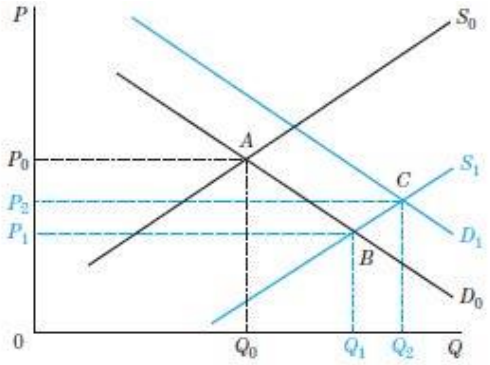
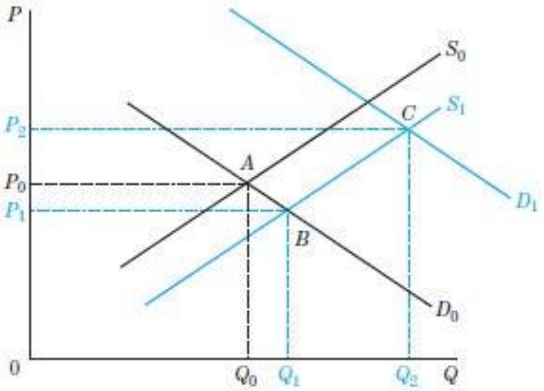


FIGURE 2.14
Increase in Supply and Increase in Demand: Higher Equilibrium Price
These changes in demand and supply result in a higher equilibrium price and a larger equilibrium quantity.



F. Math Example of an Equilibrium Change (continuation of the prior setup of the copper market in 2010

1. Start with an initial equilibrium price of $4.00 and an initial equilibrium quantity of 7 million pounds at the beginning of 2010.

2. Assume that the US and European economic weaknesses cause cancellation of copper orders during 2010 - 2011. Assume that a decrease in the demand for copper that resulted from the weaknesses in the US and Europe was not offset by an increase in the demand for copper from China. This causes several of the relevant to the market demand factors to change: the income index (I) to decrease from 20 to 14, the telecom index (TC) decreases from 2.5 to 1.875, the expectations index (E) decreases from 100 to 80.

3. Supply side factors are also allowed to change. Assume that the wage index (W) decreases from 100 to 98, the technology index increases from 50 to 55, NP increases from 20 to 28 (due to a release of copper stockpile in China).

4. Substituting for new values of for the above listed factors into the demand and supply equations results in the new equilibrium price is

$3.00 and the new equilibrium quantity is 6 million pounds. This is also illustrated graphically in Figure 2.15.

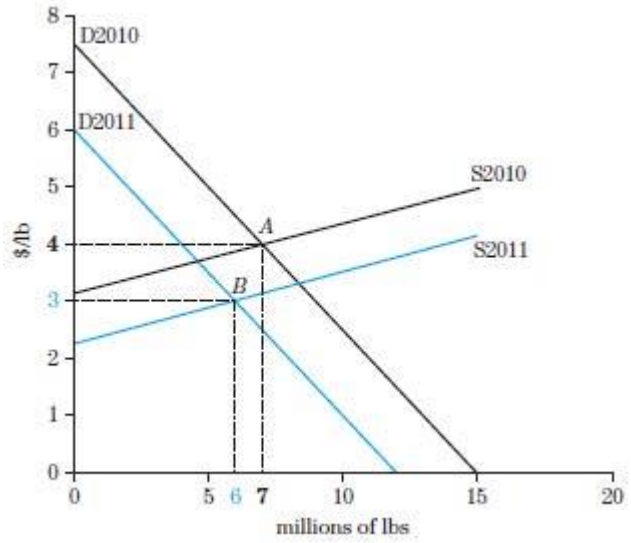


FIGURE 2.15
Copper Industry Example
This figure illustrates the changes in demand and supply in the copper industry discussed in the opening case of the chapter. Both the demand and the supply shifts resulted in a downward trend in copper prices.

SELF CHECK 2

1. Define the concept of demand and explain, on an intuitive level, why the demand curve for a good is downward sloping.
2. Distinguish between "a change in demand" and "a change in quantity demanded." What are the causes of each type of change and how do we illustrate them graphically?
3. List the factors that influence supply. How does a change in each of the factors you have listed affect the supply curve?
4. Assume the current price of good X is too high, i.e., it is above the equilibrium price. Describe the changes that would occur in a market as a result, i.e., explain how the market would adjust to equilibrium.
5. Assume there is an increase in the price of electricity (which is the result of a decrease in the supply of electricity), and electricity and natural gas are substitutes. How would this affect the demand for natural gas, and what would happen to the equilibrium price and quantity of natural gas?

Points to Ponder/Takeaways

Demand in Product/Output Markets

Understand what determines the position and shape of the demand curve and what factors move you along a demand curve and what factors shift the demand curve.

Supply in Product/Output Markets

Be able to distinguish between forces that shift a supply curve and changes that cause a movement along a supply curve.

Market Equilibrium
Be able to explain how a market that is not in equilibrium responds to restore an equilibrium.

Markets and the Allocation of Resources

The Price System: Rationing and Allocating Resources
Understand how price floors and price ceilings work in the market place

Supply and Demand and Market Efficiency
Explain how consumer and producer surplus are generated.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 3: Demand Elasticities

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain the price elasticity of demand: list the determinant of the price elasticity of demand.
2. Use price elasticity of demand to predict changes in quantity and total revenue.
3. Elaborate elasticity and total revenue for a linear demand curve: explain how the price elasticity of demand varies along a linear demand curve.

Introduction

This chapter introduces students to the concept of elasticity of demand. A demand elasticity measures how consumer demand responds to changes in a variable in the demand function. The price elasticity of demand is the key elasticity measure discussed in this chapter. It measures the sensitivity of the consumer's behavior to changes in the price of the product by dividing the percentage change in the quantity demanded by the percentage change in the price that induced the change in the quantity demanded. The case for analysis demonstrates on the example of Procter and Gamble Co. how a company's pricing policies depend on how consumers respond to price changes. The other elasticity measures introduced in this chapter are the income and cross-price elasticities of demand.

3.1 Demand Elasticity

Demand Elasticity: Quantitative measurement showing the percentage change in the quantity demanded of a particular product relative to the percentage change in any one of the variables included in the demand function for that product. Elasticity measures the responsiveness of consumers in terms of percentage changes in both variables.

Price Elasticity of Demand (e_P): Percentage change in the quantity demanded of a given good, X, relative to a percentage change in its price, all other factors constant.

A. Equation 3.1: $e_P = \%\Delta Q_X / \%\Delta P_X$

where:

e_P= price elasticity of demand
Δ= the absolute change in the variable: (Q_2-Q_1) or (P_2-P_1)

1. Price elasticity of demand is illustrated by the change in quantity demanded from Q_1 to Q_2 as the price changes from P_1 to P_2.

2. This is shown as the movement along the demand curve from A to B in Figure 3.1.

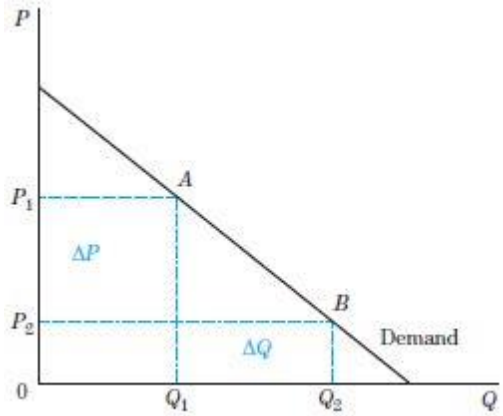


FIGURE 3.1
Price Elasticity and the Movement Along a Demand Curve
Price elasticity is measured as a movement along a demand curve from point A to point B.

B. The price elasticity of demand affects managerial decisions on pricing strategies through the total revenue.

1. Total Revenue: The amount of money received by a producer for the sale of its product calculated as the price per unit times the quantity sold.

C. Price elasticities for downward sloping demand curves are negative because of the inverse relationship between price and quantity demanded. However, to determine the size of the price elasticity, absolute values are taken for the coefficients.

1. Unitary Elasticity: $|e_P|=1$, when the magnitude of the percentage change in quantity demanded is equal to the magnitude of the percentage change in price.

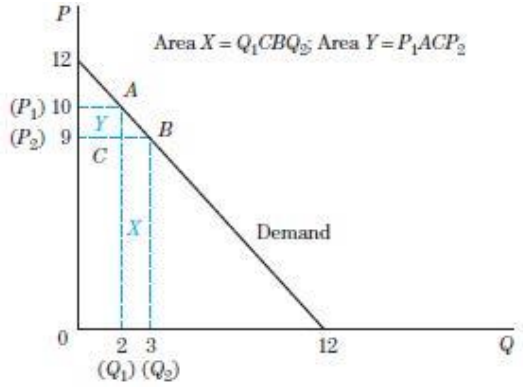
2. Elastic Demand: $|e_P|>1$, when the magnitude of the percentage change in quantity demanded is greater than the magnitude of the percentage change in price.

3. Inelastic Demand: $|e_P|<1$, when the magnitude of the percentage change in quantity demanded is less than the magnitude of the percentage change in price.

D. Price elasticity of demand and total revenue are related in the following ways.

1. When demand is elastic, a higher price will decrease total revenue while a lower price will increase total revenue. This is illustrated in Figure 3.2.

FIGURE 3.2
Elastic Demand and Total Revenue
If demand is elastic, a decrease in price results in an increase in total revenue, and an increase in price results in a decrease in total revenue.



2. When demand is inelastic, a higher price will increase total revue while a lower price will decrease total revenue. This is illustrated in Figure 3.3.

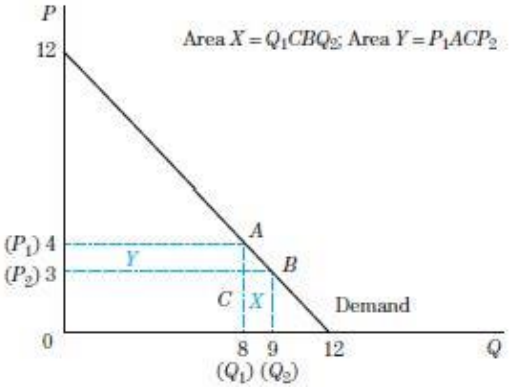


FIGURE 3.3
Inelastic Demand and Total Revenue
If demand is inelastic, a decrease in price results in a decrease in total revenue, and an increase in price results in a increase in total revenue.

3. When demand is unit elastic, there is no change in the total revenue.

E. Managerial rule of thumb: elasticity can be estimated as Px/(P1-P2). We can either use the average price (midpoint formula) or the starting value for Px. The textbook uses the starting value of P1.
    1. The rule is derived from the elasticity equation 3.2 on page 49. Since we assume that the quantity demanded changes from Q1 to zero, the change in quantity demanded equals Q1, thereby simplifying the equation 3.2 to the managerial rule stated above.

3.2 Determinants of Price Elasticity of Demand

A. Number of Substitute Goods

1. Demand is more inelastic when there are fewer substitutes available, all else constant.

2. An example of inelastic demand is airline travel by business passengers due to the lack of available substitute modes of transportation.

B. Percent of Consumer's Income Spent on the Product

1. Demand is more inelastic when a smaller fraction of a consumer's income is spent on the product, all else constant.

2. An example of inelastic demand is the local newspaper since it makes up a very tiny fraction of a consumer's income.

C. Time Period

1. Demand is more inelastic when the time period under consideration is short, all else constant.

2. It takes time for substitute products to be made available.

3.3 Numerical Example of Elasticity, Prices and Revenues

A. Calculating Price Elasticities

1. Arc Price Elasticity of Demand: A measurement of the price elasticity of demand where the base quantity or price is calculated as the average value of the starting and ending quantities or prices.

   (a) If Q_1 and Q_2 are very different from each other, a different value for the percentage change in quantity demanded may result.
   (b) If P_1 and P_2 are very different from each other, a different value for the percentage change in price may result.
   (c) To remedy these problems, the following equation is used.
   (d) Equation 3.3: $e_P = \frac{(Q_2-Q_1)/[(Q_1+Q_2)/2]}{(P_2-P_1)/[(P_1+P_2)/2]}$

2. Point Price Elasticity of Demand: A measurement of the price elasticity of demand calculated as a point on the demand curve using infinitesimal changes in prices and quantities.

   (a) For a specific demand function, appropriate derivatives can be computed.
   (b) Equation 3.4: $eP = \frac{dQ_X}{dP_x}\frac{P_X}{Q_X}$

B. A numerical example of demand, total revenue, average revenue and marginal revenue functions is shown in Table 3.2. The functions related to demand are the following.

1. Total Revenue Function: The functional relationship that shows the total revenue (price times quantity) received by a producer as a function of the level of output.

2. Average Revenue Function: The functional relationship that shows the revenue per unit of output received by the producer at different levels of output.

3. Marginal Revenue Function: The functional relationship that shows the additional revenue a producer receives by selling an additional unit of output at different levels of output.

C. Table 3.3 presents a numerical example of total revenue and marginal revenue computation. Table 3.4 extends the computational analysis to Arc and point price elasticities.

D. Price elasticity is not the same as the slope. Even though the demand curve is linear and has a single slope, the price elasticity coefficients vary.

1. The price elasticity coefficient is larger (smaller) at higher (lower) prices for a linear demand function.

2. In the elastic (inelastic) portion of the linear demand curve, a decrease (increase) in price results in an increase (decrease) in total revenue.

3. In the elastic (inelastic) portion of the linear demand curve, marginal revenue is positive (negative) and decreasing in value.

E. Demand Elasticity, Marginal Revenue, and Total Revenue
   1. Figure 3.4 illustrates the relationship between demand and marginal revenue.

FIGURE 3.4
Demand and Marginal Revenue Functions
The demand, marginal revenue, and total revenue functions are interrelated, as shown in Figures 3.4 and 3.5.

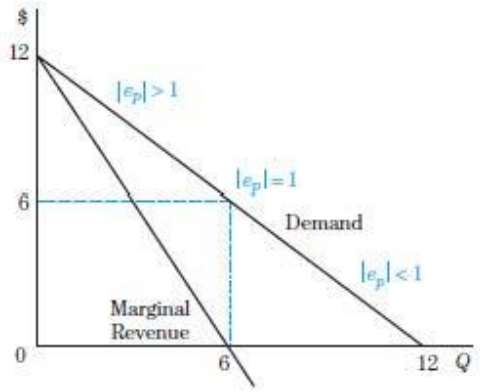


Figure 3.4 and Table 3.5 connect elasticity to total revenue and marginal revenue.

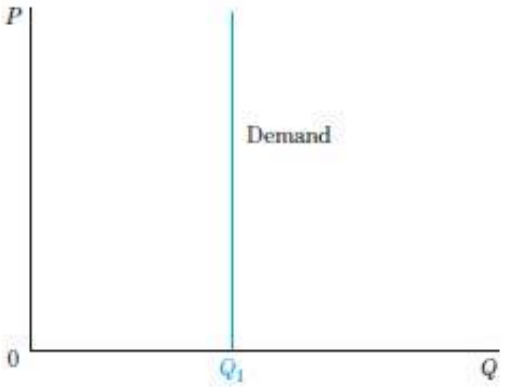
3.4 Vertical and Horizontal Demand Curves

A. Two polar cases of demand curves, vertical and horizontal demand curves are important.

B. Perfectly Inelastic Demand: Zero elasticity of demand, illustrated by a vertical demand curve, where there is no change in quantity demanded for any change in price.

1. An example is the demand for insulin by a diabetic, who is completely unresponsive to changes in price.

FIGURE 3.6
Vertical Demand Curve
A vertical demand curve represents perfectly inelastic demand.



C. Perfectly Elastic Demand: Infinite elasticity of demand, illustrated by a horizontal demand curve, where there the quantity demanded would vary tremendously if there were any changes in price.

1. There is no exact application of a perfectly elastic demand in reality. Examples that illustrate this idea are the demand for common fruits and vegetables.

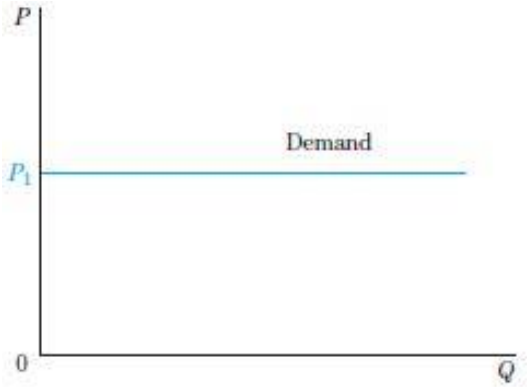


FIGURE 3.7
Horizontal Demand Curve
A horizontal demand curve represents perfectly or infinitely elastic demand.

3.5 Income and Cross-Price Elasticity of Demand

A. Income Elasticity of Demand: The percentage change in the quantity demanded of a given good, X, relative to a percentage change in consumer income, all other factors constant.

   1. Normal Good: A product whose demand will increase with an increase in income. This good has a positive income elasticity of demand.

   2. Inferior Good: A product whose demand will decrease with an increase in income. This good has a negative income elasticity of demand.

B. For goods with positive income elasticities, a distinction between necessities and luxuries is made.

   1. Necessity: A good with income elasticity between 0 and 1 where the expenditure on the good increases less proportionately with changes in income.

   2. Luxury: A good with an income elasticity great than 1 where the expenditure on the good increases more proportionately with changes in income.

C. Cross-Price Elasticity of Demand: The percentage change in the quantity demanded of a given good, X, relative to the percentage change in the price of good Y, all other factors constant.

   1. Substitute Goods: Products that can be used in place of one another. These goods have a positive cross-price elasticity of demand.

   2. Complementary Goods: Products that are used together. These goods have a negative cross-price elasticity of demand.

SELF CHECK 3

1. Provide a simple definition of the price elasticity of demand and explain why knowing the price elasticity for her product is useful to the firm's manager.
2. Explain why the price elasticity of demand varies along a demand curve, even if the demand curve is linear.
3. Summarize the relationship between elasticity, price changes, and changes in total revenue.
4. Assume that, over time, engineers develop new residential furnaces that can run on different types of fuels, e.g., natural gas, electricity, propane, and fuel oil, simply by flipping a switch on the furnace. How would this technological change affect the price elasticity of demand for natural gas? Why?

Points to Ponder/Takeaways

Price Elasticity of Demand
Understand why elasticity is preferable as a measure of responsiveness to slope and how to measure it.

Calculating Elasticities
Calculate elasticities using several different methods and understand the economic relationship between revenues and elasticity

The Determinants of Demand Elasticity
Identify the determinants of demand elasticity

Other Important Elasticities
Define and give examples of income elasticity, cross price elasticity, and supply elasticity

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 4: Production and Cost Analysis in The Short Run

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain the concepts of economic cost and economic profit.
2. Discuss the short-run costs and draw the short-run marginal and average cost curves.
3. Discuss the long-run costs and draw the long-run marginal and average cost curves

Introduction

This chapter introduces students to short-run production and cost. In the short-run, all production functions incur diminishing returns when variable inputs are used relative to at least one fixed input, reducing the additional amounts of the output being produced. Diminishing returns in production causes a short-run increase in the marginal cost, as production of more output becomes increasingly costly. In addition, the discussion of the empirical evidence demonstrates that the theoretical U-shaped cost curves may not always be appropriate in real-world firms and industries. The case for analysis, *Production and Cost Analysis in the Fast-Food Industry*, demonstrates how competitive firms adapt new production technologies to lower their costs of production.

4.1 Production

Production and costs are important for understanding supply. Production functions show how output rises with the inputs used, and the corresponding cost functions show how costs vary with the level of output produced. Production and cost functions are important for analyzing the behavior and strategy of individual firms and industries.

I. Case for Analysis: Production and Cost Analysis in the Fast-Food Industry

A. Fast-food industry is highly competitive

1. This implies that firms have little influence over the price of their product

2. This implies that to increase profits firms need to either lower costs or increase the number of customers

B. New production technologies such as call centers, internet order taking allow fast food firms to increase the productivity of their labor and thereby reduce the cost of output on per unit basis

1. McDonald's has started to utilize internet order taking in Singapore and Turkey.

2. Use of call centers allows firms to spread the peak hour activity across different time zones thereby increasing the effectiveness of labor.

C. Production technology changes include the following.

1. The use of separate kitchens for drive-through windows.

2. Timers to monitor the time it takes the customers to drive from the menu board to the cash/ pickup window.

3. Redesigning kitchens to minimize unnecessary movement by the workers.

4. Use of remote order-taking to cut costs.

II. Defining the Production Function

A. Production Function: The relationship between a flow of inputs and the resulting flow of outputs in a production process during a given period of time.

1. The production function shows the maximum amount of output that can be produced with a given combination of inputs.

2. Equation 5.1: $Q=f(L, K, M,\ldots)$
where:

Q= quantity of output
L=quantity of labor input
K=quantity of capital input
M=quantity of materials input

3. The production function is a general function and can be applied to large-scale production processes as well as production in small firms.

B. Fixed Inputs Versus Variable Inputs

1. Firms use both fixed and variable inputs in a production function.

2. Fixed Input: An input whose quantity a manager cannot change during a given period of time. Examples are acreage of land and farm equipment for crop production.

3. Variable Input: An input whose quantity a manger can change during a given period of time. Examples are farm workers, fertilizers, and seeds in crop production.

C. Short-Run Versus Long-Run Production Functions

1. Short-Run Production Function: A production process that uses at least one fixed input.

2. Long-Run Production Function: A production process in which all inputs are variable.

D. Productivity and the Fast-Food Industry

1. The *Wall Street Journal* article illustrates the difference between short-run and long-run production.

2. With fixed inputs and a given technology, employees worked faster to achieve the goal of a 90-second turnaround for each drive-through customer.

3. In the long-run, as quality decreased and employees became dissatisfied, management responded by placing an intercom at the end of the drive-through line to correct mistakes in orders and rearranged the kitchens.

III. Model of a Short-Run Production Function

A. Three measures of productivity, or the relationship between inputs and the output, are total product, average product and marginal product.

B. Total Product: The total quantity of output produced with given quantities of fixed and variable inputs.

1. Equation 5.2: TP or Q=f(L, $\overline{K}$)

The bar over K implies that capital stock is fixed.

C. Average Product and Marginal Product

1. Average Product: The amount of output per unit of variable input.

   (a) Equation 5.3: AP=TP/L or AP=Q/L
   where:

   AP= average product of labor

2. Marginal Product: The additional output produced with an additional unit of variable input.

   (a) Equation 5.4: MP=ΔTP/ΔL or MP= ΔQ/ΔL
   where:

   MP= marginal product of labor

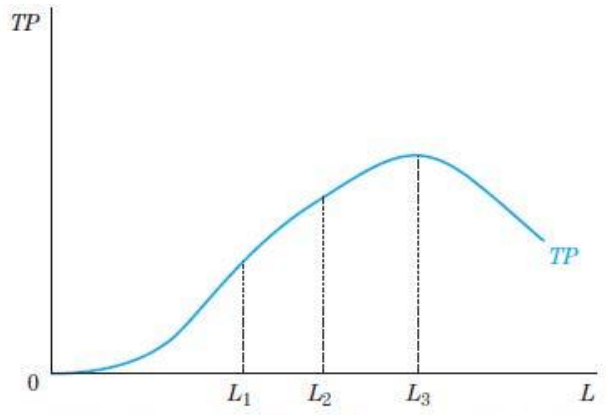
D. Relationships Among Total, Average and Marginal Product

1. When the numbers in the total product column increase at in increasing (decreasing) rate, the numbers in the marginal product column increase (decrease). This helps demonstrate increasing (decreasing) marginal productivity as the marginal product represents the rate of change of the total product.

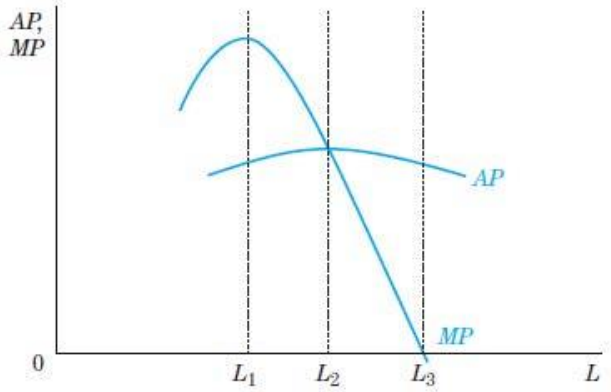
2. When the marginal product is greater (smaller) than the average product, the average product numbers increase (decrease).

3. Figures 5.1a and 5.1b illustrate the graphs of these curves and their relationships.

FIGURE 5.1
The Short-Run Production Function
The short-run production function illustrates the law of diminishing returns where the marginal product, or the additional output produced with an additional unit of variable input, eventually decreases.



(a) Total product (*TP*): Short-run production function.



(b) Average product (*AP*) and marginal product (*MP*): Short-run production function.

E. Economic Explanation of the Short-Run Production Function

1. Increasing Marginal Returns: The region where the marginal product is positive and increasing so that total product increases at an increasing rate.

2. Law of Diminishing Marginal Returns or Law of the Diminishing Marginal Product: The region where the marginal product is positive but decreasing so that the total product is increasing at a decreasing rate.

   (a) This occurs because capital input and state of technology are held constant in the short-run.
   (b) As more labor is added to the fixed capital input, the marginal product eventually starts decreasing.
   (c) Examples are too many automobile workers in a factory, too many accountants in an office space, and too many farmers on a plot of land.

3. Negative Marginal Returns: The region where the marginal product curve is negative so that the total product is decreasing.

IV. Real-World Firm and Industry Productivity Issues

A. Examples of Diminishing Return and Productivity Changes

1. Poultry farms have traditionally had problems catching chickens inside chicken houses with human catchers.

   (a) Machines capable of catching and caging 150 chickens per minute were produced and replaced some of the human catchers.

2. Retail businesses using either labor-intensive (Amazon.com) or capital intensive (Crate & Barrel) methods of filling out mail orders.

   (a) The choice depends on the cost of hiring an additional worker versus an additional unit of capital.

3. Hospitals are increasingly treating larger numbers of patients with fixed numbers of hospital beds and buildings.

   (a) Identical rooms are designed so that doctors and nurses can find equipment easily.
   (b) Nurse stations are placed so that all patients are visible.
   (c) Filers and ultraviolet devices kill germs and reduce infections.

4. Reorganization of the workplace in luxury handbag industry.

B. Productivity and the Agriculture Industry

1. The case of rice farming in China

C. Productivity and the Automobile Industry

1. In the early 1980's, the Japanese manufacturers derived two-thrids of the cost advantage from changes in improving their inventory systems and allowing workers to stop the assembly line in the event of a problem. This latter innovation reduced the need for repairs later.

2. Recent innovations include the use of the internet to link the manufacturers with their parts suppliers.

3. Despite all of the improvements in the production process, diminishing returns are visible. One illustration is the growth of quality issues in Toyota as the company's expansion allowed it to overtake GM.

D. Productivity Changes Across Industries

1. Productivity changes vary across industries.

2. During 1958-1996, productivity of the overall economy increased 0.45% a year.

3. Most productivity gains in the late 1990's are attributed to IT (80% of the productivity gains)

4. A study showed that during 1960 – 2007, the leaders in innovation among IT users in the US were the wholesale and retail trade sectors.

4.2 Model of Short-Run Cost Functions

A. Cost Functions: A mathematical or graphical expression that shows the relationship between the cost of production and the level of output, all other factors held constant.

B. Economists define costs as opportunity costs.

1. Opportunity Cost: The economic measure of cost that reflects the use of resources in one activity, such as a production process by one firm, in terms of the opportunities foregone in undertaking the next best alternative activity.

(a) Opportunity costs include implicit as well as explicit costs.
(b) Explicit Costs: A cost that is reflected in a payment to another individual, such as a wage paid to a worker, that is recorded in a t
(c) Implicit Costs: A cost that represents the value of using a resource that is not explicitly paid out and is often difficult to measure, because it is typically not recorded in a firm's accounting system.

2. Historical costs are not included in calculation of the opportunity cost.

(a) Historical Cost: The amount of money a firm paid for an input when it was purchased, which for machines and capital equipment could have occurred many years in the past.

C. Accounting Profit Versus Economic Profit Measures

1. Profits differ in accounting and economics as costs are defined differently.

2. Profit: The difference between the total revenue a firm receives from the sale of its output and the total cost of producing that output.

3. Accounting Profit: The difference between total revenue and total cost where cost includes only the explicit costs of production.

4. Economic Profit: The difference between total revenue and total cost where cost includes both the explicit and any implicit costs of production.

5. The difference between accounting and economic profits can be substantial for a firm. The text illustrates the importance of the distinction for the Coca Cola Company.

D. Definition of Short-Run Cost Functions

1. Short-Run Cost Function: A cost function for a short-run production process in which there is at least one fixed input of production.

2. Total Fixed Cost (TFC): The cost of using the fixed input, which remains constant regardless of the amount of output produced.

(a) $TFC = (P_K)(\overline{K})$
where:

P_K= price per unit of capital (fixed input)

3. Total Variable Cost (TVC): The total cost of using the variable input, which increases as more output is produced.

(a) $TVC = (P_L)(L)$
where:

P_L= price per unit of labor (variable input)

4. Total Cost (TC): The sum of the total fixed cost and the total variable cost.

   (a) TC= TFC+TVC

5. Average Fixed Cost (AFC): The total fixed cost per unit of output.

   (a) AFC= AFC/Q

6. Average Variable Cost (AVC): The total variable cost per unit of output.

   (a) AVC= AVC/Q

7. Average Total Cost (ATC): The total cost per unit of output, which also equals average fixed cost plus average variable cost.

   (a) ATC= TC/Q
   (b) ATC= AFC+AVC

8. Marginal Cost (MC): The additional cost of producing an additional unit of output, which equals the change in total cost or the change in total variable cost as output changes.

   (a) MC= ΔTC/ ΔQ
   (b) MC= ΔTVC/ ΔQ

E. Relationships Among Total, Average and Marginal Cost

1. The numbers in the total fixed column stay constant.

2. The numbers in the total variable cost column increases as more output is produced.

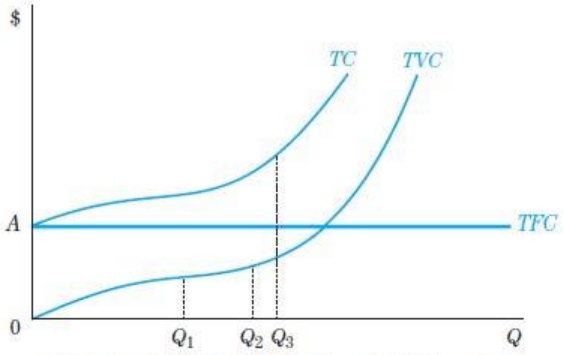
3. The numbers in the average fixed cost column decrease continuously as more output is produced.

4. Average variable cost and average total cost both first decrease and then increase.

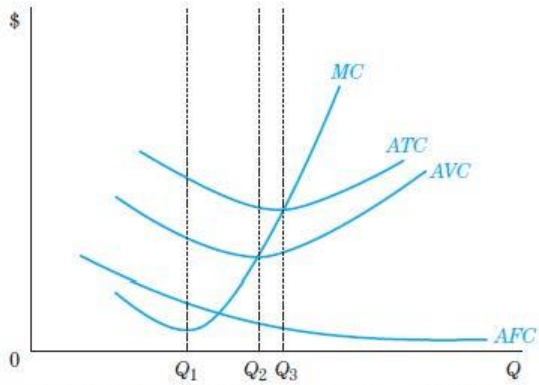
5. Average total cost always equals average fixed cost plus average variable cost.

6. Marginal cost also decreases and then increases much more rapidly than the average variable cost or average total cost.

7. The cost curves are illustrated in Figures 5.1a and 5.2b.



(a) Total cost (*TC*), total variable cost (*TVC*), and total fixed cost (*TFC*) functions.



(b) Marginal cost (*MC*), average total cost (*ATC*), average variable cost (*AVC*), and average fixed cost (*AFC*) functions.

FIGURE 5.2
Short-Run Cost Functions
The short-run total cost functions in Figure 5.2a are related to the average and marginal cost functions in Figure 5.2b.

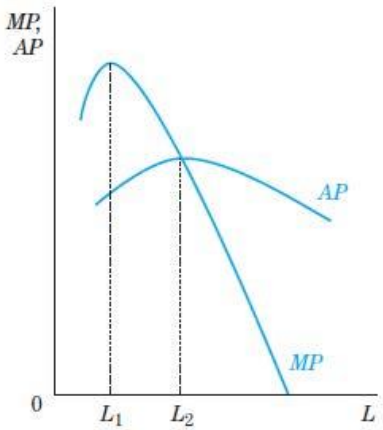
8. The marginal cost curve intersects both the average total cost and average variable cost curves at their minimum points.

F. Relationship Between Short-Run Production and Cost

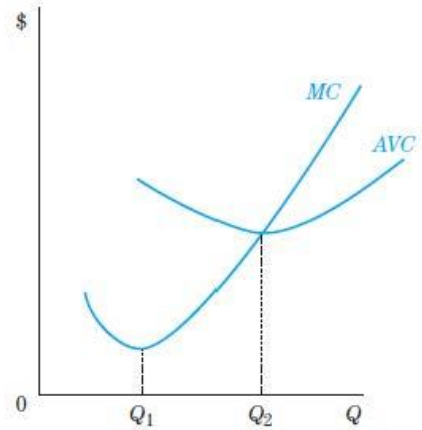
1. Marginal cost and marginal product are inversely related to each other.

2. Average variable cost and average product are inversely related to each other.

3. This is illustrated in Figures 5.3a and 5.3b.



(a) Short-run production



(b) Short-run cost

FIGURE 5.3
The Relationship Between Short-Run Production and Cost
The shape of the short-run production function in Figure 5.3a determines the shape of the short-run cost function in Figure 5.3b.

G. Other Short-Run Production and Cost Functions

1. The underlying production function determines the shapes of short-run cost curves.

2. A linear production function and its curves are illustrated in Figures 5.4a to 5.4d. In particular, marginal product and marginal cost are constant.

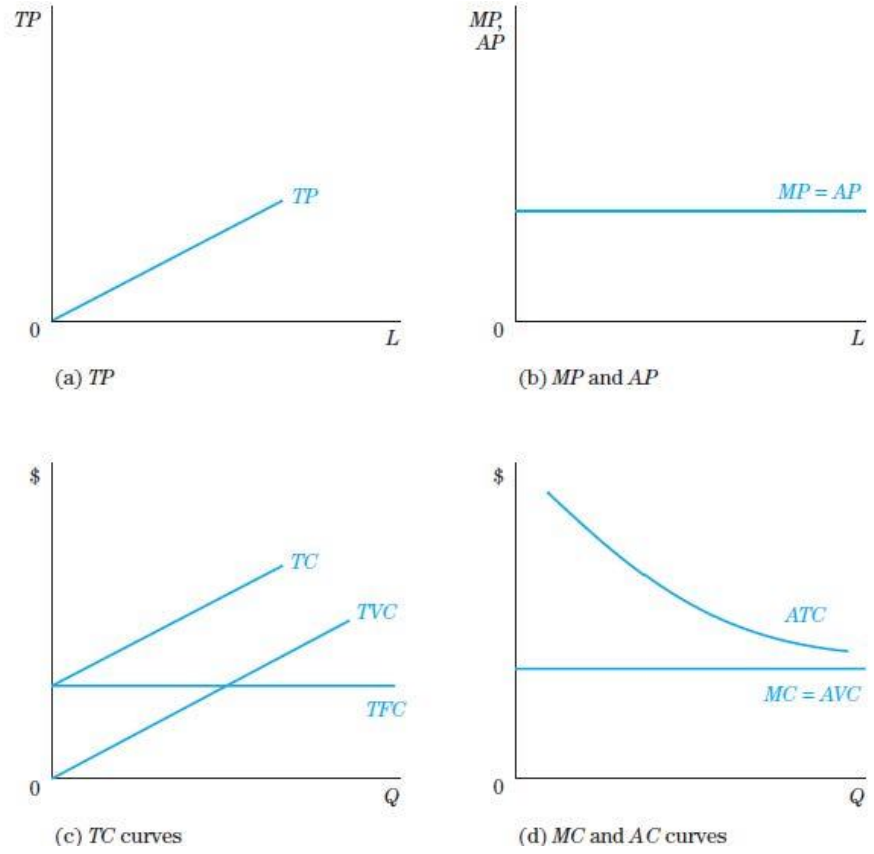


FIGURE 5.4
Alternative Short-Run Production and Cost Functions
The underlying production function influences the costs of production.

4.3 Empirical Evidence on the Shapes of the Short-Run Cost Functions

A. Econometric Evidence of Cost Functions

1. Empirical evidence suggests that total cost functions are linear for real-world firms and industries.

2. Therefore, marginal and average variable costs are constant for a wide range of output.

3. Empirical estimation of linear cost functions occurred from the 1940s to the 1960s.

4. Many recent studies, using more sophisticated econometrics techniques, also support the concept of a constant marginal cost.

B. Survey Results on Cost Functions

1. Most recent studies have been econometric analyses, with the exception of one study by Alan Blinder and his colleagues in the early 1990s.

2. Researchers had difficulty asking whether marginal cost varied with production, as executives were not familiar with the concept.

3. The results of this recently study showed that executives do not find textbook U-shaped curves to be relevant in many situations.

4. Surveys also demonstrated that fixed costs tend to play a relatively large role (the average results showed that 44% of production costs were fixed).

C. Constant Versus Rising Marginal Cost Curves

1. The discrepancy between textbook U-shaped cost curves and real-world constant or declining marginal cost curves can be explained by the fact that economic theory shows a range of possibilities.

2. Services of the fixed inputs may be varied even though the stock of capital is fixed.

D. Implications for Managers

1. Costs play an important role in determining an effective competitive strategy, especially for firms that have no control over the price of their products.

2. The distinction between fixed and variable costs is important for managers.

SELF CHECK 4

1. Explain the difference between the short run and the long run as it relates to the firm's production function. Why is this distinction important to a firm's manager?
2. Distinguish between implicit and explicit costs and give examples of each. In addition, explain how explicit and implicit costs affect the distinction between economic profit and accounting profit. What explains the distinction between the two measures of profit?
3. Use the following information on a hypothetical short-run production function to answer questions a-c.

Units of Labor/Day	5	6	7	8	9
Units of Output/Day	120	140	155	165	168

The price of labor is $20 per day. Ten units of capital are used each day, regardless of output level. The price of capital is $50 per unit.

a) Calculate the marginal and average variable product of each unit of labor input.
b) Calculate total, average total, average variable, and marginal costs.
c) Can you tell where diminishing marginal returns sets in?

Points to Ponder/Takeaways

The Behavior of Profit-Maximizing Firms

Understand the importance of opportunity costs to economic profits and how these profits feed into firm decision making.

The Production Process

Be able to describe how total, marginal and average products relate to one another.

Choice of Technology

Discuss the factors that firms consider when choosing among production techniques.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 5: Market Structure: Perfect Competition

Learning Outcomes

Upon completion of the course, students should be able to:

1. Distinguish between four market structures.
2. Explain the short-run output rule and the break-even price.
3. Describe the short-run and long-run effects of changes in demand for an increasing-cost industry.

Introduction

The chapter introduces the Perfectly Competitive model. Perfect competition is important as a stand-alone model and also as a comparison tool for the other market structures. As a stand-alone model, it allows students to understand what happens in a market when no individual firm has any market power and therefore takes the market price as given. It also defines the conditions for price-taking behavior. As a comparison tool, it allows students to see the impact lack of competition and presence of significant market power can have on the market, the consumer, and the economy as a whole.

5.1 The Model of Perfect Competition

A. The assumptions of perfect competition are:

   1. a large number of firms in the market;
   2. an undifferentiated product;
   3. ease of entry into the market or no barriers to entry; and
   4. complete information available to all market participants.

B. Perfectly competitive firms are price-takers.

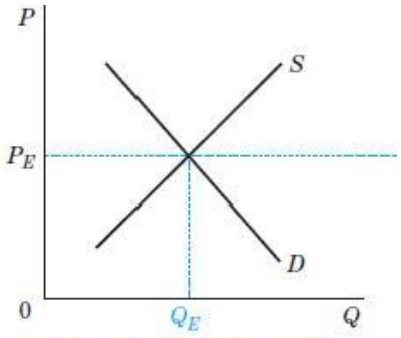
   1. Price-Taker: A characteristic of a perfectly competitive market in which a firm cannot influence the price of its product but can sell any amount of output at the market established price.

C. Table 7.1 contrasts the four market structures and presents an easy teaching tool for comparing the characteristics of the four market environments.

D. Model of the Industry or Market and the Firm

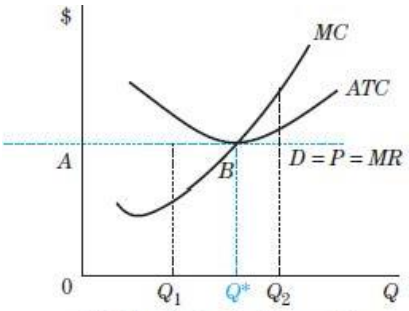
1. The market demand and supply determine market price of the good (and the market quantity of output).

FIGURE 7.1
The Model of Perfect Competition
The perfectly competitive firm takes the equilibrium price set by the market and maximizes profit by producing where price, which also equals marginal revenue, is equal to marginal cost. The level of profit earned depends on the relationship between price and average total cost.



(a) The Perfectly Competitive Industry or Market.

2. The demand curve facing an individual firm is perfectly elastic or horizontal at the market determined price. This constitutes price-taking.



(b) The Perfectly Competitive Individual Firm.

3. The output produced by a competitive firm depends on the goal of the firm, profit maximization.

   (a) Profit Maximization: The assumed goal of firms, which is to develop strategies to earn the largest amount of profits possible. This can be accomplished by focusing on either revenues or costs or both factors.

   (b) Equation 7.1: = TR-TC

   where = Profit
   TR= Total Revenue
   TC=Total Cost

   (c) Profit Maximization Rule: To maximize profits, a firm should produce the level of output where marginal revenue equals marginal cost.

(d) Equation 7.2: Produce the level of output where MR=MC

where MR= Marginal Revenue= (ΔTR/ΔQ)
where MC= Marginal Cost= = (ΔTC/ΔQ)

4. Given that a perfectly competitive firm faces a horizontal demand, the price and marginal revenue are the same. This is only true for firms with no market power (facing a horizontal demand). A price-taking firm does not need to lower the price to sell one more unit of output, making the revenue change equal the price.

5. If MR=MC, then the firm produces the optimal output level, Q*. At this level of output, profits can be positive, negative or zero.

6. An alternative method of calculating profit is the per-unit profit, (P-ATC), multiplied by the quantity, Q.

7. Even if the firm is producing the output where MR=MC, it should stop producing and shut down if the price is below AVC, i.e. it cannot cover its variable cost.

(a) Shut-Down Point: The price, which just equals the firm's average variable cost, below which it is more profitable for the perfectly competitive firm to shut down than to continue to produce it.

8. The supply curve for the perfectly competitive firm is the portion of the marginal cost curve that lies above the minimum average variable cost.

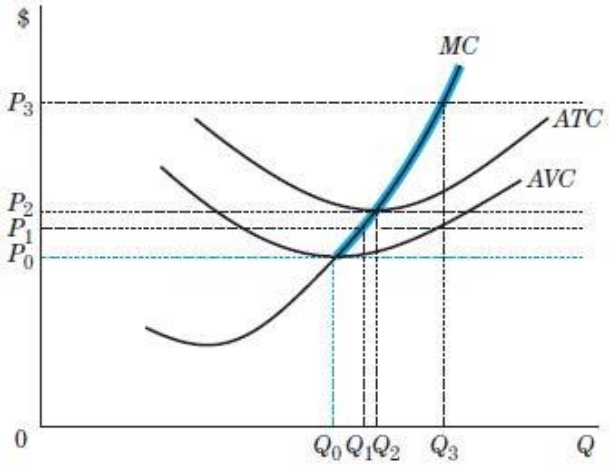


FIGURE 7.2
The Supply Curve for the Perfectly Competitive Firm
The perfectly competitive firm will shut down if the market price falls below average variable cost. The supply curve for the perfectly competitive firm is that portion of its marginal cost curve above minimum average variable cost.

9. The supply curve for the perfectly competitive industry or market is upward sloping.

E. The Short Run in Perfect Competition

1. The firm cannot change the scale of operation in the short run since at least one input is fixed.

2. Firms cannot enter or exit the industry in the short run.

3. Where P=MR=MC, the firm can be earning positive, negative or zero profits. If the price is below the average variable cost, the firm shuts down.

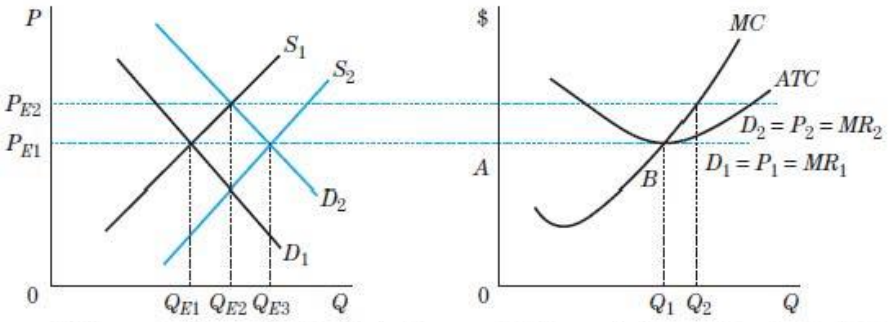
F. Long-Run Adjustment in Perfect Competition: Entry and Exit

1. Entry and exit by new and existing firms and changes in the scale of operation by all firms can occur in the long run.
2. Equilibrium Point: The point where price equals average total cost since the firm earns zero economic profit.

3. An increase in the market demand raises the profits earned by all firms through an increase in the price.

4. As there are no barriers, the positive profits signal new firms to enter the market. Entry of new firms increases the market supply to the right.

5. Entry continues until all firms are once again earning zero profits and there is no more incentive for new firms to enter. The market reaches its long-run equilibrium.



(a) Change in Demand in the Perfectly Competitive Industry or Market.

(b) Change in Demand for the Perfectly Competitive Individual Firm.

FIGURE 7.3
Long-Run Adjustment in Perfect Competition: Entry and Exit
An increase in industry demand will result in a positive economic profit for a perfectly competitive firm. However, this profit will be competed away by the entry of other firms into the market in the long run. The zero economic profit point or the point where price equals average total cost is the equilibrium point for the perfectly competitive firm.

G. Adjustment in the Potato Industry

1. The long-run adjustment process applies to the potato industry.

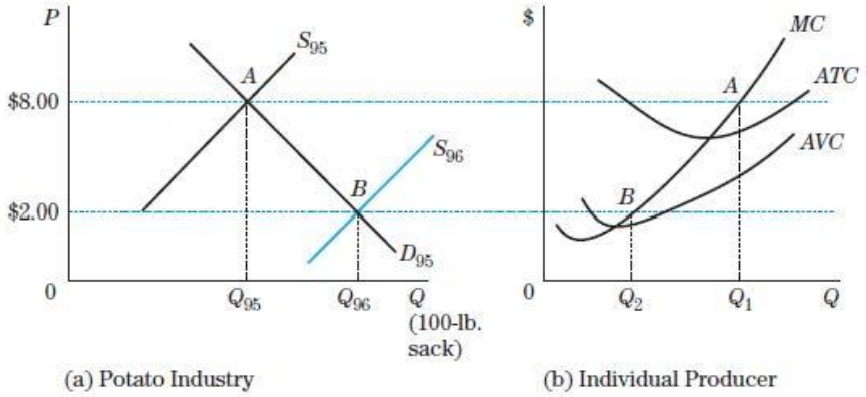


FIGURE 7.4
Adjustment in the Potato Industry
The original equilibrium at point A in Figures 7.4a and 7.4b shows the high price ($8.00 per 100-pound sack) and profits for potato farmers in 1995. In response to these profits, farmers planted more potatoes in 1996, shifting the supply curve from S_{95} to S_{96}. This increase in supply drove the price down to $2.00 per 100-pound sack (point B), less than the average total cost for many producers, leaving farmers with heavy debts.

2. The high price of $8 per 100-pound sack and profits earned by individual farmers are shown in point A.

3. In response to the prices and profits, farmers planted more potatoes in 1996. The favorable weather and insect conditions helped increase the supply and driving down the price to $2 per 100-pound sack.

4. The new price was below the average total cost for many farmers, leaving them with significant debt.

5.2 Long-Run Adjustment in Perfect Competition: The Optimal Scale of Production

1. Entry and exit in a perfectly competitive industry result in the zero-profit equilibrium (P=ATC).

2. Positive profits signal new firms to enter while negative profits signal firms to exit the industry.

3. The long-run average cost curve (LRAC) incorporates both economies of scale and diseconomies of scale for the firm.

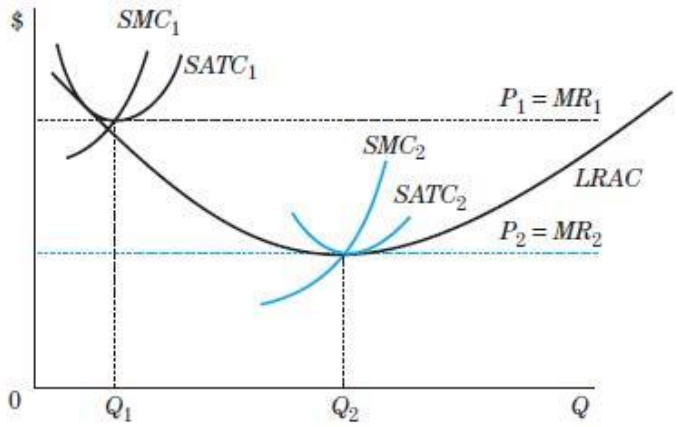


FIGURE 7.5
Long-Run Adjustment in Perfect Competition: The Optimal Scale of Operation
In the long run, the perfectly competitive firm has to choose the optimal scale of operation. This decision, combined with entry and exit, will force price to equal long-run average cost.

(a) Economies of Scale: Achieving lower unit costs of production by adopting a larger scale of production, represented by the downward sloping portion of a LRAC.
(b) Diseconomies of Scale: Incurring higher unit costs of production by adopting a larger scale of production, represented by the upward sloping portion of a LRAC.

4. The two types of adjustments that are made to reach equilibrium (P=LRAC) in the long run are:

   (a) the choice of the scale of operation, and
   (b) entry by firms that lowers product price and competes away any positive economic profits.

SELF CHECK 5

1. Summarize the characteristics of a perfectly competitive market.
2. What assumptions in the perfect competition model ensure that economic profit is zero in the long run? Explain.
3. Explain why a firm maximizes its profits by producing the level of output at which marginal revenue equals marginal costs.
4. Explain why a firm should continue to operate in the short run so long as market price is greater the firm's average variable cost at the profit-maximizing level of output.

Points to Ponder/Takeaways

Market Adjustment to a Change in Demand
Discuss the relationship between general equilibrium and demand shifts

Allocative Efficiency and Competitive Equilibrium
Explain the principles of economic efficiency

The Sources of Market Failure
Describe four sources of market failure

Evaluating the Market Mechanism
Understand the way that market imperfections may interfere with the ability of the market to achieve efficiency

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 6: Market Structure: Monopoly And Monopolistic Competition

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain a monopolist's output decision.
2. Explain why a monopoly is socially inefficient.
3. Describe the practice of price discrimination.

Introduction

This chapter introduces two models of market structure: Monopoly and Monopolistic Competition. The previous chapter discussed the model of Perfect Competition. Monopolistic competition is the natural model to follow that discussion because it describes competitive markets with product differentiation, making each individual firm a tiny monopoly when it comes to its own brand or product characteristics. However, prior to covering Monopolistic Competition, one should understand the concept of market power and its consequences, and the best model for that is Monopoly. If market structure were represented by the number of firms, then Monopoly would be on the opposite end of Perfect Competition.

One of the main topics students need to take from this chapter is the concept of market power and how it can be established/defended. Market power is simply the ability to influence or change the price without losing all sales (i.e. facing a downward slopped demand). Firms with market power are capable of charging prices above their marginal costs (this is a major contrast to Perfect Competition providing economists with a measure of market power). The key to establishing and maintaining market power is barriers to entry as they allow firms in the industry to earn profits without having other firms enter the industry to compete for those profits.

6.1 Monopoly

The market structures of monopoly and monopolistic competition, along with oligopoly, are called imperfectly competitive markets. Managers of firms in these markets have varying degrees of market power, or the ability to influence prices and develop other competitive strategies. The degree of market power is related to the barriers to entry (structural, legal or regulatory) in a given market.

I. Firms with Market Power

A. Market Power: The ability of a firm to influence the prices of its product and develop other competitive strategies that enable it to earn large profits over longer periods of time.

B. The Monopoly Model

1. Monopoly: A market structure characterized by a single firm producing a product with no close substitutes.

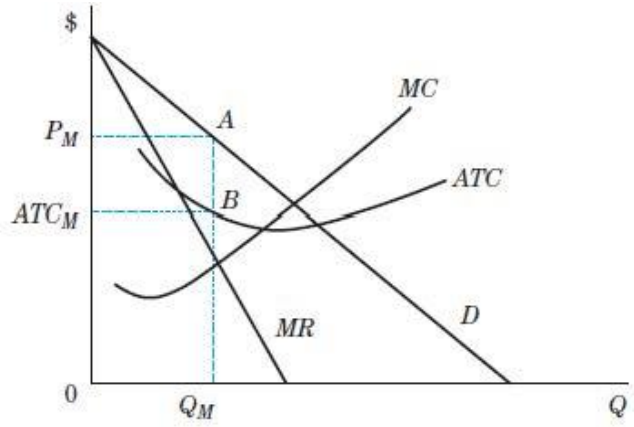
2. Any firm in imperfect competition faces a downward sloping demand curve, as it is not a price-taker, but a price-setter.

   (a) Price Setter: A firm in imperfect competition that faces a downward sloping demand curve and must set the profit-maximizing price to charge for its product.

3. To sell more output, an imperfectly competitive firm must lower the price of the product.

4. The marginal revenue curve is downward slopped and separate from the demand curve.

FIGURE 8.1A
The Monopoly Model with Positive Economic Profit
The monopolist maximizes profits by producing where marginal revenue equals marginal cost and typically earns positive economic profit due to barriers to entry.



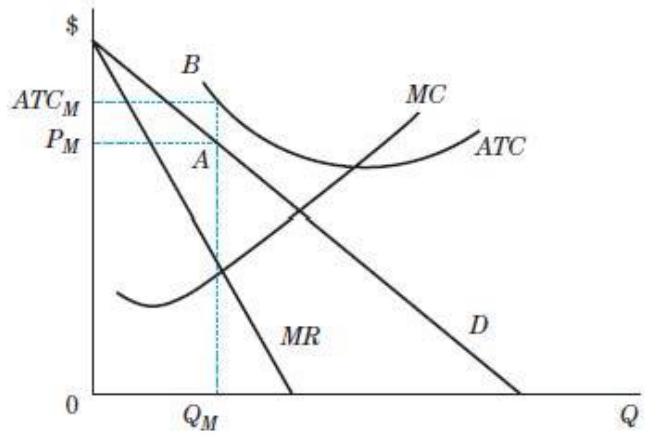


FIGURE 8.1B
The Monopoly Model with Negative Economic Profit or Losses
The monopolist could suffer losses if average total cost is greater than price at the profit-maximizing level of output.

5. The profit-maximizing level of output, Q_M, is still where the marginal revenue equals marginal cost. However, the price, P_M, that a monopolist can charge is read directly off the demand curve. As a result, there is so supply curve in this model. The monopoly determines the profit-maximizing level of output by equating MC and MR, but the price is determined by the demand (the highest price at which the output can be absorbed by the demand).

6. A monopolist can earn positive, zero or negative profits.

7. However, unlike perfect competition, positive economic profits cannot be competed away through the entry of other firms due to barriers to entry.

8. The monopoly price, P_M, is greater than the marginal cost of production.

C. Comparing Monopoly and Perfect Competition

1. The goal of all firms is profit maximization. Regardless of market structure, the profit maximizing level of output occurs where marginal revenue equals marginal cost.

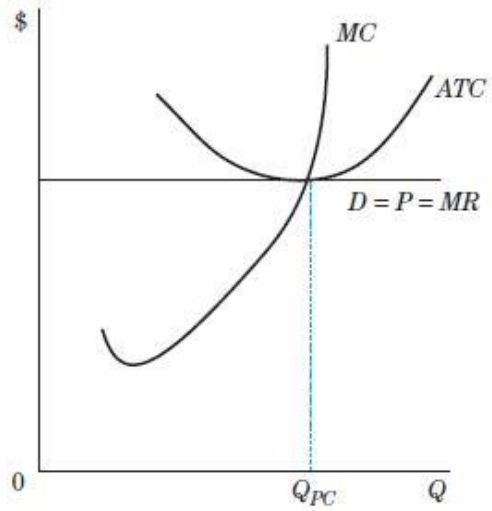


FIGURE 8.2A
The Perfectly Competitive Firm
At Q_{PC}:
MR = MC
P = ATC
P = MC
Minimum Point of ATC *Curve*
Price-Taker
Firm Has Supply Curve

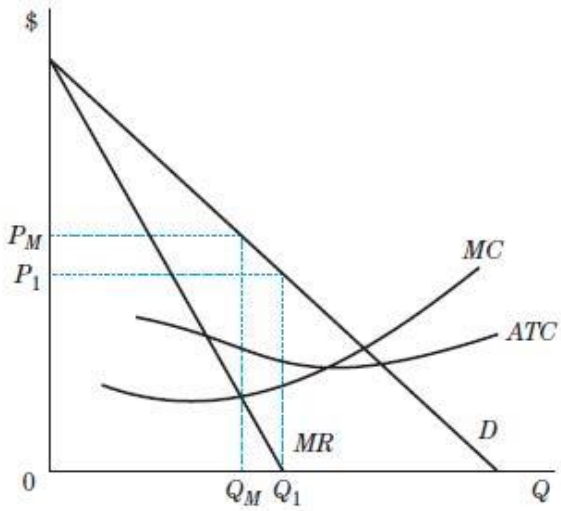


FIGURE 8.2B
The Monopoly Firm
At Q_M:
MR = MC
$P > ATC$
P > MC
Not at Minimum Point of ATC
Price-Searcher
Firm Has No Supply Curve

2. The perfectly competitive firm faces a horizontal demand curve because it takes the price set by the forces of demand and supply in the market as given.

3. The above combined with the goal of profit maximization means that the firm produces at the level of output where price equals marginal cost.

4. The perfectly competitive firm's supply curve is the rising portion of the marginal cost curve that lies above the minimum average variable cost.

5. In equilibrium, perfectly competitive firms produce where price equals average total cost and earn zero economic profit. Any positive or negative profits will be competed away through the entry and exit of firms.

6. The monopolist produces where marginal revenue equals marginal cost but it searches out the optimal price.

7. The firm with market power will produce a level of output where price is greater than the marginal cost.

8. For the firm with market power, both the marginal revenue and demand curves are downward sloping and are separate curves.

9. Firms with market power typically earn positive profits. The amount and length of time they can earn these profits depend on barriers to entry.

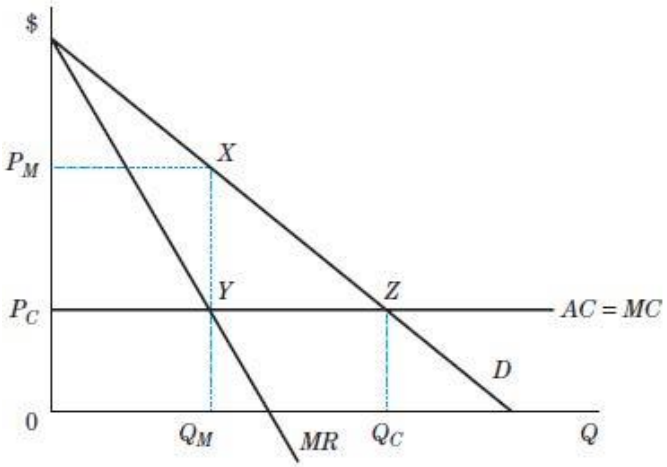


FIGURE 8.3
Comparing a Perfectly Competitive and a Monopolistic Industry
A monopolistic industry will produce a smaller amount of output and charge a higher price than a competitive industry with the same demand and cost conditions.

10. Under monopoly, price will be higher and the output will be lower than under perfect competition with the same demand and cost conditions.

11. There is a misallocation of resources in monopoly compared with perfect competition.

D. Sources of Market Power: Barriers to Entry

1. Barriers to entry help firms maintain market power and earn positive economic profits.

   (a) Barriers to Entry: The structural, legal, or regulatory characteristics of a firm and its market that keep other firms from producing the same or similar products at the same cost.

2. The following are barriers to entry.

   (a) Economies of scale and mergers;
   (b) Barriers created by the government;
   (c) Input barriers;

(d) Brand loyalties;
(e) Consumer lock-in and switching costs; and
(f) Network externalities.

3. Economies of scale acts as a barrier to entry since only large-scale firms can achieve the cost-reduction benefits of these economies.

4. Mergers are one means of achieving necessary size to realize economies of scale. These are important in industries where fixed costs are large and marginal costs are very low.

   (a) The minimum efficient scale (MES) production in the beer industry contributed to the large number of mergers.

   (b) The commodities boom contributed to mergers in the mining industry.

5. Barriers to entry created by the government include licenses, patents and copyrights.

6. Licensing of physicians and other professionals is the basis for maintaining the quality of the individuals in these professions.

   (a) Licensing in the medical industry may not remain the same as more states allow psychologists to prescribe medication.

7. Patents and copyrights give the producer of a new invention or printed work the right to the profits from that work for a number of years to encourage research.

   (a) The duration of patent protection is important since generic drug makers can enter the market if patents have expired or the copies do not infringe on the patents.

8. Other barriers include control over raw materials or key inputs in a production process.

9. The creation of brand loyalties through advertising and other marketing efforts is a strategy that managers use to create and maintain market power.

10. Lock-in and switching costs that arise from contractual commitment, durable purchases, brand-specific training, information and databases, specialized suppliers and search costs associated with

finding alternative suppliers, and loyalty programs act as barriers to trade.

(a) Lock-in and Switching Costs: A form of market power for a firm where consumers become locked into purchasing certain types or brands of products because they would incur substantial costs if they switched to other products.

11. Network externalities, including the networks of software users, compatible fax machines and modems, e-mail users, ATM users, and users of particular computer brands, act as barriers to entry.

(a) Network Externality: A barrier to entry that exists because the value of a product to consumers depends on the number of consumers using the product.

E. Changes in Market Power

1. Market power can be a changing and elusive concept.

2. Product differentiation: Kleenex introduced Anti-Viral tissues and P&G marketed Puffs With Lotion that offer extra characteristics to consumers.

3. Competition between retailers. Online versus brick and mortar retailers.

4. Borders increased online book sales to compete with its competitors.

F. Measures of Market Power

1. Economists have developed several measures of market power. Managers use these measures to gain a better understanding of their markets and to anticipate any antitrust actions in their industry.

2. The Lerner index focuses on the difference between a firm's product price and its marginal cost of production. This number increases with increased market power.

(a) Lerner Index: A measure of market power that focuses on the difference between a firm's price and its marginal cost of production.

(b) Equation 8.1: $L = (P-MC)/P$

where L= the value of the Lerner index
P= product price
MC= marginal cost of production

3. The cross-price elasticity of demand, the percentage change in quantity demanded of good X relative to the percentage change in the price of good Y, is another measure that uses degree of potential substitution between goods. This number decreases with increased market power.

4. Concentration ratios measure market power by focusing on the market share held by a certain number of the largest firms. The larger the market share held by a small number of firms, the greater the degree of market power.

   (a) Concentration Ratios: A measure of market power that focuses on the share of the market held by the X largest firms where X typically equals four, six or eight.

   (b) The Hirfindahl-Hirschman Index (HHI): A measure of market power that is defined as the sum of the squares of the market shares of each firm in an industry. This index ranges from zero for competitive firms to 10,000 for monopolists.

5. The HHI is important because the Antitrust Guidelines of the Justice Department use the index to evaluate the competitive effects of mergers and if antitrust action is appropriate.

G. Antitrust Issues

1. In the United States, the government has developed antitrust laws.

   (a) Antitrust Laws: Legislation, beginning with the Sherman Act of 1890, that attempts to limit the market power of firms and to regulate how firms use their market power to compete with each other.

2. The antitrust laws were written in very general terms, so that their intent has been interpreted through court cases and litigations over the years.

3. Greater attention has been paid to anti competitive practices that facilitate coordination among sellers, vertical structures and arrangements that increase market power.

4. Almost every merger case centers on the definition of the relevant market.

5. The proposed merger of Staples and Office Depot was voted against by the Federal Trade Commission (FTC) on the grounds that it would harm competition and lead to higher prices in the office superstore market.

6. The U.S. Department of Justice brought a suit to block the proposed merger of AT&T and T-Mobile. Such a merger would increase the level of concentration in the industry and could potentially lead to higher prices.

6.2 Monopolistic Competition

A. Monopolistic Competition: A market structure characterized by a large number of small firms which have some market power from producing differentiated products. This market power can be competed away over time.

B. Monopolistic competition lies on the end of the competitive spectrum, close to the model of perfect competition. However, the model incorporates elements of both the perfectly competitive and monopoly models.

C. Assumptions of Monopolistic Competition

1. Product differentiation exits among firms. These include the range and type of offerings of the product as well as geographic location.

2. There are a large number of firms in the product group.

3. No interdependence exists among firms.

4. Entry by new firms is relatively easy.

D. Short-Run and Long-Run Models of Monopolistic Competition

1. The short-run model and long-run models of monopolistic competition are presented in Figures 8.4a and 8.4b.

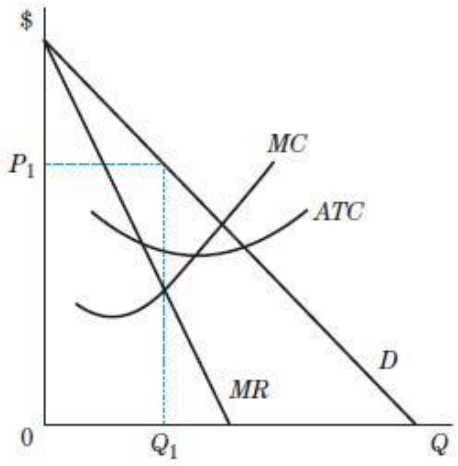


FIGURE 8.4A
Monopolistic Competition, Short Run
At Q_1:
MR = MC
P > ATC
P > MC
ATC *Not at Minimum Point*

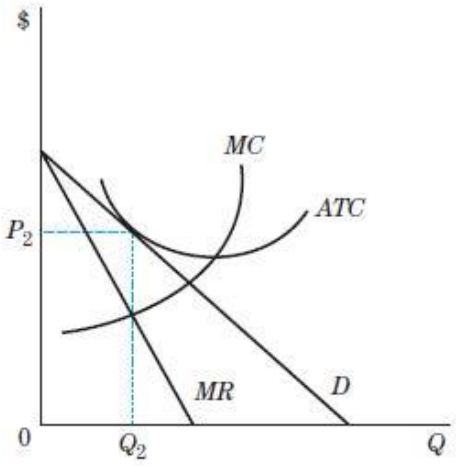


FIGURE 8.4B
Monopolistic Competition, Long Run
At Q_2:
MR = MC
P = ATC
P > MC
ATC *Not at Minimum Point*

2. Figure 8.4a is similar to the monopoly model in Figure 8.1.

3. The monopolistically competitive firm also faces a downward sloping demand curve. However, the demand is more elastic than for the monopolist given the larger number of substitutes.

4. The monopolistically competitive firm produces the profit-maximizing level of output where marginal revenue equals marginal cost and charges the price read off the demand curve.

5. The firm typically earns positive profits in the short-run because product differentiation and geographic location give the firm market power.

6. Since entry is relatively easy, short-run positive profits cannot be sustained in the long-run.

7. Other firms will produce the same or similar products, making the demand curve to become more elastic. This results in zero economic profit in long-run equilibrium as positive profits are competed away.

8. Managers of monopolistically competitive firms must continue to search for strategies that give them at least temporary market power.

9. These strategies include product differentiation, seeking out market niches, geographic location, and advertising. These firms have an incentive to advertise their product.

E. Examples of Monopolistically Competitive Behavior

1. Small drugstores have been able to compete against the large chains by cutting prices down to cost on some of their drugs to match the lower chain prices achieved through economies of scale.

2. Small hardware stores have followed similar strategies to compete with chains stores by offering personal service and convenience. In addition, these stores have geographic market power.

3. Small bookstores have developed market power through steep discounts on books, aggressive marketing, and accessible locations in strip malls.

SELF CHECK 6

1. Describe the basic characteristics of the monopoly model and explain how these characteristics affect the ability of a monopolist to earn positive economic profits, both in the short run and over time.
2. Compare and contrast the potential for a perfectly competitive firm and a monopolistically competitive firm to earn positive economic profits in the short run versus the long run. Explain your reasoning.
3. Use Figure 6.1, which represents the situation faced by a monopolist, to answer questions a-c.

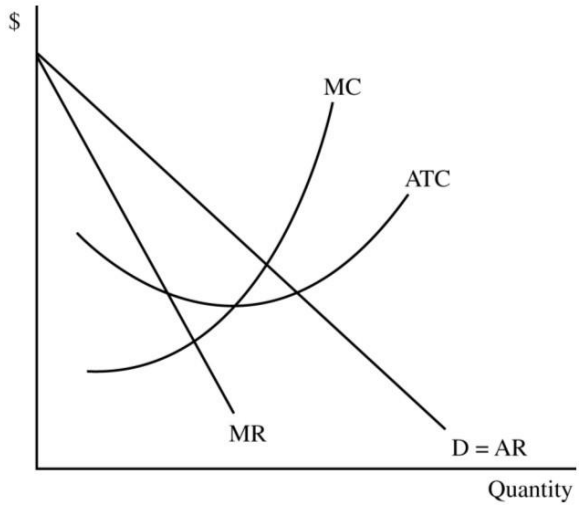


Figure 6.1

a) In Figure 6.1, indicate the profit maximizing price and output level and label them P_1 and Q_1.

b) Shade in the area that represents the firm's economic profit (or loss).

c) If this firm wished to discourage entry by other firms it could produce the output level at which it earns only a zero economic profit. Indicate the price and output level associated with a zero economic profit and label them P_2 and Q_2.

Points to Ponder/Takeaways

Imperfect Competition and Market Power: Core Concepts

Explain the fundamentals of imperfect competition and market power.

Price and Output Decisions in Pure Monopoly Markets
Discuss revenue and demand in monopolistic markets.

The Social Costs of Monopoly
Explain the source of the social costs for a monopoly.

Price Discrimination
Discuss the conditions under which we find price discrimination and its results.

Remedies for Monopoly: Antitrust Policy
Summarize the functions and guidelines of federal antitrust laws.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 7: Market Structure: Oligopoly

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain why a price-fixing cartel is difficult to maintain.
2. Describe the prisoners' dilemma.
3. Explain the behavior of an insecure monopolist.

Introduction

This chapter introduces students to the interdependent behavior of oligopoly firms that arises from the small number of firms in these markets. These firms develop strategies based on their judgments about the strategies of their rival firms and also adjust their own strategies in light of the rivals' actions. Interdependent behavior can be noncooperative or cooperative. Explicit collusive agreements are illegal in the US as they violate US anti-trust laws. Oligopoly is the only market structure discussed in class that does not have a single and comprehensive model.

3.1 Oligopoly

Oligopoly firms typically have market power derived from barriers to entry. The key characteristic is that there are a small number of firms competing with each other so their behavior is mutually interdependent. The interdependence means that the strategies and decisions by managers of one firm affect managers of other firms, whose subsequent decisions then affect the first firm.

I. Case for Analysis: Oligopoly Behavior in the Airline Industry

   A. The article describes the interdependent pricing in the airline industry that resembles strategies in a chess game.

   B. The small number of competitors implies that changes in price affect the demand for competitors.

   C. A lead airline often implements price changes at the end of the work week and lets other airlines react over the weekend before it makes adjustments on Monday.

D. Failures to follow a price increase may trigger a retaliation

E. Airlines differ in terms of their cost structure. Even when it comes to fuel, the input price might be different due to hedging, allowing some airlines not to follow fuel cost driven price increases.

II. Case Studies of Oligopoly Behavior

A. Oligopoly: A market structure characterized by competition among a small number of large firms that have market power, but that must take their rivals' actions into account when developing their own competitive strategies.

B. The airline industry has numerous examples of interdependent behavior.

1. Frontier's aggressive pricing and scheduling, especially at Denver, increased its market share relative to its rival and dominant airline, United.

2. Provision of luxury amenities on international flights until the recent economic downturn.

3. With oil reaching $130 per barrel in 2008, airlines began offsetting the increased fuel costs by charging checked bags.

C. In the soft drink industry, Coca Cola and PepsiCo Inc. have battled each other in the cola market and recently, in the bottled water market with pricing strategies.

1. The competitors differentiated their products by altering packaging and designs.

2. With the economic slowdown when consumers began buying fewer soft drinks and water, the rivals began competing for other beverages such as ready-to-drink teas and coffees and sports drinks.

D. In the doughnut industry, Krispy Kreme Doughnuts announced plans to open outlets in Canada to compete directly with its Canadian-operated chain rival, Tim Horton's.

1. Tim Horton's primarily made expansions near the Canadian border of the U.S. With little name recognition, it is currently encouraging franchises to get involved with local communities.

2. Dunkin' Donuts has been changing its store design to resemble a coffeehouse so that it can compete with McDonald's, which recently entered the market for lattes and cappuccinos.

E. About 80 percent of the parcel and express delivery industry is controlled by two rivals United Parcel Service (UPS) and Federal Express (FedEx). In 2001, these firms formed an alliance to keep a third competitor out of the US market.
   1. DHL entered in 2003. However, DHL failed to establish a sizable market share. By 2005, DHL captured 7% of the US market. In January of 2009, DHL exited the US domestic deliveries market, claiming competition from UPS and FedEx and a weakening economy as the reasons for its decision.

III. Oligopoly Models

A. Economists have developed a variety of models to capture different aspects of the interdependent behavior inherent in oligopoly.

B. The models can be divided into two basic groups, noncooperative and cooperative models.

   1. Noncooperative Oligopoly Models: Models of interdependent oligopoly behavior that assume that firms purse profit-maximizing strategies based on assumptions about rivals' behavior and the impact of this behavior on the given firm's strategies.

   2. Cooperative Oligopoly Models: Models of interdependent oligopoly behavior that assumes that firms explicitly or implicitly cooperate with each other to achieve outcomes that benefit all the firms.

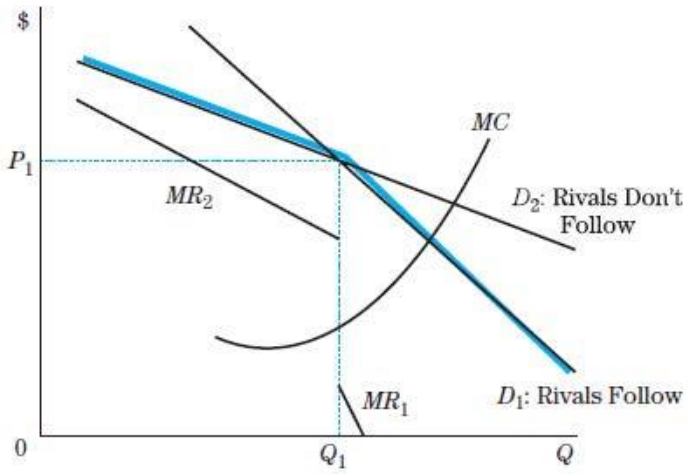
3.2 Noncooperative Oligopoly Models

A. The Kinked Demand Curve Model

   1. Kinked Demand Curve Model: An oligopoly model based on two demand curves that assumes that other firms will not match a firm's price increases but will match its price decreases.

   2. This model assumes that a firm is faced with two demand curves forming a kink at the current price level.

FIGURE 9.1
Kinked Demand Curve Model of Oligopoly
The kinked demand curve model of oligopoly incorporates assumptions about interdependent behavior and illustrates why oligopoly prices may not change in reaction to either demand or cost changes.



3. D_1 reflects demand for its product if all rival firms follow the given firm's prices changes. D_2 reflects demand if other firms do not follow the given firm's price changes.

4. D_1 is relatively more inelastic than D_2 since D_1 shows the effect on the firm's quantity demanded if all firms follow its price change.

B. Game Theory Models

1. Game theory models apply game theory to oligopoly behavior.

   (a) Game Theory: A set of mathematical tools for analyzing situations in which players make various strategic moves and have different outcomes or payoffs associated with those moves.

2. The outcomes including prices, quantities and profits are a function of the strategic behavior adopted by the interdependent rival firms.

3. The most well-known game theory example is the Prisoner's Dilemma. In this game, all players have a dominant strategy.

   (a) Dominant Strategy: A strategy that results in the best outcome or highest payoff to a given player no matter what action or choice the other player makes.

4. However, a dilemma occurs when all players choose their dominant strategies and end up worse off than if they had been able to coordinate their choice of strategy.

5. Many games will not have dominant strategies in which players choose a strategy that is best for them regardless of what their rival

chooses to do. In these situations, players choose the best strategy, given the actions of the other players.

(a) Nash Equilibrium: A set of strategies from which all players are choosing their best strategy, given the actions of the other players.

6. The prisoner's dilemma is an example of simultaneous decision making.

7. Strategies and outcomes differ if decisions are made sequentially.

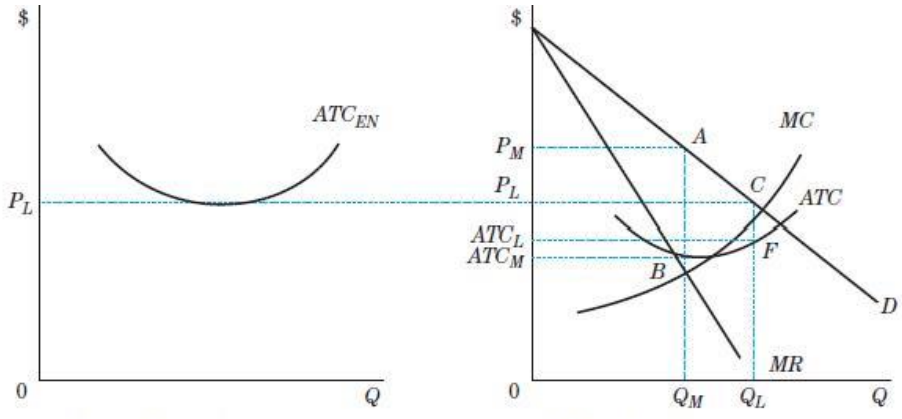
C. Strategic Entry Deterrence

8. Oligopoly firms also try to limit competition from rivals by practicing strategic entry deterrence. One such policy is limit pricing.

(b) Strategic Entry Deterrence: Strategic policies pursued by a firm that prevent other firms from entering the market.

(c) Limit Pricing: A policy of charging a price lower than the profit-maximizing price to keep other firms from entering the market, as illustrated in Figure 9.2.

FIGURE 9.2
Limit Pricing Model
With limit pricing, an established firm may set a price lower than the profit-maximizing price to limit the profit incentives for potential entrants to the industry.



9. To thwart entry, the established firm can charge the limit price, P_L (a price that is lower than the profit-maximizing price), rather than the profit-maximizing price P_M.

10. Limiting pricing strategies must be credible and rivals must be convinced that the established firm will continue its policy of low prices.

11. Xerox is an example of an oligopoly firm that engaged in strategic entry deterrence.

D. Predatory Pricing

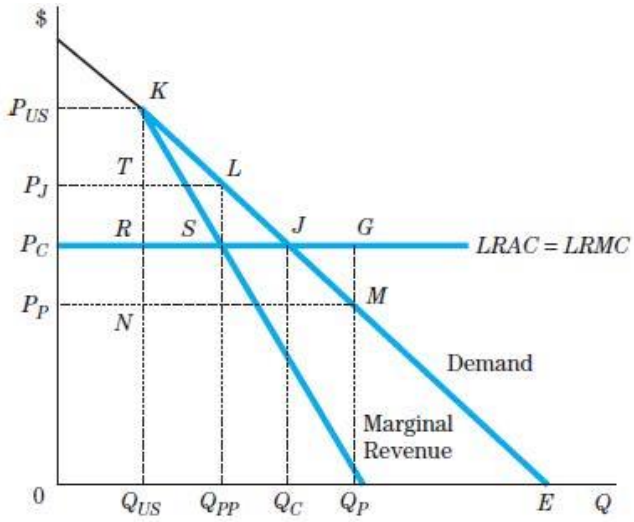
1. Predatory pricing is another strategy that oligopoly firms use.

   (d) Predatory Pricing: A strategy of lowering prices below cost to drive firms out of the industry and scare off potential entrants.

2. The firm practicing predatory pricing must lower its price below cost and incur losses itself with the expectation that the losses will be offset by future profits.

3. The predatory firm also has to convince other firms that it will leave the price below cost until other firms leave the market.

FIGURE 9.3
Predatory Pricing
Predation:
Japanese share of market = $Q_P - Q_{US}$ = NM = RG
Loss per unit to Japanese firms = $P_C - P_P$ = NR
Total loss to Japanese firms = NRGM
Postpredation:
U.S. price = P_{US}
Japanese price = P_J
Japanese share of market = $Q_{PP} - Q_{US}$
Japanese profits = RTLS



4. The textbook presents two illustration of predatory pricing. The first is of Matsushita and six other Japanese electronics firms were accused by National Union Electro Corporation and Zenith Radio Corporation of charging different prices in Japan and the US, with the prices in the US market being below the costs of production. are examples of oligopoly firms that engaged in predatory pricing. The second is Spring Airlines versus Northwest Airlines.

3.3 Cooperative Oligopoly Models

A. A second set of oligopoly models focuses on cooperative behavior among rivals.

B. Cartels

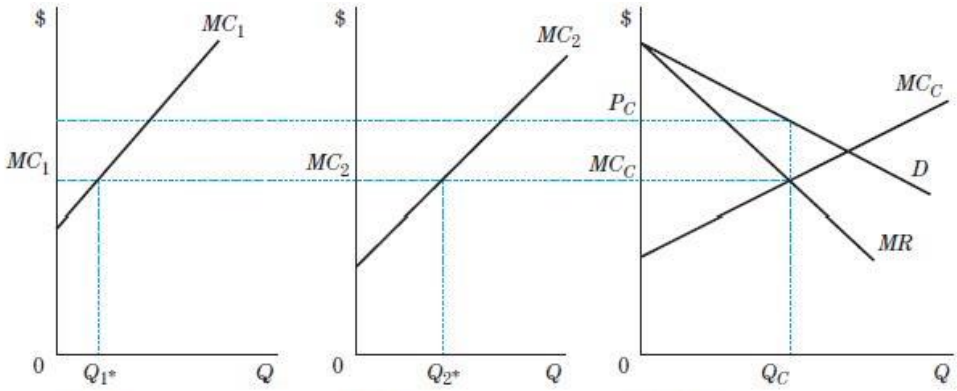
1. Cartel: An organization of firms that agree to coordinate their behavior regarding pricing and output decisions to maximize profits for the organization.

2. Cartels engage in joint profit maximization.

   (e) Joint Profit Maximization: A strategy that maximizes profits for a cartel but may create incentives for individual members to cheat.

3. The potential to cheat exists because what is optimal for the cartel as a whole may not be optimal for individual cartel members.

FIGURE 9.4
Cartel Joint Profit Maximization
A cartel maximizes the profits of its members by producing where marginal revenue equals marginal cost for the cartel and then allocating output among its members so that the marginal cost of production is equal for each member. This procedure can give cartel members the incentive to cheat on the cartel agreement.



4. The marginal cost for the cartel, MC_C, is derived through the horizontal summation of marginal cost curves of the individual firms, as is illustrated in Figure 9.4 above.

   (a) Horizontal summation of the marginal cost curves: For every level of marginal cost, add the amount of output produced by each firm to determine the overall level of output produced at each level of marginal cost.

5. For joint profit maximization, the cartel must determine the overall level of output to produce, the price to charge, and how to allocate the output among cartel members.

6. The allocation rule for joint profit maximization is to produce where each firm's marginal cost is equal to the cartel's marginal cost.

7. Cartel members have an incentive to cheat on the cartel agreement. The reason for this incentive is the restriction of the output that causes the marginal cost of each firm to be less than the cartel price. Recall that profit maximization requires that MC equals MR, and in the

case of a carter, each firm sees the cartel price as its MR. Of course, this starts to change as cheating expands and causes the price to decrease.

8. A cartel is most likely to be successful when:

   (a) It can raise the market price without inducing significant competition from non-cartel members;

   (b) The expected punishment from forming the cartel is low relative to the expected gains;

   (c) The costs of establishing and enforcing the agreement are low relative to the gains.

9. In the United States, price and output-fixing arrangements of cartels are illegal under the Sherman Antitrust Act of 1890.

10. OPEC, the Organization of Petroleum Exporting Countries, is the most well-known cartel. Saudi Arabia is the dominant player given its vast oil reserves.

    (a) In recent years, competition from non-cartel members has severely limited the strength of OPEC.

    (b) The cartel further reduced its strength when member countries could not come to an agreement on the production quota and the target price for a barrel of oil.

11. The international diamond cartel is the most successful cartel with DeBeers as the dominant company in the industry.

    (a) In the aftermath of the controversy of "blood diamonds," the Kimberly Process was established.

    (b) This program has stringent rules that participants must adhere to. It has had the effect of preventing entry of new suppliers due to the added costs of tagging, monitoring and auditing.

C. Tacit Collusion

1. Since cartels are illegal in the United States, firms may engage in tacit collusion.

(a) Tacit Collusion: Coordinated behavior among oligopoly firms that is achieved without a formal agreement.

2. Tacit collusion is facilitated by practices such as:

   (a) Uniform prices;
   (b) A penalty for price discounts;
   (c) Advance notice of price changes;
   (d) Information exchanges; and
   (e) Swaps and exchanges.

3. In some cases, there is formal price leadership.

   (f) Price Leadership: An oligopoly strategy in which one firm in the industry institutes price increases and waits to see if they are followed by rival firms.

4. Collusive behavior is also strengthened by information exchange such as identifying new customers and the prices and terms offered to them.

5. Examples of tacit collusive behavior are the Ethyl case and the airline tariff publishing case.

SELF CHECK 7

1. What is the significance of the mutual interdependence among the firms in an oligopolistic market?
2. The text's discussion of the airline industry, the soft drink industry, and the doughnut industry reveals a common theme when it comes to the types of competitive practices firms in each industry engage in. What is it and what advantage does it offer firms?
3. Of the various models of noncooperative oligopoly behavior discussed in the text, which one has the greatest shortcoming when it comes to explaining observed behavior in an oligopoly market
4. According to the kinked demand curve model, if there is a modest increase in a firm's variable production costs, what is likely to happen to the firm's profit-maximizing level of output and the amount of profit earned by the firm? Why?

Points to Ponder/Takeaways

Market Structure in an Oligopoly
Describe the structure and characteristics of oligopolistic industries.

Oligopoly Models
Compare and contrast three oligopoly models.

Game Theory
Explain the principles and strategies of game theory.

Oligopoly and Economic Performance
Discuss the economic performance of oligopolies.

The Role of Government
Discuss the role of government in oligopolistic industries.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 8: Measuring Macroeconomic Activity

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain the concept of macroeconomics
2. Explain the relationship between GDP to a nation's total income and spending
3. Explore how does the GDP measure society's well-being

Introduction

This chapter introduces students to the main measures of economic activity including the Gross Domestic Product (GDP), unemployment rate, price indices. The Gross Domestic Product (GDP) and its calculation are discussed using the expenditure/ output approach and the earnings/ income approach. Several important macroeconomic terms, such as the price level and the unemployment rate are also introduced. The chapter establishes the foundation needed for the aggregate macroeconomic model discussed in the subsequent chapters.

8.1 Gross Domestic Product (GDP)

I. Measuring Gross Domestic Product (GDP)

A. The framework to understand the variables that influence the gross domestic product depends on the foundation of the aggregate model that illustrates the circular flow in the economy.

1. Gross Domestic Product (GDP): The comprehensive measure of the market value of all currently produced final goods and services within a country in a given period of time by domestic and foreign-supplied resources.

2. Circular Flow: The framework for the aggregate macroeconomic model that portrays the level of economic activity as a flow of expenditure from consumers to firms or producers as consumers purchase goods and services produced by these firms. This flow is returned to consumers as income received from the production process.

B. The Circular Flow in an Open Mixed Economy. The key point of the diagram is to demonstrate that the income flow and the expenditures are equivalent allow us to compute the level of economic activity by either summing up the incomes to the factors of production or by summing up the aggregate expenditures.

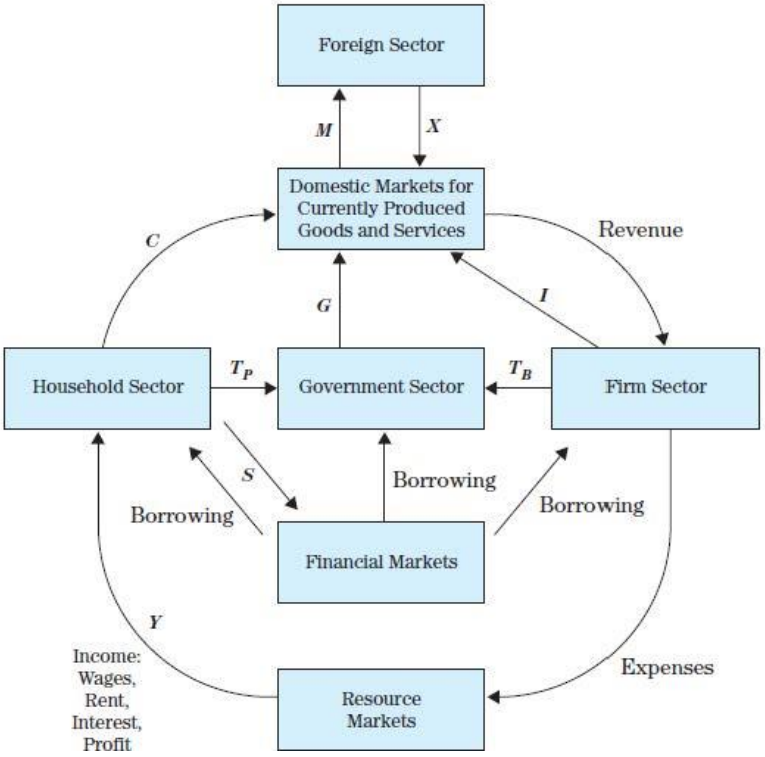


FIGURE 11.1
GDP and the Circular Flow
The circular flow is the framework that forms the basis for the aggregate macroeconomic model of the economy.
C = consumption spending
I = investment spending
G = government spending
X = export spending
M = import spending
Y = household income
S = household saving
T_P = personal taxes
T_B = business taxes

1. Figure 11.1 illustrates the circular flow in an open mixed economy.

   (a) Open Economy: An economy that has both a domestic and a foreign sector.

   (b) Mixed Economy: An economy that has both a private (household and firm) and a public (government) sector.

2. Firms sell currently produced goods and services in the domestic markets.

3. Households use part of their income on consumption expenditures (C) for these products.

4. The expenditure by households becomes revenue for the firms. It is used to purchase inputs (labor, machinery, land, etc.) in the resource markets.

5. The payments to the factors of production occur as wages, rent, interests and profits become income (Y) to households.

6. The income is used to finance further consumption in another round of the circular flow.

7. The figure also incorporates investment expenditure by firms, spending by all levels of the government and net export spending, export spending minus import spending.

8. We can measure GDP from the expenditure or output approach as the sum of consumption (C), investment (I), government (G) and net export expenditure (X-M).

   (a) Expenditure or Output Approach: Measuring overall economic activity by adding the expenditure on the output produced in the economy.

   (b) Aggregate Expenditure: The sum of consumption, investment, government and net export spending on the total amount of real output produced in an economy in a given period of time, which equals the income generated from producing and selling that output.

   (c) Aggregate Expenditure, E= C+I+G+(X-M)

9. The economic activity can also be measured by the earnings or income approach.

   (a) Earnings or Income Approach: Measuring overall economic activity by adding the earnings or income generated by selling the output produced in the economy.

   (b) Aggregate Expenditure, E=Y, income

10. We use the terms aggregate expenditure, output and income interchangeably as illustrated in the circular flow.

11. The three major uses of income for households are paying personal taxes, consumption spending and saving.

12. Paying personal taxes (T_p) leaves households with disposable income (Y_d) which they can spend through consumption (C) or saving (S).

13. The amount of income saved flows to the financial markets where it forms a pool of assets that can be borrowed by firms or governments to finance investment expenditure (I) or government expenditure (G).

C. National Income Accounting Systems

1. A national income accounting system is used to measure economic activity in real-world economies.

2. These accounts are called the national income and product accounts in the United States.

   (a) National Income Accounting System: A system of accounts developed for each country, based on the circular flow, whose purpose is to measure the level of economic activity in that country.

   (b) National Income and Product Accounts: The U.S. national income accounting system operated by the Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce.

3. The overall economic activity is measured with GDP.

D. Characteristics of GDP

1. GDP is a monetary measure of economic activity that includes the market value of domestically produced final goods and services.

   (a) Final Goods and Services: Goods and services that are sold to their end-users.

   (b) Intermediate Goods and Services: Goods and services that are used in the production of other goods and services (final). Their value becomes a part of the value of the final goods and services.

2. To calculate GDP, the value-added approach is used.

   (a) Value-Added Approach: A process of calculating the value of the final output in an economy by summing the value added in each

stage of production, i.e. raw materials to semi-finished goods and services.

3. GDP does not include most nonmarket activities that are not recorded in output or input market transactions.

   (a) Unpaid household work done by a spouse is an example.

4. GDP does not include illegal activities that are considered to be part of the underground economy.

   (a) Underground Economy: Economic transactions that cannot be easily measured because they are not reported on income tax returns or other government economic surveys.

5. The Bureau of Economic Analysis calculates an imputed value for certain expenditures for which there are no market transactions.

   (a) Imputed Values: An estimated value for nonmarket transactions, such as the rental value of owner-occupied housing, included in GDP.

6. Transfer payments are also excluded in the calculation of GDP.

   (a) Transfer Payments: Payments that represent the transfer of income among individuals in the economy, but do not reflect the production of new goods and services.

   (b) Transfer payments can be public or private.

   (c) Examples are Social Security, welfare and veterans payments which are public and transfers among family members which are private.

E. Real Versus Nominal GDP

1. GDP can increase from year to year due to three different reasons:

   (a) The prices of goods and services produced increase while quantities are held constant;

   (b) The quantities of goods and services produced increase while prices are held constant; or

(c) Both prices and quantities increase, which is typically the case.

2. There is a difference between nominal and real GDP. Real GDP is considered a better measure of economic well-being because increases represent larger amounts of goods and services available.

   (a) Nominal GDP: The value of currently produced final goods and services measured in current year's prices.

   (b) Real GDP: The value of currently produced final goods and services measured in constant prices or nominal GDP adjusted for price level changes.

3. The GDP deflator is used to compare the price of each year's output of goods and services to the price of that same output in a base year.

   (a) GDP Deflator: A measure of price changes in the economy that compares the price of each year's output of goods and services to the price of that same output in a base year.

   (b) GDP Deflator= (Nominal GDP/ Real GDP)×100

   (c) Using the base year of 2005, the nominal GDP is less than the real GDP before 2005 while the nominal GDP is greater than real GDP thereafter because of sustained inflation. Figure 11.2 illustrates this relationship

4. Real GDP is used to measure business cycles, expansions and recession, in the economy.

   (a) Business Cycles: The periodic increases and decreases in overall economic activity reflected in production, employment, profits and prices.

   (b) Expansion: The rising phase of a business cycle in which the direction of a series of economic indicators turns upward.

   (c) Recession: The falling phase of a business cycle in which the direction of a series of economic indicators turns downward.

F. Alternative Measures of GDP

1. The level of economic activity or GDP can be calculated by the expenditure/ output approach or the earnings/ income approach.

2. Expenditure/ output approach focuses on spending on currently produced goods and services by four major sectors of the economy:

   (a) Personal consumption expenditures (C);
   (b) Gross private domestic investment or investment (I);
   (c) Government consumption expenditures and gross investment or government (G); and
   (d) Net export spending (which equals export (X) minus import (M) spending).

3. Personal Consumption Expenditures: The total amount of consumers on durable goods, nondurable goods, and services in a given period of time.

   (a) Durable Goods: Commodities that typically last three or more years, such as automobiles, furniture, and household appliances.

   (b) Non-Durable Goods: Commodities that last less than three years and may be consumed very quickly, such as food, clothing, and gasoline.

   (c) Services: Non-commodity items, such as utilities, public transportation, private education, medical care, and recreation.

   (d) Personal consumption expenditures are the largest component of GDP, typically averaging around two-thirds of the total.

4. Gross Private Domestic Investment Spending: The total amount of spending on nonresidential structures, equipment and software, residential structures, and business inventories in a given period of time.

   (a) Business Fixed Investment: Spending on the structures, equipment, and software that provide the industrial capacity to produce goods and services for all sectors of the economy.

   (b) Residential Fixed Investment: Spending on newly constructed housing units, major alternations, and replacements to existing structures and brokers' commissions.

(c) Changes in Business Inventories: Changes in the amount of goods produced but not sold in a given year.

(d) Business fixed investment ranged from 14 to 17 percent of GDP from the 1980 to the 2008.

(e) Changes in business inventories tend to be the smallest but most volatile component of gross private domestic investment.

5. Government Consumption Expenditures and Gross Investment: The total amount of spending by federal, state, and local governments on consumption outlays for goods and services, depreciation charges for existing structures and equipment, and investment capital outlays for newly acquired structures and equipment in a given period of time.

   (a) This includes spending at all three levels of the government – federal, state and local.

   (b) Transfer payments do not appear as government expenditures.

6. Net Export Spending: The total amount of spending on exports minus the total amount of spending on imports in a given period of time.

   (a) Export Spending: The total amount of spending on goods and services currently produced in one country and sold abroad to residents of other countries in a given period of time.

   (b) Import Spending: The total amount of spending on goods and services currently produced in other countries and sold to residents of a given country in a given period of time.

   (c) Net export spending can be positive or negative depending on the balance between exports and imports.

   (d) Net export spending can be a relatively small figure even if the export and import flows are large but are about the same size.

7. The income or earnings approach focuses on the fact that GDP equals national income. National income is comprised of the following categories.

   (a) Compensation of employees;
   (b) Proprietors' income;
   (c) Rental income;

(d) Corporate profits; and
(e) Net interest.

8. National Income: Income that is generated from the sale of the goods and services that are produced in the economy and paid to the individuals and businesses who supply the inputs or factors of production.

9. Compensation of Employees: Wages and salaries and fringe benefits paid by employers to employees.

10. Proprietors' Income: The income of unincorporated businesses, such as medical practices, law firms, small farms, and retail stores.

11. Rental Income: The income households receive from the rental of their property.

12. Corporate Profits: The excess of revenues over costs for the incorporated business sector of the economy.

13. Net Interest: The interest private businesses pay to households for lending money to the firms minus the interest businesses receive plus interest earned by foreigners.

14. An important component of national income is personal income of households. Personal income can be further reduced to disposable income.

    (a) Personal Income: Income received by households that forms the basis for personal consumption expenditures.

    (b) Disposable Income: This is personal household income after all taxes have been paid.

    (c) Equation 11.1: $Y_d=Y-T_p$
    where Y_d= disposable income
    Y= personal income
    T_p= personal taxes, primarily the federal income tax

15. Households can divide their disposable income between personal consumption expenditures (C) and saving (S).

    (a) Saving: The proportion of households' disposable income that is not spent on consumption goods and services.

(b) Equation 11.2: $Y_d = C+S$
where Y_d= disposable income
C= personal consumption expenditures
S= saving

(c) Changes in consumption expenditures (spending on durable and non-durable goods and services) are important for managers to weigh as they represent revenue to their firms.

8.2 Other Important Macroeconomic Variables

A. Price Level Measures

1. Microeconomics focuses on relative prices whereas macroeconomics focuses on the absolute price level.

   (a) Relative Prices: The price of one good in relation to the price of another good.

   (b) Absolute Price Level: A measure of the overall level of prices in the economy using various indices to measure the prices of all goods and services.

2. We are interested in the rate of inflation or deflation in the economy.

   (a) Inflation: A sustained increase in the price level over time.

   (b) Deflation: A sustained decrease in the price level over time.

3. The GDP deflator, the Consumer Price Index (CPI), and the Producer Price Index (PPI) are measures of the overall price level in the economy.

   (a) Consumer Price Index (CPI): A measure of the combined price that consumers pay for a fixed market basket of goods and services in a given period relative to the combined price of an identical basket of goods and services in a base period.

      a. The Bureau of Labor Statistics (BLS) collects this information from surveys conducted on 50,000 housing units and 23,000 retail and service establishments in 87 urban areas across the US.

(b) Producer Price Index (PPI): A measure of the prices firms pay for crude materials, intermediate materials, suppliers and components, and finished goods.

4. Analysts sometimes focus on the core rate of inflation.

(a) Core Rate of Inflation: A measure of absolute changes

B. Measures of Employment and Unemployment

1. The Bureau of Labor Statistics (BLS) has developed a framework for categorizing the employment status of the population.

2. Equation 11.4:

Unemployment Rate= (Number Employed/ Labor Force)×100

(a) Labor Force: Individuals 16 years and over who are working in a job or currently actively seeking employment. This group consists of the employed and unemployed.

(b) Employed: Persons 16 and over who, in the survey week, did any work as an employee, worked on their own business, profession, or farm, or who worked without pay for at least 15 hours in a family business or farm.

(c) Unemployed: Persons 16 and over who do not currently have a job, but who are actively seeking unemployment.

3. Discouraged workers do not belong in the labor force.

(a) Discouraged Workers: Persons 16 and over who are not currently seeking work because they believe that jobs in their area or line of work are unavailable or that they would not qualify for existing job openings.

4. One goal of macroeconomic policy is to promote full employment of the country's labor force. Policy makers often target the natural rate of unemployment.

(a) Natural Rate of Unemployment: The minimum level of unemployment that can be achieved with current institutions without causing inflation to accelerate.

8.3 Major Macroeconomic Policy Issues

A. What factors influence spending behavior of the different sectors of the economy?

1. Any factor that influences the behavior of the economic sectors responsible for the four expenditures making up the GDP will change the level of the GDP. The four spending components of the GDP are consumption (C), investment (I), government expenditures (G) and net exports (X-M).

B. How do behavior changes in these sectors influence the level of output and income in the economy?

1. Equilibrium Level of Output and Income: The level of aggregate output and income where there is a balance between spending and production decisions and where the economy will stay unless acted upon by other factors.

2. The equilibrium is where the economy will stay at unless a shock causes the economy to temporarily deviate from it.

C. Can policy makers maintain stable prices, full-employment and adequate economic growth over time?

1. Policy makers are interested in keeping the economy at full employment, avoiding inflation or deflation.

2. In the short-run, there is a tradeoff between the unemployment level and a stable price level.

3. In the long-run, policy makers are concerned with the amount of economic growth, the percentage increase in the real GDP.

D. How do fiscal, monetary, and balance of payments policies influence the economy?

1. Fiscal Policy: Changes in the taxes and spending by the executive and legislative branches of a country's national government that can be used to either stimulate or restrain the economy.

2. Monetary Policy: Policies adopted by a country's central bank that influence interest rates and credit conditions, which in turn influence consumer and business spending.

3. Balance of Payments Issues: Issues related to the relative value of different countries' currencies and the flow of goods, services, and financial assets among countries.

4. Consumers and businesses respond to changes in a country's currency exchange rate, the trade balance and capital flows.

   (a) Currency Exchange Rate: The rate at which a country's currency can be exchanged for that of another.

   (b) Trade Balance: The relationship between a country's exports and imports which may either be positive (exports exceed imports) or negative (imports exceed exports).

   (c) Capital Flows: The buying and selling of existing real and financial assets among countries.

SELF CHECK 8

1. Distinguish between real and nominal GDP. Which one is a better measure of the business cycle?
2. Why are transfer payments excluded from government expenditure in the national income accounts?
3. The actual unemployment rate exceeds the natural rate of unemployment. What are policymakers concerned about in this situation?
4. What are the costs associated with inflation?
5. What is the relationship between unemployment and the price level in the short run?
6. What are the two policy options used to influence the economy?

Points to Ponder/Takeaways

Macroeconomic Concerns
Describe the three primary concerns of macroeconomics.

The Components of the Macroeconomy
Discuss the interaction between the four components of the macroeconomy.

Gross Domestic Product
Describe GDP fundamentals and differentiate between GDP and GNP.

Calculating GDP
Explain two methods for calculating GDP.

Nominal versus Real GDP
Discuss the difference between real GDP and nominal GDP.

Limitations of the GDP Concept
Discuss the limitations of using GDP to measure well-being.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 9: The Role Of Money In The Macro Economy

Learning Outcomes

Upon completion of the course, students should be able to:

1. Define money and discuss its functions.
2. Explain how banks create money
3. Describe the functions and structure of the Federal Reserve System.

Introduction

This chapter expands the framework and examines how the interest rate is determined. This chapter introduces the concept of money along with its functions. The chapter examines the market for money where the interest rate is determined. The chapter discusses the role of the Federal Reserve (a central bank) in monetary policy.

9.1 Money

A. Definition of Money

1. Money: The stock of financial assets that can easily be used to make market transactions and that serves as a medium of exchange, a unit of account, and a store of value.

2. Money functions as a medium of exchange and simplifies market transactions.

3. Money functions as a unit of account because money provides the terms in which prices of goods and services and debts are measured.

4. Money functions as a store of value that can be used for future market purchases.

B. Alternative to money is barter: Barter system is a system in which goods and services are exchanged directly without a common unit of account.

C. Measures of the US Money Supply

1. Currency (C): Coins held outside the Treasury, the Federal Reserve banks, and depository institutions, as well as paper money, Federal Reserve notes.

2. M1: C+ Checkable Deposits+ Traveler's Checks+ Other Checkable Deposits

3. M2: M1+ Money Market Mutual Fund Shares+ Savings Accounts+ Small Time Deposits

4. M3: M1+ M2+ Large Time Deposits+ Institutional Money Funds

5. M1, M2 and M3 are measures of the money supply and differ in terms of liquidity.

    (a) Liquidity: The ability of financial assets to be used immediately to make market transactions.

6. Checking accounts are also called demand deposits because they can be withdrawn on demand.

    (a) Demand Deposits: Another name for checking accounts or checkable deposits, one of the major components of the M1 measure of the money supply.

7. The most liquid components of the money supply best satisfy the medium of exchange function of money while the least liquid components may better serve to satisfy the store of value because they pay interest.

D. Depository Institutions and the Fractional Reserve Banking System

1. Depository and other financial institutions play an important role in determining the money supply. Depository institutions that accept deposits are backed by the Federal Deposit Insurance Corporation (FDIC).

    (a) Federal Deposit Insurance Corporation (FDIC): The government regulatory institution that supervises the activities of depository institutions in the United States and provides depositors with accounts up to a certain amount (currently $250,000) with a guarantee that they will receive their funds even in the event of a bank failure.

2. Banks earn income by making loans out of deposits and charging interest on the loans.

3. Banks need to keep a fraction of the deposits as reserves, as determined by the central bank. Hence, banks operate under the fractional reserve system.

   (a) Fractional Reserve System: A banking system in which banks are required to keep a fraction of their deposits as reserves.

   (b) Reserve Requirement: Required reserves kept in banks' vaults or as deposits at the Federal Reserve divided by demand deposits or the fraction of deposits banks are required to keep as reserves.

4. With the fractional reserve system, the simple deposit multiplier determines how much money supply increases by.

   (a) Simple Deposit Multiplier: The amount by which money supply can be increased in a fractional reserve banking system, which equals (1/rr) where rr is the reserve requirement.

   (b) Equation 13.1: $d=[(1-rr)+(1-rr)^2+(1-rr)^3+\ldots\}= (1/rr)$

   where:
   d= simple deposit multiplier
   rr=reserve requirement

   (c) If rr= 0.10, d=10 meaning that an original deposit of $100 will multiply by 10 to $1,000 of new money.

5. The actual money multiplier (mm) differs from the simple deposit multiplier due to the decisions by banks to hold reserves in excess of those required and by individuals to hold assets in cash rather than bank deposits.

   (a) Monetary Base (B): Currency plus reserves (both required and excess), a variable controlled by central bank policy.

   (b) Money Multiplier (mm): The money multiplier, mm, is usually smaller than a simple deposit multiplier, d- reflects individuals' decisions to hold some of their assets in cash rather than depositing them in a checking account and banks' decisions to hold excess reserves.

6. The following equations illustrate the money multiplier.

   (a) Money Supply (M)= Currency (CU)+ Demand Deposits (DD)

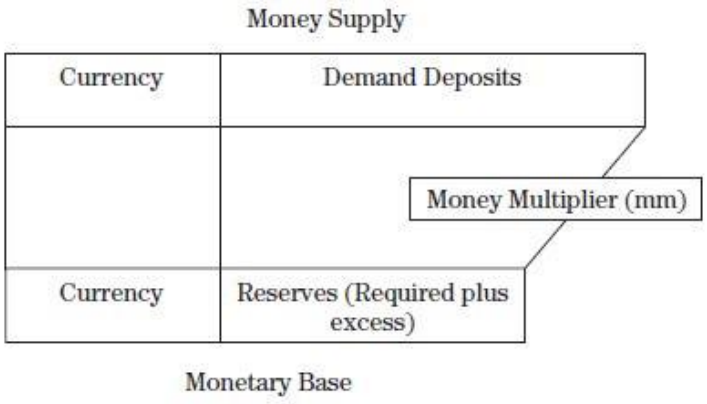
   (b) Monetary Base (B)= Currency (CU)+ Required Reserves (RR)+ Excess Reserves (ER)

   (c) Money Multiplier (mm)= Money Supply (M)/ Monetary Base (B)=
   $$\frac{CU + DD}{CU + RR + ER} = \frac{c + 1}{c + rr + e}$$

   where:
   c= currency/ deposit ratio
   rr= reserve requirement
   e= excess reserve ratio

7. Figure 13.1 illustrates the relationship between the monetary base, the policy tool of the central bank, and the money supply.

FIGURE 13.1
The Monetary Base and the Money Supply
The monetary base (currency, required and excess reserves), a policy tool of the central bank, influences the money supply through the money multiplier.



E. The Central Bank (Federal Reserve)

1. The Federal Reserve System (or the Fed) is the central bank in the United States.

   (a) Federal Reserve System (Fed): The central bank in the United States that implements monetary policy and helps regulate and operate the country's financial system.

2. The 12 Federal Reserve District Banks and their 25 branches undertake functions such as operating a nationwide payments system, regulating and supervising member banks, distributing currency and coins for the country, and serving as bankers for the U.S. Treasury.

(a) The Beige Book summarizes information collected from district banks.

(b) Beige Book: A publication of the Federal Reserve System that includes information on current economic conditions gathered from the Federal Reserve banks' staff and interviews with business contacts, economists, market experts, and other sources.

(c) Member banks of the Federal Reserve System include all national banks chartered by the federal government and state banks that elect to become members.

3. The Federal Open Market Committee (FOMC) is responsible for conducting monetary policy.

(a) Federal Open Market Committee (FOMC): The Federal Reserve body that has the primary responsibility for conducting monetary policy.

(b) The FOMC consists of 7 members of the Board of Governors, the President of the New York Fed and four other Reserve Bank presidents who serve one-year terms on a rotating basis.

(c) The remaining district bank presidents participate in the FOMC meetings, held 8 times a year, but do not vote on policy decisions.

F. Tools of Monetary Policy

1. The Federal Reserve engages in policy actions that influence the level of interest rates in the economy.

2. Open market operations are a major tool of Fed policy.

(a) Open Market Operations: The major tool of Fed monetary policy that involves the buying and selling of government securities on the open market in order to change the money supply and influence interest rates.

(b) The Fed's open market operations influence the amount of reserves held by commercial banks, which in turn, influences the federal funds rate.

(c) Federal Funds Rate: The interest rate that commercial banks charge each other for loans of reserves to meet their minimum reserve requirements.

(d) If banks need additional reserves, they can borrow at the federal funds rate from other banks in the federal funds market.

(e) Federal Funds Market: The private financial market where banks borrow and loan reserves to meet the minimum reserve requirements.

3. If the Fed engages in expansionary monetary policy, it increases the amount of reserves in the system thereby lowering the federal funds rate, which also lowers other interest rates in the economy.

(a) Expansionary Monetary Policy: Federal Reserve policy to increase the rate of growth of real GDP by increasing the amount of bank reserves in the system and lowering the federal funds and other interest rates.

(b) Contractionary Monetary Policy: Federal Reserve policy to decrease the rate of growth of real GDP by decreasing the amount of bank reserves in the system and raising the federal funds and other interest rates.

4. The discount rate is also used as a tool to influence the money supply.

(a) Discount Rate: The interest rate the Federal Reserve charges banks that borrow reserves at the Fed's discount window.

(b) An increase in the discount rate results in contractionary monetary policy as it becomes more expensive for banks to borrow reserves.

5. Nontraditional Approaches. In response to the financial crisis and recession from 2007 to 2009, the Fed developed additional set of lending programs and initiatives.
   (a) These included purchases of particular bond classes in order to lower the interest rates on those bonds (these included mortgage-backed securities). The Term Auction Facility was established to allow banks to borrow anonymously at a rate determined through a competitive auction.

9.2 Equilibrium in the Money Market

A. The Supply of Money

1. The Federal Reserve System has control of the money supply primarily through open market purchases and sales.

2. The Fed controls the nominal money supply.

   (a) Nominal Money Supply (M_S): The money supply (M1), controlled by the Federal Reserve, which is defined in dollar terms.

   (b) Real Money Supply (M_S/P): The nominal money supply divided by the price level, which expresses the money supply in terms of real goods and services and which influences behavior.

   (c) Equations 13.2 & 13.3: $RLMS = M_S/P = f(r, M_S, P)$

   where:
   RLMS= real money supply
   r= real interest rate
   M_S= the nominal money supply (controlled by Federal Reserve policy)
   P= price level

3. The equations show money supply as a function of the nominal money supply, and the price level.

   (a) The real money supply does not depend on the real interest rate but the price level and the Federal Reserve policy regarding the nominal money supply.

   (b) Figure 13.3 illustrates real money supply functions with real interest rates on the y-axis and the real money balances (M/P) on the x-axis.

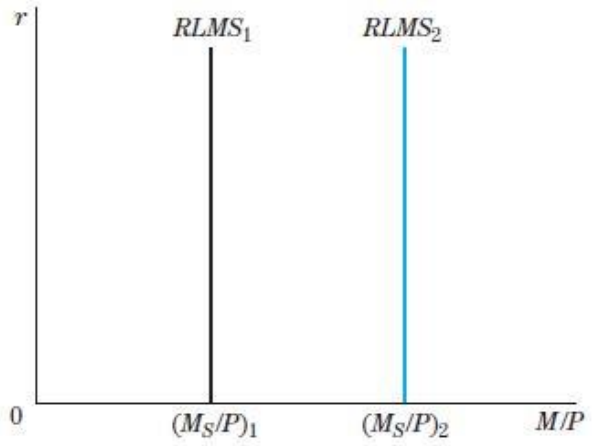


FIGURE 13.3
Real Money Supply Functions
Either an increase in the nominal money supply (M_S) by the Federal Reserve or a decrease in the price level (P) will cause the real money supply function to shift from $RLMS_1$ to $RLMS_2$.

B. The Demand for Money

4. Equation 13.4 illustrates the generalized real money demand function. The demand for money is also in real terms.

5. Equation 13.4: RLMD= MD/P= f (r, Y)

   where:
   RLMD= real money demand
   MD= nominal real money demand
   P= the price level
   r= the real interest rate
   Y= the level of real income

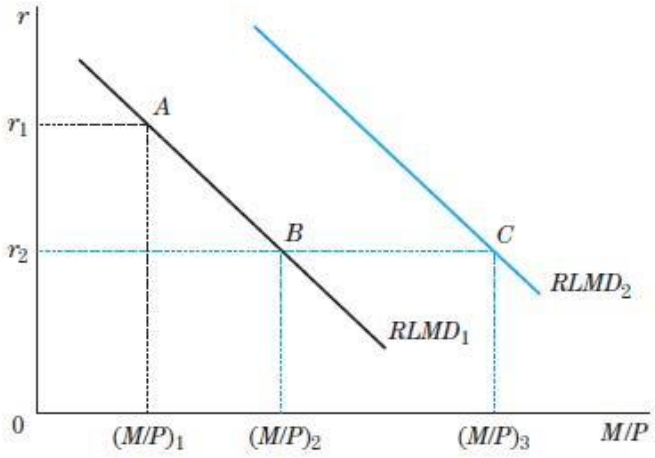
6. For simplicity, we assume that individuals can either hold money (currency and checkable or demand deposits) or government bonds that pay a positive interest rate, r.

7. The interest rate represents the opportunity cost of holding assets in the form of money.

8. The real demand for money is positively related to the real income (Y) in the economy as individuals need more money to finance the increased number of market transactions associated with higher levels of income, output, and expenditure.

9. Figure 13.4 shows real money demand functions with real interest rates on the y-axis and real money balances (M/P) on the x-axis.

FIGURE 13.4
Real Money Demand Functions
A change in the interest rate, all else held constant, causes a movement along a given money demand curve ($RLMD_1$). A change in income or other autonomous factors influencing money demand shifts the curve from $RLMD_1$ to $RLMD_2$.



10. The equilibrium in the money market occurs at that interest rate where money demand equals money supply.

    (a) Changes in the supply of money occur as a result of monetary policy change by the Federal Reserve.

    (b) Changes in the demand for money occur primarily as a result of a change in income. Individuals allocate their assets as money or interest-bearing alternatives, government bonds.

C. Overall Money Market Changes

1. Shifts in the demand and/ or the supply of money changes the equilibrium interest rate in the economy.

2. The interest rate impacts managerial and consumer spending decisions through the interest-related expenditure and aggregate expenditure functions, as discussed in the previous chapter.

SELF CHECK 9

1. Why is the money multiplier smaller than the simple deposit multiplier?
2. What are the three monetary policy tools of the Fed? Briefly describe how each tool can be used to implement an expansionary monetary policy and a contractionary monetary policy.
3. In the context of the money market, graphically illustrate and explain the impact of an expansionary monetary policy on interest rates.

Points to Ponder/Takeaways

An Overview of Money
Define money and discuss its functions.

How Banks Create Money
Explain how banks create money.

The Federal Reserve System
Describe the functions and structure of the Federal Reserve System.

The Demand for Money
Describe the determinants of money demand.

Interest Rates and Security Prices
Define interest and discuss the relationship between interest rates and security prices.

How the Federal Reserve Controls the Interest Rate
Understand how the Fed can change the interest rate.

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.

Topic 10: The Aggregate Model Of The Macro Economy

Learning Outcomes

Upon completion of the course, students should be able to:

1. Explain the concepts of aggregate demand/aggregate supply
2. Discuss the effect that the Federal Reserve's monetary policies have on the economy

Introduction

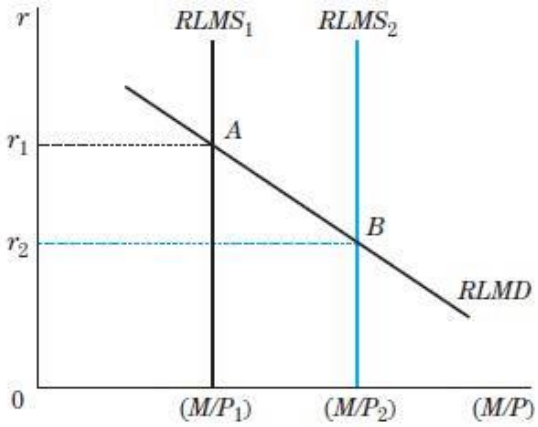
This chapter relaxes the short-run assumption of fixed prices and allows the price level to change. This is made possible by the introduction of the price level through the money market in Chapter 9. By combining the discussion in Chapters 8 and 9 and relaxing the assumption of fixed prices, we are able to derive the aggregate demand. This chapter develops the aggregate demand/aggregate supply model.

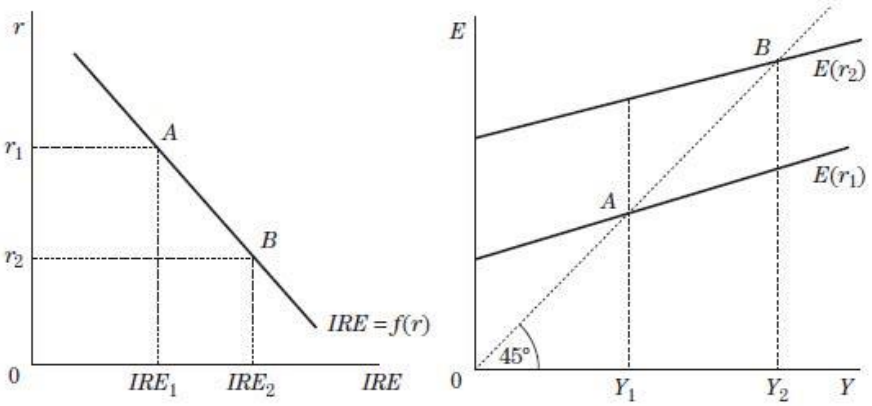
10.1 The Model of Aggregate Demand and Aggregate Supply

A. Aggregate Demand (AD) Curve: The curve that shows alternative combinations of the price level (P) and real income (Y) or GDP that result in simultaneous equilibrium in both the real goods and money markets.

1. The AD curve is derived from changes in the money supply and changes in the interest-related expenditure (IRE) and aggregate expenditure functions. These were discussed in Chapters 13 and 12 respectively.

FIGURE 14.1
Change in the Price Level and the Effect on the Money Market
A decrease in the price level from P_1 to P_2 causes the real money supply to increase from $RLMS_1$ to $RLMS_2$. Equilibrium moves from point A to point B, and the interest rate falls from r_1 to r_2.



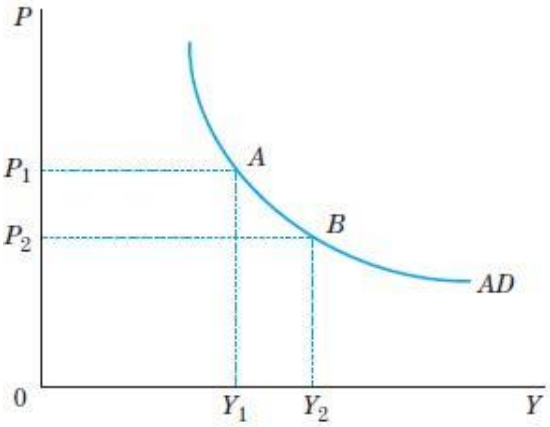


(a) Interest-related expenditure function

(b) Aggregate expenditure function

FIGURE 14.2
Interest-Related Expenditure and Equilibrium Income
A decrease in the interest rate from r_1 to r_2 increases interest-related consumption and investment expenditure from IRE_1 to IRE_2 and equilibrium income from Y_1 to Y_2.

2. The AD curve is downward-sloping indicating that larger levels of real income (Y) are consistent with a lower price level (P).



Aggregate demand curve

FIGURE 14.3
Deriving the Aggregate Demand Curve
If the price level decreases from P_1 to P_2 with the nominal money supply, M_{S1}, constant, the real money supply increases, which lowers the interest rate and increases equilibrium income. Equilibrium moves from point A (price level P_1 and real income level Y_1) to point B (price level P_2 and real income level Y_2). The AD curve traces out these alternative points of equilibrium.

3. Shifts in the AD curve are caused by changes in any of the components of the aggregate expenditure function. They are also caused by economic policies, e.g. monetary and fiscal

   (a) An expansionary monetary policy shifts the AD curve to the right.
      a. A lower interest rate generates interest-sensitive investment and consumption spending.

   (b) An expansionary fiscal policy (either increasing government spending or decreasing taxes) shifts the AD curve to the right.

   (c) Increases in other autonomous spending will also shift the AD curve to the right.

4. Equation 14.1: AD: $Y = f(P, T_P, CC, W, CR, D, T_B, PR, CU, G, Y^*, R, M_S)$

   where:
   Y= level of real income
   r= real interest rate
   T_P= personal taxes
   CC= level of consumer confidence
   W= level of consumer wealth
   CR= level of consumer credit
   D= level of consumer debt
   T_B= business taxes
   PR= expected profits
   CU= capacity utilization
   G= level of government spending
   Y*= level of foreign GDP or real income
   R= currency exchange rate (foreign currency per dollar)
   M_S= the nominal money supply (influenced by the Federal Reserve policy)

5. The variables on the right-hand side of Equation 14.1 cause the AD curve to shift either to the right or to the left.

6. Both fiscal policy (government spending, G, and taxes, T) and monetary policy tools (Fed controlling the money supply) are included as variables in Equation 14.1.

7. Table 14.1 provides a summary of the shift causing factors.

TABLE 14.1 Factors Causing Shifts in the *AD* Curve

AD CURVE SHIFTS OUT TO THE RIGHT	*AD* CURVE SHIFTS BACK TO THE LEFT
HOUSEHOLD CONSUMPTION SPENDING (C)	**HOUSEHOLD CONSUMPTION SPENDING (C)**
Decrease in personal taxes (T_P)	Increase in personal taxes (T_P)
Increase in consumer confidence (*CC*)	Decrease in consumer confidence (*CC*)
Increase in consumer wealth (*W*)	Decrease in consumer wealth (*W*)
Increase in consumer credit (*CR*)	Decrease in consumer credit (*CR*)
Decrease in consumer debt (*D*)	Increase in consumer debt (*D*)
BUSINESS INVESTMENT SPENDING (I)	**BUSINESS INVESTMENT SPENDING (I)**
Decrease in business taxes (*TB*)	Increase in business taxes (*TB*)
Increase in expected profits and business confidence (*PR*)	Decrease in expected profits and business confidence (*PR*)
Increase in capacity utilization (*CU*)	Decrease in capacity utilization (*CU*)
GOVERNMENT SPENDING (G)	**GOVERNMENT SPENDING (G)**
Increase in government spending (*G*)	Decrease in government spending (*G*)
FOREIGN SECTOR SPENDING (X, M)	**FOREIGN SECTOR SPENDING (X, M)**
Increase in the level of foreign GDP or real income (Y^*)	Decrease in the level of foreign GDP or real income (Y^*)
Decrease in the currency exchange rate (*R*)	Increase in the currency exchange rate (*R*)
FEDERAL RESERVE POLICY	**FEDERAL RESERVE POLICY**
Increase in the nominal money supply	Decrease in the nominal money supply

8. The other variables in Equation 14.1 also influence AD but are not under the control of the policy maker.

B. Fiscal and Monetary Policy Implementation

1. Fiscal policy changes result from a political process involving the President, his administration and the Congress

2. Fiscal policy can have a significant time lag as it takes time to pass a fiscal measure, create the necessary programs, fund them, and actually implement them.

   (a) Examples in the text include the 2009 American Recovery and Reinvestment Act and the "fiscal cliff".

3. Some federal expenditures and taxes act as automatic stabilizers for the economy.

   (a) Automatic Stabilizers: Features of the U.S. federal government expenditures and taxation programs that tend to automatically slow the economy during times of high economic activity and boost the economy during periods of recession.

4. Government expenditures and taxes may be discretionary or non-discretionary.

   (a) Non-Discretionary Expenditures: Federal government expenditures, for programs such as unemployment compensation, that increase or decrease simply as a result of the number of individuals eligible for the spending program.

   (b) Discretionary Expenditures: Federal government expenditures for programs whose funds are authorized and appropriated by Congress and signed by the President, where explicit decisions are made on the size of the programs.

5. The federal income tax system in the U.S. is a progressive tax system.

   (a) Progressive Tax System: An income tax system where higher tax rates are applied to increased amounts of income.

6. Monetary policy is often considered to be more precise than fiscal policy.

   (a) Most monetary policy changes result from Federal Open Market Committee operations described in Chapter 13.

7. Monetary policy focuses on targeting the federal funds.

   (a) However, consumers and firms respond to other short-term rates that tend to move together, such as mortgage rates and prime rates.

   (b) Risky investments and securities are generally charged higher interest rates.

   (c) Even thought the focus is on short-term rates, there is an agreement that there will be similar effects of long-term rates.

8. Implementation of monetary policy has also changed over time. M1 became a less useful target as M2 and M3 (that use broader measures of money) came into use.

9. Monetary policy is typically more gradual, although there are exeptions:

(a) The Fed immediately decreased the target federal funds rate after the terrorist attacks of September 11, 2001.

(b) The Fed lowered the targeted federal funds rate seven times between September 2007 and April 2008 in response to the slowing economy.

a. In an unprecedented move, the Fed allowed investment banks to borrow from the discount window.
b. The Fed also agreed to help J.P. Morgan Chase acquire the troubled Bear Sterns Company.

10. In practice, the Federal Reserve reacts to fiscal policy or other autonomous spending changes in the economy.

(a) Crowding out may be a concern for the Fed.

(b) Crowding Out: The decrease in consumption and investment interest-related spending that occurs when the interest rate rises as government spending increases.

(c) For instance, CBO estimated that the Fed's policies since 2008 effectively nullified the crowding out effects from the American Recovery and Reinvestment Act through the second quarter of 2012.

(d) In 1992, President Clinton reduced the federal budget through spending cuts and tax increases. To slow the growth, the Fed raised the targeted federal funds rate.

C. Aggregate Supply (AS) Curve: The curve that shows the price level at which firms in the economy are willing to produce different levels of real goods and services and the resulting level of real income.

1. Aggregate supply curves are based on an underlying aggregate production function for the economy as a whole.

2. Aggregate Production Function: The function that shows the quantity and quality of resources used in production, the efficiency with which resources are used, and the existing production technology for the entire economy.

3. At any point in time, there is a maximum amount of real goods and services that can be produced. This is called the level of potential output or full-employment level of output.

   (a) Potential Output: The maximum amount of real goods and services and real (GDP) income that can be produced in the economy at any point in time based on the economy's aggregate production function.

4. The shape of the AS curve and the level of potential output determines whether the aggregate demand-aggregate supply equilibrium is considered desirable by policy makers.

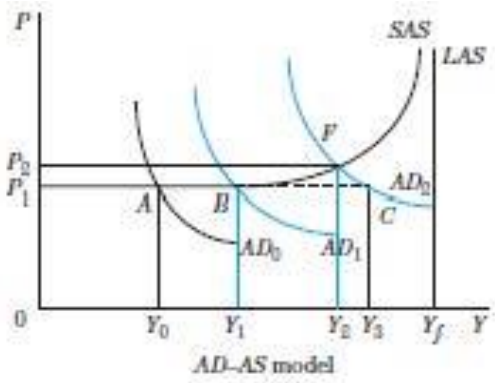
   (a) Aggregate Demand-Aggregate Supply Equilibrium: The equilibrium level of real income and output and the price level in the economy that occurs at the intersection of the aggregate demand and supply curves.

   (b) If the equilibrium level of output is far enough below the level of potential output, then expansionary fiscal or monetary policies are used to stimulate the economy.

   (c) If the equilibrium level of output is far enough above the level of potential output, then contractionary fiscal or monetary policies are used to slow the economy.

5. Figure 14.5 shows a short-run aggregate supply curve with a horizontal and an upward-sloping portion. The horizontal portion is often called the Keynesian model since it includes the assumption of "sticky" prices.

FIGURE 14.5
Aggregate Demand–Aggregate Supply Equilibrium with Short- and Long-Run Aggregate Supply Curves
An increase in aggregate demand with a horizontal aggregate supply curve results only in an increase in real output, while an aggregate demand increase with an upward sloping aggregate supply curve results in an increase in both real output and the price level.



   (a) Short-Run Aggregate Supply Curve: An aggregate supply curve that is either horizontal or upward sloping, depending on

whether or not the absolute price level increases as firms produce more output.

(b) Keynesian Model: A model of the aggregate economy, based on ideas developed by John Maynard Keynes, with a horizontal short-run aggregate supply curve in which all changes in aggregate demand result in changes in real output and income.

6. Equation 14.2: Short-Run AS: $P = f(Y_f, \text{Resource Costs})$

   where:
   P= the price level
   Y_f= the full-employment or potential level of output
   Resource Costs= the costs of the resources or inputs of production

7. Figure 14.5 also shows a long-run aggregate supply curve which is assumed to be vertical at the potential or full-employment output.

   (a) Long-Run Aggregate Supply Curve: A vertical aggregate supply curve that defines the level of full-employment or potential output based on a given amount of resources, efficiency, and technology in the economy.

8. Equation 14.3: Long-Run AS: $Y_f = f(P, \text{Resources, Efficiency, Technology})$

   where:
   Y_f= the full-employment or potential output
   P= the price level
   Resources= the amount of inputs in the economy used to produced final goods and services
   Efficiency= the means by which resources are combined to minimize the cost of production
   Technology= the state of knowledge in the economy on how to produce goods and services.

   (a) The equation implies that the long-run AS curve is vertical and not influenced by the price level (the price level effect is zero).

9. Shifts in the short-run aggregate supply curve come from productivity changes and changes in the costs of production.

10. Stagflation represents a major dilemma for policy makers.

(a) Stagflation: Higher prices and price increases (inflation) combined with lower real output and income (stagnation), resulting from a major increase in input prices in the economy.

11. Shifts in the long-run aggregate supply curve come from changes in the amount of inputs (land, labor, capital and raw materials) and increases in technology and efficiency.

SELF CHECK 10

1. Why did the Fed shift its policy target towards the federal funds rate.
2. Explain how the aggregate demand curve is derived.
3. Explain the long-run consequences of continued increases in the money supply.
4. Why is judging trends in economic indicators important to managers?

Points to Ponder/Takeaways

Aggregate Demand

Aggregate Supply

Monetary Policy

References

Mankiw, N. Gregory. *Principles of economics*. Cengage Learning, 2018.

Farnham, P.G. 2013. *Economics for Managers*. 3rd edn. United States of America: Prentice Hall.