Principles of Agricultural Economics

Fourth Edition

Andrew Barkley and Paul W. Barkley

Principles of Agricultural Economics

Principles of Agricultural Economics, now in its fourth edition, continues to showcase the power of economic principles to explain and predict issues and current events in the food, agricultural, and agribusiness sectors. This key text introduces economic principles in a succinct and reader-friendly format, providing students and instructors with a clear, up-to-date, and straightforward approach to learning how a market-based economy functions and how to use simple economic principles for improved decision-making.

The field of agricultural economics has expanded to include a wide range of topics and approaches, including macroeconomics, international trade, agribusiness, environmental economics, natural resources, and international development, and these are all introduced in this text. For this edition, new and enhanced material on agricultural policies, globalization, welfare analysis, and explanations of the role of government in agriculture and agribusiness is included. Readers will also benefit from an expanded range of case studies and text boxes, including real-world examples such as the Ukraine conflict, the Coronavirus pandemic, and immigration.

The work is supported by a companion website, including flash cards, study guides, PowerPoint presentations, multiple choice questions, essay questions, and an instructor's manual. This book is ideal for courses on agricultural economics, microeconomics, rural development, and environmental policy.

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Access the Instructor and Student Resources: www.routledge.com/cw/barkley

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Preface

We have been pleased with the reception of the first three editions of this book. The main objective of the book is to provide students and instructors with a clear, up-to-date, and straightforward approach to learning how a market-based economy functions and how to use simple economic principles for improved decision-making. Emphasis is placed on the intuition of profit maximization and how the intuition can be used to improve both personal and professional decision-making.

Based on excellent feedback from reviewers, instructors, and current users of the book, this revision expands, updates, and improves the third edition. We have added numerous case studies that apply economic principles to real-world events in agriculture and agri-business. Enhanced material has been added on current agricultural policies, globalization, welfare analysis, and explanations of the role of government in agriculture and agribusiness. We have highlighted the consumer focus of economics as applied to food and agriculture throughout the book.

New text boxes have been added on (1) value-added agriculture, (2) inflation impact on food and agriculture, (3) monopoly power and collusion in beef/poultry/agribusiness industries, (4) effect of Coronavirus pandemic on food, agriculture, and agribusiness, (5) effect of climate change on food, agriculture, and agribusiness, (6) effect of Russia/Ukraine war on agriculture, (7) impact of risk and uncertainty on markets, (8) recent changes in government policies, (9) recent changes in international trade policies, (10) impact of the rise of China on global food and agriculture, (11) relationship between fuel markets and agricultural markets, and (12) supply chains in food and agriculture.

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Abbreviations

ADM	Archer Daniels Midland
AFO	animal feeding operation
BRIC	Brazil, Russia, India, and China
BSE	bovine spongiform encephalopathy
bu	bushel
CA	controlled atmosphere
CAB	certified Angus beef
CAFO	concentrated animal feeding operation
CAP	common agricultural policy
CBOT	Chicago Board of Trade
CD	compact disc
CME	Chicago Mercantile Exchange
COOL	country of origin labeling
CRP	Conservation Reserve Program
cwt	hundredweight
DDT	dichloro-diphenyl-trichloroethane
EC	European Community
EEC	European Economic Community
EPA	Environmental Protection Agency
EU	European Union
FDA	Food and Drug Administration
FDIC	Federal Deposit Insurance Corporation
FTA	free trade agreement
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GIS	geographical information systems
GM	genetically modified
GMO	genetically modified organism
GPS	global positioning system
H	beef growth hormones
ha	hectare
HFCS	high-fructose corn syrup
kg	kilogram
kWh	kilowatt-hours
lb	pound [weight]

LEPA	low-energy precision application
m	meter
MPCI	multiple peril crop insurance
N	nitrogen
NAFTA	North American Free Trade Agreement
NCBA	National Cattlemen's Beef Association
NI	national income
NTB	non-tariff barrier
NYSE	New York Stock Exchange
OPEC	Organization of Petroleum Exporting Countries
R&D	research and development
UK	United Kingdom
US	United States
USD	United States dollars
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USSR	Union of Soviet Socialist Republics (former Soviet Union)
USTA	United States Tennis Association
WHO	World Health Organization
WTO	World Trade Organization

Economic terminology

π	profits
π_A	accounting profits
π_E	economic profits
A	land
AFC	average fixed costs
APP	average physical product
AR	average revenue
ARP	average revenue product
ATC	average total costs
AVC	average variable costs
CS	consumer surplus
D	demand curve
DWL	deadweight loss
E	equilibrium
E^d	price elasticity of demand
E^d_{Y1Y2}	cross-price elasticity of demand
E^m	income elasticity of demand
E^s	elasticity of supply
E^s_{Y1Y2}	cross-price elasticity of supply
ED	excess demand
EP	expectations of future prices
ES	excess supply
FV	future value
IR	immediate run

K	capital
L	labor
LR	long run
M	management
M	income
MC	marginal cost
MFC	marginal factor cost
MPP	marginal physical product
MR	marginal revenue
MRP	marginal revenue product
MRPS	marginal rate of product substitution
MRS	marginal rate of substitution
MRTS	marginal rate of technical substitution
MU	marginal utility
N	number of sellers
NPV	net present value
P	price of a good
P*	equilibrium price
P^c	price ceiling
P_i	input price
P_o	prices of other, related goods
P_{own}	own price of a good
$P_{related}$	goods price of related goods
P^s	price support
P_X	input price
P_Y	output price
Pop	population
PS	producer surplus
PV	present value
PPF	production possibilities frontier
q	individual-firm quantity
q^d	individual-firm quantity demanded
q^s	individual-firm quantity supplied
Q	market quantity
Q*	equilibrium quantity
Q^d	market quantity demanded
Q^s	market quantity supplied
SR	short run
t	per-unit tax
T	technology
TC	total costs
TC_A	accounting costs
TFC	total factor costs
TFC	total fixed costs
TP	tastes and preferences
TPP	total physical product
TR	total revenues
TRP	total revenue product

TU	total utility
TVC	total variable costs
Y	quantity of a good; output

Mathematical notation

$\succ$	is preferred to
$\prec$	is less preferred to
~	is indifferent to
f	function
Δ	change
m	slope
$\Delta y/\Delta x$	slope
b	y-intercept
∞	infinity

Chapter 1

Introduction to the economics of agriculture

Photo 1.1 Introduction to the economics of agriculture

Source: April Cat/Shutterstock

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Abstract

This chapter explains why economics is important and interesting. It defines the study of economics and discusses what economics is about. We introduce and explain economic terms, including producers, consumers, macroeconomics, microeconomics, positive and normative economics, absolute prices, and relative prices. The major discussion explains why scarcity is the fundamental concept of economics. The chapter also introduces and explains economic organization, resources, trends in the agricultural economy, and a review of graphs and their construction.

Chapter 1 Questions

1 What is economics, and what is it all about?
2 What are consumers and producers, and how do they interact?
3 What is the difference between microeconomics and macroeconomics?
4 How do economists deal with value judgments?
5 How do absolute prices differ from relative prices?
6 Why is scarcity considered the fundamental concept of economics?
7 How is an economy organized, and how does an economy function?
8 How are graphs constructed and used in economics?

1.0 Introduction

There were slightly more than 2 million farms in the United States (US) in 2021. Texas had the most, with more than 247,000; Alaska had the least, with 1,050. Taken together, these farms produced hundreds of crops, from apples to zucchini, from bees to turkeys, and hundreds of crops and animals in between. When sold, all products from all farms yielded a net farm income of nearly 577 billion US dollars (USD) in 2022. When the US was created in 1776, nearly 90 percent of the population lived on farms. Now, less than 2 percent of the population lives on farms. Farm output continues to grow while the farm population continues to decline. This change is due to massive technological change: improvements in the way food and fiber are produced.

Rapid technological change characterizes nearly all aspects of global agriculture. Farmers and ranchers find it advantageous to adopt new methods as quickly as possible. Mechanization and the use of agricultural chemicals have led to massive consolidation of farms and industry concentration. While this trend has resulted in fewer "family farms," it has led to lower food prices over time. These changes make the economics of food and agriculture an important and interesting subject for study.

The changes affecting agriculture have been substantial: changes in technology, changes in plant and animal breeding, changes in the diets of consumers, consumer preferences for how food is produced, changes in food exports and imports, and changes in the way agriculture relates to governments across the world.

Economics is a **social science**, meaning that it uses scientific methods to study the way people behave. Economists interested in **agriculture** focus on five questions:

- What should I produce?
- How much should I produce?
- How should I produce it?
- When should I produce it?
- For whom should I produce it?

Similar questions must be asked by consumers and business leaders as they allocate their time, talents, and money over opportunities to obtain the highest possible level of satisfaction. These basic questions form the foundation of the economic principles discussed in this book.

1.1 Economics is important and interesting!

Rapid changes in the agricultural industry make this an exciting time to study **agricultural economics**. Changes in the global economy and in the agricultural industry are occurring at a more rapid rate than at any other time in history, and these changes have huge implications for the entire domestic and global economies.

Union (EU) and Japan all subsidize their agricultural sectors.

BOX 1.1

What do agricultural economics and agribusiness majors do?

Agricultural economics is a highly diverse, dynamic, and fascinating field! The origins of the field are the application of economic principles to farming and ranching: food production. The field has grown enormously to include a wide variety of jobs, including banks, credit unions, insurance, and law firms. A large group of students who major in agricultural economics or agribusiness work for agribusiness, both large and small. These companies provide inputs (equipment, chemical, fertilizer) and services (finance, employment, and commodity trading) to farmers and ranchers. Agribusinesses also process crops and livestock in food and fiber (meatpacking, milling, baking, and food retailing, wholesaling, food manufacturing, marketing, sales, and management).

Some work for the government in jobs such as statistician or government program administration, some conduct research on all aspects of food, agriculture, natural resources, and the environment. Many agricultural economics majors work all over the world in international trade, international development, and international business. Others work in rural development

and managing natural resources: air pollution, climate change, pesticides, and biofuel management. The main characteristic of agricultural economics majors is problem solving and critical thinking: the application of the economic way of thinking about benefits and costs to real world issues in food, agriculture, natural resources, and the environment. This scarce skill is highly valued, resulting in high salaries and great opportunities for students in agricultural economics and agribusiness.

Some examples show how this happens. Events that happen in other parts of the world often have a large impact on those who live in the agricultural regions of the United States. For example, armed conflict in Ukraine results in a decrease in the global supply of food. This results in higher commodity prices in the US and throughout the world, far away from the war. Extreme weather events such as droughts and hurricanes can have major effects on the food supply. These events have become more common due to climate change. Economic knowledge provides solutions to changes in supply chains in food and agriculture.

Beef exports are an important source of beef industry profits. Japan is the largest importer of US beef, followed by South Korea and China. Therefore, economic events in these nations have a large impact on the profitability of US beef producers.

Photo 1.2 Beef and rice consumption in Japan

Source: gresei/Shutterstock

Understanding how and why consumers purchase goods provides information useful in improving decision-making by persons employed in agriculture and agribusiness. For example, high-income nations, including the US, European Union (EU), and Japan, all subsidize their agricultural sectors.

BOX 1.2

The United States Department of Agriculture (USDA)

In 1862, President Abraham Lincoln established the Department of Agriculture (USDA), created to assist farmers by providing information, research, loans, and education for rural youth. Agriculture has changed a great deal since 1862, when over half of the nation's population lived on farms. However, the mission of the USDA has remained the same: "We provide leadership on food, agriculture, natural resources, and related issues based on sound public policy, the best available science, and efficient management."

Currently, the USDA promotes the marketing of farm products overseas, promotes food safety and nutrition, provides marketing assistance to farmers, protects natural resources and the environment, conducts scientific research in agriculture, promotes rural development, and helps poor individuals and families in the form of food subsidies. Today, the USDA has nearly 100,000 employees at over 4,500 locations with an annual budget over USD 195 billion (2023).

Source: USDA website. www.usda.gov/our_agency/about_usda. Retrieved September 28, 2022.

Economic principles help explain the reasons behind the changes in agricultural policy and the impacts of the new policies as they are legislated and implemented. The remainder of this section provides short examples to demonstrate the nature of real-life economic problems and the importance of using economics to understand them.

1.1.1 Meat processing

The meat processing industry earns profits by purchasing cattle and selling meat and leather. Many years of consolidation through mergers and acquisitions have resulted in four beef packers (Tyson Foods, Cargill, JBS USA, and National Beef) selling over 80 percent of all beef sold in the US. With only four major packers, there may be less competition in buying cattle from livestock producers, possibly

resulting in lower cattle prices. However, there are some positive effects from having big packers. Larger packing plants and farms allow the meat production process to become more efficient, resulting in lower costs to consumers, who in turn purchase more meat. Increased meat sales increase profits for the livestock sector. The study of economics allows a deeper understanding of the causes and consequences of mergers and acquisitions in agricultural and food industries.

Coronavirus (Covid-19) had a large impact on global meat production and supply chains. When US meat processing employees became sick in 2020, some plants shut down, and others adopted safe distances between workers to slow the spread of the pandemic. These changes resulted in a decrease in meat availability and higher food prices.

1.1.2 Free trade among nations

Free trade agreements (FTAs) are formed to reduce or eliminate trade barriers between nations. Two of the most important FTAs are (1) the United States-Mexico-Canada Agreement (USMCA), formerly the North American Free Trade Agreement (NAFTA), and (2) the World Trade Organization (WTO), formerly called the General Agreement on Tariffs and Trade (GATT). These agreements have had major consequences for agricultural producers and consumers in the US and throughout the world. **Trade barriers** are laws that restrict the movement of goods across national borders. These FTAs have opened the way for increased exports of US grain (wheat, corn, milo, and soybeans) by eliminating or reducing trade barriers such as tariffs, quotas, and harsh inspection criteria. The FTAs allow the US to sell grain to Russia, Japan, Mexico, and other countries with fewer legal restrictions or taxes. This book demonstrates that the movement toward free trade generally has benefits for agricultural producers.

The trade agreements have caused some individuals and groups to question globalization and free trade. Many individuals and groups oppose trade with other nations. Some desire to be "self-sufficient," to not rely on other nations. Trade policy continues to be in the news as new trade agreements are negotiated, with large impacts on producers and consumers. Agricultural trade policy has become the major source of news, debate, and controversy since 2018, when tariffs were placed on billions of dollars of imported goods from China. China then retaliated by placing tariffs on agricultural imports.

Conflict between nations can create problems with globalization. War and international disputes can lead to supply chain disruption and loss of export markets. Recently, the highly globalized food and agricultural sector has tried to balance gains from trade with national security goals.

BOX 1.3

Trade barriers

Nations around the world use laws and regulations to restrict imports, exports, or both. Three common barriers include the following:

TARIFFS: Taxes paid before goods can be sold across a national border. For example, automobile consumers in the US must pay a tariff when they purchase a car made in another country.

QUOTAS: Restrictions on the quantity of goods allowed to enter the United States from another country. Quotas protect domestic producers from foreign-made products.

INSPECTION: The most subjective of the devices used to restrict imports. Inspection is used to prevent food items that are considered unsafe from entering the US economy.

Source: Economic Glossary. http://glossary.econguru.com/

1.1.3 The environment

Environmental issues play an increasingly important role in agriculture. A number of Midwestern states are well suited to growing corn (Iowa, Illinois, and Nebraska are typically the three leading states in corn production), but modern corn production often utilizes an herbicide called atrazine to eliminate weeds. Atrazine provides large agronomic and economic benefits to corn farmers in this area. Unfortunately, the chemical is also associated with human health problems, especially when it enters a domestic water supply.

The impacts of atrazine are mixed. On the one hand, the chemical provides efficient control of weeds, resulting in higher yields and higher levels of profits for corn farmers. On the other hand, atrazine contaminates the groundwater, possibly causing health problems for not only the corn farmers and their families but also for all downstream water users. Economists use a number of analytical tools to analyze trade-offs between economic benefits and environmental harm. Successful decision-making for individuals, firms, and governments involves understanding how to choose the "optimal" level of atrazine to apply to cornfields in the American Corn Belt.

1.1.4 Agricultural chemicals

The use of fertilizer and agricultural chemicals (such as atrazine, glyphosate [Roundup], and other herbicides, pesticides, and fungicides) has increased dramatically in the last 50 years. Environmentalists and others who are concerned about chemical residues in the food supply and in the domestic water supply have criticized the widespread use of almost all types of agricultural chemicals. As a result, the large agrochemical companies (Bayer, Dow, Novartis, Union Carbide, and others) are looking to diversify since environmental laws and regulations may impose higher costs on the producers of some agricultural chemicals in the future. Recent growth in the consumption of food produced without chemicals has led to large investments in organic food products by several large agribusiness corporations, including General Mills, Kraft/Heinz, ConAgra, and Gerber.

Each of these examples presents an issue that affects the lives of all consumers. Throughout the book, the main emphasis will be that consumers are the only source of profits in a market economy. Producers who are the best at providing consumers with what they want will earn the highest profits.

Economics can be helpful to those who want to understand the causes and consequences of these situations and events. These issues will be noted from time to time in later chapters. Economics helps provide improved understanding of our complex society, agriculture, and consumer choices. Economic principles and the framework of economic analysis lead to improved business, career, and personal decisions. The knowledge of just a few principles of economics allow for better decision-making.

The goal of this book is to help readers to "think like an economist." Throughout the book, simple economic principles will be applied to events and issues that appear in media outlets. Success in the rapidly changing global agricultural economy requires accurate information and the ability to recognize how the changes shape people's lives. Understanding economics often provides a context for dealing with current events, career decisions, and personal situations in a clear and precise manner.

It is important to note that the human condition is characterized by complex and sustained difficulties and problems. Economics improves our decision-making, but to date, it has not solved the fundamental problems of disease, shortages, and human limitations. However, many economists view recent history as a triumph of the economic way of thinking and a huge improvement in how long humans live and how well-off they are while they are alive. These upward trends are likely to continue, with solid economic decision-making guiding the way.

1.2 What is economics, and what is it about?

As has been mentioned, **economics** is a **social science** that centers on the study of humans as they act and interact in the marketplace. Economists study these actions and interactions. This section provides definitions and explanations of several economic concepts, then uses these ideas to provide a formal definition of economics.

1.2.1 Producers and consumers

Economists are particularly interested in how people produce and consume items such as food, clothing, housing, and a myriad of other things. Economists divide people into two broad groups: **producers** and **consumers**. Note, though, that many, perhaps most, people belong to both groups.

- ***Producer*** = an individual or firm that produces (makes; manufactures) a good or provides a service.

A **good** is a physical product such as a book or a hamburger, and a **service** is an intangible product such as a haircut, an insurance policy, or cell phone service.

- ***Consumer*** = an individual or household that purchases a good or a service.

These two groups of people are so important in economics that they have several names:

Producers = firms = business firms = sellers

Consumers = households = customers = buyers

Agricultural producers are individuals, families, or firms that grow and sell agricultural products. The products include field crops (including nonfood products such as cotton, tobacco, flax, and hemp) and animal products (including milk products, meats, wool, furs, and pelts).

A consumer is any person, firm, corporation, or institution who buys something. Consumers buy food items, such as pepperoni pizza and milk. They also buy clothing, houses, cars, cell phones, computers, and real estate. Consumers drive the economy since their purchases generate signals telling producers what products to place on the market.

As consumer preferences change, producers will earn profits from selling the goods that are most desired by consumers.

Most individuals are simultaneously producers and consumers. A wheat producer in North Dakota produces wheat and sells it to make a living. This same wheat producer buys food at the grocery store (whole-wheat bread), clothing (Wranglers), and perhaps a pickup truck (Ford). Even though most individuals are both producers and consumers, the lessons of economics are much more easily understood if the two roles are studied one at a time.

1.2.2 Macroeconomics and microeconomics

Economics divides into two major categories: **macroeconomics** and **microeconomics**.

- ***Macroeconomics*** = the study of economy-wide activities such as economic growth, business fluctuations, inflation, unemployment, recession, depression, and booms.
- ***Microeconomics*** = the study of individual decision-making units such as individuals, households, and firms.

This book is directed mainly to microeconomic behavior, or the actions and choices of individuals and individual firms. For example, it will consider issues surrounding how a feedlot owner reacts to a change in the price of cattle or the price of feed. This issue is a part of microeconomics since the feedlot is an individual decision-making unit—in this case, a business firm.

1.2.3 Positive and normative economics

As a social science, economics deals with topics of major consequence to public policy. There are many divergent opinions about issues such as immigration, the minimum wage, availability of health care, inflation, agricultural trade, welfare

(including Social Security), animal rights, environmentalism, trade wars with other nations, and the like.

Since economics deals with all of these issues, it is important to distinguish between value judgments, which are opinion statements, and neutral statements, which are factual and descriptive. The two categories of economics that keep the opinions in one box and the facts in another are **positive economics** (facts) and **normative economics** (opinions).

- ***Positive economics*** = based on factual statements. Such statements contain no value judgments. Positive statements describe "what is."
- ***Normative economics*** = based on statements that contain opinions and/or value judgments. A normative statement contains a judgment about "what ought to be" or "what should be."

QUICK QUIZ 1.1

Examine the following statements and determine which statements represent positive economics and which statements represent normative economics.

1 The market price of wheat is USD 3.82 per bushel.
2 The market price of cotton should be higher.
3 The market price of spinach should be higher.
4 Environmentalists have an increasing voice in agricultural policy.
5 Unemployment is a major economic issue.

Notice in the first three examples that price changes can be both good and bad at the same time. A price increase makes the producer of that good better off, while the consumer of that good is worse off. Similarly, when the price of oil increases, oil companies earn higher levels of profits. Meanwhile, agricultural producers who must purchase oil and petroleum-based products (gasoline, diesel, fertilizer, chemicals, etc.) are worse off. Thus, economists must be careful when making normative statements and normative judgments because "facts" have different implications for different persons. Economists attempt to eliminate normative statements from their economic discussions because what is good for one individual can be bad for another.

1.3 Scarcity

Economics is about **scarcity**. Scarcity means that there is less than the desired quantity of something. Scarcity reflects the idea that we live in a world of finite resources and unlimited wants and desires. Humans typically want more than the available quantity of money, material goods such as cars and trucks, football championships, higher grades, and time. The notion of scarcity applies to both material goods (computers and smart phones) and intangible goods (fame, respect). The result is that humans want more than they have.

- ***Scarcity*** = because resources are limited, the goods and services produced from using these resources are also limited, which means consumers must make choices, or trade-offs, among different goods.

An interesting issue related to scarcity is that the major religions of the world (Judaism, Christianity, Islam, and Buddhism) suggest that it is better to give than to receive. This important ethical principle seems to be in direct contradiction with the economic principle that "people always desire more." Mother Teresa was a Roman Catholic nun who devoted her life to helping the poorest of the poor in Calcutta, India. Mother Teresa won the Nobel Peace Prize in 1979 and was beatified to sainthood in 2013. Did Mother Teresa fall victim to the idea that "more is better than less?" Yes, even philanthropists would like to have more resources to feed the hungry and help the poor. The desire to have more than is currently available is a universal trait shared by peoples of all faiths and opinions.

Economists talk extensively about "goods." If a good is scarce, it becomes an **economic good**. A good that is scarce is one for which there is an unfilled desire such as fine foods, clothes, houses, time, and vacations. **Noneconomic goods** are not scarce: they are free goods available in any quantity to any people. A consumer can have as much as she wants at no cost. Watching a beautiful sunset is a noneconomic good, because it is free. Air is free because an unlimited quantity is available for all who want to consume it. However, air is not a free good in every circumstance. Mountain climbers, scuba divers, submariners, and test pilots would consume more air if it were free. Is the air in a lecture room totally free? Indirectly, it has a price since it requires heating or cooling before it reaches the lecture hall. Clean air is not always free: people who live in urban areas would like more clean air, if it were available.

The fundamental problem of economics is "**scarcity forces us to choose.**" **Economics** is often defined as "the allocation of scarce resources among competing ends." Scarcity constantly forces choices between what goods to buy, how to spend time, and which career goals to pursue. Economics is about making informed decisions. The study and use of economics allow individuals to make more informed personal, career, and business decisions.

1.4 The economic organization of society

There are many different forms of economic organization, or different ways that a society (usually a nation) can use to organize its economic activity. Three fundamental ways of organizing an economy include (1) a **market economy** (capitalism, free markets); (2) a **command economy** (dictatorship, communism); and (3) a **mixed economy** (a combination of a market economy and a command economy). These three forms of economic organization are described in this section. However, a quick diversion is needed to define and explain **resources**.

1.4.1 Resources

An economy must find a suitable way to allocate resources. But what qualifies as a resource that requires allocation? **Resources** are productive items used to produce

Table 1.1 Resource names and definitions

1.	Land (A)	Natural and biological resources, climate.
2.	Labor (L)	Human resources.
3.	Capital (K)	Manufactured resources, including buildings, machines, tools, and equipment.
4.	Management (M)	The entrepreneur, or individual, who combines the other resources into outputs.

the goods and services that satisfy human wants and needs. Resources, together with the letter abbreviation used by most economists, are classified and listed in Table 1.1. These groups of resources appear in every kind of economy.

A **market economy** is an economic organization in which prices determine how resources and goods are allocated. Consumers in a market economy make purchasing decisions based on the price of goods and the money available to them. If the price of chicken increases, some consumers will eat fewer chicken products. Similarly, in a market economy, producers use prices to determine what to produce. If the price of wheat increases relative to soybeans and corn, farmers will plant more acres to wheat than they did previously. In a market system, prices drive the entire economy by conveying value, or by telling how much things are worth to producers and consumers. In a free market economy (capitalism), resources are allocated to the use that brings the highest returns. Crops are grown in California's Great Central Valley, but in the bordering foothills of the Sierra Nevada Mountains, the land is too rocky and too steep for crops. Instead, the foothill land is devoted to grazing, which provides the highest return to this rocky area. Prices allocate resources; prices affect the incentives and behavior of both producers and consumers.

In a **command economy**, resources do not automatically flow to the producer earning the highest return or to the consumer who can pay the most for the product. Resources are allocated by whoever is in charge. Examples of command economies include Cuba, where resources are allocated by a dictator, and the former Soviet Union, where high-ranking members of the Communist Party used an elaborate committee system to decide how resources would be allocated. In many socialist countries such as Sweden, resources are allocated by an elected group of decision-makers. However, a dictator who has complete control of the economic system could direct the use of resources. In either case, resources are allocated according to the discretion of a generally small group of decision-maker(s), and decisions are made by considerations other than price. Resources don't always flow to the use that brings the highest return. The people who live in a command economy may desire more fruits and vegetables. If the government's goals are different from the citizens' goals, then these fruits and vegetables will not be produced. The land, labor, and other resources may be used in the production of beef or pork, rather than fruits and vegetables. The economic returns to producing crops may be higher, but it is up to the decision-making group to decide whether to produce fruit, vegetables, or meat.

Examples of market-based economies that are characterized by both political and economic freedom include the US, Australia, Canada, Japan, and the members

of the EU. Nations that do not share political and economic freedom include North Korea and Cuba. China has been moving toward a market-based economy since the 1980s, with enormous growth in economic output and incomes as a result.

Most economic systems are **mixed economies** that have elements of both market economies and command economies. The US has many markets that are free from government intervention. However, industries such as agriculture, transportation, and banking are regulated and often subsidized. Therefore, the economy of the US is a mixed economy, although the nation prides itself on being a capitalist democracy. For many years the former Soviet Union (now Russia) and China were both considered to be command economies, where elected officials planned what goods were to be produced and who would get the products. However, beginning in the 1980s, changes in both countries moved their economic systems toward free markets, particularly in agriculture. The economies of these two nations are mixed economies, with elements of both market economies and command economies.

So all real-world economies are a mixture of free market and command economies. The economic principles in this book are primarily oriented to markets since markets organize and allocate most resources in the United States.

1.5 A model of an economy

The model developed here describes any economy: market, command, or mixed. The individuals in the economy are divided into two categories: firms (producers) and households (consumers). In a subsistence economy, like an individual stranded on a remote island, producers and consumers are the same people: they must consume only what they produce. If there is no trade, the individuals have to produce all of their own food, clothing, and housing.

The major feature of a market economy is voluntary exchange. Producers and consumers are not forced to buy or sell anything. Even though this is true, the goods and services that consumers wish to purchase and consume must be produced. Resources are used to produce output. **Resources** are also called **inputs, factors of production**, or **factors** (economists use these terms interchangeably).

Table 1.2 shows the resources used to produce agricultural products. The model shown in Figure 1.1 is a simplified version of the real world. The real world is

Table 1.2 Agricultural resources

Inputs = Resources = Factors = Factors of production		*Payments*
1.	Land (A)	rent
2.	Labor (L) = operators, family, hired	wages, salaries
3.	Capital (K) = machines, buildings, tools, and equipment	interest
4.	Management (M)	profit

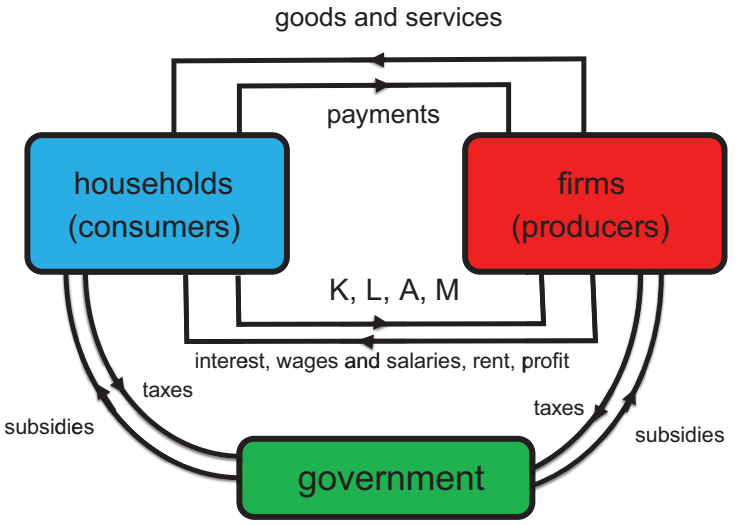

Figure 1.1 Circular flow diagram of economic activity

extraordinarily complex, so we must simplify it to understand it. One of the key elements of science is simplification or modeling, also known as "reductionism." The model shown in Figure 1.1 fits with this need to use science to understand human behavior.

The arrows in Figure 1.1 show the flow of goods and services between households and firms. The two arrows across the top of the diagram show the movement of goods and services from producers (firms) to consumers (households). Households make payments to the firms to take possession of goods and services. In order to produce goods, firms must use **inputs** (also called resources, factors, and factors of production). These resources are supplied by households and include **capital** (K), **labor** (L), **land** (A), and **management** (M). Capital is produced wealth that is used in further production. In economics, the term "**capital**" refers to physical capital, such as machines, tools, buildings, and equipment. This contrasts with the typical use of the term "capital" used to describe financial capital, or money.

Firms make payments to households for the use of inputs. Interest pays for capital, wages and salaries pay for labor, rent pays for land, and profits are the payment to management.

If the lower box labeled "government" were omitted from Figure 1.1, the model would be one of a pure market economy. All real-world economies, however, include some form of government activity. Adding government to Figure 1.1 converts a market economy to a mixed economy. Both business firms and households must pay taxes to fund the government sector, and legislation allows the government to make payments to selected households and firms. These subsidies include payments to family farms, welfare checks to low-income households, schools, transportation, the postal system, and scores of other types of payments.

1.6 Trends in the agricultural economy

The main objective of this book is to show how economic knowledge (models, theories, and methods) can assist in the understanding of agriculture. Some background information about modern agriculture in the US is helpful. Five trends affecting the agricultural industry are especially important and are presented before returning to the study of economics. Here is a synopsis.

1.6.1 Fewer and larger farms

Farm numbers continue to decline. The ongoing consolidation of small farms into larger units is primarily due to technological change, including mechanization, the use of agricultural chemicals and fertilizers, and improved seeds. These changes allow for large farms to have lower costs per unit of production than small farms. Lower production costs on large-scale operations relative to small farms has resulted in huge consolidation of farms and changes in the structure of agriculture, especially during the past half century. Farms have become fewer in number but larger and more productive.

1.6.2 Agriculture is not just farming

Production agriculture presently employs approximately 1.4 percent of the US workforce, but the food and fiber industry, which includes processing, transport, retailing, and dozens of other things, requires approximately 14.6 percent. Although it is true that "everyone eats food," the number of persons involved in production agriculture has decreased steadily over the last century.

BOX 1.4

The farm share of the US food dollar

Farmers and ranchers in the US receive 16 cents of every dollar consumers spend on food at home and away from home. The remaining 84 cents include food processing, packaging, transportation, food retailing, food service, energy, finance and insurance, advertising, legal and accounting costs, and other costs associated with making agricultural products meet the needs of consumers. This statistic can be controversial. Some individuals and groups suggest that farmers should receive a greater proportion of retail food prices. Some claim that the farmer's share of the food dollar reflects farmer profitability and/or well-being. Others use the statistic as evidence that processors and other food supply chain firms are "anticompetitive," or exert monopoly power. Agricultural economists have warned against these claims for many decades.

They suggest that these arguments are a misinterpretation of the farm share of the food dollar statistic.

The farm value of the food dollar reflects the "value-added" nature of food products that consumers desire. Raw fruits and vegetables, for example, would have a high farm share of retail prices relative to highly processed food products. However, even fruits and vegetables require transportation and grocery store costs of making the produce available at the times and locations where consumers desire them. Highly processed food products require higher levels of inputs. Making, packaging, and selling a frozen lasagna dinner incurs many costs beyond the cost of the raw (farm level) food. More processing leads to more value added. Coffee beans sold in the US would have a higher farm share of the cost than a low-fat, decaffeinated, double-shot latte.

Over time, consumer desires for more processed products have resulted in a smaller farm share of retail food prices. Profitability in agriculture stems from efficiency in the agricultural sector as it meets consumer demand in a dynamic economy, rather than the share of agricultural products in the food we eat.

Source: Economic Research Service (ERS), United States Department of Agriculture, (USDA/ERS) Food Dollar Series www.ers.usda.gov/data-products/food-dollar-series.aspx. Retrieved September 29, 2022.

1.6.3 Substitution of capital for labor

Over the past several decades, there has been an enormous movement toward mechanization, which has replaced agricultural workers with machines. This trend stems from changes in relative prices. If it is less expensive to use machines than labor, machines will be used. For example, specialized machines are used to pick cotton. These are expensive pieces of equipment, but using them is much less costly than using large crews of workers to pick the cotton by hand. The fast-food giant McDonald's hires thousands of laborers at low wages. If there is an increase in the minimum wage, McDonald's will use more machinery and hire fewer workers to operate the automatic french fry machines and drink dispensers.

1.6.4 Off-farm income for farm families has increased

In earlier years, farming was the sole source, or at least the major source, of income for most farm families. In today's agricultural economy, most farm families rely not only on income from agricultural sources but also on income from nonfarm jobs or investments. Typically, one individual in the family will do the farm work, while another will work in a nonfarm position. With this arrangement, a farm

family's total income will not be dependent on highly variable farm income alone. On average, farm families in the US have higher levels of income and wealth than nonfarm families.

BOX 1.5

Agrotourism

Agrotourism (also called agritourism) is any agricultural-based activity that hosts visitors, or tourists. Agrotourism is a growth industry and has become an important strategy to enhance incomes and the potential economic viability of small farms and rural economies. Growth in this type of niche tourism has been spurred by a large increase in consumer desire to learn more about how food is produced. Farmers and ranchers can use this growing interest in food to attract customers to their operation, educate nonfarmers about agriculture, and earn additional revenue by providing a service in high demand. Agrotourism is growing worldwide and includes picking fruits and vegetables, riding horses, tasting honey or lavender, learning about wine and cheese making, and shopping in agriculture-related gift shops.

Source: USDA. "Know Your Farmer, Know Your Food." www.usda.gov/sites/default/files/documents/KYFCompass.pdf. Retrieved September 29, 2022.

1.6.5 Exports are increasingly important to the agricultural sector

The nation's ability to produce ever-larger amounts of food has increased as a result of biological breakthroughs, mechanization, and improvements in management. The production of food has grown more rapidly than the domestic consumption of food. The US has responded by exporting more and more food to consumers in other nations. This trend has made trade policy for food and agricultural products of vital importance to the profitability and sustainability of farmers across the globe, as will be discussed and analyzed in what follows. Trade barriers such as tariffs decrease agricultural exports and lower farm-sector profits.

1.6.6 Demand for fresh fruit and vegetables

As incomes increase, consumers will demand more high-quality goods. In the case of food, fresh fruit and vegetables are considered better tasting and more nutritious. There has been a large increase in the demand for fresh fruit and vegetables. Organic products have been characterized by large profits as consumer demand has grown.

BOX 1.6

Value-added agriculture and consumer focus

In a free market economy, consumers are the only source of profits for a business firm. This is true in food and agriculture since consumers are free to purchase any type of food that they desire. Therefore, to "add value" means to provide a good or service that increases value for the customer. A successful business creates and provides value to customers.

Value-added agriculture increases the value of agricultural goods by increasing consumers' willingness to pay a premium over the price for similar but undifferentiated products. These efforts could include improving a production or marketing process to differentiate the good by making it special. Cosmic Crisp apples are an example, along with organic, natural non-GMO, gluten-free, and other special categories that consumers are willing to pay for. Value-added investments can be highly profitable by penetrating into a new high-value market by creating brand identity or brand loyalty. Value-added agriculture has been subsidized since 2000 by the Value Added Producer Grant Program (VAPG), which provides grants to individual agricultural producers for the development and marking of new or enhanced value-added agricultural production.

Source: "What is Value-Added Agriculture?" www.agmrc.org/business_development/valueadded_agricutlure/what-is-value-added-agriculture. Retrieved September 29, 2022.

1.7 Using graphs

Graphs are often used to summarize and interpret economic information. Graphs can communicate a great deal of information in a small space, which makes them useful tools to see the most important aspects of a situation or decision. A graph is a "model," and economic analysis is often an exercise in modeling. Graphs simplify the presentation of data, and social scientists must simplify the real world in order to understand it.

Most graphs allow the viewer to look at the relationship between two variables while holding everything else constant. Holding all other things constant has a special name: ***ceteris paribus*** (Latin for "holding all else constant"). Much of economics has to do with understanding the relationship between two variables. One of the most important concepts in economics is the demand curve. The demand curve shows the relationship between the price (P) and the quantity purchased (Q) of an economic good. A graph isolates the relationship between price and quantity while all else (time, place, prices of other goods, income, etc.) is held constant (*ceteris*

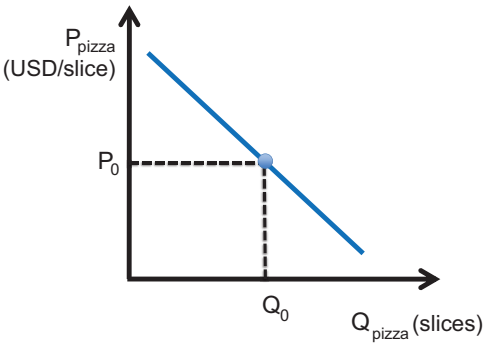

Figure 1.2 The demand for pizza

paribus). The two variables, price and quantity, can be shown simultaneously on a two-dimensional surface such as the chalkboard or a computer screen.

In economics, the horizontal axis along the bottom of graph (the "x-axis") measures the value of one variable. In Figure 1.2, the quantity of a good (Q) is the measured variable on the x-axis. The numerical value of a second variable is measured from bottom to top along the vertical axis (the "y-axis") on the left-hand side of the graph.

The graph cannot be understood unless each axis has two items: **LABELS** and **UNITS**. In Figure 1.2, the label for quantity is Q (pizza) and the units are slices. The label for price is P and the units are (USD/slice). Units are typically placed in parentheses.

To understand the graph, for a given number of pizza slices (Q_0), the price of pizza is equal to P_0. As the price of pizza increases, the quantity demanded of pizza decreases.

1.8 Absolute and relative prices

In a market economy, prices determine the decisions made by producers and consumers. Producers and consumers do not use a single price to make decisions, but rather the price of one good relative to the price of other goods that is important.

1.8.1 The difference between absolute and relative prices

- ***Absolute Prices*** = a price in isolation, without reference to other prices. Example: the price of wheat is USD 6/bushel.
- ***Relative Prices*** = the prices of goods relative to each other. Example: the price of wheat increased relative to the price of corn.

The fact that the market price of wheat is equal to USD 6/bushel does not have much meaning when making a production decision about which crop to plant.

Producers need to know the price of wheat relative to the price of alternative crops such as corn, cotton, and hay. This is because it is possible for the farmer to use the land to produce an alternative crop. The farmer desires to earn the highest possible level of profit on this land, so a good economic decision is one that considers the relative prices of all crops that can reasonably be grown on the land. In general, producers will react to a relative price increase by producing more of a good since they will earn higher levels of profit by doing so. Consumers, on the other hand, will react to a price increase by buying less of a good.

Producer and consumer reactions to price changes are central to the lessons of economics. Later chapters will help explain how producers and consumers react to price changes. The following intuition will help in understanding economics.

Producers prefer higher prices of the goods that they produce.

Consumers prefer lower prices for the goods that they purchase.

Suppose that due to an increase in oil prices, all crop prices increase the same percentage. In this case, the relative prices for all crops remain the same, even though their absolute prices increase. All of the prices moved up together, so the relative prices all remained constant.

Consider the following statement: if all prices in an economy doubled, nothing would happen. At first glance, this does not seem to make sense. However, if it is known that all of the prices in the entire economy increased by the same percentage amount, in this case doubled, then relative prices remained constant, so producers and consumers would not change their decisions. Everything would cost the same relative to everything else.

Additional information suggests that if inflation were 10 percent for all goods in the economy, then the prices of everything would increase by 10 percent. This would be true for all goods, including labor services, so wages and salaries would increase by the same amount as the prices for goods. Nothing would happen, because all items in the economy would retain the same relative value. However, if oil prices were to increase due to a war in Ukraine, then consumers would use less oil and more energy from other sources. To summarize, absolute prices are accounting devices, whereas relative prices are responsible for actual decisions.

BOX 1.7

Inflation in agriculture

Inflation is simply a general rise in the prices of goods and services. Inflation is measured by the consumer price index (CPI), calculated each month by the Bureau of Labor Statistics (BLS), based on changes in the prices of thousands of goods and services. Inflation, or price increases, has been in the background for a long period.

From 2000 to 2020, the average annual rate of inflation was approximately 2 percent. This rate is considered by economists and business leaders to be acceptable and desirable, to help drive consumption and economic growth.

In 2020, high rates of inflation became common. The CPI reported that consumer price increased by 7 percent in 2020, returning the US and global economies to rates that prevailed in the 1970s and early 1980s.

Inflation is both good and bad for agricultural producers since both output prices (wheat, corn, beef) and input prices (labor, chemicals, fertilizer) increase. Inflation reduces the purchasing power for both producers and consumers. For example, if a beef producer gains additional revenue from beef price increases of 3 percent, her net revenues would decrease if input prices increased by 5 percent. Farm credit is also affected by inflation since the cost of borrowing increases.

Inflation can also adversely affect international trade for exported goods due to changes in exchange rates between nations. If the value of the US dollar appreciates relative to other currencies, US agricultural exports become more expensive relative to the same commodities produced and sold by other nations.

Source: Snell, W. "Inflation-'Good' or 'Bad' for Agricultural Producers and Consumers?"

agecon.ca.uky.edu/inflation-%E2%80%93-%E2%80%9Cgood%E2%80%9D-or-%E2%80%9Cbad%E2%80%9D-agricultural-producers-and-consumers. Retrieved January 2, 2023.

1.8.2 Price units

The units used to express prices are crucial to understanding how producers and consumers behave. The price of a good is not just a number of dollars, it is dollars per unit (USD/unit). The price of bread at Walmart is not just USD 1, but rather it is USD 1/loaf. The following list shows other examples.

Bread	USD 2/loaf
Wheat	USD 7/bushel
Pizza	USD 15/large pizza
Blue jeans	USD 60/pair
Car	USD 23,000/car

Prices are not expressed in dollars alone. Rather, prices are expressed in **dollars per unit**.

1.8.3 Constant-quality prices

The price of a good refers to constant-quality units. It means very little to say "a pair of jeans" or "a large pizza." The statement must be more specific. Fortunately, specific qualities are often used in everyday conversation. For example, "I sold two pens of cattle," or "Ten thousand cars were sold today," or "Five billion bushels of wheat were exported to Russia in February." Such specific statements tell exactly the type of good under discussion. Other examples are as follows:

"I sold two pens of heifers of average quality."
"Ten thousand Jaguars were sold last month."
"Five billion bushels of US #2 Hard Red Winter Wheat were exported in February."

Once again, a simplified real-world example describes what is happening.

1.9 Examples of graphs

1.9.1 A graph of the demand for hamburger in Miami, Florida

The demand (consumption) for hamburger is easily described using mathematics. How do consumers respond to a change in the price of hamburger in Miami, Florida? The numbers in the demand schedule in Table 1.3 show the relationship between the price of hamburger and the quantity of hamburger purchased in Miami's grocery stores.

The units are of constant quality. Specifying constant quality means that the entire quantity of hamburger in Table 1.3 is of the same quality. The units used

Table 1.3 Hamburger demand schedule in Miami, Florida

Price (USD/lb)	*Quantity purchased* (1,000 lb)
2.30	0
2.10	20
1.90	40
1.70	60
1.50	80
1.30	100
1.10	120
0.90	140
0.70	160
0.50	180
0.30	200
0.10	220
0 (free!)	230

for the hamburger price are dollars per pound (not just dollars) P = USD/lb. In this example the units for the quantity of hamburger is assumed to be 1,000 pounds, or Q = 1,000 lb. Figure 1.3 has both labels and units on each axis.

QUICK QUIZ 1.2

What are the labels and units in Figure 1.3?

As fewer pounds of hamburger are placed on the market in Miami, consumers are willing to pay a higher price for it. This is due to scarcity. The lower the availability of something, the more valuable that it is, *ceteris paribus*. Figure 1.3 demonstrates the relationship between the price and quantity of hamburger, and nothing else. Everything else is held constant.

The graph simplifies the real world by omitting many otherwise important details. For example, if wages in Miami increase, will more hamburger be sold? Answering this question requires knowledge of income levels and how they are associated with changes in the consumption of hamburger. In addition, the demand for hamburger is seasonal. People buy more hamburger during the summer months for outdoor cooking. This is ignored in the graph. In this example, as in other cases, simplification helps ease understanding.

Photo 1.3 Hamburger demand in Miami, Florida

Source: Shutterstock

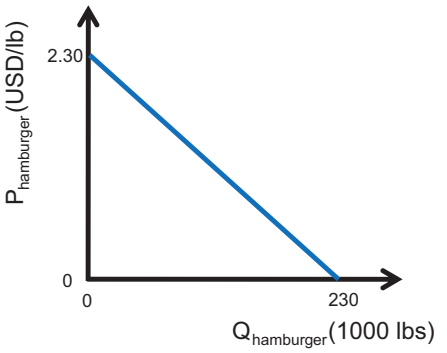

Figure 1.3 The demand for hamburger in Miami, Florida

1.9.2 The slope of a line

The same information can be viewed in a slightly different way using algebra. A **function** relates two variables, say x and y. The function y = f(x) reads as "y is a function of x." The variable x is called the independent variable since the value of x does not depend on any other variable. The y variable is called the dependent variable since the value of y depends on the value that x takes. Restated, x causes y.

x = independent variable.
y = dependent variable.

The expression y = f(x) is a general function that could take any form, linear or nonlinear. A more specific functional form is the linear form, which just means that the relationship between the two variables is a straight line. The linear functional form is as follows:

1.1 $y = b + mx$.

This can be read, "y is a function of x, where b is the y-intercept, and m is the slope." Armed with this simple algebra, the demand for hamburger in Miami becomes an equation, where P is the price of hamburger in dollars per pound, and Q is the number of 1,000 lb units of hamburger purchased in Miami:

1.2 $P = 2.30 - 0.01Q$.

The demand for hamburger in Miami can be graphed using a different method. First, calculate the slope of hamburger demand in Miami. The slope is the rate at which a relationship increases or decreases. The slope is sometimes called the "rise over the run," or the "change in y divided by the change in x." In the hamburger case, the object is to find how much the price changes when the quantity of

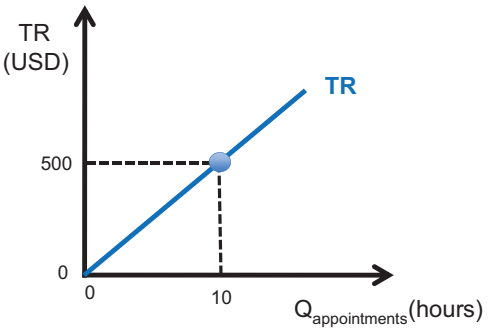

Figure 1.4 Total revenues for a veterinary clinic in Milwaukee, Wisconsin

hamburger purchased changes. The symbol for change is a Greek letter delta: Δ. The slope is equal to the following:

1.3 $\Delta y / \Delta x = \Delta P / \Delta Q$.

In the case of hamburger in Miami in Figure 1.3, the slope equals: –2.30 / 230 = –0.01. Therefore, the slope of the demand line (m) equals –0.01, and the y-intercept (b) equals 2.30. This can be seen in the equation of the line P = 2.30 – 0.01Q. The graph of this economic relationship can be derived from either the demand schedule or the equation of the line.

1.9.3 Example: veterinary clinic in Milwaukee, Wisconsin

Suppose a veterinarian charges USD 50 for a 60-minute appointment in her clinic next to the brewery in Milwaukee. The vet's total revenue (TR) is equal to the number of appointments (Q) multiplied by the price of an appointment (P = USD 50/hour):

1.4 $TR = P * Q = 50 * Q$.

This economic relationship is a linear relationship, as shown in Figure 1.4. The slope of the line (m) equals 50, and the y-intercept equals zero.

The units for total revenue (TR) are in dollars because the price P is in dollars per hour (USD/hr), and it has been multiplied times the quantity, in hours (hr). The dollars represented by TR are the bills found in the clinic's cash register at the end of the working day.

When carefully drawn, graphs are useful tools to help organize thoughts about economic relationships. Good graphics require that every axis must include **labels** and **units**. Also, prices are always in USD/unit, not just in dollars, and the units are constant-quality units. Several of the concepts discussed in this chapter will be used throughout the course. Since the content of this book is cumulative (all new

concepts build on old concepts), students who learn each concept in the beginning will have a huge advantage as the book progresses. Chapter 2 introduces the concept of production, or how we turn inputs (resources) into economically useful outputs (goods).

1.10 Chapter 1 Summary

1 Economics is important and interesting.
2 Economics helps us make better business, career, and personal decisions.
3 The goal of this book is to help the reader learn to "think like an economist." Thinking like an economist provides a framework for understanding economic events, career decisions, and personal situations in a clear and precise manner.
4 Economics is a social science, which is the study of human behavior.
5 A producer is an individual or firm that produces (makes; manufactures) a product.
6 A consumer is an individual or household that purchases a product.
7 Individuals are both producers and consumers.
8 Macroeconomics is the study of economy-wide activities or events.
9 Microeconomics is the study of individual decision-making units.
10 Positive economics is based on statements that are factual and contain no value judgments ("what is").
11 Normative economics is based on statements that contain opinions or value judgments ("what should be").
12 Price increases help producers and hurt consumers, whereas price decreases help consumers and hurt producers.
13 Economics is about scarcity. Scarcity means that there is less of something than is desired.
14 An economic good is any good whose quantity cannot expand without an increase in price.
15 A noneconomic good is a good that is not scarce (a free good).
16 Scarcity forces us to choose. We can't have everything that we want.
17 Economics is the allocation of scarce resources among competing ends.
18 A market economy is an economic organization in which prices determine how resources and goods are allocated (capitalism, free markets).
19 A command economy is an economic organization in which resource allocation is determined by whoever is in charge (dictatorship, communism, socialism).
20 A mixed economy has elements of both a market economy and a command economy.
21 Resources are productive items used to produce goods and services to satisfy human wants and desires. Resources include land (A), labor (L), capital (K), and management (M).
22 Firms combine resources (K, L, A, and M) to produce goods and services. Consumers make payments to firms to obtain goods and services.
23 The agricultural economy is changing rapidly. Important trends include (1) fewer and larger farms, (2) agriculture is not just farming, (3) substitution

of capital for labor, (4) rapid increases in off-farm income, (5) exports are increasingly important, and (6) an increase in the demand for fresh fruits and vegetables.

24 Graphs are useful tools to summarize and interpret information.

25 Absolute prices refer to a single price level, whereas relative prices refer to the prices of goods relative to (compared to) each other. The economic decisions of producers and consumers depend on relative prices.

26 Prices of goods are expressed in constant-quality prices.

27 Every graph must have units and labels on each axis.

1.11 Chapter 1 Glossary

Absolute Price—A price in isolation, without reference to other prices. Example: the price of wheat is USD 3/bushel (see **Relative Prices**).

Agricultural Economics—Economics applied to agriculture and rural areas.

Agriculture—The science, art, and business of cultivating the soil, producing crops, and raising livestock useful to humans. Farming.

Capital—Produced wealth that is used in further production. In economics, physical capital includes machinery, buildings, tools, and equipment.

Ceteris Paribus—Latin for "holding all else constant." An assumption used to simplify the real world.

Command Economy—A form of economic organization where resources are allocated by whoever is in charge, such as a dictator or an elected group of officials (see **Market Economy** and **Mixed Economy**).

Consumer—An individual or household that purchases a good or a service.

Economic Good—A good that is scarce (see **Noneconomic Good**).

Economics—The study of the allocation of scarce resources among competing ends.

Factors—Inputs provided by nature and modified by humans who use technology to produce goods and services that satisfy human wants and desires. Also called **inputs, factors of production**, or **factors**. Resources include **capital** (K), **labor** (L), **land** (A), and **management** (M).

Factors of Production—Inputs provided by nature and modified by humans who use technology to produce goods and services that satisfy human wants and desires. Also called **inputs, factors of production**, or **factors**. Resources include **capital** (K), **labor** (L), **land** (A), and **management** (M).

Free Trade Agreement—Agreements between nations to reduce or eliminate **trade barriers**.

Good—An **economic good**.

Macroeconomics—The study of economy-wide activities such as economic growth, business fluctuations, inflation, unemployment, recession, depression, and booms (see **Microeconomics**).

Market Economy—A form of economic organization in which resources are allocated by prices. Resources flow to the highest returns in a free market system (see **Command Economy** and **Mixed Economy**).

Microeconomics—The study of the behavior of individual decision-making units such as individuals, households, and firms (see **Macroeconomics**).

Mixed Economy—A form or economic organization that has elements of both a **market economy** and a **command economy**.

Noneconomic Good—A good that is not scarce; there is as much of this good to meet any demand for it. A free good (see **Economic Good**).

Normative Economics—Based on statements that contain opinions and/or value judgments. A normative statement contains a judgment about "what ought to be" or "what should be" (see **Positive Economics**).

Positive Economics—Based on factual statements. Such statements contain no value judgments. Positive economic statements describe "what is" (see **Normative Economics**).

Producer—An individual or firm that produces (makes; manufactures) a good or provides a service.

Relative Price—The prices of goods relative to each other. Example: the price of wheat increased relative to the price of corn (see **Absolute Price**).

Resources—Inputs provided by nature and modified by humans who use technology to produce goods and services that satisfy human wants and desires. Also called **inputs, factors of production**, or **factors**. Resources include **capital** (K), **labor** (L), **land** (A), and **management** (M).

Scarcity—Because resources are limited, the goods and services produced from using those resources are also limited, which means consumers must make choices, or trade-offs, among different goods.

Service—A type of economic good that is not physical. For example, a haircut or a phone call is a service, whereas a car or a shirt is a good.

Social Science—The study of society and of individual relationships in and to society, generally regarded as including sociology, psychology, anthropology, economics, political science, and history.

Trade Barriers—Laws and regulations to restrict the flow of goods and services across international borders, including tariffs, duties, quotas, and import and export subsidies.

1.12 Chapter 1 Review questions

1 Economics is

a an agricultural science
b a social science
c a physical science
d not a science, but a field of study

2 A producer is

a a person who purchases a product
b the seller of a product
c the buyer of a product
d a good sow

3 A consumer is all of the following except

a a buyer
b a household
c a customer
d a firm

4 A North Dakota wheat farmer is an example of a

a producer
b consumer
c both a and b
d neither a nor b

5 The study of growth in Mexico's level of living is an example of

a macroeconomics
b microeconomics
c political science
d consumer behavior

6 The study of how a single beef producer uses growth hormones is an example of

a macroeconomics
b microeconomics
c biological science
d consumer behavior

7 The statement "the market price of soybeans is USD 4.50 per bushel" is an example of

a positive economics
b normative economics
c a value judgment
d consumer behavior

8 The statement "the price of wheat should be higher" is an example of

a positive economics
b normative economics
c a factual statement
d consumer behavior

9 If the price of wheat rises, who is made better off?

a producers
b consumers
c both a and b
d neither a nor b

10 An increase in the price of wheat is good for

a wheat producers
b milling and baking firms
c bread consumers
d cattle producers

11 Scarcity affects

a industrial firms
b agricultural producers
c Internet users
d everyone

12 Scarcity

a reflects limited resources and unlimited desires
b affects religious persons
c forces us to choose
d all of the above

13 An example of an economic good is

a a cookie
b pollution
c garbage
d disease

14 The following is a noneconomic good

a a cookie
b a sunset
c a football
d a Lexus automobile

15 In a market economy, resources are allocated by

a prices
b whoever is in charge
c an elected group of officials
d a disaster

16 The United States is an example of:

a a command economy
b a market economy
c a mixed economy
d none of the other three answers

17 What percent of the US population is engaged in production agriculture?

a 16
b 4
c 2
d 25

18 If the price of corn increases relative to the price of other crops, *ceteris paribus*:

a farmers will plant more corn
b farmers will plant less corn

c farmers will plant the same amount of corn
d a corn consumer will purchase more corn

19 If the prices of all crops increase, then

a farmers will plant more corn
b farmers will plant less corn
c farmers will plant the same amount of corn
d a corn consumer will purchase more corn

20 The price of corn is written in which form?

a USD 2
b USD 2/bushel
c 2 bushels
d 2 bushels/USD

Answers: 1. b, 2. b, 3. d, 4. c, 5. a, 6. b, 7. a, 8. b, 9. a, 10. a, 11. d, 12. d, 13. a, 14. b, 15. a, 16. c, 17. c, 18. a, 19. c, 20. b

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