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## INTRODUCTION

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### WHAT IS ECONOMICS?

Economics is the study of how individuals and societies make choices subject to constraints. The need to make choices arises from *scarcity*. From the perspective of society as a whole, scarcity refers to the limitations placed on the production of goods and services because *factors of production* are finite. From the perspective of the individual, scarcity refers to the limitations on the consumption of goods and services because of limited personal income and wealth.

Definition: Economics is the study of how individuals and societies choose to utilize scarce resources to satisfy virtually unlimited wants.

Definition: Scarcity describes the condition in which the availability of resources is insufficient to satisfy the wants and needs of individuals and society.

The concepts of scarcity and choice are central to the discipline of economics. Because of scarcity, whenever the decision is made to follow one course of action, a simultaneous decision is made to forgo some other course of action. Thus, any action requires a sacrifice. There is another common admonition that also underscores the all pervasive concept of scarcity: if an offer seems too good to be true, then it probably is.

Individuals and societies cannot have everything that is desired because most goods and services must be produced with scarce productive resources. Because productive resources are scarce, the amounts of goods and services produced from these ingredients must also be finite in supply. The concept of scarcity is summarized in the economic admonition that

there is no “free lunch.” Goods, services, and productive resources that are scarce have a positive price. Positive prices reflect the competitive interplay between the supply of and demand for scarce resources and commodities. A commodity with a positive price is referred to as an *economic good*. Commodities that have a zero price because they are relatively unlimited in supply are called *free goods*.<sup>1</sup>

What are these scarce *productive resources*? Productive resources, sometimes called *factors of production* or *productive inputs*, are classified into one of four broad categories: *land*, *labor*, *capital*, and *entrepreneurial ability*. Land generally refers to all natural resources. Included in this category are wildlife, minerals, timber, water, air, oil and gas deposits, arable land, and mountain scenery.

Labor refers to the physical and intellectual abilities of people to produce goods and services. Of course, not all workers are the same; that is, labor is not homogeneous. Different individuals have different physical and intellectual attributes. These differences may be inherent, or they may be acquired through education and training. Although the Declaration of Independence proclaims that everyone has certain unalienable rights, in an economic sense all people are not created equal. Thus some people will become fashion models, professional athletes, or college professors; others will work as clergymen, cooks, police officers, bus drivers, and so forth. Differences in human talents and abilities in large measure explain why some individuals’ labor services are richly rewarded in the market and others, despite their noble calling, such as many public school teachers, are less well compensated.

Capital refers to manufactured commodities that are used to produce goods and services for final consumption. Machinery, office buildings, equipment, warehouse space, tools, roads, bridges, research and development, factories, and so forth are all a part of a nation’s capital stock. Economic capital is different from *financial capital*, which refers to such things as stocks, bonds, certificates of deposits, savings accounts, and cash. It should be noted, however, that financial capital is typically used to finance a firm’s acquisition of economic capital. Thus, there is an obvious linkage between an investor’s return on economic capital and the financial asset used to underwrite it.

In market economies, almost all income generated from productive activity is returned to the owners of factors of production. In politically and economically free societies, the owners of the factors of production are collectively referred to as the household sector. Businesses or firms, on the

<sup>1</sup> Is air a free good? Many students would assert that it is, but what is the price of a clean environment? Inhabitants of most advanced industrialized societies have decided that a cleaner environment is a socially desirable objective. Environmental regulations to control the disposal of industrial waste and higher taxes to finance publicly mandated environmental protection programs, which are passed along to the consumer in the form of higher product prices, make it clear that clean air and clean water are not free.

other hand, are fundamentally activities, and as such have no independent source of income. That activity is to transform inputs into outputs. Even firm owners are members of the household sector. Financial capital is the vehicle by which business acquire economic capital from the household sector. Businesses accomplish this by issuing equity shares and bonds and by borrowing from *financial intermediaries*, such as commercial banks, savings banks, and insurance companies.

Entrepreneurial ability refers to the ability to recognize profitable opportunities, and the willingness and ability to assume the risk associated with marshaling and organizing land, labor, and capital to produce the goods and services that are most in demand by consumers. People who exhibit this ability are called *entrepreneurs*.

In market economies, the value of land, labor, and capital is directly determined through the interaction of supply and demand. This is not the case for *entrepreneurial ability*. The return to the entrepreneur is called *profit*. Profit is defined as the difference between total revenue earned from the production and sale of a good or service and the total cost associated with producing that good or service. Although profit is indirectly determined by the interplay of supply and demand, it is convenient to view the return to the entrepreneur as a residual.

### OPPORTUNITY COST

The concepts of scarcity and choice are central to the discipline of economics. These concepts are used to explain the behavior of both producers and consumers. It is important to understand, however, that in the face of scarcity whenever the decision is made to follow one course of action, a simultaneous decision is made to forgo some other course of action. When a high school graduate decides to attend college or university, a simultaneous decision is made to forgo entering the work force and earning an income. Scarcity necessitates trade-offs. That which is forgone whenever a choice is made is referred to by economists as *opportunity cost*. That which is sacrificed when a choice is made is the next best alternative. It is the path that we would have taken had our actual choice not been open to us.

Definition: Opportunity cost is the highest valued alternative forgone whenever a choice is made.

### MACROECONOMICS VERSUS MICROECONOMICS

Scarcity, and the manner in which individuals and society make choices, are fundamental to the study of economics. To examine these important

issues, the field of economics is divided into two broad subfields: *macroeconomics* and *microeconomics*.

As the name implies, macroeconomics looks at the big picture. Macroeconomics is the study of entire economies and economic systems and specifically considers such broad economic aggregates as gross domestic product, economic growth, national income, employment, unemployment, inflation, and international trade. In general, the topics covered in macroeconomics are concerned with the economic environment within which firm managers operate. For the most part, macroeconomics focuses on the variables over which the managerial decision maker has little or no control but may be of considerable importance in the making of economic decisions at the micro level of the individual, firm, or industry.

**Definition:** Macroeconomics is the study of aggregate economic behavior. Macroeconomists are concerned with such issues as national income, employment, inflation, national output, economic growth, interest rates, and international trade.

By contrast, microeconomics is the study of the behavior and interaction of individual economic agents. These economic agents represent individual firms, consumers, and governments. Microeconomics deals with such topics as profit maximization, utility maximization, revenue or sales maximization, *production efficiency*, market structure, capital budgeting, environmental protection, and governmental regulation.

**Definition:** Microeconomics is the study of individual economic behavior. Microeconomists are concerned with output and input markets, product pricing, input utilization, production costs, market structure, capital budgeting, profit maximization, production technology, and so on.

## WHAT IS MANAGERIAL ECONOMICS?

Managerial economics is the application of economic theory and quantitative methods (mathematics and statistics) to the managerial decision-making process. Simply stated, managerial economics is applied microeconomics with special emphasis on those topics of greatest interest and importance to managers. The role of managerial economics in the decision-making process is illustrated in Figure 1.1.

**Definition:** Managerial economics is the synthesis of microeconomic theory and quantitative methods to find optimal solutions to managerial decision-making problems.

To illustrate the scope of managerial economics, consider the case the owner of a company that produces a product. The manner in which the firm owner goes about his or her business will depend on the company's organizational objectives. Is the firm owner a profit maximizer, or is manage-

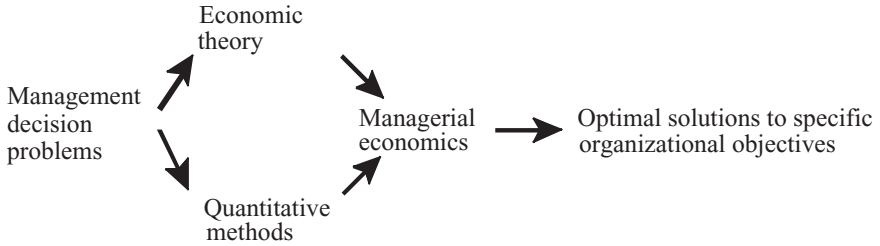


FIGURE 1.1 The role of managerial economics in the decision-making process.

ment more concerned something else, such as maximizing the company's market share? What specific conditions must be satisfied to optimally achieve these objectives? Economic theory attempts to identify the conditions that need to be satisfied to achieve optimal solutions to these and other management decision problems.

As we will see, if the company's organizational objective is profit maximization then, according to economic theory, the firm should continue to produce widgets up to the point at which the additional cost of producing an additional widget (marginal cost) is just equal to the additional revenue earned from its sale (marginal revenue). To apply the "marginal cost equals marginal revenue" rule, however, the firm's management must first be able to estimate the empirical relationships of total cost of widget production and total revenues from widget sales. In other words, the firm's operations must be quantified so that the optimization principles of economic theory may be applied.

## THEORIES AND MODELS

The world is a very complicated place. In attempting to understand how markets operate, for example, the economist makes a number of simplifying assumptions. Without these assumptions, the ability to make predictions about cause-and-effect relationships becomes unmanageable. The "law" of demand asserts that the price of a good or service and its quantity demanded are inversely related, *ceteris paribus*. This theory asserts that, other factors remaining unchanged (i.e., *ceteris paribus*), individuals will tend to purchase increasing amounts of a good or service as prices fall and decreasing amounts as the prices rise. Of course, other things do not remain unchanged. Along with changes in the price of the good or service, disposable income, the prices of related commodities, tastes, and so on, may also change. It is difficult, if not impossible, to generalize consumer behavior when multiple demand determinants are simultaneously changing.

Definition: *Ceteris paribus* is an assertion in economic theory that in the analysis of the relationship between two variables, all other variables are assumed to remain unchanged.

It is good to remember that economics is a social, not a physical, science. Economists cannot conduct controlled, laboratory experiments, which makes economic theorizing all the more difficult. It also makes economists vulnerable to ridicule. One economic quip, for example, asserts that if all the economists in the world were laid end to end, they would never reach a conclusion. This is, of course, an unfair criticism. In business, the objective is to reduce uncertainty. The study of economics is an attempt to bring order out of seeming chaos. Are economists sometimes wrong? Certainly. But the alternative for managers would be to make decisions in the dark.

What then are theories? Theories are abstractions that attempt to strip away unnecessary detail to expose only the essential elements of observable behavior. Theories are often expressed in the form of models. A *model* is the formal expression of a theory. In economics, models may take the form of diagrams, graphs, or mathematical statements that summarize the relationship between and among two or more variables. More often than not, there will be more than one theory to explain any given economic phenomenon. When this is the case, which theory should we use?

### **“GOOD” THEORIES VERSUS “BAD” THEORIES**

The ultimate test of a theory is its ability to make predictions. In general, “good” theories predict with greater accuracy than “bad” theories. If one theory is known to predict a particular phenomenon with 95% accuracy, and another theory of the same phenomena is known to predict with 96% accuracy, the former theory is replaced by the latter theory. It is in the nature of scientific progress that “good” theories replace “bad” theories. Of course, “good” and “bad” are relative concepts. If one theory predicts an event with greater accuracy, then it will replace alternative theories, no matter how well those theories may have predicted the same event in the past.

Another important observation in the process of theorizing is that all other factors being equal, simpler models, or theories, tend to predict better than more complicated ones. This principle of parsimony is referred to as *Ockham’s razor*, which was named after the fourteenth-century English philosopher William of Ockham.

Definition: Ockham’s razor is the principle that, other things being equal, the simplest explanation tends to be the correct explanation.

The category of “bad” theories includes two common errors in economics. The most common error, perhaps, relates to statements or theories regarding cause and effect. It is tempting in economics to look at two sequential events and conclude that the first event caused the second event.

Clearly, this is not always the case, some financial news reports not with standing. For example, a report that the Dow Jones Industrial Average fell 200 points might be attributed to news of increased tensions in the Middle East. Empirical research has demonstrated, however, while specific events may indirectly affect individual stock prices, daily fluctuations in stock market averages tend, on average, to be random. This common error is called the fallacy of *post hoc, ergo propter hoc* (literally, “after this, therefore because of this”).

Related to the pitfall of *post hoc, ergo propter hoc* is the confusion that often arises between correlation and causation. Case and Fair (1999) offer the following illustration. Large cities have many automobiles and also have high crime rates. Thus, there is a high correlation between automobile ownership and crime. But, does this mean that automobiles cause crime? Obviously not, although many other factors that are highly correlated with a high concentration of automobiles (e.g., population density, poverty, drug abuse) may provide a better explanation of the incidence of crime. Certainly, the presence of automobiles is not one of these factors.

The second common error in economic theorizing is the *fallacy of composition*. The fallacy of composition is the belief that what is true for a part is necessarily true for the whole. An example of this may be found in the paradox of thrift. The paradox of thrift asserts that while an increase in saving by an individual may be virtuous (“a penny saved is a penny earned”), if all individuals in an economy increase their saving, the result may be no change, or even a decline, in aggregate saving. The reason is that an increase in aggregate saving means a decrease in aggregate spending, resulting in lower national output and income. Since saving depends upon income, increased savings may be less advantageous under certain circumstances for the economy as a whole. At a more fundamental level, while it may be rational for an individual to run for the exit when he is the only person in a burning theater, for all individuals in a crowded burning theater to decide to run for the exit would not be.

### THEORIES VERSUS LAWS

It is important to distinguish between theories and laws. The distinction relates to the ability to make predictions. Laws are statements of fact about the real world. They are statements of relationships that are, as far as is commonly known, invariant with respect to specified underlying assumptions or preconditions. As such, laws predict with absolute certainty. “The sun rises in the east” is an example of a law. A law in economics is the *law of diminishing marginal returns*. This law asserts that for an efficient production process, as increasing amounts of a variable input are combined with one or more fixed inputs, at some point the additions to total output will get progressively smaller.

By contrast, a theory is an attempt to explain or predict the behavior of objects or events in the real world. Unlike laws, theories cannot predict events with complete accuracy. There are very few laws in economics, although some economic theories are inappropriately referred to as “laws.” This is because economics deals with people, whose behavior is not absolutely predictable.

## DESCRIPTIVE VERSUS PRESCRIPTIVE MANAGERIAL ECONOMICS

Managerial economics has both descriptive and prescriptive elements. Managerial economics is descriptive in that it attempts to interpret observed phenomena and to formulate theories about possible cause-and-effect relationships. Managerial economics is prescriptive in that it attempts to predict the outcomes of specific management decisions. Thus, the principles developed in a course in managerial economics may be used to prescribe the most efficient way to achieve an organization’s objectives, such as profit maximization, sales (revenue) maximization, and maximizing market share.

Managerial economics can be utilized by goal-oriented managers in two ways. First, given the existing economic environment, the principles of managerial economics may provide a framework for evaluating whether managers are efficiently allocating resources (land, labor, and capital) to produce the firm’s output at least cost. If not, the principles of economics may be used as a guide for reallocating the firm’s operating budget away from, say, marketing and toward retail sales to achieve the organization’s objectives.

Second, the principles of managerial economics can help managers respond to various economic signals. For example, given an increase in the price of output or the development of a new lower cost production technology, the appropriate response generally would be for a firm to increase output.

## QUANTITATIVE METHODS

Quantitative methods refer to the tools and techniques of analysis, including optimization analysis, statistical methods, game theory, and capital budgeting. Managerial economics makes special use of mathematical economics and econometrics to derive optimal solutions to managerial decision-making problems. Managerial economics attempts to bring economic theory into the real world. Consider, for example, the formal (mathematical) demand model represented by Equation (1.1).



$$Q_D = f(P, I, P_s, A) \quad (1.1)$$

Equation (1.1) says that the quantity demand of a good or service commodity  $Q_D$  is functionally related to its selling price  $P$ , per-capita income  $I$ , the price of a competitor's product  $P_s$ , and advertising expenditures  $A$ .<sup>2</sup> By collecting data on  $Q$ ,  $P$ ,  $I$ , and  $P_s$ , it should be possible to quantify this relationship. If we assume that this relationship is linear, Equation (1.1) may be specified as

$$Q_D = b_0 + b_1P + b_2I + b_3P_s + b_4A \quad (1.2)$$

It is possible to estimate the parameters of Equation (1.2) by using the methodology of regression analysis discussed in Green (1997), Gujarati (1995), and Ramanathan (1998). The resulting estimated demand equation, as well as other estimated relationships, may then be used by management to find optimal solutions to managerial decision-making problems. Such decision-making problems may entail optimal product pricing or optimal advertising expenditures to achieve such organizational objectives as revenue maximization or profit maximization.

### THREE BASIC ECONOMIC QUESTIONS

Economic theory is concerned with how society answers the basic economic questions of *what* goods and services should be produced, and in what amounts, *how* these goods and services should be produced (i.e., the choice of the appropriate production technology), and *for whom* these goods and services should be produced.

#### WHAT GOODS AND SERVICES SHOULD BE PRODUCED?

In market economies, *what* goods and services are produced by society is a matter determined not by the producer, but rather by the consumer. Profit-maximizing firms produce only the goods and services that their customers demand. Firms that produce commodities that are not in demand by consumers—manual typewriters to day, for example—will flounder or go out of business entirely. Consumers express their preferences through their purchases of goods and services in the market. The authority of consumers to determine what goods and services are produced is often referred to as *consumer sovereignty*. Woe to the arrogant manager who forgets this fundamental economic fact of life.

**Definition:** Consumer sovereignty is the authority of consumers to determine what goods and services are produced through their purchases in the market.

<sup>2</sup> The mathematical concept of a function will be discussed in greater detail in Chapter 2.

## HOW ARE GOODS AND SERVICES PRODUCED?

How goods and services are produced refers to the technology of production, and this is determined by the firm's management. Production technology refers to the types of input used in the production process, the organization of those factors of production, and the proportions in which those inputs are combined to produce goods and services that are most in demand by the consumer.

Throughout this text, we will generally assume that firm owners and managers are profit maximizers. It is the inexorable search for profit that determines the methodology of production. As will be demonstrated in subsequent chapters, a necessary condition for profit maximization is cost minimization. In competitive markets, firms that do not combine productive inputs in the most efficient (least costly) manner possible will quickly be driven out of business.

## FOR WHOM ARE GOODS AND SERVICES PRODUCED?

Those who are willing, and able, to pay for the goods and services produced are the direct beneficiaries of the fruits of the production process. While the *what* and the *how* questions lend themselves to objective economic analysis, answers to the *for whom* question are fraught with numerous philosophical and analytical pitfalls. Debates about fairness are inevitable and often revolve around such issues as income distribution and ability to pay.

Income determines an individual's ability to pay, and income is derived from the sale of the services of factors of production. When you sell your labor services, you receive payment. The rental price of labor is referred to as a *wage* or a salary. When you rent the services of capital, you receive payment. Economists refer to the rental price of capital as *interest*. When you sell the services of land, you receive rents. The return to entrepreneurial ability is called profit. Wages, interest, rents, and profits define an individual's income.

In market economies, the returns to the owners of these factors of production are largely determined through the interaction of supply and demand. Thus, an individual's income is a function of the quality and quantity of the factors of production owned. Questions about the distribution of income are ultimately questions about the distribution of the ownership of factors of production and the supply and demand of those factors.

The solutions to the *for whom* questions typically are the domain of politicians, sociologists, theologians, and special-interest economists, indeed, anyone concerned with the highly subjective issues of "fairness." This book

eschews such thorny moral debates. What follows will focus on finding objectives answers to the *what* and *how* economic questions.

## CHARACTERISTICS OF PURE CAPITALISM

Although there are as many economic systems as there are countries, we will discuss the basic elements of *pure capitalism*. Purely capitalist economies are characterized by exclusive private ownership of productive resources and the use of markets to allocate goods and services. Pure capitalism stands in stark contrast to socialism, which is characterized by partial or total public ownership of productive resources and centralized decision making to allocate resources.

Capitalism in its pure form has probably never existed. In all countries characterized as capitalist, government plays an active role in the promotion of overall economic growth and the allocation of goods and services through its considerable control over resources. The reason we examine capitalism in its pure form is essentially twofold. To begin with, most western, developed, economies fundamentally are capitalist, or market, economies. Moreover, and perhaps more important, understanding capitalism in its pure form will better position the analyst to understand deviations and gradations from this “ideal” state. Economies that are characterized by a blend of public and private ownership is known as *mixed economies*.

Most of the discussion in this text will assume that our prototypical firm operates within a purely capitalist market system. Although the complete set of conditions necessary for pure capitalism is not likely to be found in reality, an understanding of the essential elements of pure capitalism is fundamental to an analysis of subtle and not-so-subtle variations from this extreme case.

### PRIVATE PROPERTY

In pure capitalism, all productive resources are owned by private individuals who have the right to dispose of that property as manner they see fit. This institution is maintained over time by the right of an individual to bequeath property to his or her heirs.

### FREEDOM OF ENTERPRISE AND CHOICE

Freedom of enterprise is the freedom to obtain and organize productive resources for the purpose of producing goods and services for sale in markets. Freedom of choice is the freedom of resource owners to dispose

of their property as they see fit, and the freedom of consumers to purchase whatever goods and services they desire, constrained only by the income derived from the sale or rental of privately owned productive resources.

### **RATIONAL SELF-INTEREST**

Rational self-interest refers to the behavior of individuals in a consistent manner to optimize some objective function. Rational self-interest is also referred to by economists as bounded rationality. In the case of the consumer, the postulate of rationality asserts that an individual attempts to maximize the total satisfaction derived from the consumption of goods and services, subject to his or her wealth, income, product prices, insights, and knowledge of market conditions.

The postulate of rationality also has its counterpart in the theory of the firm. Rational firm owners attempt to maximize some organizational objective, subject resource constraints, input prices, market structure, and so on. Entrepreneurs organize productive resources to produce goods and services for sale in markets to maximize profit or some other, equally rational, objective. While it may be true that not all consumers seek to maximize their utility from their purchases of goods and services and not all firms attempt to maximize profit from the production and sale of output, these are probably the dominant forms of human behavior.

### **COMPETITION**

There are a number of conditions necessary for pure (perfect) competition to exist. For example, there must be buyers and sellers for any particular good or service. This condition ensures that no single individual economic unit has market power to control prices. Large numbers of buyers and sellers ensure the widespread diffusion of economic power, thereby limiting the potential for abuse of such power.

Another necessary condition for perfect competition to exist is relatively easy entry into and exit from the market. This condition implies that there are no or low economic, legal, or regulatory restrictions on the production, sale, or consumption of goods and services. In other words, individuals may easily enter into the production and sale of economic goods, while individuals may also enter into any market to transact goods and services as they see fit.

### **MARKETS AND PRICES**

Markets are the basic coordinating mechanisms of capitalism. Price is the essential underlying information transmission mechanism. Unless there is deception or misunderstanding of the facts, a voluntary exchange between

two parties must benefit both parties to the transaction; otherwise they would not have entered into the transaction in the first place. It is in markets, both for outputs and inputs, that buyers and sellers meet to further their own self-interest, unfettered by artificial impediments.

The price system is an elaborate mechanism through which the free choices of individuals are recorded and communicated. The price system, if allowed to operate freely, informs market participants which goods are in greatest demand, and, consequently, where productive resources are most needed. The price system enables society to collectively register its decisions about how resources ought to be allocated and how the resulting output should be distributed. In general, institutional impediments tend to impair the functioning of the price mechanism. Although government intervention in the marketplace often results in socially efficient outcomes, governments that impose the fewest restrictions on the functioning of the price mechanism tend to be the most efficient. Extensive and intrusive government intervention, characteristic of centrally planned economies, is the least efficient mode: such economies have the slowest growth and generally do the poorest job at raising living standards. It should be noted, however, that while economies with minimal government interference tend to grow rapidly, individuals with the greatest amounts of the most productive resources will receive the greatest proportion of an economy's output. Therefore, there appears to be a significant efficiency–equity trade-off in the case of pure capitalism.

The concept of *laissez-faire* describes limited government participation in the operation of free markets and free choices. Each of the foregoing characteristics of pure capitalism assumes that there are no outside impediments to the market system. For the most part, the government's role is strictly limited to the provision of “public goods,” such as public roads or national defense, and the administration of a judicial system to interpret and enforce contracts and private property rights.

## THE ROLE OF GOVERNMENT IN MARKET ECONOMIES

### MACROECONOMIC POLICY

Government participates in economic activity at the microeconomic and macroeconomic levels. *Macroeconomic policy* may be divided in *monetary policy* and *fiscal policy*. Monetary policy is concerned with the regulation of the money supply and credit. Monetary policy in the United States is conducted by the Federal Reserve.

The other part of macroeconomic policy is fiscal policy. Fiscal policy deals with government spending and taxation. Fiscal policy in the United States

may be initiated by the president or Congress but only Congress has the power to levy taxes. In formulating economic policy proposals, the president relies on advice from members of the cabinet, the Office of Management and Budget, and the Council of Economic Advisers.

In general, the objective of macroeconomic policy, sometimes referred to as *stabilization policy*, is to moderate the negative effects of the *business cycle*, the recurring expansions and contractions in overall economic activity. Periods of economic expansion, or economic “booms,” are often accompanied by a general and sustained increase in the prices of goods and services, or inflation. Periods of economic contraction are associated with rising unemployment. Macroeconomic policy is directed toward maintaining full employment and price level stability.

### MICROECONOMIC POLICY

Economics is the study of how consumers use their limited incomes to purchase goods and services to maximize their utility (satisfaction or happiness). Consumers are also owners of factors of production (land, labor, and capital), the services of which are offered to the highest bidder to generate the income necessary to purchase goods and services from firms. Finally, firms purchase the services of the factors of production to produce goods and services for sale in the market. The revenues generated from the sale of these goods and services are then returned to the owners of the factors of production in the form of wages, interest, and rents. What remains of total revenue after the services of the factors of production have been paid for is called profits. While the prices of land, labor, and capital are directly determined in the resource market, profits are residual payments to the entrepreneur, which is another source of consumer income.

In 1776 Adam Smith argued in *Wealth of Nations* that the actions of self-interested individuals are driven, as if by an *invisible hand*, to promote the general public welfare. This, Smith wrote, is because the interaction of self-interested buyers and sellers in perfectly competitive markets would tend to promote *economic efficiency*. When economic efficiency is realized, consumers’ utility, firms’ profits, and the public welfare are maximized.

Since, however, the conditions necessary to achieve economic efficiency are not always present, competitive markets are not always perfect. There are generally two justifications for the government’s role in economy. One justification for government intervention is that the market does not always result in economically efficient outcomes. The other is that some people do not like the market outcome and use the government to alter the outcome, often for the benefit of some narrowly defined special interest group. The following discussion will focus on the role of the government to promote efficient economic outcomes.

The concept of economic efficiency is often associated with the term *Pareto efficiency*. An outcome is said to be Pareto efficient if it is not possible to make one person in society better off, say through some resource allocation, without making some other person in society worse off. Two related concepts are *production efficiency* and *consumption efficiency*.

*Production efficiency* occurs when firms produce given quantities of goods and services at least cost. From society's perspective, production efficiency takes place when society's resources are fully employed and are used in the best, most productive way.

*Consumption efficiency* occurs when consumers derive the greatest level of happiness, satisfaction, or utility from the purchase of goods and services with their limited income. Consumers, in other words, receive the greatest "bang for the buck."

Efficiency in production and consumption depend on a number of conditions, including *perfect information* and the absence of *externalities*. When information is not perfect, or when externalities exist, market imperfections arise and economic efficiency is not achieved.

The main information transmission mechanism in market economies is the system of prices. A change in the market price is a signal to producers and consumers that more or less of a good or service is desired. When market prices are "right," producers and consumers will make the best possible decisions. When prices are "wrong," producers and consumers will not make the best possible decisions. Producers will not utilize the least-cost combination of factors of production, with resulting resource misallocation and waste, while consumers, by failing to allocate their limited incomes in the most efficient manner possible, will not maximize their satisfaction.

It is often argued that when information is not perfect and market solutions are not optimal, the government should step in and require that a certain amount of information be made available. Government policies pursuant to this viewpoint have resulted in companies printing ingredients on product labels, providing health warnings on cigarettes packages, and so on. In most developed countries, government mandates that new pharmaceuticals be tested and certified before being made available to the public, while members of certain professions, such as lawyers, doctors, nurses, and teachers, must be licensed or certified.

Another justification of government participation in economic activity is the existence of externalities. Economic efficiency requires that the participants in any market transaction fully absorb all the benefits and costs associated with that transaction. If this is the case, the market price of that good or service will fully reflect those benefits and costs. However, if a third party not directly involved in the transactions receives some of the costs or benefits of that transaction, externalities are said to exist. When the third party receives some of the benefits of the transaction, the externalities are said

to be positive. If, on the other hand, the third party absorbs some of the costs of the transaction, the externalities are said to be negative.

Education is an example of a service that generates *positive externalities*. Increased literacy and higher levels of education, for example, make workers more productive, and democracies operate more efficiently with a better informed electorate. Unfortunately, if producers of education do not receive all the benefits of their efforts, educational services tend to be underprovided. But if it is agreed that positive externalities exist, then one role of government is to step in and subsidize the production of education to bring the output of these goods and services to more socially optimal levels.

Pollution, which is a by-product of the production process, is an example of *negative externalities*: too much of a good or service is being produced because firms are not absorbing all the costs associated with producing that good or service. When the public is forced to pay higher medical bills because of illnesses associated with air and water pollution, resources are diverted away from more socially desirable ends. When negative externalities exist, government will often step in and tax production, or, in the case of pollution, force firms to undertake measures to eliminate undesirable by-products. In either case, production costs are raised, and output (and pollution) is reduced to more socially desirable levels.

### THE ROLE OF PROFIT

For the most part, we will assume that owners of firms endeavor to maximize *total economic profit*, where economic profit  $\pi$  is defined as the difference between total revenue  $TR$  and *total economic cost*  $TC$ , that is,

$$\pi = TR - TC \quad (1.3)$$

Profit is the engine of maximum production and efficient resource allocation in pure capitalism; its cannot be underestimated. The existence of profit opportunities represents the crucial signaling mechanism for the dynamic reallocation of society's scarce productive resources in purely capitalistic economies. Rising profits in some industries and declining profits in others reflect changes in societal preferences for goods and services. Rising profits signal existing firms that it is time to expand production and serve as a lure for new firms to enter the industry. Declining profits, on the other hand, a signal producers that society wants less of a particular good or service, presenting existing firms with an incentive to reduce production or to exit the industry entirely. In the process, productive resources move from their lowest to their highest valued use. Moreover, profit maximization not only encourages an efficient allocation of resources, but also implies efficient (least-cost) production. Thus, purely capitalist economies are characterized by a minimum waste of societys' factors of production.



**Problem 1.1.** Adam's Food World (AFW) is a large, multinational corporation that specializes in food and health care products. The following production function has been estimated for its new brand of soft drink.<sup>3</sup>

$$Q = 10K^{0.5}L^{0.3}M^{0.2}$$

where  $Q$  is total output (millions of gallons),  $K$  is capital input (thousands of machine-hours),  $L$  is labor input (thousands of labor-hours), and  $M$  is land input (thousands of acres). Last year, AFW allocated \$2 million in its corporate budget for the production of the new soft drink, which was used to purchase productive inputs ( $K$ ,  $L$ ,  $M$ ). The unit prices of  $K$ ,  $L$ , and  $M$  were \$100, \$25, and \$200, respectively.

- AFW last year used its operating budget to purchase 3,500 machine-hours of capital, 50,000 man-hours of labor, and 2,000 acres of land. How many gallons of the new soft drink did AFW produce?
- This year, AFW decided to hire 1,500 additional machine-hours of capital, but did not increase its operating budget. The number of acres used remained constant at 2,000. How many man-hours of labor did AFW purchase?
- How many gallons of the new soft drink will AFW be able to produce with the new input mix? Compare your answer with your answer to part a. What conclusions can you draw regarding AFW's operating efficiency?
- AFW sells its new soft drink to regional bottlers for \$0.05 per gallon. What was the impact of the new input mix on company profits?

**Solution**

- Substituting last year's input levels into the production function yields

$$\begin{aligned} Q &= 10(3.5)^{0.5}(50)^{0.3}(2)^{0.2} = 10(1.871)(3.233)(1.149) \\ &= 69.502 \text{ million gallons} \end{aligned}$$

At last year's input levels, AFW produced 69.502 million gallons of the new soft drink.

- The cost to AFW of purchasing 2,000 acres of land is \$400,000 ( $\$200 \times 2,000$ ), the cost of 5,000 machine hours of capital is \$500,000 ( $\$100 \times 5,000$ ), which leaves \$1,100,000 available to purchase man-hours of labor. At a price of \$25 per man-hour, AFW can hire 44,000 man-hours of labor ( $\$1,100,000/\$25$ ).
- At the new input levels, the total output of the new soft drink is

$$Q = 10(5)^{0.5}(44)^{0.3}(2)^{0.2} = 10(2.236)(3.112)(1.149) = 79.952$$

<sup>3</sup> This is an example of a *Cobb–Douglas production function*, discussed at length in Chapter 5.