CHAPTER 23

MODERN MICROECONOMICS: A RICH AND MOVABLE FEAST

INTRODUCTION

Static microeconomics in the traditions of Marshall and Walras have enjoyed and still enjoy great prestige in modern economic theory. These traditions emphasize microeconomic and macroeconomic behavior within an equilibrium framework. In recent decades, economists have ventured beyond the standard neoclassical theory of competition into such "new" realms as the nature of market disequilibrium, the development of modern public-choice theory, and the reevaluation of the theories of regulation and industrial organization.

Microeconomic theory in particular has brimmed over with new insights and applications. Although contemporary microeconomics is firmly rooted in static Marshallian principles, it has added new analytical twists. Much of this modern development can be ascribed to what might be termed a "Chicago" school of thought, led over the past three decades mainly by economists George Stigler (b. 1911) and Gary Becker (b. 1930). Marshall, it might be recalled, made many important simplifying assumptions respecting markets. Specifically, he abstracted from quality differences in products, costly consumer information, the costs of time forgone in consuming and producing goods, and the locations of sellers and buyers. The new twists of contemporary microeconomic theory consist of (1) providing a formal analysis of how market outcomes change when we relax these and other simplifying Marshallian assumptions about consumers and firms and (2) applying these new tools to interesting and novel questions that were previously thought to be beyond the purview of the economist (e.g., crime, drug use, family relations, and so on).

This chapter reviews a small sample of these new developments in economic theory. These new developments serve as examples of how past ideas

continually shape present and future ideas. Novel tools are emerging to address modern problems, but such tools are usually refinements of earlier principles discovered in the classical and neoclassical periods. For example, the new theory of household production pioneered by Gary Becker rests on the principles of utility maximization established by Jevons, Menger, and Walras. Further extensions of earlier theories of costs and benefits have resulted in an economic theory of marriage, child rearing, and crime. Like other scientists, economists build the present and the future on the contributions of the past.

CONSUMPTION TECHNOLOGY: MODERN VIEWS

Traditional neoclassical microeconomics imposes a distinct cleavage between producers and consumers, whereas contemporary microeconomics treats the cleavage as an oversimplification of the process by which goods are purchased and consumed.

The Household as a Factory

Following Gary Becker, many modern economists regard the household as analogous to a small factory that "combines capital goods, raw materials and labour to clean, feed, procreate and otherwise produce useful commodities" (Becker, "A Theory of the Allocation of Time," p. 496). The individual neoclassical consumer becomes part of both household production and consumption in this broader approach. Most importantly, contemporary analysis recognizes that the production and consumption of goods (children are sometimes regarded as consumer goods in Becker's model) *take time*. Time is an opportunity cost that must be calculated along with the market prices of any good or activity in making economic decisions. Earlier economists (e.g., Senior, Böhm-Bawerk, Marshall) also understood the nature of time as both a resource and a constraint, but their concepts were sometimes vague and never fully integrated into mainstream economic theory.

Figure 23-1 gives a schematic view of the combination of market goods and time necessary to produce ultimate goods or services ("commodities"). Just as it takes inputs of human resources, capital, and time to bring children to adulthood, the production and consumption of any ultimate good or service may be viewed as combining inputs to consume an output. If we identify an *ultimate* good consumed by an individual, such as "healthful behavior," we see that the production of such a good requires the combination of numerous "market goods" (those purchased directly by consumers in the marketplace) and time inputs. Athletic equipment, health foods of all sorts, medical services, and time spent in doing exercises and in consuming goods are all *inputs* in a process that yields the ultimate good. The individual or the household transforms these inputs into outputs through a production function.

Ultimate consumption is therefore a function of both market goods and time inputs. Since it takes time to see a play, read a book, or consume a meal, the

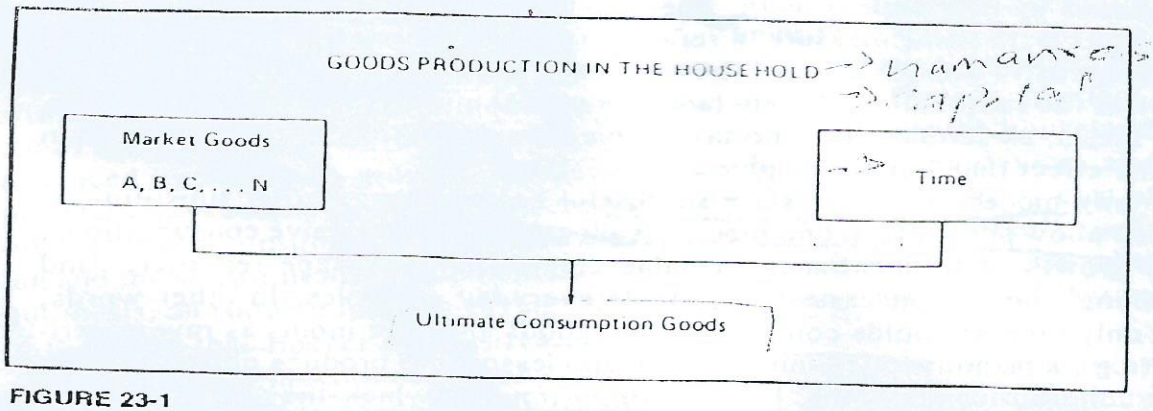

FIGURE 23-1
The household as a miniature factory combines market goods and time to produce ultimate consumption goods.

full price of these activities must include the opportunity cost of using time to engage in these consumption activities. The measurement of this opportunity cost can be approximated by the market wage of the individual under consideration. Assume, for example, that an individual who can make $10 an hour in market work is choosing between a restaurant meal which takes an hour and a "fast-food" meal which takes 15 minutes. Assume further that the money cost of both meals is $6. While both meals require the same money outlay, the full price of consumption differs substantially. The full price of the fast-food meal is $8.50 ($6 plus $2.50 in forgone income) versus $16 for the restaurant meal ($6 plus $10 in forgone income). The determining factor in the individual's final decision will be the amount of utility each meal produces per (full-cost) dollar of expenditure.

This approach also has the benefit of highlighting the full costs of household production. The value of household production—producing and raising children, performing household chores and maintenance activities, etc.—may also be expressed in terms of opportunity costs. Also, when the cost of time is placed on an equal footing with the cost of market goods, new insights into the traditional choice between work and leisure (now a choice between market work, leisure, and household production) and new views of the consumption patterns of households in terms of both quantity and quality are made possible.

The implications of the new consumer theory are expressed in the following examples. As earnings from market work rise (with equal reductions in other income), the opportunity cost of in-home productions rises, and we expect to see more goods and less time used in household production. In general, the development and widespread use of time-reducing appliances may be explained partly by this phenomenon. Greater use of child-care services, outside contracting for household services, and the emergence of condominiums and other low-maintenance housing (and lawn care) arrangements are all related to wage and earnings increases over time.

Another implication of this new theory of consumer behavior involves *patterns* of consumption. As family incomes rise, goods-intensive commodities and activities tend to be substituted for time-intensive ones. There is, in effect, a bias against time-intensive production and consumption within the household produced by economic growth. The development of time-saving devices and products is, in some measure, a reflection of the increased opportunity cost of time-intensive consumptions. The decline of time-intensive "gourmet" cooking and the substitution of high- (and increasing) quality frozen foods and take-out meals, all suitable for time-saving microwave cooking, are a manifestation of the effect that Becker emphasizes.

Many modern inventions are successful because they permit substitutions which allow people to economize by reallocating time-intensive consumptions. The growth of airline travel, portable computers, videotape recorders, and "talking" books (on cassettes) provide everyday examples. In other words, not only do households combine market goods and time inputs as raw materials (e.g., a piano, printed music, and piano lessons) to produce ultimate goods (e.g., music appreciation), but the *proportions* in which they are combined change over time as market wage rates and incomes change.[1]

Household Production

More complex contemporary theories of consumer behavior permit many new evaluations of hitherto unexplained behavior by individuals and by households. For many years, household production by individuals, male or female, such as housekeeping and child care, was routinely and implicitly left out of economic analysis. The usual choice examined was the simple and straightforward one between market work and leisure. When an individual was not engaged in a market job, he or she was enjoying leisure, analytically speaking. The problem with such an unrealistic scenario is that it assigns no value to household work.

In 1977 Reuben Gronau (b. 1937) provided a choice-theoretic framework for analyzing decisions between leisure, market (out-of-home) work, and home production.[2] Gronau questioned the implicit assumption of the traditional work-leisure tradeoff, namely that the productivity of market work is always greater than the productivity of home work, or equivalently, that the market wage always exceeds the implicit return to housework. Figure 23-2 depicts the issues that Gronau examined. In this diagram, time is measured on the horizontal axis and the quantity of all goods (i.e., tangible and intangible output,

[1] The assumption of taste stability is examined within the framework of a household production function by George Stigler and Gary Becker in their paper "*De Gustibus Non Est Disputandum*" (see References). In addition, Stigler and Becker give form to their concept by investigating the implications of taste stability for "addictions," custom and tradition, advertising, fashions, and fads.

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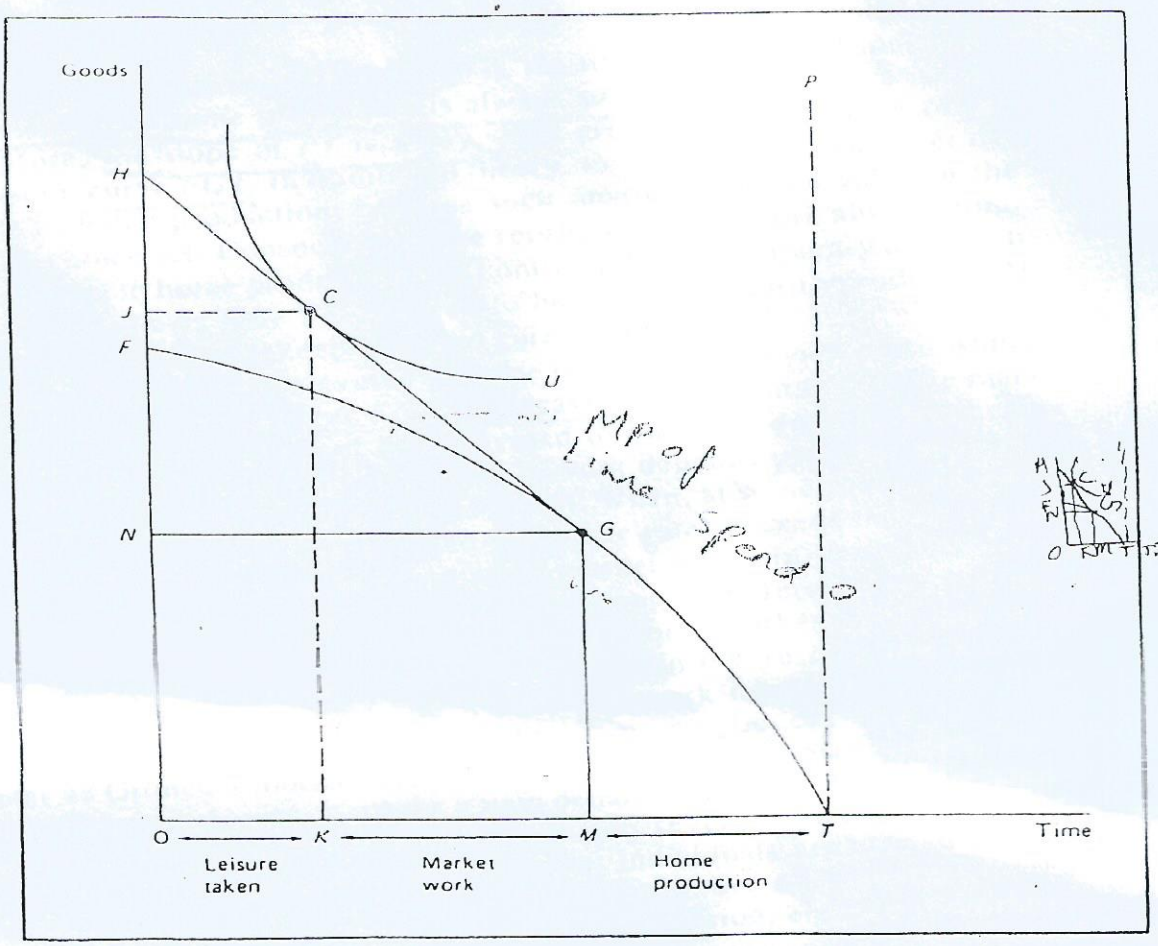

FIGURE 23-2
When goods produced in the home are given economic value, the home producer will ordinarily allocate effort among three activities: home production, market work, and leisure.

leisure, etc.) is measured on the vertical axis. The function FT describes how individuals may transform resources from the production of goods to the production of leisure and/or household services. The distance from O to T is the total time available. Time spent in leisure activities is measured in a rightward direction from the origin O, whereas time spent in home production plus market work is measured in a leftward direction from point T. The difference between the total available time and the sum of the time spent on leisure and home production is the amount of market-work time engaged in. In this model, child care and housecleaning are equivalent to BMWs, haircuts, or stereo TVs.

In Figure 23-2 the slope of the home-production transformation curve FGT measures the marginal productivity of time spent in home production versus leisure. Neglecting for a moment the other aspects of the diagram, consider the

vertical line PT. As traditional theory had it, the tradeoff facing the individual between leisure and home production is always such that only leisure is chosen. Therefore, the slope of PT is everywhere greater than the slope of the transformation curve FGT. In traditional theory, then, the individual never devotes time to home production, because such time is not given value in the individual's choice set. Consequently, the return to market work always dominates the return to home production. By contrast, the contemporary approach to this problem allows time TM devoted to home production to produce ON "goods" in terms of housekeeping, child care, and so on.

Insofar as additional time devoted to home production will yield diminishing marginal productivity, the curve FGT is concave to the origin at O. (The marginal product of each additional hour devoted to home production declines.) Whether an individual will engage in market work depends upon the marginal return to market work versus home production. When, at some point, the marginal return to market work (expressed as a wage rate) exceeds that of home production, the individual undertakes some market work. In terms of Figure 23-2, this occurs when the individual faces the wage rate represented by line HG. Given the tradeoff between leisure and *all* work (market and home production) represented by the preference function U in Figure 23-2, the individual chooses OK in leisure time and KT in *total* work time, KM of which is devoted to market work and MT devoted to home production.

Insofar as Gronau's model stresses the fact that time imposes a costly constraint on human behavior, it marks a new departure from traditional neoclassical analysis. However, its conclusions rest on several simplifying assumptions. For example, it implicitly assumes that individuals are able to choose freely the number of hours devoted to market work. We all know that, in the short run at least, this may not be true. The fixed-period, eight-hour workday is standard operating procedure in most western countries and in most types of jobs. Nevertheless, the very existence of this rigidity implies that other market adjustments are likely. Thus we find twenty-four-hour grocery stores and other similar accommodations that allow workers to make partial adjustments to the time and productivity constraints that they face. Such marketing innovations allow workers to have more flexibility in making decisions and thereby achieve higher levels of utility in scheduling combinations of leisure, home production, and market activity.

(3) Information and Search

The modern theory of consumption technology has let another genie out the bottle. In a Marshallian world, consumers are assumed to be immediately aware, at zero cost, of any price differences in a given market for a given product. By buying low and selling high, they will drive market price to a single value. One price for a product will prevail when a perfectly competitive market is in equilibrium.

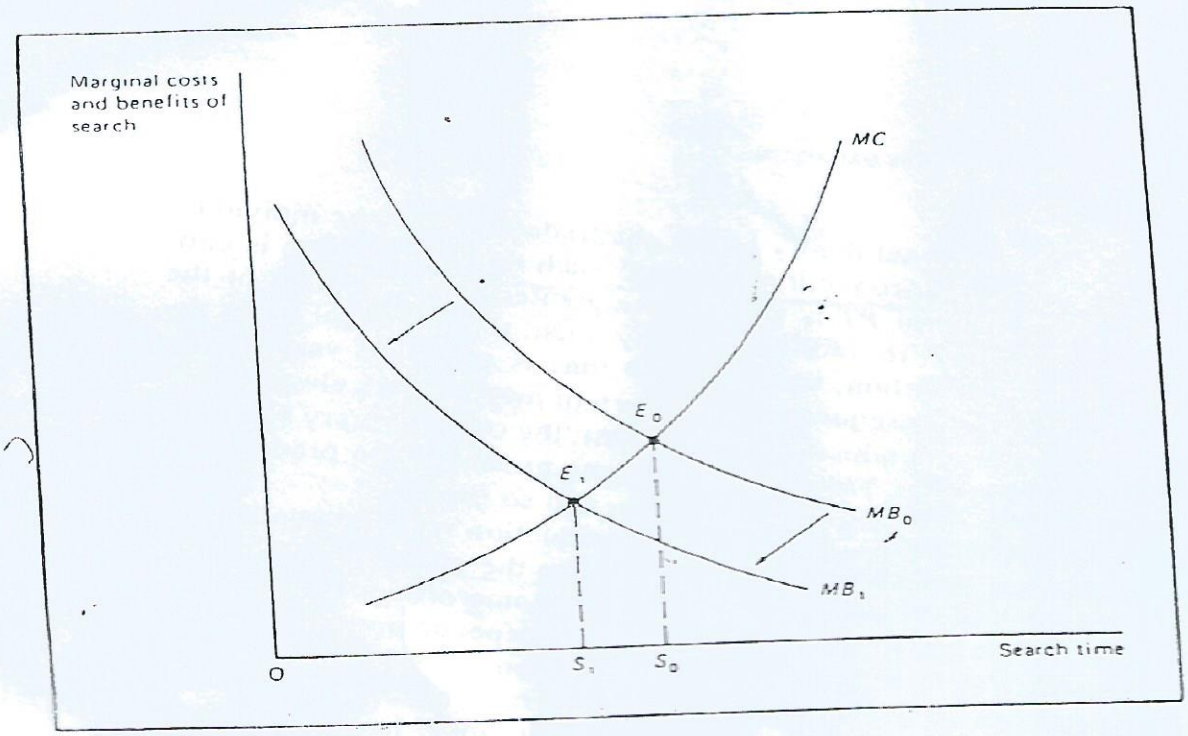

FIGURE 23-3
Advertising in its role as information reduces optimal search time spent acquiring goods and servicing.

In 1961 George J. Stigler (b. 1911) enlarged and developed the argument that information is an economic good which is costly to produce and obtain.[3] For example, when gas stations put up signs with prices on them, an act of producing information, they must pay for the construction of the signs, including raw materials and labor. Furthermore, consumers must spend valuable time (and other resources) looking for the prices that are posted. Since information concerning prices is costly to produce and obtain in most markets, transaction prices will be "dispersed" (more than one price) for the same commodity *even when the market is in equilibrium.*

A Simple Information Model Figure 23-3 provides a framework for understanding the economics of information. The marginal cost to the consumer of searching for a lower price for some particular good or service is represented by *MC* in Figure 23-3. Since additional search is typically more and more costly, *MC* rises over time. If you are in the market for a used car, for example, the marginal cost of search can be thought of as the costs of visiting and

[3] "The Economics of Information," *Journal of Political Economy*

negotiating with one or more used-car dealers. The level of the MC curve will naturally vary across goods. It will be low, for example, when shopping for clothes by mail-order catalog, but it will be high when searching for a new home.

The marginal benefit curve (MB_0) depicts the marginal benefit to the consumer of searching for a lower price. As the consumer checks the prices of more and more sellers, the prospect of finding a lower price from the next seller declines, and so MB_0 declines as search time increases. The marginal benefits of additional search will also vary across markets. For example, it ordinarily pays the consumer to search longer for a lower price when the good in question is a high-ticket item (e.g., consumer durables, such as houses, refrigerators, and automobiles), but it will usually not pay to search widely for a lower price of toothpicks or chewing gum. Generally, the larger the share of the consumer's budget represented by any one expenditure, the greater the benefit of longer search, i.e., the further to the northeast the MB_0 curve will locate in Figure 23-3.

The consumer will search until the marginal cost (MC_0) of search equals the marginal benefit (MB_0) of search. This coincides with the point of optimal or efficient search, shown by point E_0 in Figure 23-3. At levels of marginal cost and benefit to the left of point E_0 (ignore point E_1 and curve MB_1 for the moment), the extra benefits of more search exceed the extra costs. To the right of point E_0, the marginal costs of search exceed the marginal benefits. Point E_0 represents the correct or equilibrium amount of search for a given consumer for some particular good or service. Consumers employ such optimal search procedures in their shopping behavior, not so much in the rigid fashion of the diagram, but in an intuitive, instinctive manner. Since point E_0 will not be the same for all consumers for all products or services, the fact that information about prices is costly to produce and to obtain means that in most markets there will be a dispersion of final transaction prices and not a single price for a product at all locations.[4] Again, as stressed in earlier examples, this line of reasoning recognizes time as part of the *full cost* of consuming goods and services.

A New Role for Advertising Neoclassical writers such as Marshall (see Chapter 15), and even post-Marshallians such as Chamberlin (see Chapter 18), when not overtly critical of advertising in a market economy, at least deemphasized or ignored advertising. Static, competitive models that assume perfect information regard advertising as wasteful and/or unnecessary. In contrast, the new economics of search provides a rational explanation for the ex-

[4] Common sense and personal experience support the idea of search costs. The following experiment may be conducted in any community. Collect the prices for a single product of a particular quality such as a specific brand and size of aspirin or toothpaste at six or seven different stores. An array of prices will likely be observed across locations, which is a result consistent with Stigler's thesis. Real-cost differences to consumers may therefore provide a plausible explanation for different *money* prices of a particular good or service.

istence of advertising. In the new microeconomics advertising is a low-cost means of producing information. We have seen that gathering information is costly in terms of time forgone and that time has an implicit value. In the simplest of terms, advertising saves the consumer time in his or her effort to acquire information about prices or qualities of products.

Consider an example whereby the marginal cost of an additional hour of search is rising along curve MC_0 in Figure 23-3. An additional search of one hour requires that the individual give up utility in the form of time forgone. The curve MB_0 represents the marginal benefit to search (i.e., information gained), assuming that the consumer knows nothing about existing prices. Optimal search time is therefore S_0 for this consumer.

Suppose, alternatively, that the consumer originally had knowledge of some (but not all) prices charged by some sellers and that the information was obtained through newspaper advertising. With such information already in his or her possession, the consumer cannot expect to find price differentials as large through search as in the former instance in which no price information was had firsthand. Therefore, the additional benefit to any given amount of search (in terms of finding price reductions) is less in the case where the consumer starts with some price information. Marginal benefits to search in the second case may be depicted as MB_1, reflecting the fact that for any given amount of search time, additional benefits to search are less if consumers have some information ahead of time. The existence of advertising reduces the amount of time consumers spend in searching for lower prices. If consumers spend less time searching for lower prices, they necessarily have more time left to devote to other, more desirable activities such as earning income from market work, producing goods at home, or enjoying leisure.

There are, in effect, two sacrifices involved in consuming most goods: (1) the money price of the good and (2) the value of time forgone in search and other transactions costs. Together these elements constitute the full price of any good or service. In the informed modern view, advertising economizes on search time and therefore lowers the full price of goods and services.[5]

Demand Theory Innovations

Marshallian demand theory assumes that consumers purchase goods and services that are desired directly for their utility. As we have seen, this approach has been modified by more recent developments. Thus, the household is viewed now as purchasing combinations of market goods *and* time to produce more ultimate and desirable commodities. A separate, but related, new devel-

[5] In his important contribution to this topic, Phillip Nelson (see References) distinguishes between "search" goods (those whose characteristics are readily determined before purchase) and "experience" goods (those whose characteristics are primarily determined after purchase). The theory of consumer search for low prices and advertising as information is also used by Nelson to explain quality discovery by consumers.

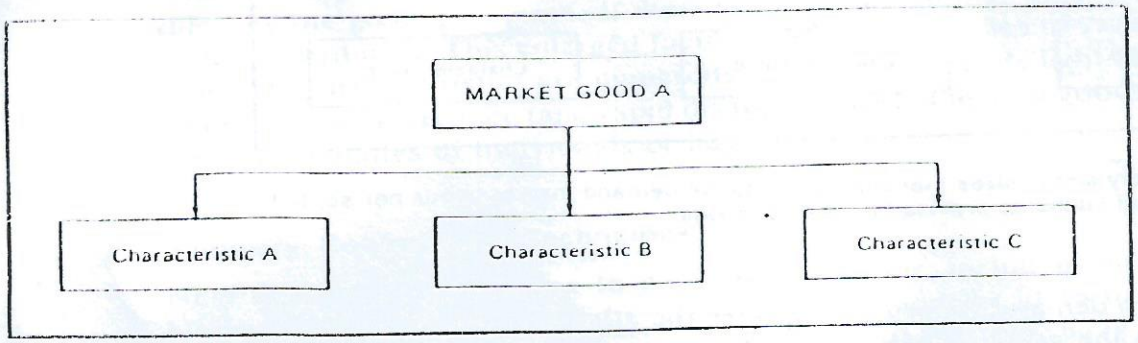

FIGURE 23-4
Modern demand theory emphasizes that individuals do not demand market goods per se, but the characteristics and attributes provided by market goods.

opment in modern demand theory emphasizes the attributes of goods and services rather than the good or service itself. This new perspective holds that consumers do not demand market goods for the direct utility provided by the good or service itself, but for the utility derived from certain combinations of utility-producing *characteristics*. This feature of demand is represented graphically in Figure 23-4, where a single market good (A) produces multiple characteristics or joint dimensions (X, Y, . . . , N characteristics).

The demand for characteristics is well known to most consumers. Most goods are capable of satisfying utility on the basis of several different dimensions. For example, individuals purchase automobiles for reasons other than mere transportation—prestige, status, and other psychological motives usually are involved also. A Porsche produces these characteristics in different proportions than a small economy car, which, in turn, produces characteristics in different proportions than a large Cadillac or Lincoln sedan. The point, commonly attributed to Kelvin Lancaster (b. 1924),[6] is that consumers actually demand jointly produced characteristics rather than products or services themselves.

This new approach has some clear advantages over the traditional Marshallian analysis of demand. For example, it provides a basis for examining goods that are obviously related but that cannot be compared easily (or at all) in standard theory. Motorcycles, bicycles, subways, buses, taxis, railroads, airlines, and walking shoes all provide one or more of the characteristics of automobiles, and yet standard theory provides no meaningful way to compare them.

Lancaster's approach to consumer behavior, along with Becker's innovations discussed earlier, serves to remind economists that the purchase of market goods is merely an intermediate step to the satisfaction of some more ultimate demand. The demand for market goods is therefore a derived demand—the demand for an automobile or a subway token is *derived* from a demand for

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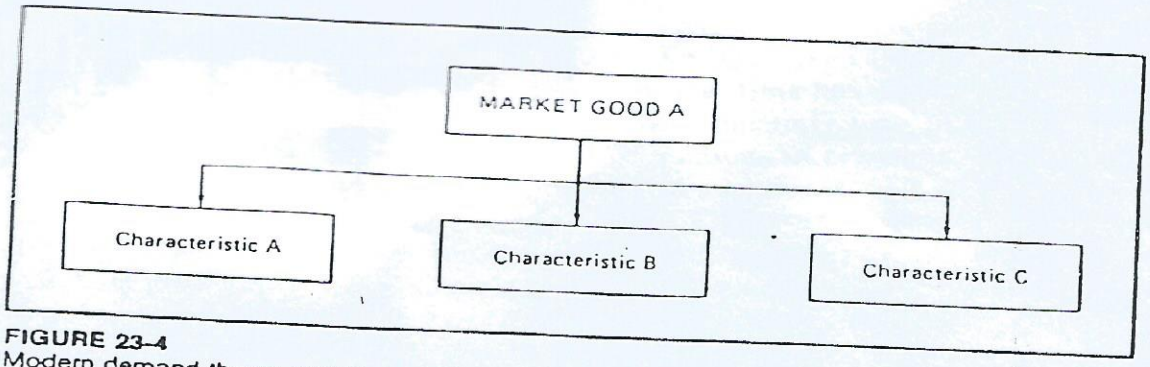

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certain utility-creating attributes (e.g., transportation and other things) provided by the good or service. It must be remembered that quality itself is one of those attributes. This enlarged focus on goods as bundles of characteristics, where the characteristics are numerous and variable, sheds light on the sometimes sudden emergence (and rapid disappearance) of market goods in the consumption bundles of individuals or households.

Summary: Consumption Technology

New developments relating to consumer behavior, including nuances of the kind discussed here, dot the landscape of modern literature in microeconomics. As with most new economic ideas, these, too, have been cast in the formal dress of mathematical models, and the result of the process has been to expose the limitations of the new developments as well as their relevance to real-world situations. On balance, however, the modern theory of consumer behavior has widened the boundaries of microeconomic theory.

NEW THEORIES OF THE FIRM

Broadly speaking, the economic function of a firm is to combine economic resources in order to produce goods and services demanded by consumers. Standard theory tells us that firms that succeed in meeting these demands efficiently survive and prosper while those that do not make losses and fail. In traditional economic theory, cost curves based on resource productivity are combined with demand and other revenue curves to make models of competitive or monopolistic (including monopolistically competitive) firms. (Figures 20-2 and 20-3 of Chapter 20 are examples of such models.) This sort of analysis *describes* firms and their mechanical activities, but it does not answer some deeper questions. Why, for example, do firms exist at all?

All advanced economies are based upon the division of labor. In a market economy the division of labor is vented in an incredible array of activities based upon the different skills and talents of individuals. But what mechanism or mechanisms ensure that such consumables as food, clothing, and airline travel are produced when and where they are wanted? The answer is found in the concept of economic coordination. In order to explain why firms exist, market coordination must be distinguished from firm coordination. Market coordination exists when the price system *directly* provides signals (through supply and demand) that guide production and consumption. Firm coordination exists when the division of labor is carried on and directed by managers. Market coordination is by nature decentralized, whereas firm coordination is by nature centralized. Firm coordination is therefore not unlike central planning in a socialist economy. Within the firm, resources are not bought and sold but are transferred through managerial command.

In the language of economics, a firm is a voluntary institution characterized by free contract. Employees agree voluntarily to follow the dictates of manag-

ers, but these "commands" are but a figure of speech. Successful managers must mimic the price system by transferring and allocating resources in an efficient manner, given the prices of equivalent resources "outside" the firm.

But if market and firm coordination are so similar, why are firms necessary at all? Why do some automobile manufacturers purchase tires for their cars rather than make their own? Why do some firms purchase advertising and travel services from outside agencies (i.e., other firms) rather than produce them within the firm. Why is market coordination used for some resource inputs and firm coordination used for others? Contemporary microeconomics seeks to provide satisfactory answers to such questions.

Why Firms? The Coasian Perspective

Why are firms necessary? In a classic paper entitled "The Nature of the Firm," published in 1937, Ronald Coase (b. 1910) proposed a simple and elegant answer to the question. Coase argued that firms emerge and exist as a least-cost means of economic coordination. There are, in short, costs to using market coordination. The hiring of inputs (e.g., temporary labor) typically involves transaction costs, search costs, and negotiation costs. If contracts are used, they must be negotiated as well as policed. The other side of the coin is that market coordination provides certain benefits. The firm is only obligated for a short term (a day's worth of labor) and is able to hire resources more flexibly. When firms hire "Kelly Girls" or other temporary secretarial services, they are using market coordination rather than firm coordination.

At some point, however, market coordination may give way to firm coordination. Entrepreneurs begin to use firm coordination when a comparison of the costs and benefits between alternative forms of coordination indicates positive benefits to coordination *within* rather than without. It may pay to organize secretarial tasks *within* the firm by hiring a secretary on a regular, longer-term basis rather than hire temporary help. A firm therefore emerges as a conglomeration of resources that are gathered together under the centralized (quasi-socialistic) direction of a manager because it is cheaper than organizing and directing resources through overt (outside) market mechanisms.

The next compelling question is, When do firms stop growing in size? Coase argued that firms face a limit to growth in the form of rising marginal costs of organization and direction. When the net benefits derived from internal organization and direction fall below the net benefits of organizing tasks through market contracts, the firm stops growing and again resorts to market coordination. Economic reality rarely presents us with an either-or situation, however. Many firms use *both* forms of resource coordination simultaneously. Market coordination may be more efficient for some specialized tasks, e.g., a "temp" secretary to type rarely needed legal documents, whereas frequent and repetitive tasks may be accomplished at lower cost by a full-time secretary with a wide array of office skills. As a practical matter, therefore, each task

within the firm may be examined from the standpoint of whether the net benefits derived from inside coordination exceed those from outside coordination.

Team Production and Shirking in the Firm

Coase's innovative theory of the firm has spawned a number of theoretical extensions. One of the more promising off-shoots of the theory has been the "team production" view of how activities are organized within firms. Most of the activities of firms, including the production of goods and services, involve team effort, and a team, like a chain, is only as strong as its weakest link. How, then, can the firm prevent its team members from shirking or engaging in unproductive behavior? One answer has been given by Armen Alchian and Harold Demsetz,[7] who maintain that the manager acts as a team monitor to ensure efficiency in those instances where several individuals or groups of individuals must work together to accomplish a task.

Specialization, as Adam Smith recognized long ago, leads to increased productivity. But without someone policing their behavior, all individuals have an incentive to shirk. Yet at the same time workers have an incentive to be monitored, since their returns are, to a large degree, adversely affected by the shirking behavior of other members of the team. These circumstances explain the emergence of the manager as the person given the responsibility to discipline those who shirk and to reward superior performance.

In the absence of team production, individual producers are disciplined by market competition, i.e., the actions of rivals. The worker can shirk, but he or she bears the full costs of such behavior by receiving lower earnings. In such circumstances, an internal monitor is not necessary. Firms that employ monitors obviously face increased costs over those that do not, so it is only when the benefits of increased productivity to team production outweigh the costs of monitoring that team production replaces individual production. In the evolutionary scheme of things, when teams can produce goods and services at a lower cost than individuals can, firms emerge and survive. The Alchian-Demsetz view therefore regards a firm as the logical consequence of positive net benefits that derive from team production even in the face of the higher costs of monitoring team performance.

The manager-as-monitor view of team production raises some rather obvious questions. Who, for instance, will monitor the manager? Does not the manager also have an incentive to shirk? The answers to these questions are to be found in the institutional composition of the firm, specifically in the pattern of incentives, both positive and negative, given to managers. On the one hand, managers are disciplined by the market. If they perform poorly, monitor-managers will be fired and competing managers will be installed by owners or stockholders. On the other hand, managers can be rewarded as residual claim-

[7] "Production, Information Costs and Economic Organization," *American Economic Review*

ants who share in the profits or rewards of team production. Managers thus have both positive and negative incentives to be efficient monitors of team production.

OTHER APPLICATIONS AND EXTENSIONS

Interest in the economics of information as a central part of the new microeconomics has raised a number of provocative issues related to the qualities of products. The central question concerns the determination of product quality and the kind of information buyers and sellers have before the purchase of products. If sellers possess information concerning product qualities that buyers do not, sellers may have incentives to sell substandard products or services. This rather obvious observation has generated various approaches to the issue of quality.

Asymmetric Information: The "Lemons" Problem

In the labor-market variant of the information problem, different employees may have different productivity potentials which are unknown to employers. In order to improve information, therefore, employers may develop screening techniques for sorting prospective employees. Good screening techniques should "signal" which workers have the highest productivity potential. There are certain worker attributes that tend to be highly correlated (i.e., provide strong "signals") with productivity, such as educational attainment or innate math and language skills. As economic theory would predict, employers will tend to utilize screening techniques that emphasize characteristics which can be measured reliably at low cost. From the standpoint of the potential employee, it should be noted that individuals have more control over certain desirable attributes than others, e.g., education versus physical appearance, race, or sex.

Ever since Hayek (see Chapter 21) pioneered the notion of markets as processors of information, it has generally been recognized that price itself is a "signal." But how reliable a signal is it? Information can be asymmetric. The possibility and the implications of asymmetric information in economic markets have been analyzed by George Akerlof in a study of the automobile market.[8] In this market, it is difficult for the buyer to get complete information before the purchase. A new car may be dependable and trouble-free, or it may be in constant need of repair. The customer usually does not know, nor can he or she know, if a car is a lemon or not until after the purchase.

Consider an instructive example from the used-car market. Used-car buyers demand cars, among other things, on the basis of the used car's price and on the probability that it is a lemon. If the initial price of used cars does not clear the market—suppose that price is "too high" and quantity supplied exceeds

[8] "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics*.

within the family unit becomes an expression of specialization that follows rational economic principles of cost and choice. Although this approach is controversial, Becker's insights give meaning to a number of social phenomena that sociologists have been at pains to understand and explain. For example, consider marriage rates and birthrates.

When marriage is viewed as an incompletely defined contract that is entered into according to the perceived costs and benefits of the participants, it is possible to bring those costs and benefits explicitly into the decision nexus. On the cost side, marriage means that each partner sacrifices some independence and makes many compromises regarding personal habits, friendships, and the direction of expenditures. On the benefit side, marriage provides companionship and reciprocal caring and love, and it facilitates the production and rearing of children. In addition to these benefits, however, marriage provides an opportunity to enjoy the economic gains from specialization and division of labor. Traditionally, division of labor has placed the male marriage partner as the primary earner of market income through outside-the-home market work. Until recent decades, in developed economies, the female partner has more or less specialized in household production and in child rearing. Although this pattern is changing in developed nations, the important point is that so long as skills vary widely between spouses, the gains to husband and wife from specialization and trade are potentially large and positive.

The "women's revolution" of the past three or four decades has changed this configuration for a significant number of individuals. Laws and practices have greatly lessened discrimination against women in the workplace. Women have, in increasing numbers, become engineers, lawyers, and physicians. In many areas of the marketplace, opportunities for educational attainment and other investments in human capital have been expanded for women. The result is that skill levels of men and women are drawing closer together. With more and more similar skills, the economic gains from specialization and trade between men and women within the organizational framework of marriage are clearly lowered. On economic grounds alone (neglecting all other factors), economic theory predicts that a reduction of the gains to marriage will lead to a decline in marriage rates and an increase in divorce rates—precisely the experience in recent times of many developed nations.

As more women have entered the (market) work force and as family incomes have risen, we have observed another phenomenon with economic implications: a decline in the birthrate. Population growth requires a sustained demand for children on the part of parents. Long ago the classical economists argued that income increases would encourage an increase in the production of children, which, in Ricardo's scenario, would eventually lead to the stationary state. Becker's analysis goes beyond the simple Malthusian framework of population growth by adding an important additional consideration: it is not only the level of income that explains population growth, but also the relative "price" of children.

The full cost of raising children depends not only on the direct expenditures entailed but also on the *opportunity* costs incurred by parents. These oppor-