CHAPTER 1

Introduction to Market-Driven Economics

Markets are all around us. They lie at the center of our economic lives. They tie people together, they tie countries together, and, today more than ever, they are tying the world together in one global economy. Our subject, microeconomics, is about the functioning of a market. Along with being of critical importance to all of us, markets are exciting to study.

The book's title is *Micro Markets*. By "micro" we are referring to the individual markets that comprise a broad economy. In contrast, the term "macro" refers to markets in the aggregate (that is, the broad economy). A micro market may be the market for a specific product (such as the book that you are now holding), or for a specific service (education, for example), or for a financial asset (e.g., a stock or bond). Have you ever considered how a micro market might operate? Have you ever thought about the forces that drive the micro markets, about how the markets can interact with each other, about who the key players in a marketplace might be, about how output might be set, consumption or asset holdings determined, and prices established? I bet you have. The objective of this book is to help formalize your insights into the dynamic behavior of the micro markets.

It is easy to take many of our markets for granted. When going to the supermarket with a shopping list, most of us simply buy our butter, eggs, and beer. But when the price of gas at the pump more than triples or falls by over thirty percent, we start asking questions. We ask questions when a bubble in the housing market bursts. And many of us scratch our heads when the Dow Jones Industrial average drops over 300 points or soars over 300 points in a single day. The fact is, markets are complex, the forces that impact them are intricate, and market breakdowns can occur. Just how efficiently a market operates depends on how it is structured. Very importantly, alternative structures exist. A marketplace can be designed, and the people

who do this can be thought of as *market architects*. The market architects can get guidance from microeconomic theory.

In this introductory chapter we consider the relationship between theory and reality, between frictionless and nonfrictionless markets, and suggest that a market can be viewed as an ecology. We identify important economic vocabulary that is needed for our subsequent analyses: *ceteris paribus* (a Greek term meaning "all else constant" that we explain shortly), fixed versus variable costs and returns, long-run versus short-run analysis, the concept of an equilibrium, marginal analysis, elasticity (a measure of responsiveness that we explain shortly), and the difference between "maximum," "minimum," and "optimum."

THEORY AND REALITY

Microeconomic *theory* is just that, it is theory. As such, it may appear to be a highly abstract, overly simplified, unpalatably unrealistic representation of any actual market. Imagine if a Martian's first sighting of a human being was a Picasso portrait. Quite startling, wouldn't you say? So why was Picasso a great painter? Here is one reason: his abstractions were great. He was able to capture the essence of a person without delivering an exact replication of the subject. That too is the goal of microeconomic theory: via the use of simplifying (and albeit often unrealistic assumptions), to capture the essence of an issue.

Real-world markets can be extremely intricate. Their many subtleties and extensive institutional detail make them almost impossible to understand in all their glory. Those who have worked in an industry can start to understand it, but even then their comprehension is typically intuitive. Ask somebody who has had the requisite experience in an industry to describe it and you will generally get just that—a great deal of description. What can we learn from the description? How can we classify thinking, generalize, and apply the knowledge more broadly to other industries and markets? That is where theory has a role to play.

The process of theorizing involves making the simplifying abstractions so as to get to the heart of the matter without being overwhelmed with unnecessary detail. The hallmark of a good theory is that, through the intelligent use of assumptions and analysis, it has honed in on the question that we are interested in. In other words, a good theory has sliced away inconsequential detail so as to gain the insights that we want.

You might appreciate microeconomic theory with real interest only when you see it being applied to an actual market. So let's do that. Throughout much of this book, we present microeconomic theory with

reference to one specific, real-world micro market: the equity market. This is an excellent market to analyze. Equities are a critically important financial asset for scores of investors, corporations, and the macro economy. Corporate equities (also referred to as "stocks") represent shares of ownership in public companies and, as such, equity financing is a major source of the financial capital that firms must have to undertake their operations. On a national level, equities comprise a major part of the portfolios of both individual investors and institutional investors such as mutual funds and pension funds. Well-functioning equity markets are essential to the vibrancy and growth of a macro economy. And in light of its dynamic properties, an equity market is a particularly intriguing micro market to study.

While the equity markets as part of the overall capital markets are our exemplative focus, other markets for consumer goods and *factors of production* have their own critically important and distinctive characteristics. Consumer items include services, and goods that can be classified as either durable or nondurable. The classic factors of production are land, labor, and physical capital. Human capital has also been treated as a factor of production in its own right. In a nonfrictionless environment we might additionally include financial capital as a productive factor (in a frictionless world, physical inputs can be turned into physical outputs without the use of any financial instrument). Further, if the nonfrictionless environment is characterized by imperfect (incomplete) information, information itself is a productive factor. All of these markets can have their own particular architecture and rules.

PRIMARY AND SECONDARY MARKETS

Comprehending a subject such as microeconomics requires understanding new vocabulary and, throughout much of this book, we will be introducing new terms. In essence, you will be learning a new language. Language lies at the heart of thought—without it, our ability to think and to communicate would be severely impaired. We suggest that you reflect on the terms that we introduce. From time to time, try using some of them in daily conversation with your friends. We do, but then again our noneconomist friends often do not understand what we are saying.

Here are two terms that apply to the equity markets: the *primary market* and the *secondary market*. The primary market for equity shares is the market where new shares are issued. The secondary market is where already issued shares are traded. A corporation looking to raise financial capital will issue new shares with the assistance of a firm like Goldman Sachs or Morgan Stanley. If the firm is going public and is issuing shares

for the first time, the issuance is called an initial public offering (IPO). Will the IPO be successful? Will individual retail investors, pension funds, mutual funds, and other institutional investors actually buy the shares? The answer depends on a number of factors, including the price the shares are offered at, the risk an investment in them would involve, and the company's future prospects for earnings growth.

One other consideration is paramount: If you buy the shares when they are offered in the primary market, will you be able to sell them whenever you want in a secondary market? Perhaps you will need funds to meet an expense, or will wish to switch into some other investment. Will you be able to raise the cash by selling the shares? Will your share holdings be adequately *liquid*?

''Liquidity'' is something that we all know something about. Here is a quick and easy definition: an asset is liquid if it can be bought or sold reasonably quickly, at a reasonable price, in reasonably large amounts, in a reasonably short period of time. Please do not ask what ''reasonable'' means—if you do, we might have to answer, ''It depends.'' Regardless, by this definition, it is clear that the equity shares of most large, publicly traded corporations are relatively liquid assets and, in comparison, that a house or a condominium apartment is a very illiquid asset.

Existing share holdings (and homes) can be bought and sold in a secondary market. What is the economic function of a secondary market? As seen through the eyes of a market participant, the function is to support trading—for instance, to handle the sale of stocks or the purchase of a home. A microeconomic theorist might state the thought a bit differently: the function of a secondary market is to make the asset that you want to buy or to sell more liquid.

Our references to the equity markets in this book will be almost entirely to the secondary markets where already issued shares are traded. The largest of these markets are the New York Stock Exchange (NYSE) and NASDAQ in the United States, and the London Stock Exchange and Deutsche Börse (the big German exchange) in Europe. The other major European stock exchange group, Euronext, merged with the NYSE in 2007 (the combined company is now named NYSE Euronext, Inc.).

Around the world, exchanges have changed and grown tremendously in the past quarter of a century. Technology, regulatory, and competitive developments have had enormous impacts, as have the engineering of new financial products (such as options and futures) and the growth of the customer base (investors, both retail and institutional). Much academic insight into the operations of the equity markets has developed over roughly the same period. This relatively new field in financial economics is known as *market microstructure*. Microstructure has its roots in microeconomic

theory. Reciprocally, microstructure provides rich examples of how microeconomic theory can be applied to shed light on the dynamic operations of a micro market. We make extensive use of these examples in this book.

FRICTIONLESS VERSUS NONFRICTIONLESS MARKETS

A theory is derived from a set of assumptions. The assumptions are the abstract descriptors of a reality that we wish to understand. Each assumption individually is typically unrealistic. The important thing is that, when properly brought together, the assumptions collectively can be realistic, and they can deliver the insights that we are looking for. For instance, we all know that the earth is round, not flat. However, for most applications that involve spatial measurement, Euclidian geometry is the way to go.

The specific assumptions that we make depend on the questions we are asking. Our focus in this book is on the micro markets, and we have an important choice to make: Assume that trading is a frictionless process, or allow for the existence of trading costs and other market impediments. Through Chapter 3, we assume a frictionless market in order to facilitate our discussion. It is interesting to know what Nirvana looks like. But then, starting in Chapter 4, we recognize the existence of various costs, blockages, and other frictions that, in real-world markets, attend trading.

Market breakdowns can occur. Recognizing this we can also understand that the efficiency of a market depends on its architecture. By *architecture* we are referring to the facilities offered to market participants (for example, the ability to purchase airline tickets via a computer) and the rules and regulations that govern trading (for example, the specification of standardized store hours, and the enforcement of minimum quality standards). Why do the facilities, rules, and regulations matter? The reason is that real-world markets are not frictionless environments. With regard to equity markets, for instance, translating fundamental information about a company into share prices is a complex, imperfect process in the nonfrictionless world. Simply handling orders and turning them into trades can be a big challenge. Consequently, theoretically desirable values for price and trading volume may not be attained.

Regarding the secondary markets for equity trading, we will explain how buy and sell orders are submitted to the market, interfaced with each other, and turned into trades and transaction prices. We will see that transaction costs, blockages, and other impediments give rise to coordination problems that can prevent the market from realizing theoretically desirable values for price and trading volume. In this context, we may gain an

understanding of how a market's trading facilities, its rules, and its regulations affect the efficiency with which individual desires to trade get translated into realized transactions and transaction prices.

And so we devote serious attention to nonfrictionless trading. However, the frictionless environment continues to have an important role to play. The zero trading cost model is an ideal against which to assess real-world markets.

HOW WELL DO MARKETS FUNCTION?

You cannot study microeconomic theory without developing a healthy respect for the power of a free market to deliver results that are desirable for society. This property of markets is vibrantly reflected in Adam Smith's description of the *invisible hand*:

> *Every individual necessarily labors to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this case as in many other cases led by an* invisible hand *[emphasis added] to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectively then when he really intends to promote it.*
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> —Adam Smith, *Wealth of Nations* (1776), p. 423

Microeconomics has been defined as the study of the allocation of scarce resources between competing ends. If markets were allowed to operate freely, would the allocation of different resources in production be socially desirable? Would the payments for the various productive factors be socially desirable? Would the allocation of resources across consumption goods be socially desirable? Achieving these results is indeed a lofty objective. It is the noble objective of a market-based economy. Can it be achieved? Does Adam Smith's invisible hand do all that Mr. Smith suggests it might? Quite strikingly, it can be demonstrated, under a simplifying set of assumptions, that these objectives would be met in a free and competitive market environment. Undoubtedly, the power of this proof accounts in large part for the basically free market stance of many microeconomic theorists.

That said, various conditions would have to be satisfied for free markets to operate with a high degree of perfection. One condition above all others has received a great deal of attention: The markets would have to be competitive. Competition is the force that drives profit-maximizing firms to achieve socially efficient results. In a simplified, competitive marketplace, price is an all-important guiding variable that competitive economic agents respond to. However, for prices to properly guide production and consumption decisions, no competitive entity can individually be big enough to have the power to influence any price. Rather, all prices must be set in the marketplace with every participant being a *price taker*, not a *price setter*.

Think of this from your own perspective. Pick a good or service that you consume. Say it is bread. You could not possibly be such a big buyer of bread that you could have the market power to influence its price. When you go to the market to buy a loaf, you are a *price taker*. You see the price and respond to it. When all economic agents are price takers, price is set in the marketplace by the underlying forces of demand and supply. We explain how this works in Chapter 3.

But what if a particular good or service is produced by just one firm? When there is just one supplier in the market, the firm is a *monopolist* (when there is just one buyer in the market, the firm is a *monopsonist*). A monopoly firm is not a price taker, it is a price setter, because it has power over price. By decreasing output, a monopoly firm can increase its price. Differently stated, if the monopoly firm sets a higher price, it is willing to accept selling less. Accordingly, monopolists do something that microeconomists are not happy about: A monopolized market compared to a competitive market supplies a smaller output and charges a higher price. This result undermines efficiency for the broader economy. It also argues for government intervention in the operations of the free market. Specifically, it leads to antitrust regulation. We consider the pros and cons of government intervention in further detail in Chapter 8.

With regard to the competitive structure of an industry, monopoly is at one end of the spectrum (there is just one firm in the industry), and *perfect competition* is at the other end (the number of firms in the industry is large enough so that each and every individual firm is insignificant in size relative to the total). Models of perfect competition further assume that the output of any one competitive firm is indistinguishable from the output of any other competitive firm in the industry (that is, one farmer's red winter wheat is indistinguishable from another farmer's red winter wheat). In perfectly competitive markets, all participants are price takers, not price setters. Do perfectly competitive markets always produce socially desirable outcomes? They do not.

There are other reasons why a free market may not operate perfectly, and these reasons apply to all markets regardless of their competitive

structure. Here are some key ones (these along with a few others are discussed in further detail in Chapter 7):

Trading costs: Markets are not frictionless; traders incur transaction costs.

Imperfect information: The information that we base our decisions on and that we act on may be enormous in scope, complex, imprecise, and incomplete.

Asymmetric information: Some people whom we deal with (trade with and make contracts with) are better informed than we are.

Irrational behavior: Some people act irrationally.

Externalities: Some innocent third parties who do not participate in a trade may be affected by the trade (for instance, the generation of air pollution in the production of electricity).

Moral hazard: A person who undertakes an activity without bearing full responsibility for all possible outcomes may not take into account harm that may be done to others.

Public goods: Goods and services (like military defense) that people may collectively benefit from but that cannot be purchased and sold individually.

Systemic risk: The risk of broader, systemwide breakdown and possibly failure.

It is clear that unregulated micro markets do not operate perfectly, that clearly identifiable causes of market failure exist. What should public policy be in light of this? To what extent should government step in and attempt to rectify undesirable situations? How much faith should we have in the ability of a free market to police itself? How much trust can we place in Adam Smith's invisible hand? Under what conditions will a free market be more robust than a regulated market? Should regulatory intervention be confined to controlling dishonest behavior and other abuses of power and position, or should it also address matters involving the architectural structure of a marketplace? These public policy issues have been debated over the years. We consider some of them in Chapter 8.

Here is the conundrum: On the one hand, free market institutions are imperfect. On the other hand, government organizations are themselves imperfect, and government officials typically have only imperfect and incomplete knowledge of the situations that they are attempting to rectify. What has euphemistically been labeled *unintended consequences* can attend even well-intentioned legislation. One particularly serious consequence of

misguided regulatory intervention is that it can undermine the one property of markets that democratic governments (and most microeconomists) typically value: the vibrancy of competition.

Both a free market's ability to produce desired results and the efficacy of government to mitigate market failings have been seen in a new light following the financial turmoil that erupted in 2008 and the frightening economic downturn that ensued. Our trust in the stability of the free market was violently shaken by a long concatenation of events that included the demise of Lehman Brothers (the venerable investment banking firm), the collapse of American International Group (AIG, the big insurance company), the freezing up of credit lines throughout the economy, and the bankruptcy of General Motors. The enormous, pervasive role that the financial sector plays in the economy was powerfully underscored by these recent events. Quite clearly, finance in the nonfrictionless world involves far more than simply transferring funds from net savers (households) to net investors (firms). Financial capital is a crucial productive factor for all firms, and it is a necessary tool for their risk management. We consider this in further detail in the book. We address the failings of the free market and the problems concerning governmental intervention in Chapters 7 and 8, respectively. But, as you will see, we conclude on a positive note: The power of a free market to ultimately produce desirable results should not be underestimated.

Competition is a pervasive force in our lives. As students we compete for grades, as athletes we compete for titles and trophies, as graduates we compete for jobs and better pay. Business firms compete for profits, politicians compete for votes, artists compete for recognition, and so forth and so on. If properly played out, the competition is inherently good. Competition can be an enormously constructive force that substantially improves the lives of individuals, the greatness of nations, and the overall quality of the global economy. In discussing a Chinese television series first aired in 2006, *The Rise of the Great Nations*, Fareed Zakaria stated that the basic message delivered by the series is ". . . that a nation's path to greatness lies in its economic prowess and that militarism, empire, and aggression lead to a dead end."[1] This is a hopeful message indeed. And it underscores the importance of having micro markets that are well-functioning, competitive, and vibrant.

At its core, microeconomics focuses intently on how competition channels activities and affects outcomes in micro markets (and, by extension, macro markets). Wise decisions can be made regarding government intervention in the marketplace only when the operations of a micro

[1]Fareed Zakaria, *The Post American World* (New York: W.W. Norton, 2008).

market are sufficiently and properly understood. This book has one overriding objective: to further that understanding for you.

A MARKET IS AN ECOLOGY

Reading about the economic forces that underlie a micro market is one thing. Actually operating in a micro market is something else. We all do this; typically any number of times a day, although we rarely give it much explicit thought. To underscore some of the important concepts presented in this book, we can together enter one market conceptually and see in more detail how it works. As noted earlier in this chapter, we will enter an equity market. We will see how prices are determined and how trading volumes are established in that market.

That is, we will see just how prices and transactions volume can be determined based on the *order flow* received by the market. We will show you how the order flow can be translated into downward sloping curves to buy shares, and into upward sloping curves to sell shares. You will see how the translation of orders into prices and trading volume depends on the architectural structure of the marketplace. You will come to appreciate that trading in the equity market involves making tactical trading decisions. You will also comprehend the costs involved in placing your orders, and will understand the cost pressures felt by a dealer firm when its inventory of shares has become unduly large.

Trading is very different from investing. Investing involves selecting the stocks that you wish to hold in your portfolio, while trading involves the implementation of your investment decisions. Trading is the activity that brings you to the marketplace. An equity market, because it is a rapidly moving, highly dynamic environment, brings to light some of the real-world characteristics of a micro market that we wish to be aware of and to understand. As described in Schwartz, Francioni, and Weber,

> *. . . once a (portfolio) decision is made and has been passed on to the trading desk, time acquires a different meaning. The clock suddenly accelerates. Prices in the marketplace can move with startling velocity in brief intervals of time. As they do, trading opportunities may pop up and quickly vanish. Your own order handling can cause a price to move away from you. Poor order placement and imperfect order timing can be very costly. Consequently, a hefty portion of the gains that an asset manager might otherwise have realized from a good investment decision can be nullified by a poor trading decision.*
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> —*The Equity Trader Course* (John Wiley & Sons, 2006), p.2

Conclusion: when you go to an equity market to trade, it pays to do it right. Doing it right calls for having the best understanding possible of a market's dynamics, of just how the market behaves.

Doing it right calls for understanding that an equity market can be thought of as an *ecology*. Ecological systems involve the interactions between living organisms and their environment. When the pattern of interactions is reasonably stable, an environment is said to be in ecological balance. This view applies to an equity market. Traders interact with each other in an equity marketplace for a multiplicity of motives. Some are looking to buy shares while others are looking to sell. The limit orders of some participants (these are priced orders that are placed on an order book) bring liquidity to the market, while the market orders of other participants (these are orders to buy or to sell immediately at prices that have been set by other participants such as the limit order traders) take the liquidity that is there away. Some people trade for informational reasons, and others for their own personal reasons, including their own liquidity needs for buying or selling shares. Yet other participants jump in as momentum players who follow (and thereby reinforce) a trend, while others approach the market as contrarians, buying as prices drop and selling as they rise. All of the above is needed for an equity market to function well as an ecological system. The wording can be stronger: The multiplicity of events is *required* for an equity market to operate effectively. And a diversity of events drives the dynamics of other real-world micro markets as well.

BASIC MICROECONOMIC CONCEPTS

Certain concepts are central to microeconomic theory. We turn to them now before progressing to the rest of the book.

Ceteris Paribus: All Things Being Equal

We will be considering issues such as how much of a good, service, or financial asset will be demanded in the market, and how much will be supplied by the market. For now, let's focus on demand. By demand, we mean the amount of a resource that a user will actually seek to purchase (consider this *effective demand*), as distinct from the amount that the individual would ideally like to have if the resource was free (consider this *wishful demand*).

If we were to ask a portfolio manager (PM) how many shares of *xyz* stock he or she would hold in a portfolio under management, what do you think the PM would immediately ask us? One question would undoubtedly

be, ''What price would I have to pay to acquire the shares?'' Right on! Regardless of the resource under discussion, how much of it you would seek to acquire would depend on its price. Price is a crucially important variable for all of us in general, and for a microeconomist in specific.

Our scarce resources are allocated across the broader set of goods, services, and financial assets that are available to us with regard to price. But price is not the only variable that counts. Other factors such as your income (and/or wealth), the price of other resources, and your tastes also matter. If we want to focus on the pure effect of price, we do so by ''holding the other factors constant.'' The Latin term for this is *ceteris paribus*, which means ''all else is equal.'' Interpret ''all else'' as everything else that is relevant, and ''equal'' as ''constant.''

So, how many shares of *xyz* will the PM wish to hold if *xyz* costs $20 a share? To answer this, we might also want to consider the investor's wealth or total assets under management, how risky *xyz* is, the earnings per share that the PM expects the company to achieve one year into the future, and the price of other stocks that he or she is considering holding.

Here are two more questions:

1. How many more shares of *xyz* would the investor wish to hold if the price was lower, say $19 per share?
2. What else might be different if the price is $19 a share rather than $20?

To assess the responsiveness of the PM's demand to hold shares to the share price, the answer to Question 2 should be ''Nothing else is different.'' Recognizing this, Question 1 can be reworded: ''How many more shares would the investor want to hold if the price were to change from $20 a share to $19 a share, all other relevant factors held constant (*ceteris paribus*)?''

Of course you might ask why the price per share has dropped from $20 to $19. Perhaps the reason is that the release of bad news has caused others to lower their expectations of future earnings. In this case, we would twist the Latin phrase around and say that ''*ceteris* is not *paribus*.'' But that would be changing the question we started out asking. Let's stick with our original inquiry: If the price of shares were to change, *all else constant*, how would the demand to hold shares change? The answer to this question is the first step to obtaining the investor's *demand curve* to hold shares. We need this demand curve to understand how the price of shares is set in the market in the first place. We consider this demand curve in further detail in Chapter 3.

An investor's demand curve shows the array of alternative quantities that would be demanded at an array of alternative prices. As we move along

a given demand curve, price is the only variable that is driving change in the quantity demanded—*all else is constant*. If any other demand determining variable changes (e.g., the investor's wealth, or the investor's investment or trading strategy, or his or her expectation of future returns for the stock or the returns expectation for an alternative, substitute investment), we say that the *demand curve has shifted*.

Let's repeat the thought with reference to a different resource: What might cause your demand for a product, such as pasta, to change? Answer: a change in any of pasta's demand-determining independent variables. If the variable is the price of pasta, your response to the price change (all else constant) would be a *movement along* your demand curve for pasta. If price is constant and some other demand-determining variable changes (perhaps your income, or your desire to cut down on carbs, or the price of rice), your response would be a *shift* of your demand curve for pasta.

A demand curve is a fundamental tool of economic analysis, and it plays a crucial role in our book. Whether the agent in question is an investor and we are considering the number of shares of a stock that are held by the portfolio manager, or the agent is the driver of a car and we are considering how many gallons of gas the driver on average purchases each week, we can conceptualize a price change and an agent's response to the price change while holding *all else equal* (i.e., *constant*). By this *ceteris paribus* procedure, we can better isolate the key factors that drive a market. In so doing, we will better understand how price is set in a market.

To summarize, *ceteris paribus* is a conceptual tool that we use to organize thinking about the interactions between a set of variables. In actual markets, lots of things can change at the same time. Nevertheless, we conceptually separate the net impacts of each of the causal factors (which are referred to as the *independent variables*) on the factor that we are interested in (which is referred to as the *dependent variable*). For empirical analysis, multivariate econometric tools exist that enable one to infer the net effect that each independent variable has on the particular dependent variable in question.

Fixed versus Variable Costs and Return

Microeconomics is oriented to decision making; it deals with questions such as, if the price of one product (coffee, for instance) increases relative to the price of another product (tea, for instance), how much should I decrease my consumption of coffee relative to tea? Or, if a company's production costs go down, how much more output should that company bring to market? Or, if the earned income of electricians increases relative to the earned income of plumbers, how many more people will choose to be electricians rather than plumbers? And so forth.

When making a decision, all costs and returns related to that decision should be taken into account. In doing so, we make a very clear distinction: Fixed costs (and fixed returns) are differentiated from variable costs (and variable returns). Only the variable components are relevant for decision making.

Here is an example of a cost that, being fixed, should not be taken into account. Harrison and his girl friend Alba have just stepped out of a taxi that has taken them to a movie theater. Because of heavy traffic, the taxi ride cost $10 more than Harrison had expected. He added that to the cost of the movie ticket and concluded that the "all-in price" was too high. Being frugal, Harrison suggested to Alba that they skip the movie and simply take a walk.

Alba, however, had something to say about this. Having taken a microeconomics course, she was able to point out the error in Harrison's thinking. "We are here already, we have already paid for the taxi, and that payment is now a fixed cost. As such, Harrison," she said, "it is a sunk cost. That cost is what it is, it does not depend on whether we see that nice movie or not. Therefore it is not relevant to our decision making. Come on, Harrison, let's buy the tickets." And so they did. And Alba was right.

As we proceed to analyze various *decisions*, it will always be variable costs only that we take into account. Fixed costs should be taken account of only when considering how well off a decision maker is (for example, the profits that a firm has realized from its production and sales are clearly affected by fixed costs).

Long-Run versus Short-Run Analysis

Long-run versus short-run analysis refers to the length of time a decision maker has to respond to the change of an economic variable. For simplicity, we distinguish between two abstractly defined time horizons, a short-run horizon and a long-run horizon. The distinction honors the reality that the marketplace is not a frictionless environment, that economic agents cannot make adjustments instantaneously, and that the process of adjusting to change takes some time. Adjustments can be made in the short run, but they are only partial. For instance, if the price of an automobile decreases, additional cars may be sold in the short run, but sales will expand more in the long run as consumers gain further time to replace their existing vehicles and/or to buy additional ones.

In the long run, all costs and returns are fully variable (and all adjustments are complete), while in the short run some costs and returns are fixed. For instance, in the short run we assume that a company's plant size is fixed but that the firm is able to alter its number of employees. In the long run, a firm's workforce and its plant size are both fully variable.

How long is the long run? The answer is, ''it depends.'' The long run is measured in years if we are thinking of the supply of cardiologists because a lengthy education is required to enter that profession. With regard to portfolio management, the long run will be measured in fractions of a year, and with regard to securities trading, an hourly interval might better define the long run.

Equilibrium

Equilibrium plays a central role in economic analysis. We seek to understand how resources are allocated between competing ends so as to maximize profits for producers (suppliers) and to maximize utility for households (consumers). How are decisions made? How should the tradeoffs that are faced be resolved? When an individual firm or household has optimally formulated its decisions, it is in equilibrium. When the firms and households that in aggregate comprise an industry have achieved stable pricing, production levels, and consumption levels, the industry is in equilibrium. After an equilibrium has been attained, nothing will change until an exogenous shock occurs (for instance, a change in technology, or tastes, or the availability of a productive resource, or the price of a related good or factor of production, or a regulatory intervention).

We consider equilibrium for individual firms and households, and for individual industries. We consider equilibrium in the short run and in the long run. We focus on *static equilibrium* (outcomes that participants attain individually, and that markets in aggregate are pushed toward by economic forces). We consider *comparative statics* (a contrast of two different static equilibria that is attributable to a difference in the value of an independent variable). And we occasionally have a word to say about *dynamic equilibrium* (which addresses the adjustment that occurs over time when a decision maker or market is not currently in static equilibrium). Our analysis of equilibrium (static, comparative statics, and dynamic) pays particular attention to the structure of relative prices. *Relative prices* is the hallmark of microeconomic analysis. Macroeconomic analysis, in contrast, focuses on variables such as aggregate income levels, economic growth, and change in the aggregate level of prices (i.e., inflation).

Marginal Analysis

Marginal analysis can be viewed as an extension of the thought that only variable costs matter. Marginal analysis means that we consider how costs and revenues change *on the margin* as we pursue an activity more or less intensively. Because fixed costs are fixed, the marginal costs associated with

fixed costs are zero. Variable costs do change, however, which is why they are called variable. Marginal costs are associated with variable costs. Here is an example.

Harrison, a serious runner, is generally on the road four times a week, averaging five miles a run. One day he set out on an eight-mile run. The first three miles were fine as he warmed up and started cruising. The next four were increasingly challenging and, finally, mile eight had to be toughed out. At the end of it, Harrison stopped. How would a microeconomist describe the pattern of each successive mile becoming increasingly more demanding? Viewing each mile marker as a one-mile increment, the pattern is one of increasing incremental cost (that is, the incremental difficulty of running from mile 7 to mile 8 was greater than the incremental difficulty of running from mile 6 to mile 7, which in turn was greater than the incremental difficulty of running from mile 5 to mile 6, and so on).

How would an economist explain Harrison having stopped at the end of mile eight? Through mile eight, the benefit of running each additional mile must have exceeded the incremental cost of doing so. But the incremental cost was increasing, and the net benefit was decreasing with each passing mile. If Harrison had run a ninth mile, the incremental cost would have risen to the point where the net incremental benefit had turned negative. Harrison undoubtedly applied this incremental analysis (if only intuitively) to decide the length of his run.

But our formidable runner did not have to make his decision in terms of one-mile increments. If Harrison was running on a quarter-mile track, he would likely have used quarter-mile increments. But a microeconomist would shrink the measurement increment even further. Let's go all the way down—let's shrink the increment to an infinitesimal amount. Then the microeconomist would not use the term *increment*, but would say *marginal*. The decision of how far to run can be made with precision when *marginal analysis* is used: Harrison would stop precisely at the point where the marginal cost rose to a level that set the net marginal benefit of continuing equal to zero.

Here is another example of marginal analysis. Alba has a portfolio that is currently valued at $100,000. She is thinking about how she would feel if, in one year, her portfolio is valued at $90,000 (negative growth), or at $100,000 (zero growth), or at $110,000 (good growth), or at $120,000 (strong growth). Alba might state her feelings as, respectively, total disgust, disappointment, satisfaction, and total delight.

A microeconomist would depict her emotions somewhat differently. Each outcome from the lowest ($90,000) to the highest ($120,000) would be assigned a *utility value* (*utility* is the term we use for *pleasure*). Clearly,

the higher the outcome, the greater is Alba's utility. Contrast two of these increments: (a) the differential utility achieved by being at $100,000 instead of $90,000, and (b) the differential utility achieved by being at $120,000 instead of $110,000. That is, how does the incremental utility gained by going from total disgust to disappointment compare in magnitude with the incremental utility gained by going from satisfaction to total delight? Which utility increment do you think would be greater? That is, which of these two jumps in portfolio performance would add more to Alba's utility index?

Economists typically assume that successive, equal-dollar increments (in this case, $10,000 increments) yield diminishing successive increments of utility. So let's presume that Alba's utility increases with dollars, but at a decreasing rate. This being the case, increment (a) is greater than increment (b). Next, let's shrink the dollar increments in question from $10,000 additions to infinitesimal additions. When we do so, we can refer to Alba's *utility function for dollars*, and to Alba's *marginal utility* of dollars. The marginal utility of dollars is the amount by which an infinitesimal increase in dollars increases her utility. Because Alba's utility is increasing with dollars at a decreasing rate, her marginal utility of dollars falls (but remains positive) as the total number of dollars that she has increases.

We can define Alba's utility function with respect to either her income or to her wealth. Either way, we see that Alba has diminishing marginal utility of income (or wealth). As we explain in Chapter 2, this property of diminishing marginal utility of income (or wealth) has important implications for Alba's willingness to accept risk.

Here are two more examples of how adjustments can be made *on the margin*.

1. An increase of wages in industry A relative to industry B leads workers to seek employment in industry A. But not all workers will feel the need to respond; only some people may change their employment. Those who do so are the ones who, either because of geographical proximity, their skill sets, and/or their personal preferences, find it most beneficial to move from one industry to the other. These are the people who are "on the margin." Change "on the margin" is all that is needed for a market to equilibrate following a price adjustment.
2. Shares of *xyz* stock are trading at $32 before bullish news comes out and the share price increases to $34. The company has 2 billion shares outstanding, but the price change occurs with only 15 million shares changing hands. Consequently, $4 billion of market capitalization was created by a dollar-trading volume of roughly $480 million. How could

this happen? The reason is that price is set in the marketplace by the subset of participants who meet in the market and trade. The subset is comprised of the *marginal participants* (those who for whatever personal reason, perhaps their assessments of information or individual cash flow needs, are most apt to buy or to sell shares). Again, the message to be received is that everyone need not respond to news for the new information to be reflected in price. As in all markets, price is determined by activity that takes place *on the margin*.

Elasticity

In our discussion of *ceteris paribus*, we have considered how a dependent variable (e.g., the quantity of a good demanded) is related to a set of independent variables (e.g., the price of the good in question, the price of other related goods, and income). Part of understanding this relationship involves knowing the *responsiveness* of the dependent variable to each of the independent variables. *Elasticity* is our measure of that responsiveness.

One way of measuring the responsiveness of some variable y to some other variable x is simply to divide the change in y (call it Δy) to the change in x (call it Δx). And so, we could let $\Delta y/\Delta x$ be the measure, where Δ signifies a discrete (incremental) change. For one reason in particular, however, this is not a good measure: The ratio is affected by the units of measurement used for both y and x. To understand the problem that this can lead to, first let y be the number of gallons of gas that a ''representative'' consumer purchases per week, and let x be the price per gallon of gas. Perhaps we observe that a 10¢ increase in price results in a two-gallon decrease in demand (in other words, that $\Delta y/\Delta x = -2$ gallons/10¢, where the minus sign indicates that the consumption of gas *decreases* when the price of gas rises at the pump).

Now let y be the number of pounds of tomatoes that the ''representative'' consumer purchases per week, let x be the price per pound of tomatoes, and assume that the price of tomatoes goes up 10¢. Perhaps we observe a value $\Delta y/\Delta x = -.5$ pounds/10¢. Question: The price of both items, gas and tomatoes, has increased by 10¢. Which of the two items is more responsive to the price change, gasoline or tomatoes?

Who can say? The problem is that a gallon of gas cannot be compared to a pound of tomatoes. There is, however, a simple way to make the two responses comparable: contrast the *percentage change* in y with the *percentage change* in x. By this adjustment, we eliminate the labels associated with y and x (e.g., *gallons* of gas and *pounds* of tomatoes). The simplest way to do this adjustment is to use marginal analysis instead of incremental analysis, and to take our measure of responsiveness to be

$$\eta_{y \cdot x} = \mathrm{d}y/y \div \mathrm{d}x/x = (\mathrm{d}y/\mathrm{d}x)(x/y)$$

where $\eta_{y \cdot x}$ denotes the elasticity of y with respect to x, and $\mathrm{d}y$ and $\mathrm{d}x$ are infinitesimal changes in y and x, respectively.

We are taking y to stand for quantity demanded. If x is the per unit price of y, $\eta_{y \cdot x}$ is the own-price elasticity of demand. If x is the representative consumer's income, $\eta_{y \cdot x}$ is the income elasticity of demand. And so on.

This is enough for now on elasticity. We return to this topic in Chapter 3.

Maximum, Minimum, and Optimum

Some things we wish to maximize, other things we wish to minimize, and for most things we want to select an optimal amount. For instance, we all want to maximize happiness, but, for a multiplicity of decisions that we make, the objective is to optimize. Do you like sugar in your coffee? If so, how much? Right now, in the context of the current discussion, "an optimal amount" is the perfect answer.

Consider the construction of an equity portfolio. Three characteristics of a portfolio are of overriding importance to an investor: its risk, its expected return, and its liquidity. For now, let's focus on just the first two and on the relationship between them. The higher the expected return that the portfolio yields, the happier we are. On the other hand, the riskier the portfolio, the more pain we feel. For any level of risk we certainly want to maximize the expected return. Similarly, for any level of expected return, we wish to minimize the level of risk. But with risk and return both being variables, our objective is to achieve an optimal combination of the two. Fortunately, we can control the risk and return characteristics of a portfolio by combining the individual financial assets that comprise it in appropriate proportions. Let's pursue this further.

When financial assets are properly priced, a clear trade-off exists between risk and return: Higher risk assets (both single stock positions and portfolio combinations) yield higher expected returns, and stocks and portfolios that offer lower expected returns are less risky. Thus investors face a trade-off: They can realize higher expected returns only by accepting more risk, or they can reduce their risk exposure only at the price of accepting lower expected returns. Facing this tradeoff, the investor should select a portfolio that offers an *optimal* combination of risk and expected return. The desired portfolio is optimal in that obtaining it maximizes the investor's utility, which is a function of wealth (we explain more about this in Chapter 2).

"Optimal" is like Goldilock's preferred porridge: It could be hotter, it could be cooler, but it is just right. A "just right" amount is determined with reference to Goldilock's single, ultimate objective: maximize her utility. In microeconomic theory, the single, ultimate objective for a consumer is just that: maximize utility. For a firm the goal is to maximize profits. In pursuit of these objectives, the decision makers make optimal choices from the menu of alternatives available to them.

FRICTIONLESS MARKETS, THE GULF STREAM, AND A DAY AT THE RACES

Two contrasts of considerable importance have been set forth in this chapter: (1) theory versus reality, and (2) frictionless versus nonfrictionless markets. With respect to the first contrast, we care about reality, but we use theoretical analysis to gain insight into the complex workings of real-world micro markets. With respect to the second contrast, real-world markets are replete with trading frictions, but we can assume these impediments away in order to simplify and thereby expedite much of our theoretical analysis. But if your study of microeconomics is confined to frictionless markets only, you might be left thinking that the subject is simply too unrealistic to be useful. Although we would disagree with your conclusion, we would certainly understand your thinking that way. But rest assured, starting in Chapter 4, we very definitely pay attention to the realities of the nonfrictionless marketplace.

However, do not be too fast to dismiss the frictionless environment. It serves two purposes, and it serves them well. For one thing, friction or no friction, strong underlying forces drive the micro markets, and it is important to understand them in their pure form. You might better appreciate this with the aid of an analogy. The Gulf Stream is a warm, powerful ocean current that has its origin in the Gulf of Mexico, after which it follows the eastern coastlines of the United States and Newfoundland before traversing the Atlantic to the shores of Europe. The ocean that it crosses is often beset by winds, heavy precipitation, and waves that in a storm can be fierce. If you care about things such as average temperatures and weather patterns on both sides of the Atlantic, you must have knoweldge of the Gulf Stream. But if you are a ship's captain, you undoubtedly also care about the wind, precipitation, rip tides, and waves on the surface of the sea. To the ship's captain, the Gulf Stream may be theory, and the surface conditions a reality. But they both matter. A wise captain should, and no doubt does, know and care about both.

Depicting the frictionless market also serves a second purpose. It is an ideal toward which we might forever strive but in reality never achieve. Superior technology, more efficient market architecture, better informed and more sophisticated participants may all help but, with regard to each of these, perfection is forever impossible to achieve. The concept of a frictionless market is like the mechanized rabbit that greyhounds chase at a race. The rabbit is always in front of the charging dogs, the rabbit is the hounds' goal, but the rabbit can never be caught. Yet it serves a very important purpose.

CHAPTER SUMMARY

In this introductory chapter we have established a number of key concepts that will be important for our market structure presentation of microeconomics. Here are some highlights of the chapter.

1. Microeconomics is the study of how economic units determine what and how many goods and services to consume (households) and produce (firms), and what and how much of the factors of production (for example, labor and capital) to supply (households) and to use in production (firms).
2. Microeconomic theory formalizes basic principles concerning how best to resolve the tradeoffs involved in consumption, production, and other allocation decisions. It does so by tying assumptions together to form an economic model. The assumptions individually need not be perfect reflections of real-world economic activity. Theory, by its nature, is abstract, while real-world markets can be very intricate. The hallmark of a good theory is that, although abstract, it provides insights that enable us to understand better the operations of the real-world micro markets.
3. Market structure refers to the architectural realities of actual marketplaces. These encompass the institutional features that pertain to market design and operations.
4. The power of microeconomic theory can be better understood by applying it to an actual, real-world market. Throughout the book, as we extend our theoretical discussion to a nonfrictionless market characterized by imperfect information, trading costs, and blockages, we focus on the equity markets. Specifically, we consider the secondary markets where already-issued equity shares are traded (not the primary markets where new shares are issued).

5. Equity market microstructure, a relatively new field in financial economics, considers the processes by which orders are submitted to a nonfrictionless marketplace, are handled in the marketplace, and are turned into trades and transaction prices.
6. Market participants (buyers/consumers and sellers/producers) interact to set the prices of goods and services in the context of specific institutional environments. Through price setting, markets allocate scarce resources to participants according to the relative prices that they face, their incomes (or wealth positions), and their tastes for the various goods and services as described by their utility functions (and also by technology which is described by production functions, a topic that we discuss in Chapter 5).
7. A vast array of different markets exists, including commodities (such as coal, crude oil, wheat, and wood), labor (full-time and part-time), managerial resources, and capital (physical, human, and financial.) Equities markets (one of the markets for financial capital) are an excellent target for market microstructure analysis.
8. We have addressed the question, how well do markets function? On the one hand, there is the positive force exerted by Adam Smith's invisible hand. On the other hand, the forces of competition that the invisible hand represents are impeded by some agents having market power (at the extreme, monopoly power), and by various other factors including trading costs, imperfect information, and systemic risk.
9. To understand better just how prices and transactions volumes are determined in an equity market based on the order flow received by the market, and to appreciate that trading in an equity market involves making tactical decisions, we have noted that the market can be thought of as an ecology. Traders interact with each other for a multiplicity of motives, and a multiplicity of motives is, in fact, required for an equity market to operate effectively.
10. We have presented seven key concepts: *ceteris paribus*, fixed costs versus variable costs and return, long-run versus short-run analysis, equilibrium, marginal analysis, elasticity, and maximum versus minimum versus optimum. These concepts underlie much of the discussion in this book. It is important to have a good grasp of them. If you feel comfortable with these concepts, you will better appreciate your study of this market structure presentation of microeconomics.

QUESTIONS TO THINK ABOUT

1. Select a micro market that you have some familiarity with and/or are curious about. Possibilities could include movie theaters, the oil market, restaurants, or the textbook market. Write down some distinctive, distinguishing characteristics of the market that you have chosen. In some markets, prices are set by the abstract forces of demand and supply, in some markets prices are administered, and in others they are negotiated. How are prices set in the market that you have selected? Also note one or two questions concerning the operations of that micro market that might intrigue you.
2. A number of assumptions underlie our microeconomic models. These include: The marketplace is a frictionless environment, participants have perfect information, the marginal utility from consuming individual goods and services is diminishing, no individual participant in a market is large enough to affect a market determined price. How do you feel about these assumptions? Could a set of assumptions that are individually unrealistic, collectively have descriptive/predictive power? What is the alternative if you do not make some of these assumptions?
3. Liquidity is a tricky concept. You might know it when you see it, but how would you define it? Give this some thought and then pick two markets, one that you consider relatively liquid and one that you consider relatively illiquid. Contrast the two markets in terms of your definition of liquidity. How might the relative absence of liquidity in one of these markets affect your willingness to go to that market to trade?
4. Consider your decision of whether or not to do something such as make a substantial purchase (perhaps an automobile) or take a lengthy vacation trip. What are some of the costs (frictions) involved in implementing a decision to go ahead with the purchase or to take the trip? Examples of an implementation cost include the hassle of moving from one house to another, of going through airport security before boarding a flight, of getting a bank loan before buying a car, or of incurring transaction costs when buying/selling a financial instrument. Might you be dissuaded from proceeding by the implementation costs alone? If your answer to any of the above questions is yes, can you see that trading frictions can change market outcomes?

(*Continued*)

(*Continued*)

5. What do you think about the power of Adam Smith's invisible hand to produce desirable micro-market outcomes? We have presented eight major reasons why a real-world, competitive market may not deliver theoretically desirable outcomes. Which of these reasons do you consider the most important? Can you provide specific examples of some of the reasons in action?
6. Select two different goods or services, one that you expect would be relatively price-elastic and one that you expect would be relatively price-inelastic. Explain the basis for your elasticity expectations.

TraderEx SIMULATION: LET'S LOOK AT A MARKET

The chapter started with the statement that our subject, microeconomics, is about the functioning of a market. Let's take a look at a specific market. With the use of a simulation model, we can focus in on one micro market that is both of critical importance to the macro economy and is particularly intriguing: a market where already issued equity shares trade. We can do this with the use of the TraderEx simulation software that is available in *Mastering the Art of Equity Trading Through Simulation: The TraderEx Course*. TraderEx is an interactive computer simulation that is designed to increase your understanding of how real-world equity markets operate, and to provide you with hands-on experience in making tactical trading decisions.

Mastering the Art of Equity Trading provides further information about the structure of the equity markets and about how to use the software. Specific exercises are also provided. We invite you to use *Mastering the Art of Equity Trading* in the end-of-chapter material in the other chapters of this book. At this time, we turn to the simulation software to get a first glimpse of how an equity market can function.

The order-driven market is a good environment to start with. By order-driven, we mean that some market participants who are looking to buy or to sell shares for their own portfolio reasons have posted buy or sell orders. These posted orders are referred to as limit orders, and we discuss them in greater detail in Chapter 4. Because the limit orders posted by some participants establish the prices that other participants can trade at in the market, the environment is called "order-driven." On the TraderEx screen, you will see limit orders that have been placed on the *limit order book*. A *limit order* means that a price limit has been placed on the order, and the participant is

willing to wait for it in order to execute the order (and is willing to take the risk that the price limit will not be met). For a buy limit order, the price limit is the highest price the buyer is willing to pay. For a sell limit order, the price limit is the lowest price the seller is willing to receive. Do you want to buy? Enter a buy limit at your price. Want to sell? Enter a sell limit at your price. But there is also another way that you can buy and sell. You can enter a market order and trigger a trade against an already-posted limit order. The order entry box for doing this is at the top of the limit order book. If you buy ''at market,'' you buy at the lowest posted offer (assuming that the book has sufficient depth). If you sell ''at market,'' you sell at the highest posted bid (again, assuming that the book has sufficient depth).

Look at TraderEx's limit order book and start to become familiar with it. Get a feel for how buy and sell pressures interact in a marketplace to produce transaction prices and trading volume, and think of these buy and sell pressures as *demand and supply*. In our basic models, demand and supply jointly determine price and quantity in a marketplace. Think about how the orders you see on the limit order book collectively reflect the demand and supply propensities that have been openly expressed in the market.

But what about market orders? Until the market orders have been entered, are they *unexpressed, latent* demand and supply propensities? Hmm, this is something to think about.