Chapter 1
Introduction

The field of industrial organization encompasses a host of intriguing questions. Why do cell phone companies charge a fixed fee for a given number of minutes and a high price for each additional minute? Why do firms produce a vast number of brands? If advertising persuades consumers to buy something, are they better off? If two large firms merge, is society better or worse off? What if one of the firms is failing? These are just a few of the questions that are addressed in the book.

Even before taking a course in principles of microeconomics, most people realize that monopolies (i.e., markets with one firm) tend to charge higher prices than firms in competitive markets with many firms. That is, if we had a magic wand and could instantly change a competitive industry into one with a single seller, most people would predict an increase in price. In *Politics and Ethics*, Aristotle wrote about the problem of the high price associated with monopoly, which is frequently called an "unjust price." What is less understood is what happens between the limiting cases of monopoly and perfect competition, when markets are imperfectly competitive and have just a few sellers. Yet, most markets are imperfectly competitive.

Industrial organization, which is sometimes called industrial economics, analyzes the theory and empirical evidence of imperfectly competitive markets.[1] In this book, we emphasize three main topics. First, we are interested in studying the forces that shape market structure and the reasons why some industries have many producers while others have just a few.

Second, we analyze how markets function and the economic consequences of imperfect competition. Unlike competitive and monopoly markets, strategic behavior typically plays a key role in imperfect competition. Our understanding of firm strategy benefits from both game theory and behavioral economics. Game theory provides a rigorous foundation for studying the strategic actions of rational players. Behavioral economics provides insights from psychology and evidence from experiments to show that some consumers suffer from cognitive weaknesses and have

[1] Schmalensee (1988) provides an excellent overview of the field.

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preferences that are more complicated than traditional consumer theory would suggest. Contributions from behavioral economics help us to identify many of the marketing tactics that are used by firms to exploit these consumer traits.

Finally, we are interested in public policy towards business, especially with problems related to market power resulting from imperfect competition. Understanding how markets are structured and the economic consequences of imperfect competition will allow us to better evaluate the merits of antitrust and regulatory policy.

In this chapter, we provide a brief introduction to the field of industrial organization. We review its origins and discuss how behavioral economics is contributing to the field. Next, we outline policy issues that motivate much of the theoretical and empirical research in industrial organization. We also discuss the connections among theoretical ideas, economic models, and reality. Finally, we outline the topics and approaches used in the book.

1.1 The Origins and Methods of Industrial Organization

The field of industrial organization has been influenced by developments in other branches of economics and by various schools of thought. The theoretical underpinnings of the field derive from microeconomics, which provides the foundation for consumer theory, producer theory, and game theory. Industrial organization differs from microeconomic theory in that it puts greater emphasis on real-world markets, institutional arrangements, and empirical evidence. Our understanding of the real world has also been enhanced by behavioral economics, a relatively new field of economics that will be described more fully in the next section.

Before discussing the origins of industrial organization, it is important to emphasize that the field benefits from both theoretical analysis and empirical studies of real markets. Problems arise, however, when there is a disconnect between the two, a concern raised by Barbra Wootton over 70 years ago. According to Wootton (1938), 5), "What is lacking [in economics] is any effective means of communication between abstract theory and concrete application." Part of the problem is that it takes very different intellectual gifts to be successful in theoretical and applied research. This was clearly understood by Joseph Schumpeter (1954), 815) who said:

> There are such things as historical and theoretical temperaments. That is to say, there are types of minds that take delight in all the colors of historical processes and of individual cultural patterns. There are other types that prefer a neat theorem to everything else. We have use for both. But they are not made to appreciate one another.

On this issue, Shubik (1980, 21) argues that "it has been the tendency of these groups to work almost as though the other did not exist."

We will see that this tension has influenced the development of the field. Theoretical economists constructed precise models to describe imperfectly

competitive markets. On the other hand, early empirical and institutional economists rejected theory and studied the real world to gain an understanding of such markets. Both approaches are valuable, and we strive to reach a balance between the two. As Leamer (2007, 4587) points out, we run into problems in our research when we take "theory too seriously" and when we fail to take "theory seriously enough."[2]

1.1.1 Early Theoretical Foundations

Although the ancients clearly understood the high price associated with monopolies, modern economic thought began with Adam Smith's publication of *The Wealth of Nations* in 1776, which discussed the benefits of competition and the costs of monopoly.[3] Formal models of competition and monopoly were not developed until the nineteenth century, however, and did not become widely disseminated until Alfred Marshall published *Principles of Economics* in 1890. His book was a major success because it was so accessible, emphasizing graphical over more advanced mathematical modeling techniques. Although monopoly and competitive models provide a clear picture of the polar extremes of market structure, they have one obvious limitation. Most real markets have just a few firms, differentiated products, and consumers and producers with limited information. These are qualities not found in perfectly competitive and simple monopoly models.

In the early 1930s, Chamberlin (1933) and Robinson (1933) developed models of imperfect competition.[4] Chamberlin's model of monopolistic competition gained immediate acceptance because it was simple and filled the gap between perfect competition and monopoly by allowing competing firms to produce differentiated products. The model has elements of both monopoly and perfect competition. Like monopoly, each firm has a monopoly over the sale of its particular brand and faces a negatively sloped demand function. Like perfect competition, there are no entry barriers and the market consists of many competitors, albeit competitors who sell differentiated products. The major drawback with the model is that with many competitors, strategic interaction is rendered nonexistent. That is, each firm is so small that the action of one firm has an insignificant effect on the profits and behavior of competing firms.

[2] This is consistent with his earlier work where Leamer (1996) argued that to do good research in economics, we must do three things. First, we must address relevant policy and scientific questions. Second, we need to develop theories that shed light on the question and help organize the data analysis. Finally, we need to use data that are consistent with theory and help answer the question at hand. See Varian (1997) for a discussion of the social value of economic theory.

[3] For a discussion of monopoly theory prior to Adam Smith, see De Roover (1951).

[4] For a discussion of the similarities and differences in their models, see Bellant (2004).

Strategic interaction can be critical in oligopoly markets, imperfectly competitive markets with just a few sellers. In this setting, the actions of one firm affect the behavior and profits of other firms. The first formal models were analyzed long before the model of monopolistic competition. Cournot (1838) developed a static duopoly model, an oligopoly model with just two firms that compete by simultaneously choosing output, and Bertrand (1883) developed a static duopoly model where two firms simultaneously choose price.[5] Although these models allowed for strategic interaction, they were essentially ignored by industrial organization economists until the second half of the twentieth century.

Part of the problem with Cournot's work in particular was that it was highly abstract and technical for its time. Bertrand (1883, 74) commented that Cournot's "ideas disappear under the abundance of mathematical symbols." Bertrand also criticized Cournot for making the unrealistic assumption that firms compete in output, when most real firms compete in price. Fisher (1898, 133) provided a more favorable review of Cournot's model and the use of mathematics in economics, stating that Cournot's work was ignored because "[i]t was too far in advance of the times." Today, the study of the Cournot and Bertrand models is the starting point for investigation of oligopoly theory.

Another early criticism of oligopoly theory is that it predicts that almost anything can happen. At one pole is the cartel model which predicts monopoly pricing. At the other is the simple Bertrand model that produces competitive pricing. The Cournot model produces an equilibrium price that is in between these extremes. We will see that game theory addresses this criticism by showing how the rules of the game (i.e., the institutional setting and the legal and market constraints) better align theoretical models with reality.

1.1.2 Institutional and Empirical Traditions

In the first half of the twentieth century, many economists were critical of the formal models of imperfect competition. Not only could these models produce any outcome from cartel to perfect competition,[6] critics argued that the formal models were overly abstract and had little connection to the real world. In response, economists from the "institutional school" used inductive analysis to study the effect of legal, social, public, and private institutions on the evolution of real-world markets. A notable example is the work by Clark (1927), who synthesized the economics of industry concentration with legal and political factors to study the role of government regulation.

[5] In addition, von Stackelberg (1934) developed a dynamic version of the Cournot model.

[6] This can be seen in Bowley's (1924) "conjectural variation" model of oligopoly that is summarized in Hicks (1935).

At the same time, empirical economists also contributed to the development of the field. They conducted case studies to investigate the pricing behavior and economic performance of large corporations and manufacturing industries. For example, Ripley (1907, 1916) analyzed growing industrial concentration in the USA, particularly in the salt, steel, and leather industries. Means (1935a, b) made a valuable contribution to our understanding of price movements in individual industries. He found that prices in concentrated markets were relatively sticky and did not follow the laws of demand and supply. In the backdrop of the Great Depression, Means raised the concern that the failure of prices in oligopoly markets to fall during an economic downturn would exacerbate a recession.[7]

1.1.3 The Structure–Conduct–Performance Paradigm

The field of industrial organization began to take shape in the 1930s with the work of Edward Mason (1939) and others at Harvard. This work produced what is now called the **structure–conduct–performance (SCP) paradigm**.[8] Because this paradigm has had such an influence on the field, we discuss it in some detail.

Mason's goal was to develop a model that would allow one to assess the economic performance of real-world markets. In essence, he tried to synthesize the best of theory and institutionalism in a way that was empirically applicable to real markets. Mason's efforts led to a taxonomy of fundamental market attributes. The general categories of market attributes are their basic conditions, structure, conduct, and performance. These categories and several key elements in each are summarized in Table 1.1.

Basic conditions refer to the demand and cost conditions of the market. They include the price elasticity of demand and the nature of technology, factors that are generally fixed for a considerable length of time. Market structure describes characteristics that identify departures from perfect competition. These include the number and size distribution of firms, the degree of entry and exit barriers, and whether or not products are differentiated. Conduct identifies the key choice variables of firms, including price/output, advertising, and product design.

A crucial goal in industrial organization is to evaluate whether or not a market performs well from society's perspective. Important performance elements include static and dynamic efficiency, macroeconomic stability, and equity. By equity we mean that which is just, fair, and impartial. Questions of equity are normative, which involve issues of "what ought to be." In contrast, positive questions involve issues of "what is." An example of a normative economic question is: Should we regulate

[7] This conclusion was later questioned by Stigler and Kindahl (1973) and Carlton (1979, 1986).

[8] Discussion of the evolution of the structure–conduct–performance paradigm borrows from Grether (1970) and Phillips and Stevenson (1974). A paradigm refers to a theoretical or accepted framework within a discipline at a given time.

Table 1.1 Taxonomy of market attributes: basic conditions, structure, conduct, and performance

Basic conditions	
Demand	*Cost*
Price elasticity of demand	Technology
Substitutes and complements	Input prices
Cyclical character	Value/weight ratio
Market structure	
Number and size of firms	Entry and exit barriers
Product differentiation	Vertical integration
Conglomerateness	
Conduct	
Pricing behavior	Advertising
Product design	Research and development
Mergers	
Performance	
Static efficiency	Equity
Dynamic efficiency	Macroeconomic stability

electricity rates? An example of a positive economic question is: What is the most efficient way to regulate electricity rates?

Although equity concerns are sometimes thought to be outside the domain of economics because they require value judgments, equity is still important. As a society, we want firms to behave in a socially responsible manner and refrain from deceptive and unfair business practices. We may also deem it unfair if producers earn excessively high economic profits, especially if excess profits predominately benefit the wealthy. In the end, we want markets to be efficient, stable, and equitable. Unfortunately, we frequently cannot attain more of one without giving up some of another. With regard to efficiency and equity, this is the well-known efficiency–equity trade-off.[9]

Development of the SCP paradigm produced two outcomes. First, it categorized the principle characteristics of markets, making market classifications and comparisons more scientific. Second, the simplest version of the paradigm postulated the testable hypothesis that causality runs from structure to conduct to performance. It was thought that high concentration facilitated collusion and poor economic performance (as reflected in high profits). Although there is little support for this simple version of the hypothesis today, the classification of key SCP elements remains useful.

In spite of its limitations, many scholars favored the SCP paradigm over purely theoretical models because of its empirical applicability. First, data could be used to identify the important distinctions in structure, conduct, and performance of different

[9] The classic work on the efficiency–equity trade-off is Okun (1975, 120), who said that "the conflict between equity and economic efficiency is inescapable." We will see in Chap. 19 that this is more of a trade-off between efficiency and equality than efficiency and equity. For a less pessimistic view, see Blank (2002).

industries. This led to a number of studies that examined the facts relating to a particular industry. Second, the SCP paradigm resulted in a slew of empirical studies using a cross section of data from different manufacturing industries to determine the influence of market structure and conduct on industry performance.[10] Many of these early studies found a weak but positive correlation between concentration and industry profits, evidence that was thought to support the hypothesis that high concentration is a cause of high profits and is, therefore, inefficient.

The SCP evidence led to a shift in public policy. A growing confidence that markets with fewer firms will be inefficient led to strict enforcement of the antitrust laws in the 1950s and 1960s. It also provided theoretical support for the structural standards that are found in the 1968 Merger Guidelines of the Department of Justice.

1.1.4 Competing Paradigms and Public Policy

The SCP paradigm and empirical evidence did not go unchallenged. In the 1960s, economists associated with the Chicago School of economic thought began to question both the theory and the empirical evidence in support of the SCP paradigm.[11] The Chicago School perspective is based on several tenets. First, the perfectly competitive model generally provides a good approximation of how markets in the real world operate.[12] Second, competition is desirable because it rewards success and eliminates inefficiency. Third, monopoly power is possible, but unless it is supported by government, dynamic market forces make it short lived. Fourth, even if a market fails to produce a socially optimal outcome, there is no guarantee that government action can improve things.

Although the Chicago School is frequently thought to support a conservative, free market (i.e., laissez faire) economics agenda, this is not quite right.[13] For instance,

[10] For a review of 46 studies that used data from 1936 to 1970, see Weiss (1974). For more recent reviews, see Schmalensee (1989), Scherer and Ross (1990), Carlton and Perloff (2005), Waldman and Jensen (2006), and Perloff et al. (2007).

[11] The Chicago School is associated with the Department of Economics at the University of Chicago. However, not all members of the department adhere to the tenets of the Chicago School, and not all Chicago economists are at the University of Chicago. Leading Chicago economists include Milton Friedman, George Stigler, and Gary Becker, all Nobel Prize winners. For a more complete discussion of the Chicago School and its critics, see Reder (1982), Van Overtveldt (2007), Pitofsky (2008), Crane (2009), and Wright (2009).

[12] According to Reder (1982, 12), when dealing with an applied problem Chicago School economists "have a strong tendency to assume that, in the absence of sufficient evidence to the contrary, one may treat observed prices and quantities as good approximations to their long-run competitive equilibrium values."

[13] The Austrian School is more closely associated with a faith in free markets and limited government. Like Chicago, it places greater emphasis on dynamic efficiency, but unlike Chicago it has less faith in mathematical modeling and empirical analysis. For more information about the Austrian School, see The Ludwig von Mises Institute at http://mises.org.etexts.austrian.asp.

followers of the Chicago School favor antitrust legislation that makes collusion and large horizontal mergers illegal. At the same time, their work raised concerns with government policy. The most important of these are that government agents need not pursue socially desirable goals, that government intervention is costly, and that government policies can produce unintended consequences.[14] Thus, government intervention may be desirable but only if the social benefits outweigh the social costs (Demsetz 1969). It is more accurate to characterize members of the Chicago School as skeptics of the political process than as conservatives (Reder 1982, 31).[15]

It is from this vantage point that Chicago School economists questioned the SCP paradigm and its supporting evidence. They scrutinized every aspect of the paradigm and empirical evidence, including data limitations, sample selection, the static nature of the model, and the argument that causality runs from structure to performance.[16]

Demsetz' (1973) **superior efficiency hypothesis** provided a credible alternative interpretation of the empirical evidence that concentration is positively correlated with industry profits.[17] According to Demsetz (1973, 3), markets are dynamic, and successful firms with lower costs or better products will earn higher profits or economic rents and capture a larger share of the market. This will cause both industry concentration and profits to increase. Thus, the positive correlation between concentration and profits is due to the superior efficiency of larger corporations, not collusion. In other words, causality runs from performance to structure, rather than from structure to performance as predicted by the SCP paradigm.

These conflicting hypotheses led to divergent policy recommendations. While the SCP paradigm favors deconcentration policies, the superior efficiency hypothesis does not. In the words of Demsetz (1973, 3), "[t]o destroy such power [through antitrust enforcement] ... may very well remove the incentive for progress." That is, dynamic efficiency requires that we refrain from penalizing successful firms that monopolize a market because such a policy may reduce the incentive to invest in innovations that produce monopoly power but still benefit society overall. Of course, these differing views are not mutually exclusive. That is, excess profits could be due to both monopoly power and the superiority of leading firms.

[14] Regarding monopoly power, for example, Demsetz (in Goldschmidt et al. 1974, 238) states that "If we could surgically cut out this monopoly power without bearing the costs of frequently penalizing efficiency and competition, I would say, 'I am for it.' I just don't believe it is possible to do that. The costs of trying would greatly exceed the potential benefits."

[15] The great recession or financial crisis of 2008–2009 has led to greater scrutiny of the market system and of the Chicago position. For instance, a recent series of papers in Pitofsky (2008) presents evidence that the Chicago School "overshot the mark" in the area of antitrust. Furthermore, Posner (2009), a Chicago economist and legal scholar, argues uncharacteristically that the recent crisis is due to insufficient government involvement in financial markets.

[16] For a review of these criticisms and the evidence, see Stigler (1968), Goldschmidt et al. (1974), and Scherer (1980, Chap. 9).

[17] Others who have expressed similar views include Brozen (1971) and McGee (1971). Alternatively, Mancke (1974) argued that this strategic advantage can be driven by luck rather than superiority.

According to Bresnahan and Schmalensee (1987, 373), by the end of the 1970s "the critics [of the SCP paradigm] generally prevailed." It became clear that market structure need not reliably predict performance. In addition, concerns with causality and data limitations virtually eliminated empirical research that used inter-industry data to investigate the relationship between structure and performance. As a result, the status of the SCP paradigm was greatly diminished.[18] Nevertheless, the classification of structure, conduct, and performance elements still provides a useful taxonomy of variables that are important in industrial organization.

1.1.5 Game Theory and the New Theoretical Industrial Organization

Although contributions from the SCP and Chicago traditions have been valuable, arguably the foremost contribution has been the application of game theory to industrial organization problems. Game theory developed into an influential modeling tool with John Nash's (1950) discovery of the solution concept to noncooperative games, known as the Nash equilibrium.[19] Game theory became invaluable as a tool for analyzing strategic problems that occur in all of the social sciences. Although it was not until the 1970s that game theory made its way into industrial organization, today virtually every theoretical model in the field builds from the Nash equilibrium concept.

In a game-theoretic setting, the Nash equilibrium identifies the actions that each rational player will pursue to maximize the player's payoff (i.e., utility or profit). This requires that each player choose a best response to the actions of all other players in the game. The Nash equilibrium is reached when each player behaves optimally, assuming that all other players behave optimally as well. Once there, players cannot improve their payoffs by changing their behavior. It may seem obvious that fully rational players would behave this way, but of course many good ideas are obvious once they are revealed. Nevertheless, Nash's contribution goes beyond the idea. He also proved that all games that meet certain conditions have at least one Nash equilibrium. Thus, he is known for both the idea and its existence proof.

[18] For example, in his overview of the field, Schmalensee (1988) gave little attention to the SCP paradigm. In addition, in a 1996 survey of industrial organization economics, Aiginger et al. (1998) found that those surveyed did not expect the SCP paradigm to be revived. Caves (2007) provides a less pessimistic view, however.

[19] This won him the Nobel Prize in economics. You may know John Nash from the Russell Crowe movie, *A Beautiful Mind*. In true Hollywood fashion, in the movie Nash gains inspiration for his contribution to game theory from a bar scene where he and his friends discuss their strategy for meeting women. In reality, his idea came to him in an economics class in international trade. For a more accurate picture of Nash's life, see Nasar (1998). Nash won the Nobel Prize in 1994, along with two other game theorists, John Harsayni and Reinhard Selten, who refined the Nash equilibrium concept to solve games with imperfect information and dynamic settings.

As we stated previously, analysis of the Cournot and Bertrand models is the starting point for the study of oligopoly theory. Each of these models represents a Nash equilibrium to an oligopoly game that has a different set of characteristics. In the classic Cournot model, there are two firms that produce homogeneous goods (e.g., spring water) and compete by simultaneously choosing output. The only difference between the Cournot and Bertrand models is that firms compete by setting price instead of output in the Bertrand model. A significant outcome of these models is that they show how a simple change in the rules of the game can have a dramatic effect on the Nash equilibrium. In the Cournot model, the equilibrium price is between the monopoly and perfectly competitive price, while in the Bertrand model it equals the perfectly competitive price.

There are several reasons why game theory is essential to theoretical research in industrial organization. First, it provides a clear picture of how fully rational players will behave in a strategic setting. Second, it provides a set of tools that allow us to make more realistic modeling assumptions concerning the rules of the game (i.e., goals, market conditions, laws, and social norms). Game theory informs us of what can and cannot happen, conditional on a given set of assumptions. When assessing the validity of a model, the game-theoretic approach directs attention to the realism of assumptions as well as the predictive power of the model (Fudenberg and Tirole 1987).[20] In other words, game theory clarifies how the outcome in an imperfectly competitive market depends on the key features of the legal, institutional, and market setting. Thus, modern models address concerns raised by critics that early theoretical models of imperfect competition (1) were based on overly simple assumptions and (2) could prove that almost anything can happen. Finally, game theory is especially useful to policy analysis, as it can give us a better understanding of the economic consequences of an institutional change.

1.1.6 New Empirical Industrial Organization

While game theory changed the way we study theoretical industrial organization, the empirical tradition continues to be influential. New empirical research in industrial organization uses a structural framework in which empirical models derive directly from theoretical models.[21] New studies also benefit from better data sets and econometric techniques.

[20] We have purposefully avoided the debate about whether a model should be judged by the realism of its assumptions or the accuracy of its predictions. We may choose a simplifying assumption in order to build a model that is tractable but would want to avoid assumptions that are clearly false. Differing positions can be found in Friedman (1953) and Nagel (1963). For a discussion of the debate, see Boland (1979) and Martin (2007a, b).

[21] For a discussion of the use of structural methods in industrial organization, see Nevo and Whinston (2010).

Beginning in the 1970s, empirical scholars began to abandon inter-industry data sets, reverting back to case studies. According to Einav and Nevo (2006, 86), "In the last 25 years, [industrial organization] studies have increasingly focused on single industries, using a combination of economic theory and statistics to analyze interaction between firms." This work has produced more accurate estimates of market power and the economic consequences of events such as a merger or change in the economic or legal environment. Unfortunately, it is frequently difficult to obtain sufficient data to test some of the finer predictions of game-theoretic models.

In response, a recent and promising line of research has emerged where the unit of study has moved from the industry or firm to the brand. For instance, the widespread use of price scanners and supermarket discount cards has enabled scholars to create detailed data sets that link market conditions to data on price, promotional activity, consumer characteristics, and consumer demand for particular products. These new sources of data have allowed for better controls of some of the relevant game theory characteristics and have improved the quality of empirical research in the field. Another response has been the use of experimental methods to analyze industrial organization questions (Plott 2007).

1.2 Behavioral Economics and Industrial Organization

The field of behavioral economics began with pioneering studies by Simon (1955) and Kahneman and Tversky (1979), which use concepts and evidence from psychology to gain a better understanding of human behavior. Early studies were based on experimental evidence, and more recent work uses neuroscience methods, where brain scans provide insight into how people make decisions. This has produced a promising new subfield of behavioral economics called neuroeconomics.

Two important conclusions emerge from behavioral economics research. First, consumer preferences are generally more complicated than simple theory presumes. For example, some people suffer from loss aversion, which occurs when a person places much greater weight on the loss of $x than a gain of $x (measured in the absolute value of the change in utility). Second, due to cognitive limitations, people sometimes make mistakes. You may make a mistake when calculating which brand of cornflakes is cheaper per ounce when a 1.25 pound box of brand X sells for $4.99 and a 21 ounce box of brand Y sells for $5.09. Many people also have problems with overconfidence and time inconsistency. In the case of dieting, it may be rational to begin a diet tomorrow, but once tomorrow arrives procrastination sets in and the starting date is postponed for another day.

The cognitive weaknesses of consumers can have a dramatic effect on market outcomes. For instance, online dating sites use a special pricing scheme to exploit consumers who are biased in favor of the default option. A contract for a 6 month subscription might include one of the following defaults. When the

6 month subscription period is over, service for another 6 months (1) continues automatically unless the subscriber takes action (i.e., actively cancels service by phone or e-mail) or (2) continues only if the subscriber takes action (i.e., actively renews service by phone or e-mail). Because some subscribers who do not wish to continue the service will fail to actively cancel their subscription, choosing a default that automatically continues service transfers revenues from consumers to producers. Successful companies are well aware of such flaws and exploit them to earn greater profit.

Given this growing body of evidence, economists have begun to enrich traditional economic theory by incorporating insights from behavioral economics. One of our goals is to do just that. We will summarize some of the flaws revealed by behavioral economics and show how companies develop strategies to exploit those flaws.

1.3 Public Policy and Industrial Organization

A crucial goal in any field of economics is to gain a sufficient understanding of the economy to provide enlightened policy recommendations. This involves evaluating the effectiveness of new and current policies by assessing their benefits and costs. A socially desirable policy will produce positive net social benefits (total benefits minus total costs).

The process of identifying potentially beneficial laws and regulations has three steps. First, we need to uncover areas of potential market failure—situations where markets may fail to allocate resources in socially optimal ways. Second, we need to identify the most effective policy that will correct the problem.[22] Stopping here would lead to what Demsetz (1969) calls the "nirvana" approach to public policy analysis. This approach can produce undesirable policies because it ignores the fact that the implementation of a policy can be expensive and produce unintended consequences. Thus, the third and final step requires a comparative institution approach where we evaluate a real market outcome with a real policy-corrected outcome. We would then choose the option that is most socially desirable. When the cost of government action is excessively high, the free market outcome would be optimal even with its imperfections. Nevertheless, we begin our discussion using the nirvana approach and reserve discussion of the cost of government policy to Chap. 20.

In industrial organization, a central policy interest relates competition and efficiency. When inadequate competition leads to market power, price exceeds marginal cost and markets are statically inefficient. In a dynamic world, competition for market dominance causes firms to make investments that are designed to

[22] Frequently, there are many equally effective policies. In that case, we would select the lowest cost policy.

Table 1.2 Major antitrust statutes in the USA

Sherman Act (1890): The Sherman Act has two important provisions.

Section 1: "Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among several states, or with foreign nations, is declared to be illegal."

Section 2: "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce . . . shall be deemed guilty of a felony."

Clayton Act (1914): The Clayton Act addresses four specific business practices.

Section 2: Price discrimination is illegal where the effect may be "to substantially lessen competition or tend to create a monopoly." The provision does allow for price differences that reflect differences in costs and when it meets the low price of a competitor.[a]

Section 3: Market restrictions such as exclusive-dealing contracts and tying contracts are illegal where the effect is "to substantially lessen competition or tend to create a monopoly."

Section 7: Mergers are illegal where the effect may be "to substantially lessen competition or tend to create a monopoly." Section 7 had a loophole that allowed mergers by asset acquisition. The loophole was later eliminated in the *Celler–Kefauver Act (1950)*.

Section 8: Interlocking directories of corporations larger than a certain threshold are prohibited.[b]

Under the Clayton Act, injured parties can recover treble damages.

Federal Trade Commission Act (1914): This Act established the Federal Trade Commission (FTC) that was charged, along with the Department of Justice (DOJ), with interpreting and enforcing the antitrust laws. Section 5 states that "the Commission is hereby empowered and directed to prevent persons, partnerships, or corporations . . . from using unfair methods of competition in commerce."

Hart–Scott–Rodino Act (1976): The Hart–Scott–Rodino Act required firms of a minimum size to notify the DOJ and the FTC of their intention to merge. In most cases the government works with the firms involved to reach a negotiated settlement.

[a]The Robinson–Patman Act (1936) amended Section 2 and gave greater protection to small retailers who were battling the growing chain-store movement in the USA.

[b]This means that large corporations in the same industry cannot be controlled by a common board of directors.

give them a competitive advantage over their competitors. When this behavior leads to market power alone, it is socially harmful. If it produces lower costs and better products, however, it can be dynamically efficient and socially desirable.

Two forms of policy address anticompetitive concerns, antitrust legislation and government regulation of business.[23] The antitrust laws are designed to foster a competitive economy, and the major antitrust statutes are listed in Table 1.2. The first major piece of legislation is the Sherman Act (1890), followed by the Clayton Act (1914), the Federal Trade Commission Act (1914) and the Hart–Scott–Rodino Act (1976).

These laws address issues related to market structure and firm conduct. Section 2 of the Sherman Act and Section 7 of the Clayton Act address structural issues.

[23] A third policy would be for the government to nationalize an industry to form a public enterprise. Although this is how we operate the postal, water, and sewer services, it is less common and is not addressed here.

Firms guilty of monopolization are in violation of Section 2 of the Sherman Act and can be broken up into smaller enterprises, directly affecting market structure. When a merger is successfully challenged under Section 7 of the Clayton Act, industry concentration is kept from rising. Other sections of the Sherman and Clayton Acts address issues of anticompetitive practices. For example, Section 1 of the Sherman Act makes collusive activity illegal.

In some cases, legislation gives a government agency discretionary power to regulate business. "Social regulation" is established to protect the environment and the welfare of consumers and workers. For instance, the Food and Drug Administration is responsible for regulating the safety of food and drugs. The Occupational Safety and Health Administration is responsible for the safety and health of workers. In this book, we are primarily concerned with "economic regulation," which involves price/output regulation that is designed to address market failure due to market power. Today, this typically involves the regulation of natural monopolies where industry production costs are minimized when there is only one firm. In these industries, regulatory agencies may be established to promote static and dynamic efficiency.

1.4 Economic Theory, Models, and Mathematics

1.4.1 Theory, Models, and Reality

Although the words theory and model are sometimes used interchangeably, there are useful distinctions between them.[24] Theories embody a set of ideas and insights about an aspect of the economy and how it functions. They describe a broad conceptual approach. Examples include consumer theory, producer theory, and game theory. Theories represent abstract ideas that are distinct from reality. Economic models sit in the middle, connecting theory to reality. Historical facts may describe an economic event, but facts alone cannot explain why an event occurred. Theories and models are used to provide explanations of economic events and predict how we might change the course of events.

A model is a formal representation of a part of a theory and is used to explain and make predictions about some aspect of the economy. Models are more specific than theories and are reductionist by definition. That is, they are designed to make sense of reality by reducing complex relationships to their fundamental elements. A road map can be helpful even though it excludes some of the details of a city. In the same way, an economic model can be useful in analyzing the market for cell phones, even though it ignores some of the details of the market.

[24] Our discussion of the distinction between a theory and a model borrows from Leijonhufvud (1997), Morgon (2002), Sutton (2002), and Goldfarb and Ratner (2008).

In economics, we frequently use simplifying assumptions to produce tractable models of complex economic phenomena. To capture every aspect of reality would produce a model that is unmanageable or hyperfactual.[25] At the same time, a model that oversimplifies will be unrealistic and of little use in explaining or predicting reality. The art of good economic modeling is to reach the proper balance and avoid oversimplifying and overfactualizing.

Describing models as bridges between theory and reality enables us to classify them in a meaningful way. Models that are closely connected to theory are more general and abstract; they are typically called purely theoretical or abstract models. Models that are more realistic and empirical (i.e., based on data and observation) are typically called applied models. One example is an econometric model that uses data to address a concrete economic issue.

Consider an example from consumer demand theory. General models of consumer choice tells us that consumer demand for a particular good will depend on prices, income, consumer preferences, and a variety of other social and institutional factors. Given this general theory, we might use a reductionist model to gain insights into the relationships of a handful of key variables. In this case, we are implicitly invoking the *ceteris paribus* assumption where all other variables are taken to be held fixed and are ignored.

A purely theoretical model might assume that a rational consumer has a demand function (D) for a particular good that depends only on the price of the good (p), the price of a substitute good (p_s), and consumer income (m). The demand function could be described generally as $D(p, p_s, m)$, meaning that demand is a function of p, p_s, and m. From this model, one can show that the effect of a price change can be decomposed into two parts: the substitution effect and the income effect. This is a purely abstract or theoretical result, as it is not connected to any real market. The model becomes more concrete as we give it more structure. If we assume that demand is linear, then $D = a - b_1 \cdot p + b_2 \cdot p_s + b_3 \cdot m$, where a, b_1, b_2, and b_3 are constants. With appropriate data from a particular market and a proper estimation technique, we can estimate the parameters of the model to produce an even more specific specification, such as $D = 12 - 4p + 3p_s + 2m$.

In industrial organization we are interested in different types of models. Theoretical models are abstract but can be used to address real world problems. Cournot's oligopoly model is one example. Empirical models are applied and employ real world data to estimate parameters and test important hypotheses. For example, an empirical model might be used to test whether real firms in a particular industry behave as Cournot or Bertrand competitors.

Another characteristic of a model is its degree of formality. A less formal model might rely on geometry and graphs to connect theory with reality. More formal models utilize advanced mathematical techniques. The use of advanced

[25] For example, Stigler (1949, 319) states that "... the role of description is to particularize, while the role of theory is to generalize—to disregard an infinite number of differences and capture the important common element in different phenomena."

mathematics allows us to analyze more complex models such as those that have a greater number of dimensions. With geometry, it is difficult to graph a three-dimensional problem and impossible to describe one that has ten dimensions. More advanced mathematics overcomes this limitation. This comes at a cost, though, as mathematics is a difficult subject.

1.4.2 Modeling and Mathematics

Most of the formal analysis in this book relies on geometry and algebra. In some cases, however, calculus is useful. We realize that many undergraduate textbooks avoid calculus, but we think that this is a mistake because calculus makes some forms of analysis much easier.[26] Furthermore, we implicitly use calculus all of the time in applied microeconomics courses: marginal cost is the first derivative of the total cost function, and a firm's profit maximizing level of output is found by setting the first derivative of the profit equation equal to zero. Some books avoid calculus by replacing the symbol for small change, d (or ∂), with the symbol for change, Δ. But this does not eliminate the underlying calculus; it is just a way of avoiding the term "derivative." Other books relegate calculus to footnotes, but this can disrupt the flow of the analysis.

Our applications in the book that rely on calculus require more intuition than technical skill. That is, our goal is to understand how a change in one variable affects another variable. Wherever reasonable, we will use linear functions, where the slope of the line informs us of the change in the dependent variable (y) due to a change in the independent variable (x), as in Figs. 1.1 and 1.2. Occasionally we will use smooth functions that are hill or bowl shaped (i.e., quadratic functions), as in Fig. 1.3. In this case, the slope of a tangent line to the curve represents the change in y with respect to a "small" change in x (dy/dx). Maximum and minimum values of functions such as these occur where the tangent to the curve is horizontal (i.e., it has a 0 slope) (Figs. 1.1–1.3).

The Mathematics and Econometrics Appendix at the end of the book describes the math and statistical tools that are used in the book. In mathematics, these include a review of graphs, areas of rectangles and right triangles, linear and quadratic equations, slopes of tangents to curves, and derivatives of linear and quadratic equations. The regression section covers basic distribution functions, regression analysis, hypothesis testing, and methods to evaluate regression estimates.

[26] Even though mathematics is difficult for most of us, according to Weintraub (2002) the use of mathematics in economics is the most important development in the field of economics in the twentieth century.

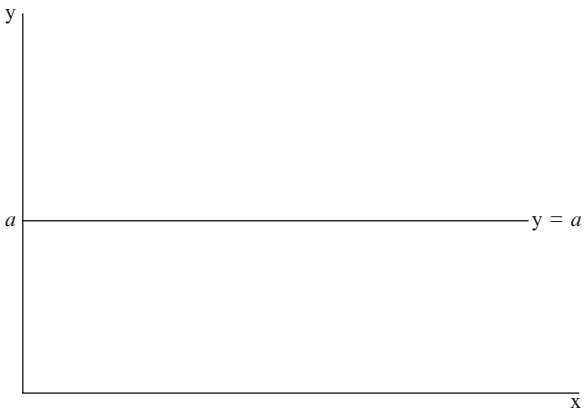

Fig. 1.1 The relationship between x and y when y is a constant

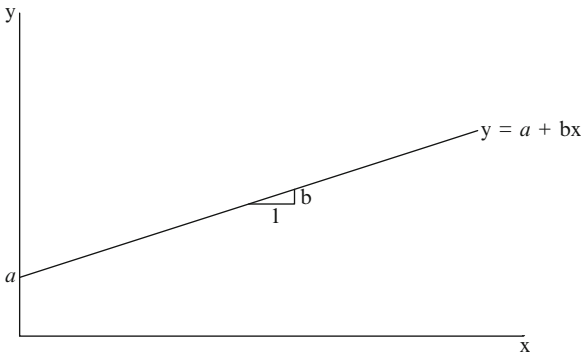

Fig. 1.2 The relationship between x and y when y is a positively sloped linear function

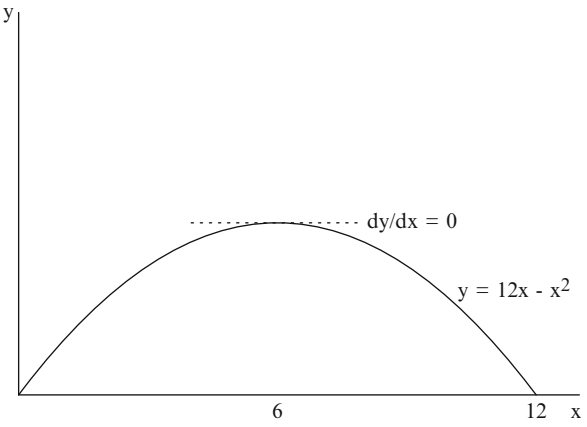

Fig. 1.3 The relationship between x and y when $y = 12x - x^2$

1.5 Approach of the Book

In this book, we strive to present a balanced view of the field of industrial organization. First, we address fundamental questions in the field, including:

- Why do some markets have many producers, while others have just a few?
- What forces foster competition and enhance economic efficiency?
- Why do firms advertise and how does advertising affect social welfare?
- What factors encourage technological progress?
- To what extent have our antitrust laws and government regulations been socially beneficial?

Second, we develop the classic theories and models used to address these questions. By bridging the gap between abstract theory and the real world, these models provide a better understanding of how imperfectly competitive markets work. Third, data and empirical evidence are presented to further understanding of real markets. Finally, we provide an eclectic set of evidence and points of view that do not represent any one particular school of thought. Both the theoretical models and the empirical evidence are used to enlighten policy analysis.

Ultimately, we want to know whether or not imperfectly competitive markets perform well from society's perspective. Society's performance goals are (static and dynamic) efficiency, macroeconomic stability, and equity. As with other books, we devote most of our attention to issues of static and dynamic efficiency. Ethical corporate behavior is also important, especially to policy analysis, and we discuss this topic at the end of the book. Of course, macroeconomic stability is desirable too, but like most books in industrial organization we leave this topic to others.[27] We also devote relatively little time to market imperfections that are directly associated with externalities, public goods, and risk and uncertainty.

Whenever possible, we will use the scientific method to analyze the economic problems associated with imperfectly competitive markets. The goal is to (1) tackle important questions, (2) use models to address these questions by constructing clear conjectures or hypothetical explanations (i.e., hypotheses), (3) report on empirical evidence that tests these hypotheses, and (4) interpret and draw conclusions about the results.[28] With this method, reliable answers are more likely to emerge over time.

Of course, there are limitations with the scientific method when applied to the social sciences where value judgments come into play, experiments can be too costly to perform, and data are inadequate to perform a proper hypothesis test. Nevertheless, a leading American physicist Lisa Randall (2011, 20) makes a strong case for using the scientific method to address public policy questions.

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[27] For discussion of the relationship between industrial organization and macro stability, especially as it applies to administered or sticky prices, see Carlton (1979, 1986) and Scherer and Ross (1990).

[28] This also involves publishing the results and retesting hypotheses to assure their validity. For further discussion, see Wilson (1952).

> Public policy is more complicated than clean and controlled [scientific] experiments, but considering the large and serious issues we face—in the economy, in the environment, in our health and well-being—it's our responsibility to push reason as far as we can. Far from being isolating, a rational, scientific way of thinking could be unifying. Evaluating alternative strategies; reading data, when available, . . . about the relative effectiveness of various policies; and understanding uncertainties—all features of the scientific method—can help us find the right way forward.

Part I of the book provides a review of the economic tools that we use throughout the book. Chapter 2 discusses demand and cost theory. Chapter 3 summarizes the relevant tools of game theory, and Chap. 4 outlines many contributions from behavioral economics. For most readers, some of this will be review material.

In Part II, we discuss nonstrategic issues that are relevant in industrial organization. In Chaps. 5 and 6, we review the competitive and monopoly models, the static benchmarks of policy analysis. In Chap. 7, we describe different types of product differentiation and discuss how product differentiation affects firm demand and costs. In Chap. 8, we present the theory of market structure.

Game theory is used extensively in Part III, where we discuss oligopoly theory and market power. The most abstract analysis is found in Chaps. 10 and 11, where we review the traditional static and dynamic models of oligopoly, such as the Cournot, Bertrand, and Stackelberg models. We connect theory to reality in most other chapters by including empirical evidence and case studies where relevant, such as Chap. 9 where we discuss cartels and in Chap. 12 where we discuss empirical studies of market power.

Part IV is the most eclectic, as it uses models that build from game theory and benefit from behavioral economics. It also presents empirical evidence and discusses real-world examples to illustrate a variety of marketing strategies that are used by firms. Primary topics in this section include product design (Chap. 13), advertising and other marketing practices (Chaps. 14–16), technological change (Chap. 17), and mergers (Chap. 18).

A review of overall market performance, case study analysis, and policy issues are discussed in Part V. Chapter 19 summarizes the evidence regarding the efficiency, equity, and corporate responsibility in imperfectly competitive markets. Antitrust and regulation policies are discussed in Chap. 20. Industry and firm case studies are found in Chap. 21.

Rather than provide an encyclopedic review of the evidence, in most cases we focus on seminal and relatively recent studies. Throughout the book, concrete examples of firm behavior and industry performance derive from the major sectors of the US economy, including manufacturing, transportation, and wholesale–retail (see Table 1.3). The choice of case studies reflects our tastes and is driven by historical significance, strategic importance, and policy relevance. These include the antitrust litigation of cartel activity in the steel industry from the past and the continued cartel activity in the petroleum industry. Strategic behavior becomes vivid when reviewing the marketing battles between Coke and Pepsi in the soft drink industry. The economic consequences of rising concentration and negative externalities can be seen in the market for alcoholic beverages, particularly in the

Table 1.3 Percent of gross domestic product (GDP) by major sector of the economy

	Share of GDP by sector (%)	
Sector	1982	2003
Agriculture, forestry, and fisheries	2.8	1.0
Utilities	–	1.9
Transportation	3.5	2.8
Construction	4.0	4.4
Health care and social assistance	–	6.8
Finance and insurance services	4.2	7.9
Real estate	11.8	12.4
Government	–	12.7
Manufacturing	20.5	12.7
Wholesale and retail trade	16.0	13.1

Sources: Scherer and Ross (1990, 58) and the US Department of Commerce, Bureau of Economic Analysis at http://www.bea.gov, accessed May 20, 2011.

brewing industry. Finally, the effect of deregulation has been most dramatic in the airline industry. Discussion of these and other industries can be found throughout the book, as well as in Chap. 21.

A significant departure from other books in industrial organization is the incorporation of evidence from behavioral economics. We review behavioral economics in Chap. 4 and later show how firms exploit common cognitive errors made by consumers. We also show how managerial overconfidence and bias can affect firm behavior to the detriment of stockholders. Contributions from behavioral economics are employed most frequently in Part IV, where we discuss the non-price–output marketing practices of firms, and in Chap. 20, where we discuss policy prescriptions. We believe that this approach enhances our understanding of the field of industrial organization.

1.6 Summary

1. The field of **industrial organization** is the study of imperfectly competitive markets. In this field, we analyze why some markets have many competitors, while others have just a few. We investigate the strategic behavior of firms and the economic performance of imperfectly competitive markets. Poor economic performance can justify antitrust and regulatory policy.
2. A crucial goal in industrial organization is to evaluate whether or not a market performs well from society's perspective. Economic performance elements include static and dynamic efficiency, macroeconomic stability, and equity. Most of our discussion will involve positive economics, that is, the study of what is. The study of equity issues will also be important. It requires value judgments, making it the purview of normative economics—the study of what ought to be.

3. The origins of the field trace back to the theoretical development of duopoly models of Cournot and Bertrand in the nineteenth century. Other noteworthy contributions include the development of the monopolistically competitive model in the 1930s by Chamberlin and the institutional and empirical traditions of the early twentieth century. The field began to take shape in the late 1930s with the development of the **structure–conduct–performance (SCP) paradigm**, which categorizes the principle characteristics of markets. The simplest version of the paradigm predicted that performance depends on conduct, and conduct depends on market structure. Work by Chicago and other economists have successfully shown that causality is not so simple. Demsetz' (1973) **superior efficiency hypothesis** states that firm success will lead to higher concentration and better economic performance. Thus, the SCP paradigm no longer plays a prominent role in industrial organization analysis. Nevertheless, the taxonomy of important elements of structure, conduct, and performance is still useful today.
4. Since the 1970s, **game theory** has transformed how we think about industrial organization issues. It provides a method for analyzing how fully rational players will behave in a strategic setting. It also allows us to develop models with considerable institutional reality, enabling us to better understand how institutional changes will affect firm behavior and market performance.
5. **Behavioral economics** is a relatively new field that brings insights from psychology and experimental evidence to enhance our understanding of consumer and manager decision making. One point is that consumers suffer from cognitive limitations. These insights influence research in industrial organization, as they provide economic motivation for the strategic actions taken by firms that clearly exploit these limitations.
6. Both abstract theory and concrete empirical work in industrial organization provide a knowledge base for evaluating public policy regarding large corporations. In particular, we are interested in investigating the justification and application of economic regulation and the antitrust laws.
7. It can be useful to view theory, models, and reality as separate entities. Theories represent a set of ideas regarding how the economy functions. Models are designed to connect theory to reality. Models are naturally reductionist, reducing a description of a particular aspect of the economy to its core elements. Models that are more closely connected to theory are called purely theoretical or abstract models. Those that are realistic and empirical are called applied models. Modern industrial organization makes use of game theory and behavioral economics to develop both abstract and empirical models of firms and industries.
8. Most abstract models in this book are described using graphs and algebra. Where appropriate, calculus is used. Calculus enables us to analyze a model in greater depth, to discuss a wider set of models, and to work with problems involving more than three variables. Most of our examples use linear or quadratic functional forms, making calculus derivations relatively easy. The Mathematics and Econometrics Appendix provides the tools needed to understand the book.