Modern Industrial Organization

FOURTH EDITION

Dennis W. Carlton • Jeffrey M. Perloff

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Modern Industrial Organization

Fourth Edition

Global Edition

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Preface

There's no IO without U.—Sesame Street

Modern Industrial Organization, Fourth Edition, combines the latest theories with empirical evidence about the organization of firms and industries. It goes beyond the descriptive traditional structure-conduct-performance approach by using the latest advances in microeconomic theory, including transaction-cost analysis, game theory, contestability, and information theory. Practical examples illustrate the role of each theory in current policy debates, such as whether mergers promote economic efficiency (Chapter 2), whether predatory pricing is likely to be a serious problem (Chapter 11), whether preventing manufacturers from restricting distributors' prices benefits consumers (Chapter 12), whether providing consumers with more information about prices or products increases welfare (Chapter 13), whether advertising is harmful (Chapter 14), whether joint ventures are the best means of encouraging research (Chapter 16), whether current antitrust laws promote competition and increase welfare (Chapter 19), and whether government regulation does more harm than good (Chapter 20).

Modern Industrial Organization is designed for use by both undergraduate and graduate students. The theories presented in the chapters require only a microeconomics course as a prerequisite and do not involve calculus. Technical appendixes supplement selected chapters and provide a rigorous foundation for graduate students. Starred sections are relatively difficult and may be skipped.

We have used this book in both undergraduate and graduate courses. In our undergraduate courses, we rely on the chapters and skip the technical appendixes. In graduate courses, we use the chapters and technical appendixes along with supplementary readings based on selected articles that are discussed within chapters or recommended at the end of chapters.

Structure of the Book

The first half of the book covers the basics of competition, monopoly, oligopoly, and monopolistic competition. Chapter 1 discusses the basic approach used in the book. Chapter 2 discusses the reasons why firms exist, merger activity, and costs. Chapters 3 and 4 develop the basics of microeconomic theory—costs, competition, monopoly, barriers to entry, and externalities—that we use throughout the rest of the book. Variations on the standard models (such as a dominant firm facing a competitive fringe) are also presented.

Chapters 5 through 7 explain the recent developments in the theory of oligopoly and monopolistic competition. Chapter 5 covers cooperative oligopoly behavior (cartels), and Chapter 6 examines both cooperative and noncooperative behavior

based on game theory. Chapter 7 focuses on monopolistic competition and product differentiation. Chapter 8 concludes the first part of the book with a thorough review and assessment of empirical work on market structure.

The remainder of the book covers the "new industrial organization"—material that is often missing from traditional texts. These topics, essential for applying the theories of industrial organization to everyday problems, are at the heart of many public policy debates and are the focus of considerable recent research. Chapters 9 and 10 cover common pricing strategies such as price discrimination through quantity discounts and tie-in sales. Chapter 11 examines strategic behavior where firms determine the best ways to do battle with their rivals. Chapter 12 discusses common business practices between manufacturers and distributors (vertical integration and vertical restrictions) and the dramatic changes in public policy toward these practices in recent years. The next two chapters, Chapters 13 and 14, address the problems that arise when consumers are not perfectly informed and when firms must advertise their products. The role of time is introduced in Chapters 15 and 16, which analyze how the durability of a product affects the market and how innovation can be encouraged. Chapter 17 considers evidence on the ways markets operate, and explores how modern microeconomic models of industrial organization may affect the macroeconomic economy. Chapter 18 examines the industrial organization issues that arise in international trade. The two concluding chapters, Chapters 19 and 20, analyze antitrust policy and government regulation.[1]

Although we believe that *Modern Industrial Organization* contains innovative ideas, we recognize that any textbook must borrow from existing research. We have tried to indicate when we have relied on the insights of others. However, we may have occasionally omitted a reference to an author whose ideas predated ours. We apologize for any such oversights.

Changes in the Fourth Edition

There are three major changes in the Fourth Edition. First, we have added many new applications, as well as discussions of important recent policies and new theories. Much of this new material is based on significant findings from more than 250 relevant articles and books published since our last edition. We have substantially updated material on cartels, particularly international cartels, and antitrust activities (Chapter 5); we have included a new section on estimation issues concerning differentiated

[1]Sometimes commonly used words have special meanings in the law that differ from the standard usage by economists and the general public. We try to use clear language to express economic rather than legal principles. For example, we might say that the "price of wheat in the market in Chicago affects the price of wheat in the market in Kansas City." Although such a statement uses the word *market* loosely, the point of the statement—that the prices of wheat in Chicago and Kansas City are related—is clear. In an antitrust trial, however, a specific legal definition of a market (see Chapter 19) is used and whether there are two separate markets or a single combined market is often of central interest. Our statement should not be interpreted to mean that there are necessarily two distinct wheat markets in Chicago and Kansas City for legal purposes.

goods oligopolies (Chapter 7); we have added a major new section on Sutton's modern approach to structure-conduct-performance analysis (Chapter 8); and we have substantially updated our discussion of patents and copyrights (Chapter 16) and regulation (Chapter 20).

Second, we have updated 18 examples and added 51 new examples. For instance, in one updated application, we conducted a new study of how the prices of Coke and Tropicana orange juice vary across grocery stores within a city. Our new examples spotlight a range of current events, among them the Enron scandal, the importation of low-price drugs from Canada, genetically modified organisms, the effect of 9/11 on flag sales, Blockbuster's innovative pricing polices, mergers in Europe, a monopsony in hiring priests, the change of China's tobacco monopoly to dominant firm status, the international vitamins cartel, the value of minivans, the certification of thoroughbreds, counterfeit Halal meat, Napster and piracy issues, and many others.

Third, we have significantly augmented our Web site, **www.aw-bc.com/carlton_perloff,** with extensive supporting material. Still-timely material that we removed from the Third Edition is available on the Web site. Further, we have written many new applications for the site.

Alternative Course Outlines

To cover the entire book takes two quarters or semesters. The book is designed, however, so that shorter courses can be constructed easily by choosing selected chapters, as shown in the following proposed reading lists.

Chapter 2 through 4 review and extend the basic material that is often covered in an intermediate microeconomics course: the theory of the firm, costs, the theory of competition, the theory of monopoly, and externalities. These chapters can be reviewed quickly for students with extensive preparation in microeconomics. Chapters 2 through 8 comprise the basic material for any course. Depending on the interests of the students and the instructor, a one-quarter or semester course could then sample a few of the chapters in the remainder of the book to obtain a flavor of the ways industrial organization can be used to study real-world problems.

All courses:
Carefully cover the core material in Chapters 2 and 5–8.

For courses that do not assume a strong background in microeconomic theory:
Cover Chapters 3 and 4.

Courses that assume a strong background in microeconomic theory:
Quickly review Chapters 3 and 4.

Courses that require calculus:
Include the technical appendixes and material on the Web.

Policy-oriented courses:
Cover international trade, antitrust, and regulation (Chapters 18 through 20). As time allows, include strategic behavior (Chapter 11), price discrimination (Chapters 9

and 10), vertical relationships (Chapter 12), limited information, advertising, and disclosure (Chapters 13 and 14), government policies toward innovation (Chapter 16), and macroeconomics (Chapter 17).

Regulation courses:
Regulations are dealt with throughout the book. Cover, in particular, externalities (Chapters 3 and 4), vertical relations (Chapter 12), limited information (Chapter 13), advertising and disclosure (Chapter 14), government policies toward innovation (Chapter 16), international trade (Chapter 18), and other government regulation (Chapter 20).

Business courses:
Include strategic behavior (Chapter 11), price discrimination (Chapter 9 and, optionally, nonlinear pricing, Chapter 10), vertical relations (Chapter 12), information and advertising (Chapters 13 and 14), and international trade (Chapter 18).

Courses that stress the latest theories:
Include strategic behavior (Chapter 11), vertical relations (Chapter 12), information and advertising (Chapters 13 and 14), government policies toward innovation (Chapter 16), market operation (Chapter 17), and international trade (Chapter 18).

Advanced courses:
Add chapters on nonlinear pricing (Chapter 10) and durability (Chapter 15).

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PART ONE

Introduction and Theory

CHAPTER 1 Overview
CHAPTER 2 The Firm and Costs

CHAPTER 1

Overview

Leave all hope, ye that enter. —*Dante Alighieri*

This text presents both traditional and new theories of **industrial organization**: the study of the structure of firms and markets and of their interactions. Introductory microeconomics analyzes idealized models of firms and markets; this text takes a closer, more realistic look at them, warts and all.[1] In introductory physics, one first disregards gravity and friction in studying the movement of bodies, and then adds these complications to the analysis. The study of industrial organization adds to the perfectly competitive model real-world frictions such as limited information, transaction costs, costs of adjusting prices, government actions, and barriers to entry by new firms into a market. It then considers how firms are organized and how they compete in such a world. This chapter describes some of the approaches that help to organize the study of industrial organization and gives an overview of the material in later chapters. Finally, it describes some of the analytic tools that are used.

Models

There are at least two major approaches to the study of industrial organization, and, because they are compatible as organizing principles, this text uses both of them. The first approach, *structure-conduct-performance,* is primarily descriptive and provides an overview of industrial organization. The second,

[1]We use the terms *market* and *industry* loosely and interchangeably. In antitrust cases, important distinctions are made between these terms, as is discussed in later chapters.

price theory, uses microeconomic models to explain firm behavior and market structure.

According to the structure-conduct-performance approach, an industry's **performance** (the success of an industry in producing benefits for consumers) depends on the **conduct** (behavior) of its firms, which, in turn, depends on the **structure** (factors that determine the competitiveness of the market).[2] The structure of an industry depends on basic conditions, such as technology and demand for a product. For example, in an industry with a technology such that the average cost of production falls as output increases, the industry tends to have only one firm, or possibly a small number of firms. If only one firm (a monopoly) sells output in an industry, it may be able to set a price that is well above its marginal costs of production. If the basic conditions make the demand for the monopoly's product relatively inelastic (people are relatively insensitive to price), then the price in that market is higher than if the demand is relatively elastic (people are price sensitive).

Figure 1.1 illustrates the relationships among structure, conduct, and performance and shows how basic conditions and government policy interact. The relationships among the five boxes are complex. For example, government regulations affect the number of sellers in an industry, and firms may influence government policy to achieve higher profits. Similarly, if entry barriers lead to monopoly and monopoly profits, new industries may develop new, substitute products that affect the demand for the original product. Empirical researchers who rely on this paradigm typically use data at the industry level. They ask, for example, if industries with certain structural features (for example, few firms) have high prices.

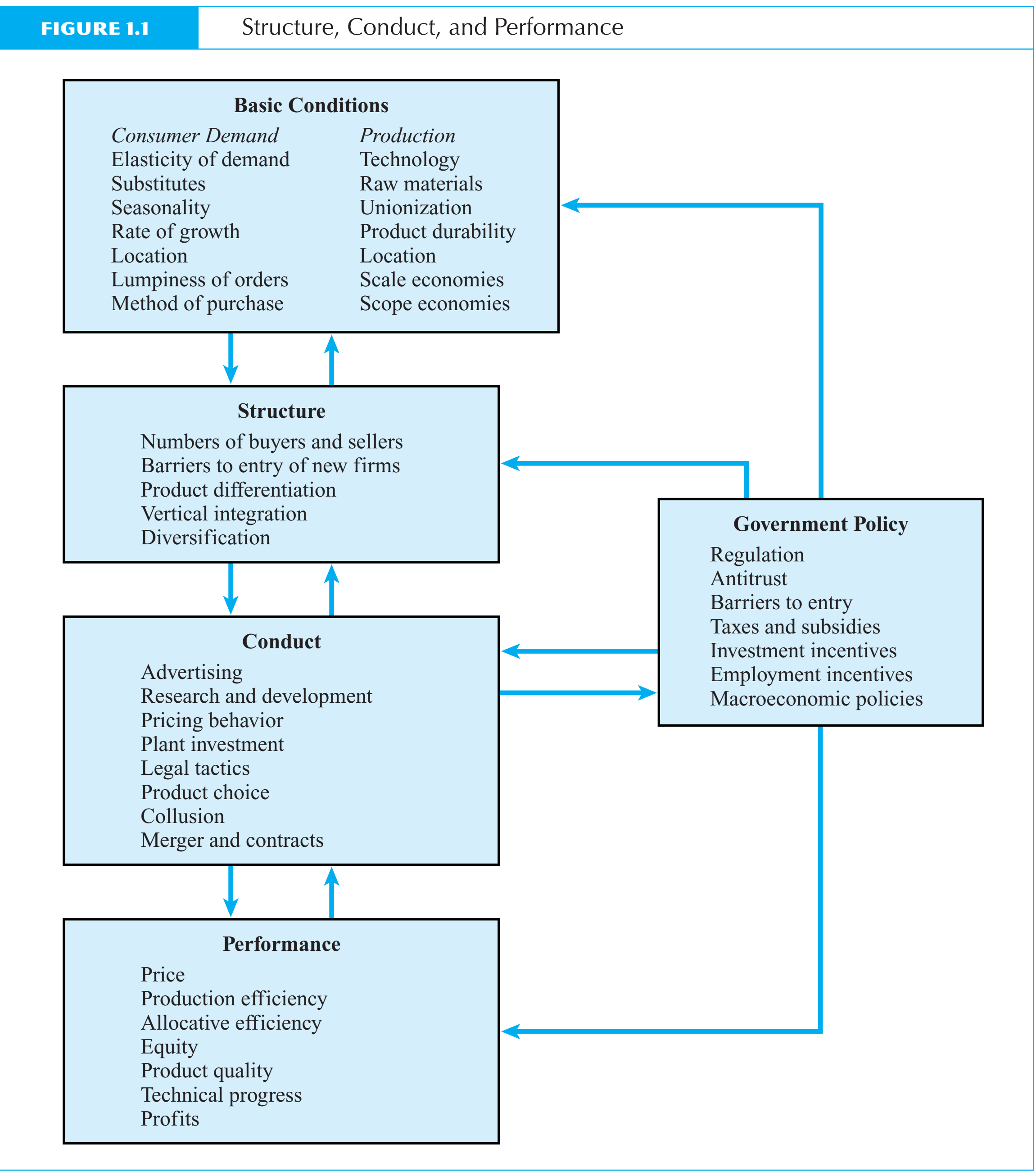
The structure-conduct-performance approach is a very general way to organize the study of industrial organization, and can be used to organize the material in the rest of this book. The second major approach, the price theory paradigm, can also be used to organize and interpret this material.

Price Theory

Price theory models analyze the economic incentives facing individuals and firms to explain market phenomena. George J. Stigler (1968), an early proponent of this analytical approach, believed that industrial organization researchers should use microeconomic theory to design empirical studies of markets and of the effects of public policy. Today, most industrial organization research and courses are well grounded in microeconomic theory. Two reasons for the shift to this approach are the recent availability of data at a more micro level and advances in price theory. In recent years, three specific theoretical applications of price theory have won substantial support—transaction cost analysis, game theory, and contestable market analysis—and help to explain structure, conduct, and performance.

[2]The structure-conduct-performance approach was developed at Harvard by Edward S. Mason (1939, 1949) and his colleagues and students, such as Joe S. Bain (1959).

FIGURE 1.1 Structure, Conduct, and Performance



Transaction Costs

Transaction costs are the expenses of trading with others above and beyond the price, such as the cost of writing and enforcing contracts. Using formal price theory analysis, the transaction cost approach uses differences in transaction costs to explain why structure, conduct, and performance vary across industries.

Over 60 years ago, Ronald H. Coase (1937) explained that a firm and a market are alternative means of organizing economic activity. Coase emphasized that the use of the marketplace involves costs. These costs help to determine market structure. For example, where the cost of buying from other firms is relatively low, a firm is more likely to buy supplies from others than produce the supplies itself.

Oliver Williamson (1975, 8–10), one of the major proponents of the transaction cost approach, says that four basic concepts underlie this analysis:

1. Markets and firms are alternative means for completing related sets of transactions. For example, a firm can either buy a product or a service or produce it.
2. The relative cost of using markets or a firm's own resources should determine the choice.
3. The transaction costs of writing and executing complex contracts across a market "vary with the characteristics of the human decision makers who are involved with the transaction on the one hand, and the objective properties of the market on the other" (p. 32).
4. These human and environmental factors affect the transaction costs across markets and within firms.

This approach aims to identify a set of environmental and human factors that explain both the internal organization of firms and organization of industries. The key environmental factors are *uncertainty* and the *number of firms*; the key human factors are *bounded rationality* and *opportunism*. **Bounded rationality** is the limited human capacity to anticipate or solve complex problems. Problems arise when uncertainty is combined with bounded rationality, or where the managers of the few firms in an industry behave opportunistically (take advantage of a situation).

Thus, in a world of great uncertainty, it may be too difficult or costly to negotiate contracts that deal with all possible contingencies. As a result, firms may produce internally even though, otherwise, it would be cost-effective to rely on markets.

When the number of firms is small and individuals are opportunistic, firms may not want long-term contracts for fear of being victimized in the future. For example, a firm that relies on another to supply a factor that is essential to its production process may be exploited because it cannot operate if its supply is stopped. This problem is likely to be important if there are few alternative suppliers.

Thus, reliance on markets is more likely when (1) there is little uncertainty and (2) there are many firms (competition) and limited opportunities for opportunistic behavior. When these conditions are reversed, firms are more likely to produce for themselves than to rely on markets. The transaction cost approach has been very successful because of its broad explanatory power.

Game Theory

Another approach that is increasingly important to economic theorists is **game theory** (von Neumann and Morgenstern 1944), which uses formal models to analyze conflict and cooperation between firms and individuals. Competition among firms is viewed as a game of **strategies**, or battle plans of the actions of a firm, that describe the behavior of each firm. A firm's strategy determines, for example, its output, price, and advertising level. In the game, firms compete for profits. Game theory describes how firms form their strategies and how these strategies determine the profits.

Game theory provides insights in games in which there are relatively few firms. Much of this text concerns such markets, and many of the models it presents are examples of game theory.

Contestable Markets

The importance of entry to the competitive process has been recognized for a long time. Demsetz (1968) and Baumol, Panzar, and Willig (1982) emphasize that industries with only a few firms (or just one) can be very competitive if there is a threat of entry by other firms. Markets in which many firms can enter rapidly if prices exceed costs and can exit rapidly if prices drop below costs are called **contestable**. As Baumol, Panzar, and Willig explain, firms are reluctant to enter an industry if it is very costly to exit.

With few firms but easy entry and exit, the market is contestable and can have the properties of a competitive market: Price equals marginal cost and strategic behavior is irrelevant. There are few known examples of such markets. If there are few firms in an industry and entry or exit is difficult, the market is not contestable and the strategic behavior studied by game theorists is relevant.

Organization

Where I am not understood, it shall be concluded that something very useful and profound is couched underneath. —*Jonathan Swift*

The main objective of this text is to provide a systematic presentation of the basic theories—both traditional and new—of how firms and markets are organized and how they behave. Rather than treating structure and conduct as given, the text explains them as the outcome of individuals' maximizing behaviors. That is, it shows how the price theory models provide the underpinnings for the structure-conduct-performance paradigm. The paradigms complement each other, and both are useful for developing an understanding of industrial organization.