

## THE EMPIRICAL RENAISSANCE IN INDUSTRIAL ECONOMICS: AN OVERVIEW

TIMOTHY F. BRESNAHAN AND RICHARD SCHMALENSEE

This brief essay introduces a special issue of *The Journal of Industrial Economics* devoted to the recent burst of empirical work in industrial organization. Trends in empirical research in this field are discussed, emphasizing the ways in which recent work builds upon and departs from earlier traditions. The papers in the special issue, which exemplify these developments, are briefly discussed.

### I. INTRODUCTION

THE 1980s have seen a rebirth of interest and activity on the empirical side of industrial economics, stimulated in part by the wide-ranging and fundamental theoretical advances of the preceding decade. The papers in this collection exemplify the interrelated set of developments that have revitalized empirical work in industrial economics in recent years. While each study makes significant contributions to knowledge, these contributions are quite diverse. These essays are unified by style and approach rather than by topic, method, or findings. A brief history of styles of empirical work in industrial economics (section II) serves to set the stage for a discussion of these unifying themes.<sup>1</sup>

This collection of essays was easy to assemble because many able industrial economists are now doing interesting empirical work. Our task would have been considerably harder at the start of this decade, since much less was then happening on the empirical front. And a collection of empirical work assembled in 1980 would have differed in several basic respects from this one.

Recent studies do follow the earlier cross-section tradition by relying primarily on systematic statistical evidence. But the recent literature reflects the growing importance of formal theory in industrial economics; there is more interest in testing a specific hypothesis in the context of explicit maintained hypotheses. In addition, reflecting the case study tradition, recent studies are likely to involve collection of new data and analysis of a small group of firms or industries. In sections III and IV of this essay we attempt to articulate some of the unifying themes running through the new work and to relate them to the papers in this collection.

<sup>1</sup> The knowledgeable reader will recognize that we have glossed over much in section II in the interest of brevity. We hope we will be forgiven for not calling attention to a number of important contributions that do not conform to the generalizations we advance.

## II. HISTORICAL BACKGROUND

Grether [1970] and other writers (particularly in the United States) date the emergence of Industrial Economics (or Industrial Organization) as a distinct field of economics from the work of Edward Chamberlin and Edward Mason at Harvard in the early 1930s. The “Harvard School” initially stressed detailed, book-length case studies of particular industries; see Wallace [1937] for an influential early example. The research program led by Mason sought to learn about imperfectly competitive markets by induction from careful studies of particular examples. These studies made relatively little use of formal economic theory or of econometric techniques.

In the early 1950s, Joe Bain [1951], [1956] changed the focus of empirical research in industrial economics by showing the apparent power of statistical studies of industry-level cross-section data. Bain’s approach seemed to promise rapid and objective development of general relations based on large samples of markets. While few followed Bain’s lead immediately, the journals began to fill with cross-section work in the 1960s as computation costs fell and government-supplied data became more widely available.

As economics as a whole shifted from a book-oriented discipline, like history, to a journal-oriented discipline, like mathematics, in this same period, shorter case studies began to become more common. Instead of examining all aspects of an industry’s structure, conduct, and performance, these studies generally focused on particular aspects of conduct. And, under the influence of George Stigler and others identified with the “Chicago School”, increasing use was made of the tools of Marshallian price theory.<sup>2</sup> But little explicit modeling of imperfect competition was done, and econometric techniques were not heavily employed.

In a survey of “Quantitative Studies of Industrial Organization” presented in 1970, Leonard Weiss [1971] concentrated almost exclusively on cross-section econometric work. As William Comanor [1971, pp. 403–4] noted in his favorable comment on Weiss’ paper:

Despite the original prescription of Edward Mason, practitioners in this area have moved away from an early reliance on case studies and toward the use of econometric methods of analysis. To a large extent, therefore, a review of econometric studies of industrial organization is a review of much of the content of the field.

At the end of his survey, Weiss [1971, p. 398] opined that “perhaps the right next step is back to the industry study, but this time with regression in hand”.

While some econometric industry studies were done in the 1970s, the early part of that decade saw the publication of many more cross-section studies of industry-level, government-supplied data. But critics of this approach became

<sup>2</sup> For examples of both current and contemporary interest, see the essays collected in Stigler [1968]

more vocal and persuasive during the 1970s. They argued that industry-level cross-section data could not be used to identify and estimate structural relationships of interest. And, by the end of the decade, the critics had generally prevailed. The study of industry-level cross-section data had fallen from fashion, and fewer studies of this sort appeared in leading journals.<sup>3</sup>

The journal space thus made available was filled not by industry studies but by reports on a burst of theoretical activity, begun by Michael Spence and others in the early 1970s, involving the formal analysis of imperfectly competitive markets. This activity continues unabated, with recent work making heavy use of the developing tools of noncooperative game theory.

At the start of the 1980s, then, relatively little exciting empirical work was being done in industrial organization: industry-level cross-section work was suspect, and case studies were no more attractive than they had been a decade earlier. The main action was on the theoretical front.

### III. THE RECENT RENAISSANCE

As the papers in this collection demonstrate, a good deal of exciting empirical work has been done in industrial economics in the last few years. As in the earlier cross-section tradition, this work stresses systematic statistical analysis rather than anecdotes. Similarly, the turn of much recent work toward single industries or groups of closely related industries is a continuation of the case study tradition. Recent studies, however, tend to differ from much of the earlier work in the mainstream case study and cross-section traditions in three interrelated ways. In retrospect, at least, all three of the new trends discussed in this section and exemplified in this collection are natural responses to the dissatisfaction with the two earlier traditions, a dissatisfaction that solidified in the late 1970s.<sup>4</sup>

First, a large fraction of recent work employs new sources of data or data sets constructed in new ways from traditional sources. The field has moved well away from the heavy reliance on Census-provided industry-level data acknowledged by Weiss [1971] and Comanor [1971] at the start of the 1970s.

There is, of course, nothing really new in this. The careful collection of new evidence was always central to the case study tradition in both its "Harvard School" and "Chicago School" variants. But data collection is not a terribly exciting activity, and as traditional case studies fell from fashion, so did the construction of new data sets.

Data set construction is more popular now partly because developments in computer hardware and software have reduced the associated costs and partly because the shortcomings of traditional data sets have become clear. Just as new experiments are central to advances in most natural sciences, so it

<sup>3</sup> For general discussions of these developments, see Schmalensee [1982, 1988].

<sup>4</sup> Schmalensee [1982] provides a vintage-1980 view of then-emerging trends in empirical research.

is becoming clear that new data are important to progress in industrial economics. But the main reason for a renewed interest in data is probably the widespread perception that new tools and approaches permit one to perform new and interesting empirical analyses. The personal, professional payoff to data set construction has risen.

A second trend visible in recent work is the growing tendency to exploit contemporary advances in economic theory and econometric methods. The theoretical developments that began in the 1970s produced a rich set of hypotheses, along with a powerful set of modeling techniques for use in imperfectly competitive markets and a generation of scholars familiar with those techniques. Similarly, as the general analytical level of work in industrial economics has risen, empirical researchers in the field have become more willing and able to exploit the latest advances in econometric method and thus to move well beyond exclusive reliance on ordinary least squares.

But the best recent work is not just a showcase for technique; rather it lets new data tell interesting stories simply and clearly. Several of the papers in this collection use nothing more than ordinary least squares and simple tables to allow new data to speak clearly to the reader. Others use relatively exotic techniques because they are necessary to reveal what the data have to say about the issues addressed.

A third trend apparent in the recent empirical literature is a shift toward the firm, rather than the industry, as the unit of observation. Again, there is nothing really new in this; industry studies have always necessarily treated individual firms as separate observations. But the work of Demsetz [1973] and others in the early 1970s began to focus attention on the importance of intra-industry differences and thus to shift attention away from industries and toward firms. In the same period, Iwata [1974] showed that formal theory and sophisticated econometric techniques could be used to analyze seller conduct in new and interesting ways.

Following Iwata [1974], many authors have responded to Weiss' [1971] call to go "back to the industry study, but this time with regression in hand". Econometric industry studies are a growth area, with new analytical techniques being developed to cope with problems that arise in these studies.<sup>5</sup> Like the earlier "Chicago-style" industry studies, recent efforts generally focus on particular aspects of conduct. But, in a departure from the earlier traditions, the tools of imperfect competition theory are now routinely used to construct explicit structural models, and the latest econometric techniques are used to estimate structural parameters and to test structural hypotheses.

#### IV. THIS COLLECTION

Six of the essays assembled here follow the cross-section tradition insofar as they are based on data covering many industries. But none closely resembles

<sup>5</sup> For a detailed survey of this area, see Bresnahan [1988].

the cross-section studies that dominated the empirical literature in the late 1960s and 1970s. Though several use data from traditional sources, none limits attention to a single industry-level cross-section, and only the study by Domowitz, Hubbard, and Petersen takes the industry, rather than the firm or business unit, as the fundamental unit of observations. And the influence of recent developments in economic theory and econometrics is quite clear in this set of papers.

### *Profitability differences*

Three of the papers that study multiple industries deal with a phenomenon that was the focus of the cross-section tradition: sources of differences in profitability among firms and industries.

Domowitz, Hubbard, and Petersen use a panel data set they constructed from US Census data. These data allow them to focus on differences in the cyclical behavior of prices and price-cost margins among industries with different structures and different average margin levels. They relate the observed differences to recent dynamic models of collusive behavior.

Schmalensee's essay is based on traditional US data sources: the Internal Revenue Service and the Census of Manufactures. But he uses intra-industry data for two different years, along with a set of formal models and non-standard econometric techniques, in an attempt to evaluate the collusive (Bain [1951]) and differential efficiency (Demsetz [1973]) explanations of intra- and inter-industry differences in measured profitability.

Finally, the paper by Cubbin and Geroski uses a newly-constructed panel data set on large UK firms to study the relative importance of firm-specific and industry-wide determinants of profitability changes over time. The results of this study strongly support the importance of firm-level analysis.

### *Oligopoly pricing*

Much attention has been recently paid to empirical analysis of individual markets, rather than of the broad sweep of industries. Half of the essays in this collection concentrate on individual industries or markets, and five of these are primarily focused on the measurement of power over price. But these are not traditional case studies. They are all firmly grounded in recent theoretical work on imperfectly competitive markets, and several of them employ novel econometric methods.

The essay by Panzar and Rosse has circulated in working paper form since 1977 and has had a considerable influence on recent studies of individual industries. Panzar and Rosse use microeconomic theory to derive tools for interpreting reduced form relations between revenue and input prices that were encountered in research on the US newspaper industry.

Bresnahan's essay, earlier versions of which have circulated since 1980, applies maximum likelihood methods to estimate structural models of

markets with differentiated products using data on the US automobile industry. Bresnahan compares the empirical implications of alternative behavioral assumptions and argues that a sharp, temporary increase in competition occurred in this industry in 1955.

Ashenfelter and Sullivan advance the work of Panzar and Rosse by developing nonparametric techniques for studying the relationship between cost shifts and industry equilibrium. They apply these techniques to data on the US cigarette industry. Their work has interesting implications both about behavior in this industry and for the study of firm behavior in other settings.

Slade analyzes data she collected on day-by-day changes in retail prices and wholesale costs of gasoline for a set of filling stations in Vancouver, British Columbia, during and after a price war. She estimates demand and reaction functions for these stations and uses her results to shed light on the validity of competing theories of price wars.

Hendricks, Porter, and Boudreau analyze data on auctions for the rights to extract oil from particular undersea tracts off the US coast, along with information on the subsequent returns from those tracts. Their analysis has implications for the validity of recent theoretical models of auctions and shows the power of simple statistical methods when carefully applied to rich data.

### *Competition in the long run*

The remaining four studies in this collection treat questions of industry structure and firm conduct from a somewhat longer-run perspective. Of these, three of the four use broad cross-sections of firms in different industries. Lieberman's study, however, is based on his database of closely-related chemical processing industries.

Cohen, Levin, and Mowery employ the Line-of-Business data collected by the US Federal Trade Commission (FTC) along with the results of a large-scale survey. The FTC data relate to individual business units within diversified firms, and thus permit one to disentangle the influences of firm, business unit, and industry characteristics. Cohen and his co-authors use these data to test the Schumpeterian hypothesis that large firms are more research intensive, all else equal.

The papers by Evans and Hall are concerned with the classic Gibrat's Law hypothesis that average firm growth rates are independent of firm size. Both papers use large, new data sets. Evans concentrates on industry-specific patterns and on the effects of firm age on growth; Hall develops new econometric techniques to deal with problems posed by the non-random disappearance of firms in the sample over time.

Finally, Lieberman analyzes data on additions to capacity in the chemical industry. He uses recently-developed techniques for the estimation of qualitative choice models along with traditional case-study methods to shed light

on the empirical relevance of theoretical models in which investment in long-lived capacity is undertaken to deter entry.

#### V. CONCLUDING REMARKS

As we noted at the start of this essay, the studies that follow are indeed diverse. They address a wide range of issues, ranging from traditional concerns to the implications of very recent theoretical work. But they share elements of style and approach that clearly mark them as work of the 1980s. And many of them will serve as important points of departure for future research—both empirical and theoretical.

TIMOTHY F. BRESNAHAN,  
*Department of Economics,*  
*Stanford University,*  
*Stanford,*  
*California 94305,*  
*USA.*

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RICHARD SCHMALENSEE,  
*Sloan School of Management,*  
*Massachusetts Institute of Technology,*  
*Cambridge,*  
*Massachusetts 02139,*  
*USA.*

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