

Industrial Organization

Edited by

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Introduction

Whither industrial organization? Victor Fuchs posed that query in 1972 and answered it as follows: ‘all is not well in this once flourishing field’ (1972, p. xv). The answer to that same query is entirely different in 1990: industrial economics is alive and well and is the queen of applied microeconomics.

If both Fuchs and I are right, as I think that we are, then the intervening years have witnessed a remarkable transformation. The articles reprinted as Parts II and III of this book, which deal, respectively, with ‘The New Economics of Organization’ and ‘Strategic Behaviour and Competition’ helped to effect that transformation.

These new developments had distinguished antecedents. The articles reprinted in Part I, many of which were written by economists from outside of the field of industrial economics, supplied the foundations upon which Parts II and III – the new economics of organization and a revitalized theory of strategic behaviour and competition – were built. Albeit perhaps still premature, I submit that a new science of organization is taking shape to which industrial economics has been both a principal contributor and beneficiary.

This chapter is organized in three parts. Section 1 provides an overview of the field of industrial economics, section 2 provides a short introduction to each of the articles reprinted in this volume, and section 3 contrasts the state of industrial economics today with that of the field 25 years ago.

1. An Overview

That industrial economics has had distinguished antecedents is evident from the articles reprinted in Part I of this volume. These are not my concern here. Rather, what I want to emphasize are

1. the centrality of industrial economics within applied microeconomics,
2. the growing importance of the economics of organization, and
3. the nature of the new developments in the area of strategic behaviour and competition.

1.1 Centrality

Viewed strategically, it is hard to identify another field within applied microeconomics that is as centrally located as industrial economics. That is partly because industrial economics is the natural arena in which to do work on the theory of the firm. Inasmuch as the theory of the firm and the theory of consumer behaviour form the twin pillars of microeconomics, industrial economics deals with core issues.

The main concern of industrial economics has been less with the firm itself than with the behaviour of the firm in relation to other firms. Joe Bain, whose important work has had a lasting impact on the field, approached the subject in the following way:

Being concerned in the main with the market behavior of enterprises, I have given major emphasis to the relative incidence of competitive and monopolistic tendencies in various industries or markets. Correspondingly, my primary unit for analysis is the industry or competing group of firms (Bain 1959, p. vii).

The theory of the firm that informed such industry analysis held that the ‘firm is a technical unit in which commodities are produced. [It] transforms inputs into outputs, subject to the technical rules specified by [the] production function’ (Henderson and Quandt 1971, p. 52). Although the adequacy of that construction was challenged many years ago (Commons 1934; Coase 1937), the production function approach prevailed. That is because it takes a theory to beat a theory (or to join a theory), whence a rival (or complementary) conception of the firm needed to be fashioned. The new economics of organization has attempted precisely that.

Directly or indirectly, many of the articles reprinted in Part II, which deals with the new economics of organization, have had that purpose and effect. These efforts were driven by a growing perception that many firm-as-production-function explanations for puzzling firm and market practices did not satisfy weak plausibility tests. Feeble ‘existence’ arguments (many of which appealed to price discrimination as the explanation for nonstandard or unfamiliar business practices) elicited increasing scepticism. Demands for new theory mounted.

1.2 *The new economics of organization*

Bain relegated the study of ‘how enterprises do and should behave’ to the field of management science (1959, p. vii). This division of labour was widely felt to be appropriate, as a consequence of which the theory of the firm to which industrial economics appealed was essentially that ‘of the category of the individual agent’ (Kreps 1984, p. 8). It being the usual practice to describe individual agents by utility functions and consumption sets, profit functions and production possibility sets were evidently the appropriate terms with which to describe firms.

Albeit instructive, viewing the firm as a production function is seriously delimiting. It encourages the view that technology is determinative of economic organization, whence the allocation of economic activity as between firm and market is unproblematic. The study of economic organization ‘on its own terms’ was discouraged as a consequence.

An alternative view – which, however, was very slow to take hold – is to attempt a unified theory of market, hierarchy, and hybrid modes of organization. This was accomplished by regarding the firm and the market as alternative forms of contracting. Although the rudiments of such a unified theory can be variously described, I focus here on three features:

1. microanalytics (which includes choice of a unit of analysis),
2. behavioural assumptions, and
3. an economizing orientation.

As indicated, the unit of analysis with which Bain worked was ‘the industry or competing group of firms’. Although this composite level of aggregation is useful for purposes of describing the economic context within which competition takes place, it incompletely engages the organizational/institutional structures within which economic *activity* takes place. The

new economics of organization is preoccupied with this latter class of issues. Knowledge of the details of alternative forms of organization has become vital to an assessment of competition.

A rather cautious version of the micro-forces argument is as follows (Kreps and Spence 1985, pp. 374–5):

... if one wishes to model the behaviour of organizations such as firms, then study of the firm as an organization ought to be high on one's agenda. This study is not strictly speaking, necessary: one can hope to divine the correct 'reduced form' for the behaviour of the organization for the behaviour of the organization without considering the micro-forces within the organization. But the study of the organization is likely to help in the design of reduced forms that stress the important variables.

There are at least two ways to read this statement. One is to regard the last sentence as an afterthought or throw-away, in which case the basic message is that economists can continue the past practice of 'divining' reduced forms. That is the business-as-usual interpretation. The other possibility is that the last sentence carries the freight – in which event past practice is no longer viable (if ever it was) and needs to give way to a more microanalytic treatment of the details of organization.

The first interpretation would relegate the study of microanalytics to noneconomists or, alternatively, turns on the hope that economists will be lucky. The main risks with the first of these are that those to whom the study of the details are relegated will either take the wrong observations or will report the right observations in ways that mask their economic significance. Since hoping to get lucky is even more problematic, the evident need is for economists to take the study of organization seriously.

Herbert Simon's contrast between the physical sciences and economics in microanalytic respects is instructive. As he observes (1984, p. 40):

In the physical sciences, when errors of measurement and other noise are found to be of the same order of magnitude as the phenomena under study, the response is not to try to squeeze more information out of the data by statistical means; it is instead to find techniques for observing the phenomena at a higher level of resolution. The corresponding strategy for economics is obvious: to secure new kinds of data at the micro level.

But while the strategy may be obvious, its implementation is not. How micro is micro? One possibility is to become very micro, in which event Simon's proposal that the 'decision premise' be made the basic unit of analysis (1956, p. xxxii) warrants consideration. Albeit useful for purposes of psychology (Newell and Simon, 1972), the decision premise has yet to find widespread application to economics.

An alternative unit, proposed earlier by John R. Commons, has proved more promising. Thus Commons described the problem of economic organization as that of dealing simultaneously with conflict, mutual dependence, and order, whereupon the criterion for the 'ultimate unit of economic activity ... [should] contain in itself the three principles of conflict, mutuality and order', (Commons 1925, p. 4). The transaction, in his view, was responsive to these principles and he proposed that the transaction be made the basic unit of analysis

(Commons 1925, p. 4; 1934, pp. 4–8). The obvious next steps – to identify the principal dimensions with respect to which transactions differ, and to ascertain the (comparative) organizational implications that accrue thereto – were a long time in coming, however.

The second rudimentary feature to which I referred are the behavioural assumptions. Of special importance are choices of (1) a cognitive assumption and (2) a self-interest seeking assumption. Directly or indirectly, much of the new economics of organization assumes that economic agents are boundedly rational. Moreover, all of this literature assumes that economic agents are given to opportunism – where this is expansively defined as self-interest seeking with guile and includes both moral hazard and adverse selection.

Herbert Simon has defined bounded rationality as behaviour that is ‘*intendedly* rational, but only *limitedly* so’ (1957, p. xxiv). Although the latter part of the definition has attracted more attention and has elicited great resistance among economists, the intended rationality part of the definition deserves equal weight. Intendedly rational agents are attempting effectively to cope, which is in the ‘rational spirit’ tradition that Kenneth Arrow associates with economics (1974, p. 16). Intendedly rational agents who perceive their limited cognitive competence will presumably treat mind like any other scarce resource. *Ceteris paribus*, forms of organization that economize on bounded rationality are favoured.

As Simon remarks, it is ‘only because individual human beings are limited in knowledge, foresight, skill, and time that organizations are useful instruments for the achievement of human purpose’ (1957, p. 199). More generally, and more importantly, *all complex contracts are unavoidably incomplete* in a regime of bounded rationality. Accordingly, comprehensive contracting models, of both Arrow–Debreu and mechanism design kinds, give way to models of incomplete contracting.

The second behavioural assumption to which I referred – that of self-interest seeking – is also pertinent. If parties to a contract would self-enforce promises, then incomplete contracting could be saved by introducing a general clause, whereby each party pledged to cooperate – in a joint profit maximizing manner – during contract execution and at contract renewal intervals. If, however, economic agents will sometimes break their covenants, and if court ordering is costly, then ‘contract as promise’ is not reliably efficacious. To the contrary, if economic agents are given to opportunism – which is a subtle form of self-interest seeking that includes a willingness to make self-disbelieved promises – then contract as promise is naive and safeguarding contracts against the hazards of opportunism becomes the source of added value.

An economizing orientation is the last of the three key features that I ascribe to the new economics of organization. Note in this connection that the economizing to which I refer is broader and more rudimentary than is customary. Frank Knight’s characterization of the economic problem is pertinent (1941, p. 252; emphasis added):

... men in general, and within limits, wish to behave economically, to make their activities *and their organization* ‘efficient rather than wasteful.’ This fact does deserve the utmost emphasis; and an adequate definition of the science of economics... might well make it explicit that the main relevance of the discussion is found in its relation to social policy, assumed to be directed toward the end indicated, of increasing economic efficiency, of reducing waste.

This conception of economizing is broader than is customary in that it goes beyond technology to include organization. The efficiency condition referred to, moreover, is rudimentary: the reduction of waste. Moves toward rather than along an efficiency frontier are thus contemplated.

Note in this connection that the standard for judging efficiency is not of an abstract Pareto optimality kind but instead is one of remediability. If all feasible forms of organization are flawed, then the relevant test with which to judge a 'condition of inefficiency' is whether a move to an alternative mode can be orchestrated which yields net social gains. The costs of the move as well as the defects associated with the proposed mode are thus entered into the calculus (Coase 1964).

The new economics of organization works out of this general framework and attempts to answer some of the most nettlesome problems in economics. Why do we have firms? What are the factors that are responsible for limits to firm size? Is the modern corporation well-described by a production function, or does the appearance of hierarchy and the uses of internal incentive and control apparatus really require that the corporation be conceived as a governance structure? Is a unified approach to the study of contract feasible, and if so what are the regularities or themes out of which a unified contractual theory works? New microanalytic concepts, new theory, and new empirical work have all taken shape as efforts to answer these and related questions of economic organization have taken their place on the research agenda. The essays in Part II elaborate.

1.3 Strategic behaviour and competition

Several types of strategic behaviour can be distinguished. First, there is nonstrategic behaviour. This would obtain if prices in product and factor markets are parameters. More generally, optimizing behaviour that does not entail conscious efforts to preposition in relation to actual or potential rivals and/or to discipline or otherwise respond punitively to rivalry is nonstrategic. *Ex ante* positioning and *ex post* contingent responsiveness, especially in combination, are appropriately regarded as strategic.

Some contend that the recent literature on strategic behaviour merely dresses up and warms over the entry barrier analysis that appeared in the 1950s and dominated industrial economics through the early 1970s. But there is a great deal more to it than that.

The systematic analysis of entry barriers made its appearance with the publication of books by Paolo Sylos-Labini (1956) and Joe Bain (1956) and by Franco Modigliani's interpretation and presentation of the central arguments (1958). It quickly made headway and became a core concept in the structure-conduct-performance paradigm. Dissent nevertheless appeared as entry barrier arguments came to be used uncritically.

Objections of three kinds were registered: logic, mechanics, and irremediability. The first of these is that many entry barrier arguments were static and focused on *ex post* outcomes when the condition that needed to be assessed was the competitive process *in its entirety*. Pertinent in this connection is that competition is an intertemporal process, while many entry barrier arguments were of an atemporal kind.

Secondly, entry barrier models purported to deal with oligopoly without ever asking how the mechanics of collective action were to be realized. More generally, whole classes of activity were described as entry barriers without reference to cost effectiveness. If, however, the

efficacy, say, of advertising as a barrier to entry is conditional on customer, firm, and market attributes, then critiques of a generic activity (advertising) ought to be supplanted by focused critiques in which the requisite preconditions are satisfied. Regrettably, that was not done but sweeping indictments against broad classes of activities – to include virtually all vertical market restrictions – were registered instead.

The third objection is the remediability criterion to which I referred earlier. If all feasible forms of organization are flawed, then the mere existence of an entry impediment does not, without more, warrant public policy intervention. Instead, intervention is warranted only upon a showing of prospective net social gains.

Mistaken treatments of economies of scale are illustrative of this last. To describe economies as a barrier to entry invites the conclusion that this is an antisocial outcome. Public policy hostility towards economies easily could and did result. Only upon displaying the tradeoffs implicit in moving from the (supposedly) less preferred market structure, in which larger firms enjoyed greater economies of scale, to the (supposedly) more preferred market structure, in which all firms were small and on a parity in scale *diseconomy* respects, was this convoluted application of entry barriers reasoning reversed.

That entry barrier analysis was incomplete and/or overreaching does not, however, establish that there was nothing there. Much of what has been in progress during the past decade is an effort to put the analysis of strategic behaviour on more secure foundations. At first implicitly and later explicitly, the concepts and apparatus of noncooperative game theory have become the prevailing techniques of analysis.

The critical need in dealing with strategic behaviour was first to recognize and then to operationalize the distinction between credible and noncredible threats. That many firms and individuals (executives, lawyers, and even economists) bluster, cajole, threaten, and fulminate is easy to document. But it is also true that many of these claims are idle threats – in that to carry out the threat would leave the maker of the threat worse off as a consequence. It is elementary that idle threats will not serve as deterrents if they are seen through by others.

To be sure, ‘bogey-man’ economics can be good fun – and antitrust cases are replete with solemn pronouncements by lawyers and expert witnesses that firms are intimidated by idle threats made by rivals. The credible threat literature insists, however, that business behaviour be viewed in a more hardheaded way. Only those threats that satisfy credibility conditions are ones to which real economic consequences are appropriately ascribed.

Although industrial economists backed into the literature on noncooperative games and even self-discovered subgame perfection, it was not long before the relation between the needs to explicate and analyse strategic behaviour and the extant literature on noncooperative games was correctly discerned. Indeed, not only has industrial economics drawn on this literature, but the study of strategic behaviour became the source of a number of extensions to and elaborations or clarifications of the underlying game theoretic framework that John Harsanyi (1967; 1973) and Reinhard Selten (1965; 1975) had pioneered. The logic of small numbers rivalry in the context of interdependent sequential decisions with varying information structures is now well advanced.

These advances notwithstanding, there are good reasons to be discomfited by the current state of strategic analysis. The assumptions of the models are heroic in ascribing a very high level of sophistication (tantamount to hyperirrationality) to the actors. Also, strong common knowledge assumptions regarding key parameters and probability distributions are needed.

The sensitivity of the results to what appear to be small changes in the assumptions is disconcerting.

But there has been real progress. The purported ‘illogic’ of strategic behaviour has given way to disputes over realism, predictive content, and remediability. That our understanding of the issues has greatly benefitted from this literature and that continuing advances are in prospect are broadly conceded. Industrial economics has definitely become more cautious and qualified in public policy respects as a consequence. But if the world of competition is very complicated, then excesses of simplification are to be avoided. Industrial economics has simply moved beyond an ‘oversimplification’ threshold from which there is no returning.

2. The Essays

As indicated, the articles selected for reprinting in this volume are organized in three clusters. The first group is classic antecedents. The second deals with the new economics of organization. Strategic business behaviour is the main focus of group three.

2.1 Antecedents

The first essay in the book is fittingly the influential 1937 article by Ronald Coase on ‘The Nature of the Firm’. Coase in that article squarely faced the matter of firm and market as alternative modes of organization. Thus although it had been customary to take the allocation of economic activity as between firm and market (or, in more mundane terms, the decision to make-or-buy) as given, Coase observed that this needs to be derived. He further urged that a symmetrical approach to firm and market organization be adopted in which differential transaction costs are made the cutting edge. Albeit plausible, the economic import of this line of analysis became evident only upon subsequent operationalization.

Armen Alchian’s provocative paper on ‘Uncertainty, Evolution, and Economic Theory’ (1950) is the second essay (and interestingly, is the only article to appear in both the *Readings in Industrial Organization and Public Policy* (Heflebower and Stocking 1958) and in this volume). The Alchian article is significant in several respects. For one thing, selection arguments play a large (albeit often unacknowledged) role in virtually all forms of long-run competitive analysis. Second, the use of simplifying assumptions of an ‘as if’ hyperrationality kind can sometimes be justified by invoking selection arguments. And third, Alchian’s treatment of evolutionary issues is insightful and is carefully nuanced (more so than many of those who rely on Alchian for authority). Significant subsequent contributions to evolutionary economics notwithstanding (Nelson and Winter, 1982), there is no other single article that covers the material as well as Alchian.

The third article is somewhat of an outlier. This is Lionel McKenzie’s treatment of ‘Ideal Output and the Interdependence of Firms’ (1951). The issue of vertical integration is examined in circumstances where the upstream supplier possesses monopoly power and inputs are used in either fixed or variable proportions. Although subsequent work addresses efficiency and monopoly consequences more completely and symmetrically, McKenzie’s early treatment is still illuminating.

The fourth essay is Franco Modigliani’s review article, ‘New Developments on the Oligopoly

Front' (1958). Modigliani summarizes and interprets the two books – one by Sylos-Labini (1956), the other by Bain (1956) – in which the basic barriers to entry framework was first advanced. But there is more to this article than summary and interpretation. Modigliani clarifies, unifies, and introduces added apparatus. Entry barrier analysis was off to an auspicious start.

George Stigler's famous paper on 'A Theory of Oligopoly' (1964) appears next. This article is one of a series of applications that work off of 'The Economics of Information' (1961) approach that Stigler had developed earlier (and which has inspired a great deal of work in the information economics field). Accordingly, Stigler approaches oligopoly by posing it as a problem in the theory of information, with special emphasis on the factors that influence the ease of policing a collusive agreement.

Although the immediate concern in Kenneth Arrow's article on 'Uncertainty and the Welfare Economics of Medical Care' (1963) is with the provision of medical care, the more general purposes of this article are

1. to show that 'market failure' is a more subtle and pervasive condition than had been hitherto realized and
2. to advance the proposition that nonmarket forms of organization often arise as a means by which to mitigate market failures.

In opposition, therefore, to prevailing views that nonstandard forms of contracting (by firms or physicians) had monopoly purpose and effect and that market failures ought to be rectified by realigning property rights, Arrow advanced a rival interpretation in which the hypothesis that nonmarket forms of organization often serve to relieve market failures was introduced.

The final article in this background section is Herbert Simon's 'The Architecture of Complexity' (1962). Simon maintains that hierarchy is one of the central structural schemes that the architect of complexity uses and shows wherein hierarchy is a recurrent organizing theme in complex biological, physical, and social systems. Simon observes that most complex systems are supported by stable subsystems; and he associates a condition of 'near-decomposability', which is a rudimentary form of hierarchy, with many of them. Many heated controversies over complex economic organization are needlessly confused because of a failure to appreciate the uncontrived appearance of and the instrumental purposes served by hierarchy.

The section on 'The New Economics of Organization' opens with the article by Michael Rothschild and Joseph Stiglitz on 'Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information' (1976). This insightful treatment of information asymmetries – mainly in the form of adverse selection – shows that a pooling equilibrium with customers from two risk classes is impossible. Because, moreover, high-risk individuals impose a negative externality on low-risk individuals, a separating equilibrium always comes at a cost. The upshot is that insurance markets (and other markets beset by information asymmetries and information impactedness) pose novel and difficult problems – to which, however, new methods of economic analysis can be brought productively to bear. Applications of this general approach to other areas (such as the organization of work, where ability differentials are the concern) have since been made.

Bengt Holmstrom's article, 'Moral Hazard in Teams' (1982), is in the information economics tradition. Holmstrom extends earlier work of a principal/single-agent kind to include relations

between multiple agents in teams. Whereas the main role that had previously been ascribed to principals in a team production context was monitoring, the primary role of the principal in Holmstrom's setup is to administer incentive schemes for which budget balancing is not required. His treatment of incentives in teams also relates to the tournament literature. He develops a sufficient statistic condition on relative performance evaluation according to which competition among agents is not valued because it induces added effort but rather because it is a device to extract information optimally.

Jean Tirole's examination of 'Hierarchies and Bureaucracies: On the Role of Collusion in Organizations' (1986) works out of a three-tier agency theory setup. Rather than treat contracting between successive interfaces within a firm in dyadic terms, Tirole investigates the contracting ramifications of a principal-supervisor-agent setup in which collusion between supervisor and agent (*vis-à-vis* the principal) is permitted. A farsighted principal will foresee these effects and factor them into the incentive scheme. Although in this model collusion is responsible for added inefficiency, the approach invites further analysis in which social benefits to collusion are admitted.

George Akerlof's essay on 'Loyalty Filters' (1983) is related to, but different from, Kenneth Arrow's essay on medical care. A fundamental hypothesis advanced by Arrow is that nonmarket forms of organization often have the purpose and effect of mitigating market failures. In the absence, for example, of 'ideal insurance', a variety of nonstandard contracting and organizational practices with trust-infusing consequences may be created. Akerlof, however, takes this argument off in another direction: various forms of nonmarket behaviour can have the purpose and effect of advantaging one group in relation to another. Broadly speaking, the loyalty filters examined by Akerlof favour the haves in relation to the have-nots. Welfare losses, rather than welfare gains, arguably result.

My paper, 'Transaction-Cost Economics: The Governance of Contractual Relations' (1979), is also in the spirit of crafting nonmarket (or market-assisted) responses to market failures. It relates both to Coase's early article on 'The Nature of the Firm' and to the Arrow essay referred to above. If transactions differ in their attributes, if alternative governance structures (firms, markets, hybrid modes) differ in their costs and competencies, and if economizing on transaction costs is taken to be a leading purpose of economic organization, then transactions will presumably be aligned with governance structures in a discriminating way. The view of the firm as production function makes way for the view of the firm as governance structure in the process.

Sanford Grossman and Oliver Hart's paper on 'The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration' (1986) embraces the transaction cost economics argument that all complex contracts are unavoidably incomplete, as a consequence of which (and contrary to agency theory) it is impossible to concentrate all of the relevant contracting action in the *ex ante* incentive alignment. Although the formal modelling of incomplete contracting is formidably difficult, Grossman and Hart develop a model in which both *ex ante* alignment and *ex post* adaptation differences between market and hierarchical modes of organization are recognized. The paper invites further efforts to model and thereby assess the properties of discrete structural contracting alternatives, which is precisely what has materialized.

Although Paul Joskow's paper, 'Vertical Integration and Long-term Contracts: The Case of Coal-burning Electric Generating Plants' (1985), is mainly an empirical contribution, it

provides added conceptual framework for understanding issues of comparative institutional analysis as well. Assessing the efficacy of alternative modes of economic organization is a more microanalytic undertaking than has been characteristic of empirical microeconomics in the past. Joskow's imaginative approach to these issues demonstrates that the added empirical burdens of transaction cost economics can be met. Subsequent empirical work (by Joskow and others) is corroborative.

The last paper in this section is by Benjamin Klein and Keith Leffler, 'The Role of Market Forces in Assuring Contractual Performance' (1981). This paper adopts a very stringent self-enforcing contract orientation. If manufacturers are unable to appeal to the courts to enforce contractual covenants that require distributors to behave 'responsibly', and if there are free-riding and other contractual hazards, then how will contracts be designed to mitigate these effects? Klein and Leffler show that, in relation to a first-best optimum, inefficient production techniques will appear and that distributors will be paid a premium, the prospective loss of which, through contract cancellation, will deter cheating. The use of rents for deterrence purposes has general application, as witnessed by the extensive literature on 'efficiency wages'.

Strategic behaviour is a fascinating subject and has attracted considerable attention from those who do theoretical industrial economics. It is perhaps surprising, therefore, that the first article in Part III is an empirical one. The provocatively titled paper by Harold Demsetz, 'Two Systems of Belief About Monopoly' (1974), is also provocatively written. The main target of the paper was the then widespread view that many large firms enjoyed monopoly power by reason of contrived entry barriers. Demsetz took exception with the arguments and evidence that supported this view and provided arguments and evidence to the contrary. Further theoretical and especially empirical work on these matters has resulted.

As previously remarked, the logic of entry barrier analysis was held to be defective. A new and more rigorous logic was evidently needed and began to take shape (Spence, 1977). The duopoly model used by Avinash Dixit in his paper, 'The Role of Investment in Entry-Deterrence' (1980), sets out the basic logic and demonstrates the critical importance of investments in durable, nonredeployable assets to effect entry deterrence. Albeit without expressly invoking subgame perfection, this is the spirit of the Dixit analysis nonetheless. Given credible pre-entry commitments, the logic of entry barriers was made secure. But inasmuch as a duopoly setup is highly specialized, the empirical significance and antitrust enforcement ramifications of the argument can be questioned.

Philippe Aghion and Patrick Bolton examine the use of 'Contracts as a Barrier to Entry' (1987). Credible threats remain the focus. What Aghion and Bolton examine is whether an incumbent supplier can fashion a penalty clause, the effects of which penalty make the incumbent better off. While leaving the buyer indifferent between a simple contract (with no penalty) and a contract with a penalty that is paid only in the event of entry (in which event the buyer would switch his purchases to the entrant). They show that penalties can be devised such that lower cost entrants can be deterred – although not necessarily precluded – from entering. Extensions are proposed and a possible rationale for the hitherto puzzling legal prohibition against 'unreasonable' liquidated damages clauses in contracts is suggested.

A further significant development in the strategic behaviour literature is the paper by Paul Milgrom and John Roberts, 'Limit Pricing and Entry Under Incomplete Information: An Equilibrium Analysis' (1982). The use of limit pricing here turns on an information asymmetry between the sitting monopolist (or incumbent) and the potential entrant. Whereas the incumbent