CONTESTABLE MARKET THEORY AS A REGULATORY FRAMEWORK: AN AUSTRIAN POSTMORTEM

JOHN BRÄTLAND

Under contestability theory, multi-product monopolists restrain their pricing behavior by the threat of entry by competitors. Hence, industry structure provides no *a priori* rationale for regulation. Yet, the analytical elements of contestability theory purport to define and, through regulatory means, attain an efficient industry structure producing at lowest cost without profit. These analytical elements of contestability include *economies of scope*, *subadditivity*, and *sustainability*. However, contestability theory ignores the analytical implications of uncertainty, change and entrepreneurship. *Economies of scope* occur if joint production of a slate of products is empirically revealed to be less costly than if each product were to be produced by a separate firm. *Subadditivity* demonstrates that economies of *scale* and *scope* are such that a single firm is the least costly means of satisfying a specific demand for a specific slate of products. Moreover, even with only one firm, competitive pricing is thought to be achievable if: (1) prospective entrants are assured of entry free of barriers and the ability to recoup entry costs upon later exit; and (2) the incumbent firm is induced by threat of entry to charge *sustainable prices* such that no profitable entrepreneurial entry is possible. But regulation is thought to be necessary if (a) subadditivity holds but no sustainable prices exist to forestall entry or (b) the market is uncontested because of entry barriers and unrecoverable entry costs. Nonetheless, in both cases, regulatory responses are critically reliant on *opportunity costs being objective and measurable*. But opportunity costs are only objective in a static equilibrium devoid of uncertainty, economic change and genuine entrepreneurial

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JOHN BRÄTLAND is an economist working in Washington, D.C. The views expressed in this study are strictly those of the author. The author wishes to thank Robert L. Bradley, Jr. and two anonymous referees for thoughtful comments on an earlier version of this paper.

activity. Hence, the policies aimed at increasing economic efficiency are necessarily empty and irrelevant.

INTRODUCTION

William Baumol, John Panzar, and Robert Willig first presented the theory of contestable markets in their 1982 book, *Contestable Markets and the Theory of Industry Structure* (Baumol et al. 1988). It was touted as a "theory of industrial organization . . . [that] will transform the field and render it far more applicable to the real world . . . because of the observability of its properties, the theory of contestable markets can be extremely helpful in the design of public policy."[1] The theory is based on a simple and sensible idea: the threat of entry can induce incumbent firms in an industry to moderate pricing behavior even in industries with only a single firm. In this sense, contestability theory offers an alternative theory of natural monopoly and the way in which consumers' interests are best served by the way in which such a firm can respond to the pressure of threatened entry into the industry. Natural monopolies are traditionally assumed to be characterized by economies of scale that make marginal-cost-pricing unworkable. To preserve the benefits of scale economies, conventional thinking has traditionally been guided by the doctrine that such firms must be regulated. But contestability theorists intend to at least partially debunk this notion.

Modern contestability theory challenges conventional thinking on two fronts. First, the traditional definition of natural monopoly is abandoned and replaced by one combining economies of scale and economies of scope. Natural monopoly exists if a single firm is able to produce a particular listing of goods more cheaply than the same combination of goods could be produced by some industry configuration including more than one firm (Train 1991, p. 8). The second way in which contestability theory breaks with the traditional thought is in arguing against presumptive regulation of the monopolist. If the market were contestable, the pricing behavior of the incumbent firm would be disciplined by the threat of entry of competitors. In other words, the threat will induce something approaching competitive pricing on the part of the incumbent monopolist.[2] Facing this deterrence, the incumbent firm in the

[1]The quote is from Elizabeth Bailey's foreword to the book by Baumol et al. (1988, pp. vi, xv).

[2]In one sense, contestability theory represents a distinct move away from the structuralist or concentrationist approaches to industrial organization theory criticized by Dominick Armentano in his book *Antitrust and Monopoly: Anatomy of Policy Failure* (1990, pp. 32-40). The essence of this approach to industrial organization is that few or one firm in an industry necessarily means an absence of competitive pressure in pricing. However, Armentano is highly critical of the analytical and informational assumptions that seem to underlay antitrust policy and convincingly makes the case that efficiency is not a state of the market that is amenable to empirical measurement. Murray Rothbard also condemns the notion that any legitimate economic efficiency could ever be

industry earns no profits but only a competitive rate of return on investment. Zero economic profits are a presumptive indicator of economic efficiency. True contestability exists if prospective entrants are potentially able to enter the industry and, if necessary, later exit the industry with the ability to recover all or nearly all of the costs associated with initial entry. Issues related to asset specificity are assumed not to be a problem in recouping costs. If these conditions are met, market structure, in itself, does not provide a presumptive case for regulatory intervention (Spulber 1989, p. 142).

But contestability theory presumes that inefficiency can be detected and that corrective regulatory sanctions can be imposed. Contestability theory, as originally formulated by Baumol et al., is intended to provide an analytical framework for dealing with either of two sources of inefficiency. First, empirically discernable conditions of the market may reveal that a single multiproduct firm is the least costly (most efficient) means of satisfying the consumer demand for the slate of products being produced. However, contestability theory presumes that regulators can empirically detect situations in which no schedule of prices would be available to the incumbent monopolist that would forestall entry of competitors and the loss of production economies. In such cases, the regulating authority has the normative obligation to prevent the entry of new competitors. Second, situations arise in which markets with as few as one firm are found to be *uncontested*. In these circumstances, the theory purports to provide a coherent framework for determining which prescriptive pricing schedules are welfare enhancing.

Some of the paradoxes and contradictions of the theory arise from the fact that it was developed during a period that coincided with the deregulation of major industries in the United States. Some of these previously regulated industries include telephony, electric power, airlines, and railroads. One could reasonably assert that under previously existing regulatory regimes, these industries were relatively static. However, deregulation has meant that more dynamic entrepreneurial change characterizes these industries. Contestability theory fails to address the fact that if entrepreneurial entry were a reality, the implicit assumptions of a static neoclassical framework no longer pass muster. In this sense, the theory reflects an analytical disconnect; it introduces the prospect of *ex ante* entrepreneurial entry into a market framework that is also assumed to be sufficiently transparent and objective to allow "efficiency-enhancing regulatory intervention." Clearly, this postulated transparency is necessarily contingent on the attainment of strict equilibrium conditions. Yet at the same time, contestability theory claims to have regulatory relevance to the inherently entrepreneurial activity of entering and exiting an industry. *It presumes to apply a theory of entrepreneurship in a market setting in which true entrepreneurs cannot exist*. Actual contestability must be

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achieved by the regulatory actions of government. Rothbard observes that "efficiency, therefore, can never serve as a utilitarian touchstone for law or public policy" (Rothbard 1978, p. 92).

manifested in an entrepreneurial world characterized by genuine market uncertainty necessarily implying entrepreneurial judgment.[3] The extent to which entry and exit can be profitably accomplished must, in reality, be a totally speculative conjecture on the part of the entrepreneur and not a matter that can be discerned by a regulating authority assessing objective data.[4] There is no empirical content that would provide a framework for the ambitious regulatory agenda envisioned by Baumol and his cohorts. These and other features of contestability theory are the basis of the following examination.

Basic Elements of Contestable Market Theory

As originally formulated, contestability theory is principally intended to provide a framework for regulation of natural monopoly; it also outlines an allocative ideal in which a policy of *laissez faire* is most efficient. This allocative ideal is characterized by three features. First, potential entrants would be able to pursue profit opportunities within the industry yet at the same time be assured of recouping entry costs should later exit become necessary. This condition would establish *contestability*. Second, the natural monopolist would be able to produce a listing of goods more cheaply than the same listing of goods could be produced by some industry configuration including more than one firm. If this condition is satisfied, the monopolist's cost function is said to be *subadditive*. Third, prices charged by this natural monopolist would be *sustainable* in that they would offer no prospect of profitable entry by a prospective competitor; that is, prices would cover costs and allow only a competitive rate of return for the natural monopolist.[5]

However, these ideal conditions may not be fully satisfied in which case regulatory intervention is thought to be in order. But establishing the need for a corrective regulatory agenda is not possible unless *contestability*, *subadditivity,* and *sustainability* have objective, measurable content. This content is critically dependent on the ability of regulators to examine the cost structures

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[3]In an earlier publication Baumol himself was a thoughtful critic of the very type of model he later advances under the label of "contestability."

> *Obviously the entrepreneur has been read out of the model. There is no room for enterprise or initiative.* The management group becomes a passive calculator that reacts mechanically to changes imposed upon it . . . it does not exert, and does not even attempt to exert, any influence. (Baumol 1968, pp. 66-67; emphasis added)

[4]Some Austrian economists employ the discovery metaphor rather than terms such as "speculative conjecture" in describing this process; see Ikeda (1990) and Kirzner (1992).

[5]An anonymous referee has reminded this writer that the concept of sustainable industry structure is not unique to contestability theory and that its use is common to the literature of industrial organization.

within firms. But, as the following analysis will attempt to demonstrate, if these cost structures are to be interpreted as reflective of actual opportunity costs, the economic environment must satisfy strictly static equilibrium conditions devoid of uncertainty and the possibility of entrepreneurial entry or exit. This paradox is examined in greater depth in the remainder of the paper.

The contestability criterion: freedom of entry and costless exit

The requirement that exit from the industry be costless has been one of the more controversial aspects of contestability theory (Shepherd 1984, pp. 572–77). Nonetheless, to the extent that this condition holds, the incumbent monopolist would be forced to face the contingency of hit and run entry by prospective competitors. This prospect would condition the pricing behavior of the incumbent firm so that no profits would be earned on any of its products over and above a normal, competitive rate of return. In other words, the single incumbent firm would face potential competition rather than actual competition from firms already in the industry. But this general insight is not new and has long been understood in the context of industries comprised of single-product firms. The concept of contestability was anticipated by Joe Bain in his 1956 book, *Barriers to Competition* in which he observed

> that most analyses of how business competition works and what makes it work have given little emphasis to the force of potential or threatened competition of possible new competitors . . . that so far as economists have recognized the possible *importance* of [the threat] they have no very good idea of how important it actually is. (Bain 1956, p. 1)

The economist Wayne Leeman drew similar conclusions in a paper published in the same year as Bain's book. In describing Leeman's research, Murray Rothbard, observes

> Leeman concludes, quite correctly, that large rather than small firms dominate many markets, *not* as a result of victorious cutthroat competition and monopolistic pricing, but by taking advantage of low costs of much large-scale production and keeping prices low in fear of *potential* as well as actual rivals. (Rothbard 1962, p. 910; Leeman 1956, pp. 333–34)

While the central idea in contestability theory is not new, one must draw a sharp distinction between the earlier work of Leeman and Bain and the later theory as put forward by William Baumol and his colleagues. They delineate indicators of performance for an industry and claim the ability to use these indicators to empirically determine deviations from desired levels of efficiency. Baumol et al. make several heroic claims for the theory of contestable markets that some earlier economists would not have been prepared to make. For example, (1) a perfectly contestable market permits the monopolist to earn the same profits it can obtain in a perfectly competitive market, and no more. Any earnings that exceed the cost of capital will attract new entrants, who can undercut the incumbent monopolist's prices and take its customers

away. (2) Perfectly contestable markets exclude any firm that is inefficient (firms failing to produce at "minimum costs") because inefficiency would enable efficient entrants to take business away. Finally (3) cross-subsidy cannot endure in a perfectly contestable market. Each product *X* must earn revenue at least sufficient to cover the increments in the firm's total cost that result from provision of that product. This is so because no other product *Y* can provide excess profits with which to offset any losses incurred in the production of *X*. Each product must fully pay its own way if the firm is to avoid insolvency. Hence, in a perfectly contestable market, as in a perfectly competitive one, the prices that prevail will be those required for economic efficiency.[6] But what is the likelihood that these criteria have any empirical content? One notes that such content requires a degree of empirical transparency that could in principle only arise in an environment free of uncertainty, economic change and entrepreneurial activity.

Economies of scope and their source in the multi-product firm

The traditional neoclassical definition of natural monopoly presumes to identify a situation in which economies of scale are such that the monopolist is the least costly means of satisfying market demand. Economies of scale are present when the average cost of producing a single unit of output decreases as output expands. The theory of contestable markets is a revamping of the *neoclassical definition of natural monopoly* made necessary by the introduction of what has been labeled "economies of scope." If the firm is producing more than one product, a situation can arise in which market demand for the affected products will support only one firm. In other words, "economies of scope are said to exist if a given quantity of each of two or more goods can be produced by one firm at a lower total cost than if each good were produced separately by different firms" (Train 1991, p. 8). Economies of scope can be manifested in production processes in which scale economies may be absent. Suppose three different products *X*, *Y*, and *Z* can be produced separately by three different firms at respective financial outlays of $C(X)$, $C(Y)$, and $C(Z)$. However, the three products can be produced by one firm at a total financial outlay of $C(X, Y, Z)$; if the condition $C(X, Y, Z) < C(X) + C(Y) + C(Z)$ exists, then economies of scope are present. As with economies of scale, economies of scope can be realizable at some levels of output but not at others.

The implicit assumption made in the theory of contestable markets is that the external observer is availed of objective data on the way in which economies of scope affect the opportunity costs of the multi-product firms. The implausibility of this assumption is highlighted by the likely source of scope economies. Baumol et al. make reference to what they refer to as a *public input* that once employed in the manufacture of one good is at the same time available at minimal cost in the production of additional goods (Baumol

[6]The three items in this list are those presented by Baumol and Sidak (Baumol and Sidak 1994, pp. 43–44).

et al. 1988, p. 76). A variant of this idea would be the production of a set of goods that require a common overhead. Other views hold that scope economies arise from innovative means employed to exploit excess capacity within the firm (Baumol et al. 1988, p. 76). The reference to excess capacity raises issues that may be more congenial to Austrian perspectives on the firm. Frederic Sautet refers to the capacities of a firm to "generate and explore synergies within its own structure" (Sautet 2000, p. 92). Sautet acknowledges that these synergies can arise from production processes that share the same assets but adds that "it can also be seen in relation to the stock of knowledge (capabilities, routines, and interconnectedness between assets) . . . and coordination of learning processes inside the firm [which] leads to the emergence and exploitation of organizational knowledge" (Sautet 2000, p. 92).[7] In other words, firms have the capacity to integrate existing dispersed knowledge and to generate new knowledge. But one must note that it is certainly not evident that such information can ever take on an objectified form useful or valid in regulating industry structure.

Subadditivity: The basis of a theory of natural monopoly

Subadditivity redefines the concept of natural monopoly. It refers to an industry structure in which one multi-product firm is able to produce a combination of goods at a combined cost that is less than the cost that would be born by several firms manufacturing the individual goods or smaller sub groupings of goods. The concept is distinct from and more inclusive than "economies of scope." Both concepts refer to the same listing of goods but *subadditivity* refers to a situation in which a single firm is able to exploit both economies of scale and economies of scope and hence produce any combination of the same listing of goods more cheaply than the same listing of goods could be produced by *any* alternative industry configuration (Baumol et. al. 1988, p. 170). With presumptive subadditivity, the entry of new firms means a loss of efficiency since both the now-smaller incumbent and entrants would be supplying the market at a higher cost. Consumers would ostensibly be served less efficiently with more than one firm.

In most discussions of subadditivity, an effort is made to express the concept mathematically. But establishing subadditivity requires a comparison between the presumably objective costs of producing the product by one firm or n separate firms. For the multi-product natural monopolist, both economies of scale and scope must be capable of quantitative examination. A mathematical example posits a vector listing of products expressed as $q = (q_1, q_2, \ldots, q_m)$ that apparently meet a particular market demand. But this market demand for all of the q_i can be met by n different planned schedules of production, $(q^1, q^2, \ldots, q^n)$, as might be undertaken by different firms. In this formulation, the subscripts represent individual products and the

[7]The author thanks an anonymous referee for pointing out that these ideas were also explored earlier by Edith Penrose (1959, pp. 33–34).

superscripts represent production plans that may arise from different industry configurations (Tirole 1988, p. 20). An individual production plan q^j may contain some or all of the total quantity supplied of q_i and the plan may contain some or all of the m products in the listing. The vector for q^j could be represented by $q^j = (q_1^j, q_2^j, \ldots, q_m^j)$ but some of the respective components may be zero. Each of these n production plans can be collapsed into a single production plan of one firm. This collapsing is represented as the sum of the respective n vectors q^j.

$$\sum_{j=1}^{n} q^j = \left(\sum_{j=1}^{n} q_1^j, \sum_{j=1}^{n} q_2^j, \ldots\ldots\ldots, \sum_{j=1}^{n} q_m^j \right) \tag{1}$$

Hence, the test for the subadditivity condition for the multi-product natural monopoly is expressed as follows:

$$\sum_{j=1}^{n} C(q^j) > C\left(\sum_{j=1}^{n} q^j \right) \text{ for all vectors } q^j \text{ such that } \sum_{j=1}^{n} q^j \neq 0. \tag{2}$$

But subadditivity is more easily stated than detected and is largely acknowledged as such by its champions. Baumol et al. note that

> unfortunately, the intuitive appeal of the subadditivity concept is counterbalanced by its analytical elusiveness. We often cannot recognize whether a particular function is or is not subadditive simply by looking at its mathematical expression or its graph. Moreover, there apparently exist no straight-forward mechanical criteria that permit us to test whether or not a particular function is subadditive. This is a very demanding task for empirical work because it is likely to require data well outside the range of available observations. (Baumol et al. 1988, pp. 170–71)

Similarly, William Sharkey calls attention to the fact that "by the very nature of subadditivity, which requires comparison of a single firm's costs with an infinity of alternatives, no regulator can be entirely certain that the firm it regulates is a natural monopoly" (Sharkey 1982, p. 84).

But is the problem deeper than these acknowledgements would suggest? While the caveats raised by Baumol et al. and Sharkey are obviously legitimate, their concerns seem to be limited to the possible unavailability of data. But the more troubling issue is that opportunity costs do not exist independently of actual decisions and that the nature of the decision affects the degree to which observable data have the desired economic content. For example, in changing and uncertain markets, do data on financial outlays measure opportunity costs? If not, no means exist by which to define n, the number of production plans to be used in making the comparison shown in (2) above. Even if $C(q^j)$ could be legitimately defined as an objective cost function, with n as indeterminate, no means are available to establish how the vector of products q is distributed between hypothetical production plans. Also, what do cost functions actually measure and how does this measurement relate to a firm's valuation of opportunities relinquished by decisions to produce a particular

aggregation of goods? Under what circumstance would the content of such a valuation actually be readily available to a regulating authority? Assuming that enhancement of efficiency and economic welfare are the ends sought by regulation, can any legitimate prescriptions be made in the absence of firms' actual valuation of opportunities relinquished? Do the opportunity costs for potential entrants have any logical meaning or analytical significance prior to a firm's actual decision to enter the industry? These questions are explored at greater length below.

Sustainability of prices and industry structure

A natural monopoly may function as a competitive market. But is the natural monopoly a *sustainable industry structure*? Three conditions must be satisfied for the prices charged by the natural monopoly in the industry to be sustainable. First, the quantities demanded of the goods defining the market must equal the quantities of the outputs produced. Second, the prices received by the producing firm must yield revenues no less than the full costs of production. Third, there must be no opportunity for profitable entry by potential entrants (Baumol et al. 1988, p. 5). In the event that there is only one firm in the industry, sustainability refers to a set of prices that can be charged by the monopolist that simultaneously allows the firm to avoid losses on any of the products produced yet at the same time creates no inducement for other firms to enter the industry and produce all or some of the products produced by the incumbent firm. The absence of an inducement for potentially rival firms to enter generally means that profits are not earned by the incumbent firm and no cross subsidization occurs in the production and sale of any of the products. The incumbent firm "breaks even and additional entry is unprofitable" (Spulber 1989, p. 138).

> Given free entry and competitive pricing strategies, sustainable market equilibrium prices must be subsidy free. If prices are not subsidy-free, then revenues for some output or set of outputs exceed their stand-alone costs. This would provide an incentive for rival firms to provide those outputs at competitive prices, thus contradicting their sustainability. (Spulber 1989, p. 138)[8]

Like subadditivity, the concept of sustainability is highly static and reveals a neoclassical bias in the way profit is viewed in contestability theory. Profit and loss are not seen as ever-present features of the market emanating from the ceaseless changes in economic data, new opportunities and consequent need for new adjustments. Moreover, profit and loss are not viewed in terms of success or failure in adjusting the course of production activities to the

[8]Stand-alone cost of a product or a subset of products is the cost which would be incurred if a decision were made to produce only some specified set of products standing alone.

most urgent demands of consumers.[9] Rather, profits, assuming they are empirically evident, are an unwanted phenomenon and are viewed as an indication that the market is functioning inefficiently and are interpreted as evidence that the consumers are not being well served by an existing industry structure.

Presumed Objectivity of Cost and Profit: A Purported Framework for Industry Regulation

Contestability theory contrives a set of scenarios in which regulatory intervention is alleged to improve economic efficiency and to increase welfare. Circumstances requiring regulation would include the following: (1) subadditivity holds but no sustainable prices exist to forestall entry and (2) the market is not contestable because of entry barriers arising from the prospect that costs are not recoupable. Since both prospects are thought to be detrimental to efficiency and economic welfare, contestability theory interprets these phenomena as a rationale for regulatory intervention. The theory presumes to provide an operational framework for the actual regulation of industry structure and the pricing of industrial outputs. For contestability theory to play such a role, cost functions estimated from empirical data must be legitimate representations of opportunity costs and economic profits must be empirically measurable.

Cost functions and opportunity costs

The central concepts of contestability theory and its proposed regulation of prices are all crucially dependant upon the objectivity of opportunity cost. Opportunity costs would need to be objective to allow the construction of a cost function with sufficient empirical legitimacy to allow welfare inference. In their book, Baumol et al. make the following statement on the criticality of an objectively measurable cost function:

> Throughout the book we have found it most convenient and natural to conduct our analyses in terms of firms' cost functions and their properties. Indeed, the analysis has driven us to this approach, because our results show that it is the properties of the cost function that are directly related to the elements of industry structure and performance with which we have been concerned. This focus on cost functions is fortunate since recent advances in duality theory and in techniques of empirical analysis have guided the profession away from the problem-ridden task of direct

[9] A particularly trenchant critique of the static neoclassical equilibrium approach to viewing industry performance and issues of efficiency can be found in a paper by Sanford Ikeda (1990, pp. 78–79). One of the themes emphasized by Ikeda is that profits are evidence of temporary or transitional ignorance that are only eliminated through a process of entrepreneurial discovery.

> estimation of technological relationships (production functions and multi-output production transformation functions) and toward the estimation of cost functions instead. *Thus, we find ourselves felicitously aligned with mainstream trends*. (Baumol et al. 1988, pp. 445-46; emphasis added)

This quote raises the question: can the econometric estimation of a "cost function" reveal legitimate information of opportunity cost? In his book *Cost and Choice*, James Buchanan has emphasized that this approach to opportunity cost implicitly rests on an assumed equilibrium in which the following conditions must simultaneously hold: (1) reckoning of opportunity costs must be free of any uncertainty, (2) no unexploited profit opportunities can exist anywhere in the economy, (3) decisions must be made at the margin, that is, without discrete discontinuities, and (4) decisions must be made on strictly economic or pecuniary grounds (no noneconomic considerations can prompt decisions) (Buchanan 1969, p. 50).[10] Buchanan explains that "[i]t is essential for each of the qualifying conditions to be satisfied if measured marginal costs [incremental financial outlays] are to be employed as an objective representation of the subjective elements that actually enters the [firm's] choice calculus" (Buchanan 1969, p. 50).

The equilibrium conditions discussed by Buchanan would normally end the discussion since few economists, would seriously contend that *any* of these stipulations would ever be satisfied in any real market. Along similar lines, Ludwig von Mises explicitly links the concept of cost to the subjective act of choice:

> Costs are a phenomenon of valuation. Costs are the value attached to the most valuable want-satisfaction [forgone] . . . because the means required for its satisfaction are employed for that want-satisfaction the cost of which we are dealing with. . . . If costs were a real thing, i.e., a quantity independent of personal value judgments and objectively discernible and measurable, it would be possible for a disinterested arbiter to determine their height. . . . There is no need to dwell any longer on the absurdity of this idea. (Mises 1998, p. 393)

Use of capital goods over time and the presumptive objectivity of profit

As noted above, in the contestability paradigm, profits are a presumptive indicator of inefficiency. Working from this misguided premise, regulation of

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[10]Buchanan added that decision-makers must know their own utility functions. Baumol himself reviewed the Buchanan book, *Cost and Choice* in the 1970 *Journal of Economic Literature*. In this review Baumol offers the following inscrutable, contradictory, and confused observation: "economists should learn the lessons offered to us in this little book—and learn them well. It can save them from serious errors." However his next words were the following: "*but it should not be used to justify complete inaction on the ground that the relevant information is largely subjective and unknowable even to a reasonable degree of approximation*" (Baumol 1970, p. 1211; emphasis added). Baumol and his colleagues seem to have avoided few of the errors against which Buchanan warned.

efficiency presumes the existence of objective information on economic profit. Unfortunately for regulators, objective information on profit requires the assumption that financial outlays are faithful representations of opportunity costs of acting. Moreover, any attempt to use the financial outlays of an industrial enterprise as a representation of opportunity cost must inevitably face the fact that the firm owns capital assets the use of which in any given time period will involve a user cost that is not reflected in direct financial expenses. Much of opportunity cost arises from the present use of property that forecloses alternative future employment. Hence, the practical realities of company efforts to establish their user cost of capital mean that future relinquished opportunities must be valued in a way that reckons uncertainty and change.

Contestability theory has been examined in the context of various industries including electrical power transmission, local telephone, railway transportation, airline travel, and even banking.[11] To varying degrees, these industries are capital intensive and critically reliant on prudent intertemporal management of capital assets. Use of capital goods in any particular time period involves a sacrifice in the form of a user cost or economic depreciation. This user cost is reflected in a reduction in the present value of future rents and, if it were ever measurable, would be gauged as a reduction in the market value of already-used capital goods.

Baumol and his colleagues purport to address these issues but do so in the most unrealistic equilibrium framework. They note the importance of formulating a theory of user cost or depreciation that is consistent with both accounting usage and economic theory.

> Economists generally recognize that accounting depreciation rules bear little relationship to underlying economic relationships. What is less clear is a set of depreciation rules that *is* consistent with the tenets of economic theory. We will show, that our analysis does yield specific rules for depreciation, rules that are not only consistent with recovery of invested resources, but which, in addition, satisfy the requirements of optimality in intertemporal resource allocation. (Baumol 1988, p. 384)

In the context of an elegant mathematical presentation, they go on to note:

> The value of the capital can be assessed economically as the present value of the stream of future payments to capital, minus the present value of the stream of future costs [user cost] of the net investments that, in part, make those payments possible. . . . A set of depreciation payments is any stream of charges that add up to the sum of original investment costs. For any stream of payments to capital there is an equivalent stream of depreciation charges [user cost] and vice versa. . . . Thus if the firm decides on a set of outputs, input purchases, and prices over time, it *automatically decides*, implicitly, on the streams of payments to capital and depreciation charges.

[11] See: Baumol and Sidak (1994 and 1995), Tye (1995), and Dickens (1996).

> Consequently, there is a direct relationship between the firm's pricing decisions and its depreciation decisions. For example, a decision to use accelerated depreciation for a piece of equipment is tantamount to a decision to charge a high price (relative to variable costs) for those products of the equipment which are supplied early in the life of that item, and then reduce the products' prices (relative to variable costs) as the item ages. . . . That is, among the infinite number of different streams of depreciation assessments that cover the cost of capital equipment over its lifetime, we may select that stream of assessments which induces [an] . . . optimal pattern of quantities demanded and supplied over the relevant time interval. (Baumol 1988, pp. 385-87; emphasis added)

Hence, Baumol and his colleagues purport to objectify user cost (depreciation); "[t]he optimal set of depreciation assessments, and the corresponding prices, are those necessary for efficiency in the intertemporal allocation of resources" (Baumol 1988, p. 387). Baumol and his cohorts do not see these depreciation decisions as judgments or conjectures to be made by property owners. Rather, user costs are treated as determined magnitudes or objective data that may be available for regulatory scrutiny.

One concludes that Baumol and his colleagues consider neoclassical equilibrium to be a presumptive description of reality. Were it such, efficiency would be an empirically measurable economic phenomenon. But all of this mechanistic, deterministic precision dissolves into emptiness and absurdity if the assumption of a static intertemporal equilibrium is dropped, which, of course, it must be. True markets are dynamic and uncertain phenomena. In an equilibrium world, the reduction in the market value of capital goods should be equivalent to the reduction in the present value of future net receipts arising from current use of the asset. In these static, idealized circumstances, user cost would be precisely equivalent to the incremental reduction in the market value of the capital goods employed in the production process. But in real world markets, used capital goods, even if they are nonspecific to particular employments, are not standardized products with quotable market prices. Their market value is always a matter of judgment that will necessarily differ between decision makers depending upon their understanding of the market.

Hence, user cost is subjective. In this reckoning, the owner of capital assets attempts to establish, at the margin, a balance between the valuation of the current benefit of using capital goods and his valuation of future productive benefits relinquished because of current use. This user cost is based on the acting entrepreneur's understanding or expectation of the market's future. In a realistic disequilibrium world, no two actors are likely to see the future of the market in exactly the same way. The fact that "tenders submitted by different firms for the same order often quote prices that differ widely is no doubt due to the differences in user cost calculated" (Lachmann 1986, pp. 66-67). These realities are essentially ignored in the suggested applications of contestability theory. The user cost imputed to the current use of capital

goods will reflect the highly personal outlook of owner-entrepreneurs who may embrace optimism or pessimism, boldness or timidity at any one moment in time in which they must make decisions.

User cost can never be embedded in an econometrically estimated cost function to be applied to the regulation of industry. This barrier has stark implications for the use of the concept of economic profit;

> [w]hat is present profit depends no less on expectations of future revenue than our present magnitudes. . . . Firms in the same industry, even if they all had the same physical assets, could earn the same rate of profit on them only if their directors put the same valuations on them and had depreciated them at the same rate. (Lachmann 1986, pp. 77, 71)

The reckoning of profits by a firm is really a matter of uncertainty, judgment, and discovery meaning that profits cannot be empirically evident even to the accountants employed by the firm. As markets change, historical costs and profits are always subject to review after the fact. Peter Lewin has observed,

> The judgment involved in measuring the latter [user cost] affects the profit calculation and lends it an unavoidable element of arbitrariness. This means that profit, even measured retrospectively, necessarily contains elements of subjective judgment or convention. (Lewin 1999, p. 164)[12]

Hence, the regulatory act of trying to discern profits of a firm cannot simply be a matter of examining accounts; as Ludwig von Mises noted

> [c]ost accounting is therefore not an arithmetical process which can be established and examined by an indifferent umpire. It does not operate with uniquely determined magnitudes that can be found out in an objective way. Its essential items are the result of an *understanding of future conditions, necessarily always colored by the entrepreneur's opinion about the future state of the market.* (Mises 1998, p. 346; emphasis added)

Regulatory Imperatives and Presumed Applications of Contestability Theory

If opportunity costs and economic profits are matters of subjective judgment by the owners of invested property, what remains of the regulatory agenda underlying the theory of contestability? The remainder of this paper will answer this question by examining the scenarios thought to require regulatory intervention. First, subadditivity may hold for the natural monopolist but there are no prices that can be charged that will forestall the entrepreneurial

[12]In this context, historical reassessment of user costs and profits is not irrelevant for future action. Reassessment may reveal that capital assets thought to be available for planned production may not be.

entry of competitors. What is thought to be lost by the entry of such firms is the benefit of both scale and scope economies. After entry of competitors, firms would be operating at smaller scales and probably narrower scopes of production than were possible when the single firm was supplying the market. The supposition is that consumers are hurt by the prospect of the same slate of goods being supplied at higher costs and higher prices by more than one firm. Hence, regulatory prohibitions on entry are thought to be necessary. Second, subadditivity may hold but the market is not perfectly contestable. What appears to be a lack of perfect contestability may arise from the perception that there is little threat of entry to discipline the pricing behavior of the incumbent firm. Perhaps entry involves sunk cost or the entrant may be at a cost disadvantage in having to bear costs that are not borne by the incumbent firm. In the event that the market was somehow found to be uncontested, the regulating authority would be called upon to impose operational pricing regimes that would replicate the pricing that would occur if markets were contestable.

Preventing entry when subadditivity holds but sustainable prices do not

One can begin by asking a Hayekian question: to whom is this information given? Of course, the answer is that it is given to no one. But, for the moment, one can set aside the most compelling fact about subadditivity, namely that no means exist by which to identify it. Assume that a hypothetical circumstance has somehow been identified in which the single firm represents the most efficient (least costly) means of meeting market demand for the particular slate of goods. *Subadditivity* holds. "The question arises: are there always prices that a natural monopolist can charge that will prevent entry, that is, are sustainable? If not, then allowing entry will prevent the attainment of an optimal equilibrium" (Train 1991, p. 308). Assume there is no set of *sustainable* prices. In this situation, contestability is actually thought to be detrimental to economic welfare since consumers will be paying higher prices for goods that are being produced at higher cost. Is this a regulatory problem? Should the government ever presume to have a policy position on such a situation—assuming that it could be identified?

Consider the following example.[13] Three products can be produced in a market in which demand is fixed at 1,000 units for each product. If produced by separate firms, total cost for each product is $30,000; total cost for the three products would be $90,000. Also suppose that economies of scope exist allowing any two of the products to be provided by one firm at a cost of $48,000. But assume that a subadditive monopoly is possible in which all three products can be produced for a cost of $75,000 earning total revenue of $75,000. Hence, with three firms, total cost is $90,000; with two firms, total

[13]The example given here is derived from one presented by Kenneth Train (1991, pp. 309–10). However, Train credits Edward Zajac (1978) with the example.

cost is $78,000 and with a monopolist, total cost $75,000. For the monopolist, profits would be zero but another firm could enter and provide *two* of the products, *X* and *Y*, charging $24.50 for each and earning $49,000 in total revenue and a net profit of $1,000. Assume that an incumbent monopolist already exists and tries to forestall entry of the second firm by lowering the price of products *X* and *Y* to $24.00 such that a potential entrant earns no profit. Then the monopolist must charge $27.50 for Product *Z* to break even. However, at these prices, a prospective entrant could charge $23.50 for product *X* and $26.50 for product *Z*, earning revenues of $50,000 and a profit of $2,000. Under any other price combination a new firm would be able to provide *X* and *Y*, *X* and *Z,* or *Y* and *Z* at a lower price and make a profit, even though the incumbent monopolist would be earning zero economic profit.

Does the situation outlined in this example call for regulatory intervention? Theorists plunge ahead with suggested proscriptions on entry. "Clearly, in this situation, an equilibrium with one firm, which is optimal from a cost perspective, is not possible if entry is allowed" (Train 1991, p. 310). In his book *The Theory of Natural Monopoly*, William Sharkey claims that

> to the extent that entry results in inefficient production, it may be desirable to place restrictions on the competitive process when an unsustainable natural monopoly is known to exist. . . . Because entry into a natural monopoly market necessarily results in higher costs of production, a possible goal of regulation would be to prevent such entry. (Sharkey 1982, pp. 148, 151–52)

Baumol et al. are only slightly more circumspect in recommending a strict prohibition on entry into the industry:

> Where markets are perfectly contestable and monopoly is natural but unsustainable, limitations upon entry may be needed to ensure that the socially optimal set of products can be produced in the most efficient manner. This theoretical finding must be interpreted as no more than the first step in the process of identifying the economic characteristics of the special situations that may warrant concern over the effects of free entry. (Baumol et al. 1988, pp. 221–33)[14]

Policy proscriptions on entry of additional firms largely ignore the analytical and policy implications of an entrepreneurial environment. First, no empirical means would provide objective information on sustainable prices.

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[14]One notes that the example given above is not totally clear on the pricing issues facing a subadditive natural monopoly. To allow for economies of scale and scope, prices must exceed marginal costs by an amount sufficient to allow the natural monopoly to break even. However, the example given in the text seems to suggest that the natural monopolist is able to earn no profit by setting its prices for the three products equal to cost of the products. But the latter pricing policy is not one that would allow the natural monopoly to survive even if there were no threat of entry.

The most critical point to note in this example is that the stated "facts" are never revealed as objective information either to regulators or to prospective competitors. What are listed as facts in the example can never be more than conjectures or judgments that will almost always differ among the various affected parties and observers. Hence, sustainability can never serve as a guideline in making regulatory decisions on allowing or prohibiting entry. Second, no demand schedule is rigidly stable. The schedule of demand around which the concept of subadditivity rests is in fact not static. In the example given above, demand is assumed to be fixed at 1000 for each of the three services provided by the natural monopolist. In reality, the quantities demanded of the respective products in the list would be subject to dynamic change. Demand may become smaller or larger depending upon changes in the tastes or goals of customers. The volume of each good demanded by consumers may be growing to a degree that would eventually allow entrants and the incumbent to fully exploit the economies and scale and scope to the degree initially enjoyed by the incumbent prior to the entrance of new firms. Third, another form of market change affecting the product list is that its actual composition may undergo significant change over time. Entrants into the industry are not necessarily restricted to production from within the initial slate of goods produced by the incumbent natural monopolist (Lewin 2004, p. 4). Entrants may offer differentiated slates of goods that may intersect but not replicate the slate offered by the incumbent monopolist. After the entry of new firms into the previously one-firm industry, competitors may well begin to offer new products as part of their entrepreneurial efforts to better satisfy consumers. New slates of goods may be conducive to cost complementarities in production implying that more firms would be able to more fully exploit economies of scale and scope as the market grows. In other words, subadditivity may be eventually destroyed by competition with accompanying gains *to consumers*. Fourth, economies of scale and scope as manifested in production costs do not remain constant over time. Improvements in old production technologies and introduction of new technologies will drive down costs as firms seek higher profits in their efforts to better satisfy consumer demand. These types of market change suggest that no natural monopoly should ever be protected from entry by potential rivals. Subadditivity and sustainability as they may apply to a particular firm at a particular moment in time are always likely to be only transitional and temporary.

Uncontested monopoly: regulation through Ramsey pricing

Ramsey-optimal prices are designed to achieve an optimal upward deviation from marginal cost with the intent of providing the regulated firm with sufficient revenue to remain in business. The deviation from marginal cost pricing takes into account the elasticities and cross elasticities of demand of the respective products produced by the regulated natural monopoly. If one assumes that upward deviation from marginal cost can be chosen optimally, the regulated firm is assured a flow of revenue sufficient to cover the costs of

all goods produced. Baumol and Sidak note the following: "If this set of prices yields revenues insufficient to cover the suppliers total cost, however, the prices must be modified [from marginal cost pricing] for the goods to continue to be supplied by private enterprise" (Baumol and Sidak 1995, pp. 31–32).

Ramsey prices are achieved when the deviation from marginal cost multiplied by the net elasticity of demand is the same for all products produced by the firm. Application of the Ramsey rule yields the following relationship:

$$\left[\frac{p_i - MC_i}{p_i}\right]\left(E_i - \sum_{j=1}^{n-1} E_{ji}\right) = \left[\frac{p_j - MC_j}{p_j}\right]\left(E_j - \sum_{i=1}^{n-1} E_{ij}\right),\ i \neq j,\ E_{ji} \geq 0, E_{ij} \geq 0. \quad (3)$$

The following definitions apply to (3): p_i, and p_j are the prices of products i and j respectively (i, j = 1,....,n-1); MC_i and MC_j are respectively the marginal costs of products i and j; E_i and E_j are the own price elasticities of demand for products i and j respectively; E_{ji} is the cross elasticity measuring the percentage change in the quantity of good j demanded in response to a one percent change in the price of good i; and E_{ij} is the cross elasticity measuring the percentage change in the quantity of good i demanded in response to a one percent change in the price of good j.

In (3) the difference between the demand elasticities and the summation of cross elasticities yields a net elasticity of demand to be used as a weighting factor in deriving the Ramsey prices.[15] For each product, the largest revenue contribution is achieved by applying the "inverse net elasticity" relationship in such a way that larger deviations from marginal cost are imposed for those products with the lowest net elasticity of demand. For example, a large net elasticity of demand will add little to the revenue of the regulated natural monopoly. The increase in price results in a significant reduction in the quantity demanded. However, for a good q_j with a small price net elasticity of demand, a 1 percent increase in price will be accompanied by more than a 1 percent increase in the revenues of the firm. Hence, Ramsey prices are viewed as second-best optima because they selectively establish deviations from marginal cost pricing which assure the firm sufficient revenue to continue to produce the products in question. Moreover, Ramsey-optimal prices purport to accomplish the above while minimizing distortions in consumer choices and loss of economic efficiency.

To Baumol and his colleagues, a critical shortcoming of Ramsey-optimal pricing is that it imposes daunting data requirements with respect to product

[15]The relationship in (3) is derived from one presented by Train (1991, pp. 126–27). In deriving net elasticities, Train subtracts only one cross elasticity from the own price elasticity. He does not subtract the summation of cross elasticities. The net elasticity takes account of the possibility that some of the cross elasticities may be positive and others negative.

demand. But they fail to recognize or acknowledge the fact that the marginal-costs information required to apply the formula will be unavailable—or more accurately—non-existent. Moreover, contestability theory perpetuates a fundamental error with respect to the meaning of the relationship between price and marginal cost. For example, Baumol and Sidak assert that

> [e]conomic efficiency requires that the price of every product be set equal to its marginal cost, provided that doing is consistent with the economic viability of the firm (which will be true in the absence of scale economies, as must be true in a world of perfect competition). . . . A more direct way of viewing the matter is to interpret marginal cost as the true cost the consumer imposes upon the economy in buying an additional unit of product. . . . Consequently, if the consumer makes purchase decisions rationally, achieving a given level of satisfaction at minimum cost to himself, he automatically does so at minimum cost to society, as economic efficiency requires. (Baumol and Sidak 1995, pp. 27–28)

However, the presumed normative significance of any observable equivalence between price and observable outlays is debunked by James Buchanan:

> equalities between prices and marginal costs, as objectively observed quantities in fully competitive equilibrium, are inferred predictions which depend on the behavioral assumptions upon which the whole theory is constructed. *These equalities have no normative significance and they have no direct relationship to allocational efficiency*. (Buchanan 1969, p. 40)

While Ramsey prices are thought to be "optimal deviations" from marginal costs, the same types of mistaken inferences are drawn with respect to the efficiency of their use as have traditionally been imputed to marginal cost pricing.

Uncontested monopoly: regulatory imposition of price ceilings

The same analytical barriers arise with respect to the alternatives recommended for use instead of Ramsey prices. Constrained-market prices have been offered as a more viable regulatory pricing procedure and are based on the idea that a regulating authority can, on the basis of available cost data, derive and impose price ceilings and price floors between which the regulated firm is free to pursue its own pricing strategy for all of the products produced (Baumol and Sidak 1995, pp. 37–38). Of interest is the fact that between the price ceiling and price floor, the regulated firm would be able to design its own set of discriminatory prices in maximizing the income allowable under the regulatory constraint. In applying constrained-market pricing to uncontested markets, the objective is to (a) provide assurance that the incumbent firm earns only a competitive return on investment, and (b) prevent cross subsidization since deliberate "losses" for one product must be compensated by economic profits from other products (Baumol et al. 1988, pp. 24–29). Hence, the rationale of the price constraint is to duplicate these

results of contestability even in situations in which the market is not contestable. The remaining analysis will concentrate on the operational validity of the proposed price ceilings and price floors. In the case of price ceilings, opportunity costs present an even more severe analytical barrier since it is dependent upon the quantitative reckoning of *hypothetical* opportunity costs. The regulator must be able to infer costs or glean information on costs independently of actual entry decisions by entrepreneurs.

The ceiling price of constrained-market pricing is intended to be the upper-bound price that the regulated natural monopoly is able to charge for any particular product. The ceiling is based on a regulator's presumed inference of the price at which a hypothetical entrant may attempt to enter a hypothetically contestable market; of course, in this case, the natural monopoly is not threatened by entry of competitors. The price ceiling for an individual product derives from stand-alone-cost costs of individual products or subgroupings of products that would presumably be associated with production by a more specialized firm. Stand-alone cost (SAC) "is the cost which would be incurred by an efficient entrant to the industry in question if it were to decide to produce only some specified set of [products]. . . . That is, it is the cost to produce just those items 'standing alone'" (Baumol and Sidak 1995, p. 52). Assume that a multi-product regulated firm were producing products (goods or services) $q_1, q_2, \ldots, q_n$. The cost to the firm of producing these products is supposedly given by the function $C = C(q_1, q_2, \ldots, q_n)$. The cost of producing each of these products separately by individual firms is supposedly given by $SAC_1 = C(q_1)$, $SAC_2 = C(q_2), \ldots SAC_n = C(q_n)$. But in this case, the SAC's would be hypothetical costs imputed by the regulating authority. Assuming that costs were measurable or imputable magnitudes, economies of scope would reveal the following inequality:

$$C(q_1, q_2, q_3, \ldots, q_n) < \sum_{i=1}^{n} SAC(q_i). \tag{4}$$

The relationship in (4) would apply for the sum of the stand-alone costs for any combinations of subsets of the original listing of goods produced $q_1, q_2, \ldots, q_n$. The price ceiling or maximum price for the product q_i is established by its stand-alone cost $SAC_i = C(q_i)$. Why? The stand-alone cost is intended to represent the most costly potential alternative source for the product in question. This cost is equivalent to a price for q_i that is imputed to be just sufficient to attract new firms prepared to produce only the one product. Baumol and Sidak outline the responsibilities of the regulator: "such a price [in excess of SAC_i] should be rejected by the regulator in the non-contestable regulated market, where the regulator's task is to impose the attributes of competitive behavior wherever the powers of competition are inadequate to automatically to prevent the price from being adopted" (Baumol and Sidak 1995, pp. 81-82). In other words, the price ceiling is based upon the regulator's alleged ability to impute the costs that would be incurred by a hypothetical new competitor in a hypothetically contestable market. Undaunted, Baumol

and Sidak refer to this ceiling as the "combinatorial cost test" and assert that it prevents the regulated incumbent firm from using its economies of scope to

> achieve earnings that would not be permitted to it by the forces of an effectively [hypothetical and non-existent] competitive market . . . the combinatorial stand-alone price ceiling means that the prices of every combination of the firm's products must yield combined revenues not exceeding the corresponding stand-alone cost of the combination of products in question. (Baumol and Sidak 1994, p. 78)

However, this analytical device is empty. Stand-alone costs do not exist in any meaningful sense independently of actual entrepreneurial decisions by entrants to produce specific subsets of the monopolist's product slate. Again, to reiterate a central point, entrepreneurs in the process of weighing the costs and benefits of entry subjectively experience opportunity cost but this experience is never revealed as objective information to external observers such as a regulating authority. The opportunity costs of *hypothetical entrants* cannot be imputed by a regulating authority in the way suggested in the application of contestability theory. If the regulated natural monopoly were functioning in an environment characterized by uncertainty and economic change, the price ceiling based on stand-alone hypothetical costs is nothing more than the most fanciful theoretical speculation.

Uncontested markets and the non-operational regulation of price floors

A misguided concern over predatory pricing prompts contestability theorists to suggest regulatory constraints on what they view as "excessively low prices." Baumol and Sidak assert

> that an excessively low price can be as damaging to economic efficiency as an excessively high price. Prices that are too low may come at the expense of adequacy of investment and may prevent expansion of capacity, modernization of facilities, and ultimately, continued operation of supplier firms. (Baumol and Sidak 1995, p. 65)

But from the regulatory perspective, the principal stated concern is the prevention of "cross subsidization" and "predatory pricing." Predatory pricing is thought to be pursued by a firm intent on driving competitors from the market. As the theory goes, once competition has been driven out of the market, the monopolist would be free to raise prices to monopolistic levels. Another possible strategy would be one in which the multi-product firm would price a product "below cost" and to subsidize this "loss" by charging a price for another product that exceeds its "cost." The regulation of a price floor would be intended to prevent the incumbent regulated firm from pursuing price strategies capable of driving out competitors or of preventing entry by potential competitors.[16]

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[16]For an incisive analysis demonstrating that predatory pricing behavior cannot logically be explained within the theoretical boundaries defining the neoclassical theory of the firm, see William Anderson (2003, pp. 23–40).

One of the measures of cost suggested as a price floor for the single product q_i is *average incremental cost*. In the regulatory framework described by Baumol and Sidak, the average incremental cost AIC is not the equivalent of marginal cost. *Incremental cost*, in this case, would be manifested in the addition to total cost borne by the firm through the act of adding product q_i to the slate of products already produced. Hence, AIC_i is the cost per unit of q_i added to the regulated firm total "cost" as a result its production of the product. Moreover, AIC_i as shown in (5) differs from average variable cost in that it includes those "product-specific" fixed costs that are necessary in the production of q_i:

$$AIC_1 = \{C(q_1, q_2, q_3 \ldots, q_n) - C(0, q_2, q_3 \ldots, q_n)\}/q_1. \tag{5}$$

Hence, for the individual product q_1, the price floor constraint assures that $p_1q_1 \geq AIC_1$ holds when the product is considered individually. To the extent that this latter relationship were evident, it would represent presumptive evidence that the firm is not engaging in predatory price behavior. The price floor idea advanced by Baumol and his colleagues also applies to particular subsets of products sharing common costs. Assume that the regulated firm produces a set k of 4 products which share common costs $S_k(q_1, q_2, q_3, q_4)$. The price floor applied to this subset of products would be given by the following:

$$\sum_{i=1}^{4} p_i q_i \geq \sum_{i=1}^{4} AIC_i + S_k. \tag{6}$$

Finally, the price-floor condition must satisfy the following condition for all product sets produced by the regulated firm:

$$\sum_{i=1}^{n} p_i q_i \geq \sum_{i=1}^{n} AIC_i + \sum_{k=1}^{K} S_k. \tag{7}$$

In (7), the S_k are the subsets of products which share common costs. The sum over K subsets represents all the combinations of product subsets sharing costs within the regulated firm.

Several criticisms of these price floors become apparent. First, these constructions are empirically empty; the regulatory strategy is operational only if costs can be seen as objective and hence measurable. As emphasized throughout this paper, opportunity costs are subjective, which means that these procedures provide no legitimate basis for regulatory intervention aimed at promoting economic welfare or efficiency. No legitimate procedures exist to determine if a price is *predatory* nor is there any means by which one can discern predatory motives in the pricing behavior. "The cutting of price may just as well be due to inability to dispose of a stock at any higher price as to 'cutthroat' competition, and it is impossible for an observer to separate the two elements" (Rothbard 1962, p. 604). In general one cannot detect any

legitimate distinction between aggressive pricing and pricing practices that are allegedly predatory.

Second, the concern over predatory pricing appears odd and disjointed in the case of uncontested natural monopoly. Recent research has shown that predatory pricing cannot be rationally explained within the context of the neoclassical theory of the firm (Anderson 2003). Moreover, what could possibly be the rationale for so called predation if the market is in fact uncontested? Can any rational case be made that low prices are a barrier to entry that should be precluded because such prices offer no prospects of profitable entry? Is this not the type of behavior that one would hope to see in a market characterized by the presence of a single firm within an industry? In fact,

> the process of attempting to eliminate rivals is inherently competitive. Large firms bent on eliminating competitors would presumably seek to reduce final prices, increase their own efficiency and productivity, and offer additional services to potential buyers, all in order to secure business from rivals. But such competitive activity . . . ought not to be discouraged in any way. (Armentano 1990, p. 42)

Much of the absurdity regarding predatory pricing arises from the notion that contestability theory provides insight into optimal industry structure. But as Murray Rothbard has noted: "We do not know, and economists cannot tell us, the optimum size of a firm in any given industry" (Rothbard 1962, p. 573).

CONCLUSIONS

Contestability theory makes a case that the pricing behavior of a multi-product natural monopolist is disciplined by the threat of entrepreneurial entry. The contestability model employs three major concepts. These include (1) *economies of scope* in which joint production of a slate of products is less costly than if each product were to be produced by separate firms; (2) *subadditivity*, a formal demonstration that the single firm is the least costly means of satisfying a specific demand for a specific slate of products. But even in such a case, "benefits of competitive pricing" are thought to be achievable if: (a) prospective entrants are assured of the ability to recoup entry costs; and (b) the incumbent firm is induced by threat of entry to charge *sustainable prices* such that no profitable entry is possible. (3) *Sustainability* is attained if market demand is being fully satisfied and the monopolist is able to charge prices that fully cover the cost of production and offer no prospects of profitable entry.

Regulatory intervention is purportedly warranted if the above conditions are not met. However, establishing such is critically dependent upon objective opportunity costs and profits. But opportunity costs and economic profits are inherently subjective. This analytical barrier becomes particularly apparent in dealing with the issue of user cost or opportunities relinquished in the use of capital assets over time. While contestability theory claims to deal with these

issues, techniques offered for the objective reckoning of user-cost are hopelessly empty under uncertainty, change, and entrepreneurship.

Two scenarios present an alleged rationale for regulatory intervention: (1) subadditivity holds but no sustainable prices exist to forestall entry or (2) the market is not contestable because of entry barriers or situations in which costs are not recoupable. In the former case, contestability theory would proscribe entry. But, quite aside from the fact that no means are available to detect subadditivity, such a regulatory agenda ignores the fact that the slate of products defining the subadditivity condition is subject to change as are production technologies. Hence, barring entry is absolutely without foundation and is likely to be detrimental to economic welfare.

In the event that there is thought to be no threat of entry by competitors, contestability theory would prescribe prices to be charged by the incumbent monopolist. However, each of these regulatory strategies requires objective information on opportunity costs. But such information never exists. One of these strategies is Ramsey pricing in which prices represent optimal deviations from marginal cost. This approach to pricing is advanced as a means of covering production costs while minimizing inefficiencies arising from marginal cost pricing. Other approaches to price regulation would employ cost information to establish price ceilings and price floors. For the same reason, each of these regulatory approaches must be rejected.

While the individual entrepreneur is able to arrive at some judgments about scale economies, economies of scope, subadditivity and sustainability are largely beyond empirical investigations. No information would ever be available to a regulating authority that would justify intervention or the presumption that welfare would be enhanced by a particular regulatory sanction. To this extent, the theory of contestable markets does not apply to real markets since it is too significantly detached from reality to have any validity in regulatory policy.

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