Contestable Markets: An Uprising in the Theory of Industry Structure: Comment

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In his AEA presidential address, William Baumol (1982) describes the theory of contestable markets as "an uprising" which "aspires to provide no less than a unifying theory as a foundation for the analysis of industrial organization" (pp. 14–15). A perfectly contestable market is defined as one into which entry is absolutely free and from which exit is absolutely costless (p. 3). In such a market, the price-taking results of the perfectly competitive model apply even if there is only a small number of incumbent firms. The crucial feature of a perfectly contestable market is its vulnerability to hit-and-run entry. A potential entrant could exploit even the most transient profit opportunity by instantaneously entering, collecting his profit, and exiting before incumbents could lower price: "...potential entrants find it appropriate to evaluate the profitability of entry in terms of incumbent firms' pre-entry prices" (p. 4). To prevent hit-and-run entry, incumbents must produce efficiently and earn zero profits. In a perfectly contestable market, therefore, the threat of entry suppresses any oligopolistic interaction that might occur among a small number of firms.

We will show that perfect contestability requires two implausible conditions:[1] (i) in response to high prices, an entrant can enter instantaneously at any scale, that is, there is no entry lag; and (ii) an entrant can undercut an incumbent's price and exit with no loss of fixed costs before the incumbent can adjust price, that is, the incumbent's price adjustment lag exceeds the exit lag.[2] If these conditions are relaxed even slightly, the results can differ dramatically from those obtained under perfect contestability. Specifically, if (ii) holds but (i) is violated, the incumbent may charge a high price pre-entry even though entry will eventually bring price down. If (ii) is violated, entry may not occur; whether it occurs depends upon the nature of the nondegenerate oligopolistic game expected post-entry.[3]

Consider a homogeneous good market and assume initially that there is a single incumbent and a single potential entrant. Suppose that (ii) above holds but (i) does not, that is, the incumbent's price-adjustment lag exceeds the exit lag but there is some entry lag. Because the entrant can enter at any scale, undercut the incumbent, and exit before the latter can adjust price, any supracompetitive pre-entry price (i.e., any price

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[1]In interpreting perfect contestability we have relied in part on Baumol and Robert Willig (1981) and Baumol, John Panzar, and Willig (1982).

[2]We assume that all firms have the same cost function which exhibits some fixed, overhead cost. For analytical tractability, we represent the degree of difficulty in recovering the fixed cost (i.e., the notion of sunkedness) as the time it takes to leave the market with the fixed cost fully recovered. We call this time the "exit lag" and assume that it is the same for an incumbent as for an entrant. We also allow some lag between the time entry occurs and the time an incumbent can adjust price, and call this the "price-adjustment lag." Arguably, if the incumbent foresees entry he may be able to prepare in advance to either exit, or to adjust price when entry occurs, and may therefore be subject to no exit or price adjustment lags. In such a case, our ensuing criticisms of the nonrobustness of Baumol's results would be strengthened. By assuming that the incumbent faces both price adjustment and exit lags, and that the exit lag for the incumbent is the same as for the entrant, we are considering a case relatively favorable to Baumol's approach, It has been pointed out to us that Avinash Dixit (1982) also notes that conditions (i) and (ii) above are necessary for perfect contestability.

[3]There is a post-entry game in Baumol's model but it is degenerate, since the entrant can undercut the incumbent, gain the entire market and exit before the incumbent can adjust price.

above the level yielding zero profit net of an allowance for interest on the fixed cost) will induce entry and subsequent loss of the incumbent's entire market. The incumbent will set his pre-entry price at one of the following two levels: either the competitive level or the monopoly level. The competitive price yields a zero profit stream forever and no entry. The monopoly price induces entry and some subsequent loss (since the incumbent is undercut and earns zero revenue but incurs an opportunity loss equal to the interest foregone on his fixed cost); however, pre-entry the incumbent earns monopoly profits. Depending on the relevant parameters, either of these pre-entry prices could maximize the incumbent's present value. Furthermore, if there is *no* exit lag—as in the perfectly contestable case—the choice is clear: since the incumbent can now exit and avoid any loss from being undercut post-entry, he will set pre-entry price at the monopoly level!

In the above example, the threat of entry may not keep price low but actual entry will occur if the incumbent's pre-entry price is supracompetitive: the entrant can undercut the incumbent during the price-adjustment lag and exit before this lag elapses. Once we assume that the *exit* lag exceeds the price-adjustment lag, the entrant will be unable to escape price reactions by the incumbent and therefore may choose not to enter.

Consider the following example. Assume no price-adjustment lag and only arbitrarily small entry and exit lags. Conditions (i) and (ii) above are violated, but structurally the market is "almost perfectly contestable" as an arbitrarily small exit lag means that the fixed cost can be fully recovered almost immediately. However, the equilibrium is radically different from that in a perfect contestable market. Since price can now be adjusted instantaneously in response to entry, the entry decision now depends only on the nondegenerate oligopolistic game expected post-entry. Therefore, the incumbent will set pre-entry price at the monopoly level.[4]

[4]In the first example, since the incumbent cannot change his price post-entry, he may set pre-entry price at the entry forestalling level. Here, the incumbent can lower price if entry occurs and therefore will set pre-entry price at the monopoly level.

Moreover, the post-entry game may well imply negative profits to both firms (as in a Bertrand duopoly with identical firms having positive fixed cost and constant marginal cost), so the potential entrant may stay out despite the incumbent's high price.[5]

The assumptions of the above example can be relaxed in several respects without changing our qualitative results. First, there can be a positive price-adjustment lag; as long as this lag is shorter than the exit lag, the entrant will still have to consider the post-entry game in deciding whether to enter. Second, there can be several incumbents initially rather than one. The decision whether to enter will then depend upon a post-entry ologopolistic game involving several rather than two firms.[6] To summarize, Baumol's theory is not robust; once we deviate even slightly from the strict assumptions of perfect contestability, pricing and entry decisions depend upon the nature of firm interactions. There is no escaping the "reaction functions and the other paraphernalia of standard oligopoly models" (p. 11).

The nonrobustness of Baumol's results concerning industry behavior also calls into question whether the optimal industry structure (the size distribution of firms) said to prevail in perfectly contestable markets (pp. 5–6) is approximated in markets that are almost perfectly contestable. Baumol bases his structural results on the threat of hit-and-run entry which keeps prices and profits at competitive levels. We have seen that hit-

[5]Characterizing the entrant's behavior in this situation is complex, because of the question of which firm would exit if the entrant were to come in. However, suppose that the entrant believed (with probability one) that the incumbent would exit. For certain parameter values, the losses that the entrant would incur while the incumbent remained in the market—because of the exit lag—would still exceed the present value of profit in the post-exit period, hence the entrant would stay out.

[6]If there are multiple *entrants*, the problem becomes more complicated since an entrant must know the number of such entrants, and whether they would enter sequentially or simultaneously. With a large number of entrants moving simultaneously, it is possible that none would enter because of the losses that would be incurred if all entered simultaneously (see, for example, Roger Sherman and Thomas Willett, 1967). The implications of different numbers of entrants and different interactions among them have not been thoroughly analyzed to our knowledge.

and-run entry may be impossible in markets that are almost perfectly contestable. Consequently, Baumol's conjecture (pp. 7–8) that equilibrium industry structure in almost perfectly contestable markets approximates that of perfectly contestable markets remains to be proved.

If the perfectly contestable market were a plausible case, it might not matter that Baumol's results do not extend beyond this case. However, as shown earlier, perfect contestability requires that an outsider can enter, produce, sell, and exit without loss—all before an incumbent can adjust price. Typical set-up costs and specificity of capital make this description grossly unrealistic. Indeed, it is precisely because incumbents can adjust price and output rapidly in response to entry that the early limit pricing models of entry deterrence (for example, Joe Bain), were criticized and replaced by subsequent theoretical work (for example, Earl Thompson and Roger Faith; A. Michael Spence; Steven Salop; Avinash Dixit, 1980; Reynolds and Salop; Paul Milgrom and John Roberts).

One final point should be noted. In some markets there may exist outside institutions that prevent price reactions by incumbents or negate their effect on entrants. For example, long-term contracts may enable entrants to contract for a fixed price before entering —as in Harold Demsetz's "competition-for-the-market" model.[7] Such contracts move us to an environment radically different from the usual oligopoly one. In this different environment, the threat of entry would ensure zero profit and approximately optimal performance even if irrecoverability of fixed costs precluded hit-and-run entry. The question of exit and therefore of recoverability of fixed costs would not arise, so the nature of equilibrium would be independent of whether the market was contestable in a structural sense.

[7]Such long-term contracts are likely to be infeasible because of the cost of monitoring and enforcing quality and performance, for example, Oliver Williamson, (1976). Long-term contracts are particularly unlikely where new entrants are involved since the quality and cost of their product is relatively unknown.

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