

Barriers to entry

The precise definition of barriers to entry is controversial; different versions have been proposed over the years. The issue is not one of pure semantics, since evidence of barriers to entry plays an important role in merger review and other areas of antitrust policy. One definition that seems to reflect current thought and practice is: Barriers to entry are structural, institutional and behavioral conditions that allow established firms to earn economic profits for a significant length of time.

Scholars usually debate theories, proofs, frameworks, and the like. Rarely does controversy set over a definition, as in the case of “barriers entry.”

Economists tend to agree on the relevant issues, namely what the market outcome is given a set of assumptions regarding costs, demand, and the nature of competition. So why so much fuss over a definition? One answer is that words and definitions play an important role in antitrust analysis. For example, the DOJ/FTC (2000) *Antitrust Guidelines for Collaborations Among Competitors* suggest that evidence of substantial barriers to entry leads to closer scrutiny of the practice being challenged. Entry conditions play a similar role in other areas of antitrust policy (e.g., merger analysis) in the U.S., the European Union and other parts of the world. So, like it or not we must address the issue of what barriers to entry are.

Bain (1956) defined an entry barrier as the set of technology or product conditions that allow incumbent firms to earn economic profits in the long run. Bain identified three sets of conditions: economies of scale, product differentiation, and absolute cost advantages of established firms. Stigler (1968) criticized this approach, especially the idea of scale economies as a barrier to entry. He offered an alternative definition: a cost of producing which must be borne by an entrant but not by an incumbent.

Both of these approaches are incomplete, as a simple example will show. I will consider a series of different markets with the same structural conditions: a demand $D(p)$ and a technology that consists of a fixed cost F and zero variable costs. In market A, potential entrants sequentially decide whether to pay F , which is sunk; and then active firms compete a la Bertrand. Market B is like market A, but entrants collude at the monopoly price. Market C differs from market A in that potential entrants simultaneously decide whether to pay the fixed cost F , and moreover F is only committed for a short period of time. Finally, in market D potential entrants first simultaneously commit to their price level for a given short period, and then they decide whether to pay the fixed cost F , to which they are committed during the same period as price.

All of these scenarios feature the same structural conditions, and so the Bain and Stigler tests would yield the same answer. Under the Bain approach, there would be barriers to entry, namely the scale economies implied by the fixed cost technology. Under the Stigler definition, there would be no barriers to entry, since all firms face the same cost conditions. But both approaches would miss the substantial differences between the various markets. In market A, the equilibrium is for the first potential entrant to become

a monopolist. In market B, firms will enter to the point where each firm makes zero profits (I am ignoring here the integer constraint). In market C there are multiple Nash equilibria. A reasonable one is for firms to enter with a probability such that their expected profit is zero. However, with positive probability the outcome of this equilibrium is for one firm to be a monopolist, just like market A. Finally, in market D the equilibrium is for one firm to enter with a price equal to average cost.

The above example, while simplistic, shows the importance of looking beyond costs and demand to include behavioral conditions. What is the timing of moves, that is, what are firms committed to and for how long? The toughness of oligopoly competition, one of the key differences across the cases in the above example, is largely the result of the assumed timing of moves. The length of time over which costs are committed (how sunk costs are) is also a crucial factor. In fact, the issue of time reveals an additional limitation of the Bain approach, with its emphasis on the long-run equilibrium. What good is it to know that the long-run equilibrium is a symmetric duopoly if it takes years for an entrant to catch up with an established firm?

Taking these considerations into account, and with a view at the practical antitrust use of the concept of barriers to entry, a reasonable definition seems to be: *the set of structural, institutional and behavioral conditions that allow incumbent firms to earn economic profits for a significant length of time*. Admittedly, this is a fairly general definition, but necessarily so: the problem with other definitions is that, in attempting to be more specific, they become incomplete and potentially misleading.

Strategic entry deterrence

In the analysis of entry conditions and barriers to entry, a greater emphasis was initially placed on structural (or exogenous) entry conditions, e.g., economies of scale or incumbent cost advantages. The game theory “revolution” of the 1970s and 1980s, however, shifted the focus to firm behavior. This led to a coherent story of why structural conditions may turn into barriers to entry. Consider for example market A in the above example. If two firms imply zero prices, as the Bertrand assumption and zero variable costs imply, then the equilibrium outcome is for one firm to enter and set monopoly price, no matter how small F is. However, if price competition is not vigorous (market B), then no matter how high F is incumbent firms never earn economic profits. More generally, it’s the combination of entry cost levels, the irreversibility assumption and the oligopoly competition assumption that, together, lead to a barrier to entry.

Once the game theory apparatus was developed, the number of applications blossomed, frequently with particular models formalizing particular instances of entry barriers endogenously created by incumbents. So, in the 1970s DuPont increased its capacity in the Titanium Dioxide industry as a way to preempt entry or expansion by rival firms. From the 1950s to the 1970s, established firms in the ready-to-eat breakfast cereal industry rapidly increased the number of brands they offered, possibly as an entry preemption strategy. In the late 1960s and early 1970s, Xerox developed hundreds of patents that it never used (“sleeping patents”), their purpose being allegedly to make it

more difficult for an entrant to challenge its plain-paper photocopy monopoly. Before the expiry of its patent on aspartame, Monsanto signed exclusive contracts with its major customers of Nutrasweet (Coke and Pepsi), effectively reducing the residual demand to a potential entrant. And so on.

Gilbert (1989) provides an excellent, if slightly outdated, survey of the game theoretic work in this area. What is common to all of these examples of strategic entry deterrence is a prior action by incumbents that decreases the probability of subsequent entry. This may result from an increase in entry costs (Xerox's sleeping patents, Nutrasweet's contracts) or a decrease in the entrant's post-entry profits (Dupont's excess capacity, excess number of cereal brands). In fact, it suffices that the entrant's *beliefs* regarding costs and profits shift in the appropriate direction, even if there is no direct effect. In a world of asymmetric information, a low price by the incumbent may be interpreted as an absolute cost advantage and thus discourage entry; and repeated aggressive reaction to past entry episodes may increase the expectation of aggressive reaction to future entry. So the strategies of limit pricing or predatory pricing may also create barriers to entry.

Conclusion

The game theory revolution had the benefit of revealing the rich interaction between structural conditions and behavioral conditions. But it also complicated the task of deriving a simple, general definition of barriers to entry. In other parts of the field of industrial organization, the reaction to the "embarrassment of riches" created by game theory has been to focus on particular industries. I believe a similar approach must be taken with respect to the concept of barriers to entry and its application.

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