

# ENTRY BARRIERS AND ANTITRUST OBJECTIVES\*

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## Abstract

We show that the types of entry barriers relevant for antitrust cases depend on and vary with the welfare criterion according to which the potential social gains from entry are being evaluated. In this respect the confusion in antitrust cases around the concept of “entry barriers” primarily reflects an absence of a commonly agreed upon objective function for competition policy rather than a failure to reach a consensus on how to define entry barriers.

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# 1. Introduction

Evaluations of antitrust cases often focus on the force of entry to impose competitive discipline and prevent the abuse of dominant market positions. Characterizations of the nature of industry-specific entry barriers constitute an essential ingredient of such evaluations. For example, antitrust authorities are typically required to support recommendations against the approval of mergers by demonstrating the existence of significant entry barriers.

In an important contribution von Weizsäcker (1980) demonstrates that the market might under certain circumstances generate excessive entry relative to what would be socially optimal. He shows, for example, that the economy might benefit from higher, not lower, entry barriers in the presence of particular forms of economies of scale or goodwill effects. A number of recent articles, for example, McAfee, Mialon, and Williams (2004), Schmalensee (2004) and Carlton (2004), highlight the failure of the economics literature to define and characterize entry barriers in an unambiguous way so that the characterization can be applied for antitrust evaluations. In particular, McAfee, Mialon, and Williams (2004) list a variety of non-converging definitions from the existing economics literature and characterize their limitations. Finally, they propose their own set of definitions, which emphasizes the distinction between primary (direct) and ancillary (reinforcing) barriers to entry. In a technical appendix they present a model with economies of scale as ancillary barrier to entry, which “exacerbate the entry delay caused by brand loyalty.” Finally, Carlton (2005) argues that an intuition based on the static concept of barrier to entry can be misleading in many industries, and thus, more intuition can be gained by looking at dynamic models which better accommodate adjustment costs and uncertainty.

In this article, we argue that the confusion around the concept of entry barriers is not primarily related to ambiguity regarding a proper definition, but arises because there is no broad consensus about which welfare criterion should be applied as a basis for evaluating the potential social gains from entry. For this purpose we outline a simple model which exhibits the entry thresholds generated by sunk entry costs as well as switching costs created within the framework of an existing customer relationship.

Our analysis shows that the magnitude of the distortion created by sunk entry costs and switching costs is determined and varies by whether entry is evaluated by (i) the sum of consumer surplus and industry profits, (ii) the first-best allocations generated by marginal-cost pricing imposed by regulation, or (iii) the consumer surplus alone.

## 2. The Model of Entry with Sunk and Switching Costs

Consider a market for a homogenous product or service, produced by an incumbent firm, and potentially by an entrant. Upon entry, both firms compete in prices. Consumers are indexed by  $x$ , where  $x \geq 0$ . Formally, the utility function of a consumer buying at most one unit and indexed by  $x$  is given by

$$U_x \stackrel{\text{def}}{=} \begin{cases} \beta(1-x) - p^I & \text{Buys from the incumbent firm} \\ \beta(1-x) - p^E - s & \text{Buys from the entrant} \\ 0 & \text{Does not buy this product,} \end{cases} \quad (1)$$

where  $s \geq 0$  denotes the switching cost of a buyer who switches from the incumbent's brand to the entrant's brand.

The incumbent firm produces under a constant marginal cost of  $c^I$ . If entry does not occur, the incumbent exercises full monopoly power. The monopoly price, quantity produced (number of consumers served) and the incumbent's monopoly profit are given by

$$p^I = \frac{\beta + c^I}{2}, \quad q^I = \frac{\beta - c^I}{2\beta}, \quad \text{and} \quad \pi^I = \frac{(\beta - c^I)^2}{4\beta}. \quad (2)$$

The potential entrant can produce at a lower marginal cost of  $c^E < c^I$ , but must incur a sunk entry cost of  $F > 0$ . Upon entry, the entrant undercuts the incumbent firm by setting its price at the level of  $p^E = c^I - s$ , so that the entrant becomes the only supplier. Clearly, entry is never profitable if the switching cost exceeds the entrant's variable cost advantage, that is, if  $s > c^I - c^E$ . The quantity sold  $q^E = \hat{x}$  is solved from  $\beta(1 - \hat{x}) - p^E - s = 0$ . Hence the quantity sold and the resulting profit to the entrant are

$$q^E = \frac{\beta - c^I}{\beta} \quad \text{and} \quad \pi^E = (p^E - c^E)q^E - F = \frac{(\beta - c^I)(c^I - c^E - s)}{\beta} - F. \quad (3)$$

Therefore, entry occurs only if

$$F < F^E \stackrel{\text{def}}{=} \frac{(\beta - c^I)(c^I - c^E - s)}{\beta}. \quad (4)$$

Condition (4) defines the threshold for entry. This threshold always exists because the profitability of entry requires that  $s < c^I - c^E$ . Furthermore, we can directly conclude that this threshold is less likely to prevail when the switching cost is increased, and more likely to hold when the entrant has a more significant variable cost advantage.

### 3. Social Gains from Entry I: “Standard” IO Social Welfare Function

We say that there are entry barriers, if entry is socially beneficial, but no firm finds it profitable to enter and to compete with the incumbent firm.

We start by defining the social welfare function as the sum of aggregate consumer surplus and industry profit. This definition is commonly used in the Industrial Organization literature. If entry does not occur, social welfare is given by,

$$W^I = \int_0^{q^I} [\beta(1 - x) - p^I] dx + \pi^I = \frac{3(\beta - c^I)^2}{8\beta}, \quad (5)$$

where the quantity and profit are substituted from (2).

If entry occurs, (3) implies that social welfare is given by

$$W^E = \int_0^{q^E} [\beta(1 - x) - p^E - s] dx + \pi^E = \frac{(\beta - c^I)(c^I - 2c^E - 2s + \beta)}{2\beta} - F. \quad (6)$$

### 4. Social Gains from Entry II: Pareto Optimality Considerations

Pareto efficient allocations are easily captured by considering a regulated economy, where the regulator mandates marginal cost pricing. Assuming  $p^I = c^I$  if entry does not occur, the number

of buyers is  $q^I = (\beta - c^I)/\beta$ . If entry occurs,  $p^E = c^E$  and hence  $q^E = (\beta - c^E - s)/\beta$ . Note that in this environment the government must tax consumers to subsidize the sunk entry cost,  $F$ . By raising these revenues with lump-sum taxes the government can sustain Pareto efficient production allocations with marginal cost pricing. Altogether, the welfare levels associated with the Pareto optimal allocations under no entry and entry are given by

$$W^I = \frac{(\beta - c^I)^2}{2\beta} \quad \text{and} \quad W^E = \frac{(\beta - c^E - s)^2}{2\beta} - F. \quad (7)$$

## 5. Social Gains from Entry III: Consumer Surplus Perspectives

According to many experts, see for example Schmalensee (2004), policymakers in the United States typically assess the benefits from entry based on consumer surplus alone. Thus, the majority of antitrust cases in the United States are evaluated mainly on the basis consumer surplus rather than total surplus as defined by (5) and (6). If we compare aggregate consumer surplus before and after entry occurs, according to the prices computed in Section 2, we obtain that entry always dominates since

$$\int_0^{q^I} [\beta(1-x) - p^I] dx = CS^I = \frac{(\beta - c^I)^2}{8\beta} < \frac{(\beta - c^I)^2}{2\beta} = CS^E = \int_0^{q^E} [\beta(1-x) - p^E - s] dx. \quad (8)$$

Note that neither the switching costs  $s$ , nor the entrant's costs affect the comparison given in (8) since the entrant "subsidizes" consumers' switching costs by setting  $p^E = c^I - s$ . Therefore, as far as we are concerned with consumers only, we can conclude that entry dominates no-entry as long as the switching cost falls short of the reduction in marginal cost. That is, if  $s < c^I - c^E$ . Note that this is also a necessary condition for entry to be profitable. Consequently, the consumer surplus criterion always supports the promotion of entry no matter what is the sunk entry costs.

As was shown in Section 2, the private threshold for entry is increasing with an increase in consumers' switching cost, and declining with an increase in the entrant's cost advantage. In this respect, switching costs (the entrant's variable cost advantage) extend (diminish) the set of

entry barriers in the sense of enhancing the distortion between the private entry criterion and the socially optimal entry criterion independently of the precise welfare criterion used for evaluating the social gains of entry.

## 6. What is a Barrier to Entry?

We now approach our main question of what constitutes entry barriers? We demonstrate that the answer to this question depends on which social welfare function being used. Clearly, entry actually occurs if the entry is profitable, meaning that the sunk cost is bounded by  $F^E$  as defined in (4).

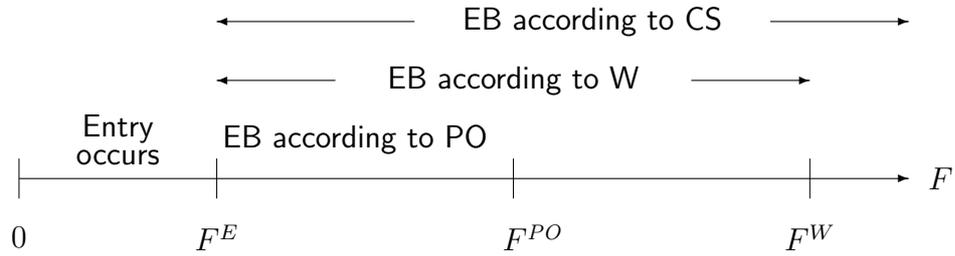
Next, if we refer to the “standard” definition of social welfare given in Section 3, entry is socially beneficial if  $W^E > W^I$  given in (5) and (6). This holds true if

$$F < F^W \stackrel{\text{def}}{=} \frac{(\beta - c^I)(7c^I - 8c^E - 8s + \beta)}{8\beta}. \quad (9)$$

The interval  $(F^E, F^W)$  can be viewed as the set of entry sunk costs for which the private market does not induce entry even though the criterion of total welfare suggests that there are social gains from entry. In contrast, if we apply the Pareto criterion analyzed in Section 4, entry is socially beneficial if  $W^E > W^I$  given in (7), which leads to the condition

$$F < F^{PO} \stackrel{\text{def}}{=} \frac{(c^E)^2 - (c^I)^2 + 2c^I\beta - 2c^E(\beta - s) - s(2\beta - s)}{2\beta}. \quad (10)$$

Figure 1 compares (4), (9), and (10) in the dimension of entry sunk cost. Note that it can be easily shown that  $F^W > F^{PO}$  for sufficiently high values of  $\beta$ , so that the range depicted in Figure 1 is nonempty. Figure 1 demonstrates that private incentives for entry are always below the social benefits since  $F^E < \min\{F^W; F^{PO}\}$ . This is not surprising. What is interesting here is that for all entry costs in the range of  $F^{PO} < F < F^W$  there are entry barriers according to the social welfare criterion but *not* if we use the first-best welfare criterion. Furthermore, as demonstrated in Section 5, when evaluations are based on the criterion of consumer surplus, entry barriers exist for all values of the entry cost exceeding the private entry threshold i.e., for all  $F > F^E$ .



**Figure 1:** Entry barriers as functions of the welfare criteria being used. *Notes:* (i) EB means entry barriers. (ii) EB under CS assume  $s < c^I - c^E$ .

## 7. Conclusion

In this paper we have shown that the concept which we call entry barrier is determined by and varies the welfare criterion according to which the potential social gains from entry are evaluated. We demonstrated that the set of entry barriers successively increases in the sense of inclusion as we move from applying total welfare via first-based allocations associated with regulated marginal cost pricing to the criterion of the consumer surplus. The entry barriers are maximal when evaluated from the point of view of consumer surplus in the sense that this welfare criterion supports the promotion of entry no matter how high are the sunk entry costs.

Consequently, the confusion about entry barriers arises primarily because the entry barriers are derived from the underlying welfare criterion used for evaluating the social gains from entry. Without this basic perspective, discussions of how to define entry barriers can hardly be fruitful and constructive. This article highlights the primary importance of the objective function selected for competition policy. From an antitrust perspective, important industry-specific features like the entry barriers cannot be defined and cannot be even discussed unless the objective function of competition is explicitly specified.

## References

- Carlton, D. 2004. "Why Barriers to Entry Are Barriers to Understanding." *American Economic Review*, Papers and Proceedings, 94: 466–470.
- Carlton, D. 2005. "Barriers to Entry." National Bureau of Economic Research, Working Paper No. 11645.
- McAfee, P., H. Mialon, and M. Williams. 2004. "What is a Barrier to Entry?" *American Economic Review*, Papers and Proceedings, 94: 461–465.
- McAfee, P., H. Mialon, and M. Williams. 2004. "Technical Appendix to What is a Barrier to Entry?" Available for downloading from <http://vita.mcafee.cc/>.
- Schmalensee, R. 2004. "Sunk Costs and Antitrust Barriers to Entry." *American Economic Review*, Papers and Proceedings, 94: 471–477.
- von Weizsäcker, C. 1980. "A Welfare Analysis of Barriers to Entry," *Bell Journal of Economics*, 11: 399–420.