Can Reduced Entry Barriers Worsen Market Performance? A Model of Employee Entry*

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Abstract

The fundamental contribution of the paper is to contest the view that reducing barriers to entry cannot retard market performance when firm rivalry is productive. In a model of employee entry, we demonstrate that a reduction in barriers to entry causes no fall in industry price when incumbents are able to buy-off potential entry through higher wages. Over the longer term, the analysis illustrates that reductions in barriers to entry can cause industry price to be *greater* than if entry barriers had persisted at their initial level. Correspondingly, the model indicates that investment in endogenous barriers to entry and wage ceilings on executive salaries may *enhance* market performance.

JEL Classification: L12, L13, K21, L41, L51

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1 Introduction

An increase in firm rivalry need not always result in greater economic welfare (see for example, Salop (1979) and Dasgupta and Stiglitz (1980)). However, the more familiar, and from a competition policy perspective, influential depictions of less than perfectly competitive markets demonstrate than an increase in firm rivalry can enhance both competitiveness and economic welfare. In these markets, it is held that reductions in barriers to entry and exit to an industry cannot retard market performance. In other words, a reduction in barriers to entry is either expected to cause a fall in market price or at the very least have no effect. This perspective has led to a competition policy 'rule of thumb' where a reduction in barriers to entry is currently perceived as one of the main objectives (rather than as a means) of competition policy.

In this paper we demonstrate that consideration of the dynamic entry process as endogenous raises doubts about this conclusion. We argue that reductions in barriers to entry may retard market performance in markets where increased firm rivalry enhances market performance. We, therefore, advise against a 'rule of thumb' approach to the regulation of barriers to entry. In a model where an incumbent's employees pose the only threat of entry, reductions in barriers to entry may result in increased salaries rather than an increase in actual entry. We show that, in the short run, reductions in barriers to entry may result in higher salaries and no entry. Over a longer time period reductions in barriers to entry may cause firms to limit the number of their employees in the knowledge that the subsequent threat of entry will translate into increased salaries. In this case reductions in barriers to entry cause higher prices and lower output. In other words, they retard market performance.

The basic intuition behind our result rests on the concept that production technology and entrepreneurial ideas are knowledge which may be disseminated through employment.[1]

[1]To our knowledge, we are the first to consider a model where employees represent a significant threat to entry.

Specifically, an incumbent's employees often constitute the most credible potential entrants, having a detailed knowledge of the production technology, and both output and factor markets. This may be particularly true of employees (most likely senior executives) who have sufficient entrepreneurial ability and capital to be credible entrants and competitors to an incumbent. The analysis is likely to be relevant to client-oriented and technology-led industries where certain employees acquire specific human capital[2] through employment, where this human capital is necessary for market entry and is transferable to other firms. For example, in the technology-led sector, the launch of Real Networks Inc., which competes with the Microsoft Media Player, was instigated by Rob Glaser, a former executive of Microsoft. Recently, Microsoft has suffered further losses in senior management and in response have increased executives' benefits (Buckman, 2000). Similarly, in the mobile phone industry former employees of Nokia, Ericsson and Motorola set up the British company Sendo, in competition with their previous employers (van Grinsvan, 2000). It is also notable that a common practice among SMEs frequently involves offering share options to key employees; particularly those who have established a good reputation and relationship with clients. In these cases we argue that entrepreneurial employees are likely to be highly paid.

Thus, incumbents can reduce the threat of entry if most potential entrants are their own employees. A form of rent seeking emerges under which employees, who are also potential entrants, are offered a share of any monopoly profits as an incentive not to enter the market. This leads us to expect a negative relationship between labor costs and barriers to entry and exit. Recognizing this, low entry barriers may induce an incumbent to curtail the number of its employees (the scale of prospective entry), hence reducing output. Thus low entry barriers may cause an inefficient initial labor hiring decision, resulting in higher prices.

The analysis also contributes to our understanding of endogenous barriers to entry. In-

[2]We use the term human capital in a broad sense to encompass not only production know-how but also those inputs necessary for completing sales such as business contacts, client lists and accumulated goodwill.

vestment in the creation of barriers to entry is usually attributed in the literature to a desire to create monopolistic power. In other words, it enables firms to charge monopolistic prices. In this paper we link barriers to entry to labor costs and thereby offer a further reason why firms may raise barriers to entry—simply, they may do so to reduce labor costs. This incentive is an increasing function of the number of employees hired. Moreover, where reductions in labor costs can improve market performance, the model indicates that some economic welfare benefits can at least partly offset the undesirable consequences of endogenous barriers to entry.

Furthermore, because liquidity constraints can act as an impediment to entry, reductions in liquidity constraints can have effects analogous to reductions in barriers to entry. The model, therefore, shows that enhanced ease of entry resulting from financial support for firm start-up may lead to poorer market performance.

Throughout the paper it is apparent that competition policy objectives could be facilitated by wage ceilings on executive salaries. In most countries the jurisdiction of competition law does not extend to the labor market. Thus, such an initiative would require a change in the law. Clearly, the analysis supplements previous research on the welfare cost of excessive executive salaries by suggesting that such salaries may also reduce outputs and raise product prices.

2 A model of employee entry

Consider an incumbent monopolist who employs n employees who have sufficient wherewithal, skill, client contacts, enthusiasm, foresight, capital, etc., (for example, senior executives or employees with highly specific but transferable human capital) to enter the market and compete with the incumbent. We will refer to such attributes as entrepreneurial ability (for example, Evans and Jovanovic (1989)). Further, suppose that these employees are the *only* source of potential entry to this market and that there are

sunk cost barriers to entry of magnitude F. Thus, factors such as license fees, learning-by-doing, product switching costs for consumers, and an incumbent's reputation for quality and reliability of product supply (whether actual or perceived) may require entrants to incur added sunk costs before they can enter the market. In some cases, for such barriers to arise it may be necessary for an incumbent to invest resources specifically for the purpose of raising entry costs (for example, via excessive advertising), while in others specific investment is not necessary when barriers to entry are a natural concomitant of production and sale (for example, through consumer goodwill).

We assume that each individual has a defined level of ability. Therefore, we let the incumbent's (I) and employees' (E) skills and abilities be summarized by a differentiable cost function $C^I(\cdot)$ and $C^E(\cdot)$ with $C^{I\prime}(q), C^{E\prime}(q) > 0$, where q represents output.[3] For simplicity, we assume that marginal costs are constant with $C^{I\prime}(q) = c^I$ and $C^{E\prime}(q) = c^E$. The intuition of our results clearly extend to both increasing returns (when C^I and C^E are concave) and decreasing returns (when C^I and C^E are convex). Introducing increasing returns is straightforward, however, with decreasing returns, the analysis is complicated by the fact that average costs fall with more employees—that is, when individual cost functions are subject to decreasing returns, there are increasing returns with the number of employees. In order for employees to be of any value to the incumbent, we require that $c^I > c^E$. Given our assumption that marginal costs are constant, the assumption of asymmetry among employees is innocuous and simplifies our notation. Finally, if entry occurs, firms are assumed to behave as homogeneous good Cournot competitors with inverse demand function $P(\cdot)$.

In the foregoing analysis we distinguish between short and long-run decision making. In the short run, we assume the number of employees and barriers to entry are exogenous. In the long-run we recognize that these are endogenously determined by the firm's behavior. We initially illustrate how a firm may control the number of potential entrants through

[3]Here $C^E(\cdot)$ is the cost function that would apply to the employee's new firm if they were to establish such a new enterprise.

its hiring strategy. We then demonstrate how a firm may seek to raise barriers to entry in order to reduce wage costs, thereby increasing hiring and output.

2.1 The short run

We assume that Cournot competition occurs if any employees choose to enter the market. Let n be the number of workers initially employed by the incumbent, q^I be the Cournot Nash equilibrium output for the incumbent and q^E be the entrants' Cournot Nash equilibrium outputs. If $n^* < n$ employees enter as competitors, the incumbent and each entrant earns respective profits of:

$$\pi^I(n, n^*) = P\left(q^I + n^* q^E\right) q^I - c^E q^I - (n - n^*) w^E \tag{1}$$

$$\pi^E(n, n^*) = P\left(q^I + n^* q^E\right) q^E - c^E q^E - F \tag{2}$$

where F is an entrant's entry cost and the c^E are the employee/entrant marginal costs.

In order to prevent the $n^* + 1^{\text{st}}$ entrant,[4] the incumbent must pay its remaining $n - n^*$ employees $\pi^E(n, n^* + 1)$.[5] In a Nash equilibrium, the incumbent cannot pay less than $\pi^E(n, n^* + 1)$ *and* prevent the $n^* + 1^{\text{st}}$ entrant. To see this, suppose that in equilibrium, the incumbent paid $w^E < \pi^E(n, n^* + 1)$ and no more employees chose to enter. Any given employee would have an incentive to enter since as long as all other employees followed their equilibrium strategy of not entering, she could earn $\pi^E(n, n^* + 1)$ rather than the wage w^E, offered by the incumbent. Thus if the incumbent chooses to prevent the $n + 1^{\text{st}}$ entrant, her profits π^I can be rewritten as:

$$\pi^I(n, n^*) = P\left(q^I + n^* q^E\right) q^I - c^E q^I - (n - n^*) \pi^E(n, n^* + 1) \tag{3}$$

[4]Since marginal costs are constant, there is no cost savings to be made by entering as a group and therefore employees will never choose to enter the market as a coalition.

[5]When $n^* + 1 = n$, this expression remains the same, however, it is affected by the fact that with no employees, the incumbent's marginal cost is $c^I > c^E$ and hence is forced to cut output further than as the direct result of entry.

In general, it will pay the incumbent to prevent the $n^* + 1^{\text{st}}$ entrant as long as $\pi^I(n, n^*) \geq \pi^I(n, n^* + 1)$. Given n, the incumbent chooses $n^* \in \{0, 1, \ldots n\}$ to maximize (3). To solve this in general is not trivial. However, it is easy to establish some of the properties of the optimal n^*. First of all, provided that n is not too large, the incumbent will always find it in its interest to prevent all employee entry. To see this, consider the case when $n = 1$. Since monopoly profits are strictly greater than the total duopoly profits that follow entry, even if there are no barriers to entry (i.e., $F = 0$), the incumbent is always better off paying her sole employee $\pi^E(1, 1)$. In order to prevent any entry, the incumbent must pay each employee its share of the the duopoly profits. Thus, as n becomes large, the cost of preventing entry becomes arbitrarily large and therefore the incumbent will be forced to allow some entry. Secondly, if F is sufficiently large then the incumbent will again prevent all entry. This can be illustrate by the case $F = \pi^E(n, 1)$. In this case, a sole entrant gets zero profit by entering and the incumbent prevents all entry, regardless of the number of employees.

Note that alterations in F change employee salaries, which enter the incumbent's profit function as a constant. The greater the prospective rewards for an entrant, the more the incumbent must pay an employee in order to prevent entry. Thus, given some set of employees, when the incumbent completely prevents entry, small changes in F will not affect the incumbent's profit maximization problem. Therefore reduced entry barriers do not necessarily put downward pressure on prices.

To summarize:

Proposition 1 *For a given number of employees, if employees represent the only threat of entry, it will be profitable to prevent potential entry as long as fixed entry costs, F, are sufficiently large or as long as n is not too large. If the incumbent does find it profitable to prevent entry, a small reduction in barriers to entry will have no effect on industry price and economic welfare.*

Thus the effectiveness of reductions in barriers to entry hinges closely on a relatively abundant supply of potential entrants, n. If employee-entrepreneurs are scarce, attempts to increase market contestability may have no effect on industry performance but may merely cause an increase in their salaries. It follows that constraining employee entrepreneur's (executive) salaries can be a tool of competition policy!

2.2 The long run

In the long run, lowered entry barriers can, in fact, result in higher prices. In particular, suppose a firm that is considering the option of establishing itself within a new market realizes that in order to prevent competition, its employees will need to be paid a single entrant's duopoly profits. Recognizing this, the firm would rationally restrict its initial scale of entry through the number and choice of employees.

For given n and the associated optimal n^*, consider the incumbent's profits:

$$\pi^I(n, n^*) = P\left(q^I + n^* q^E\right) q^I - c^E q^I - (n - n^*)\pi^E(n, n^* + 1) \tag{4}$$

It is clear that since returns to scale are constant, the incumbent will hire at most one employee.[6] That is, although $c^E < c^I$, subsequent employees confer no additional cost savings and must either be paid wage $\pi^E(n, n^* + 1)$ or else be allowed to enter as a competitor.

Since the incumbent hires either zero or one employee, we can directly compare the profits earned in the two cases. If she hires no managers in addition to herself, her profits are:

$$\pi^I(0, 0) = P\left(q^I\right) q^I - c^I q^I \tag{5}$$

On the other hand, if she hires one manager, she can either pay that manager $\pi^E(1, 1)$

[6]By the phrase, "one employee," we mean an employee who is a potential competitor and that the incumbent may have other (non-entrepreneurial) employees who are embodied in in the c^I and c^E.

and prevent entry or else she can allow entry. As we have already shown in the previous section, she will always prefer to prevent entry in this case and therefore earns:

$$\pi^I(1,0) = P\left(q^I\right) q^I - c^E q^I - \pi^E(1,1) \tag{6}$$

Consider the extreme case where barriers to entry are large so that $\pi^E(1,1)$ is close to zero. Since $c^E < c^I$, she will strictly prefer to hire the manager. However, as barriers to entry decline and F falls, the manager becomes more expensive and as a result, if the cost savings from hiring the manager are small relative to $\pi^E(1,1)$, the incumbent will not hire a manager, resulting in higher costs and therefore a higher monopoly price.

Proposition 2 *The incumbent will hire at most one employee. Furthermore, the incumbent will hire an employee only if the employee is sufficiently more efficient and if entry barriers are relatively large.*

In other words, in response to lower entry barriers, the incumbent may cut back on its scale of entry (from one manager to none) so that production becomes less efficient and the price rises. Obviously with non-constant returns to scale cost functions, the equilibrium could have more than one manager and reductions in the barriers to entry would produce a similar long term incentive to reduce the managing work force.

Furthermore, note that lower entry barriers have a negative effect on profitability, through both the effect on scale of entry and the effect on salaries. Now suppose the incumbent has an outside option worth Y^I and assume that n is the incumbent's scale of entry when the employee barrier to entry is F.[7] It clearly follows that given an outside option, if $\pi^I(n,0) < Y$ the incumbent will not enter. That is, lower entry barriers may actually have the perverse effect of reducing entry.

[7]Note that the incumbent may have her own barrier to entry F^I which is distinct from Y^I. In our model, $Y^E = \pi^E(n,1)$ is endogenous.

2.3 Endogenous Barriers to entry

In the previous section we assumed that from the firm's perspective barriers to entry were exogenously determined. We now drop this assumption and allow firms to have some discretion over F.[8] Under normal assumptions, barriers to entry are introduced by incumbents because they facilitate monopolistic pricing. If they achieve this end they detract from market performance. We now show that when employees pose the main threat of entry, endogenous barriers to entry may also be stimulated by a desire to reduce labor costs. Therefore, by Propositions 1 and 2, incumbent investment in barriers to entry do not necessarily retard market performance and may even enhance it.

Now suppose that F is defined as $F = F(D)$ where $F'(0) > 1$ and D is investment aimed at raising barriers to entry. Further, assume that $F''(D) < 0$ and $\lim_{D\to\infty} F'(D) = 0$ so that there are decreasing returns to investing in entry barriers. In the short run when $n \in \{0, 1\}$ is fixed equation (3) becomes

$$\pi^I = P\left(q^I\right) q^I - c^E q^I - n\left((\hat{P} - c^E)\hat{q}^E - F(D)\right) - D. \tag{7}$$

Profit maximizing D must satisfy

$$\frac{\partial \pi_I^j}{\partial D} = nF'(D) - 1 = 0. \tag{8}$$

When $n = 0$, since employees pose the only threat of entry, the incumbent will invest nothing to increase the barriers to entry. On the other hand, when $n = 1$, since $F'(0) > 1$, the incumbent's investment in barriers to entry are non-zero. Furthermore, at the optimum D^*, $F(D^*) - F(0) > D^*$ so that if the incumbent can increase barriers to entry, she is *ex ante* more likely to hire a manager who is more efficient than herself. In fact, this is a re-statement of Proposition 1 in that decreases (increases) in F may raise (lower) employee wages without a corresponding effect on industry output or price. Thus,

[8] For example through advertising or lobbying government for preferential treatment.

Proposition 1 implies that endogenous barriers to entry may be motivated by a desire to reduce labor costs and that in such circumstances a reduction in market contestability may have no effect on industry output and price. Only in cases at the margin where such investment prevents actual entry will it entail an increase in industry price. Otherwise it merely causes a reallocation of value added from employees to shareholders.

Correspondingly, Proposition 2 indicates that in the longer run (when n is variable) endogenous barriers to entry may enhance market performance. In these cases the reduction in wages (induced by investment in endogenous barriers to entry) causes firms to hire a more efficient employee, produce more output and lower market price. In sum, investment in endogenous barriers to entry may enhance market performance.

2.4 Extensions

The model can be extended in a number of ways. First, it should be noted that the strict definition of 'barriers to entry' assumes perfect capital markets. This excludes a 'lack of finance' as a barrier to entry. However, in practice business start-ups are frequently constrained by a lack of finance (for example, Evans and Jovanovic 1989, Holtz-Eakin et al 1994, and Black et al 1996). If liquidity constraints bind in this way then they, in effect, act as barriers to entry. The model of employee entry raises some interesting competition policy issues in this regard. In the model a binding liquidity constraint would place an upper limit on the level of output that an employee entrant may produce in self-employment. An entrant's profits are limited to $\bar{\pi}(\bar{q}_i)$ where $\bar{q} = f(\bar{k})$. The more binding the liquidity constraint ($\bar{k}$) the less the incumbent has to pay in order to buy-off potential entry. Thus, relaxing liquidity constraints could have paradoxical effects—having no effect on market performance in the short-run, but having a negative effect in the long-run. Similarly, endogenous barriers to entry may have long-run positive effects in markets where liquidity constraints bind. In this case, firm strategies which raise barriers to entry reduce the threat of employee entry and hence allow firms to hire

more employees. These possibilities, therefore, question the appropriateness of a generic policy approach of relaxing liquidity constraints which in many cases act as 'barriers to entry.'

We mentioned earlier that diseconomies of scale and heterogeneous employees present modeling difficulties. This is, of course, a pity as the logic of the model appears to be highly relevant for these cases. However, with some caution, we feel it is worthwhile to comment briefly on these two scenarios. Under decreasing returns to scale there is a greater incentive for a firm to hire more employees. Greater output from a given employee occurs at increasing cost per unit of output. In this situation, reductions in hiring due to a fall in barriers to entry are likely to have even greater negative effects on market performance than in our scenario with constant returns to scale. In terms of heterogeneous employees, an interesting possibility arises. Less productive employees are likely to be less able entrants and pose a lower threat of competition. Thus, it will be cheaper to buy-off potential entry from less productive workers. In this case, one might expect a reduction in barriers to entry to cause a firm's long-run hiring policy to switch to hiring less productive employees. The logic is that it is safer to hire an employee who is unlikely to acquire the human capital to set up her own company. In other words, firms may deliberately reject the best candidate for a job! Again, in the long run reductions in barriers to entry may retard market performance.

3 Conclusion

In the paper we analyzed the effect of a reduction in barriers to entry and exit in a market where firm rivalry is productive and the supply of potential entrants is treated as an endogenous variable. In a model of Cournot competition where employees pose the only threat of potential entry we demonstrated that a reduction in barriers to entry (an increased threat of entry) caused no reduction in industry price when incumbents were

able to buy-off potential entry through higher wages. Over the longer term, the analysis demonstrated that an increased threat of entry could cause equilibrium industry price to be higher than that which would have occurred if entry barriers had been left at their initial higher level.

The fundamental purpose of the paper was to question the generic presumption that reductions in barriers to entry cannot have negative effects on performance in markets where firm rivalry is productive. With many commonly used models of imperfect competition, reductions in barriers to entry are perceived as having a non-negative effect on market performance—actual entry causes firms to behave more competitively and potential entry may have similar effects (e.g., Baumol et al, 1982). This viewpoint continues to be highly influential in the formulation and practice of competition policy. It has been used by antitrust regulators to pursue a generic policy of 'barrier to entry busting.' In the paper we demonstrated that barriers to entry may enhance market performance and therefore, suggest a more discerning regulatory approach towards entry barriers. This seems particularly relevant for business sectors (such as hi-tech or client oriented) where employees (usually the highly skilled) can acquire the specialized human capital necessary for market entry. Similarly, the model raises questions about current generic conclusions about the welfare effects of endogenous barriers to entry and liquidity constraints. It also raises the question of whether executive salaries should become a competition policy issue.

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