Preemption, Divestiture, and Forward Contracting in a Market Dominated by a Single Firm

By TRACY R. LEWIS*

A central concern of industrial organization literature is to determine if markets dominated by a leading producer tend to remain that way when entry by rival firms is possible.\(^1\) In particular, suppose market entry is limited by the availability of an essential raw input, such as a natural resource, or by technological know-how. At some future time, more of the raw input becomes available, permitting outsiders to enter. At this point, the leader can maintain its market position by either discovering or purchasing new raw inputs or technologies before the potential entrants.

Entry prevention by the means so described is called preemption. Curtis Eaton and Richard Lipsey (1979), Partha Dasgupta and Joseph Stiglitz (1980), Richard Gilbert and David Newbery (1982), and others have argued in several contexts that leading firms will persist whenever preemption is possible. Their argument is simple and appealing. Suppose the market can accommodate one more firm. The leader can prevent entry by spending more than the potential entrant to acquire the input necessary for production. The value of the input to the entrant equals the expected present value stream of its profits. This will be determined by the post-entry competition with the leader which may take several forms. However, unless the post-entry equilibrium is cooperative, the input will be worth more to the dominant firm. The reason is that the leader can at least utilize the input exactly as the entrant would have used it, and earn the same profits as the entrant.\(^2\) But typically, the leader can improve on this by coordinating production from his new and existing inputs. Hence the new input will be valued more by the dominant firm and he will outspend the would-be entrant to acquire it.

This paper examines two characteristics of preemptory acquisition or innovation which will affect the evolution of market structure. First, it analyzes the prospects for entry deterrence when there are several new technologies or sources of capacity available for outside firms to acquire. Suppose the dominant firm and potential entrants learn that a fixed amount of new industry capacity will be available at N distinct sources in the future. Depending on the context, a source may be a stock of a raw material or a new production process. When N exceeds one, the market leader must contend with multiple threats of entry. There is an important distinction between the cases where there is just one and where there are several entrants to preempt. In markets consisting of a leading firm and a competitive fringe of suppliers, fringe producers typically benefit from the presence of the leading firm; a fringe firm's profits increase with the more industry capacity that is controlled by the leader. Hence the value to an entrant of capturing one of the N input supplies increases with the number of sources that the dominant firm is expected to preempt. Assuming potential entrants hold con-

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\(^1\)The modern treatment of market evolution through innovation and R&D was inspired by Joseph Schumpeter (1947). For more recent work which is pertinent to my discussion, see F. M. Scherer (1980), Partha Dasgupta (1982), Dasgupta and Joseph Stiglitz (1980), Steven Salop (1979), and Lester Telser (1982).

\(^2\)This may not be true if consumers act strategically as well, for then they may behave differently towards the leader as compared to the entrant. An example where market power may be detrimental to a producer appears in Eric Maskin and Newbery (1978).
sistent expectations, then the cost to the leader of preempting each source increases with the number of available input sources it intends to purchase. This is because the value of each of these units to an entrant increases with the expected size of the dominant firm.\footnote{Gilbert and Newbery analyze the case of multiple entry. They assume, however, that the potential entrant’s profit is not affected by the size of the dominant firm.}

This paper shows that the argument for profitable preemption when there is a single threat of entry does not generalize to the case of multiple entry. Similar observations about the difficulties for a leading firm to enhance its market position through mergers or acquisitions, or for a cartel to maintain stability when there are increasing numbers of firms, appear in various places in the theoretical industrial organization and antitrust literature.\footnote{For example, various determinants of the costs of mergers and acquisitions are discussed by Telser (1966), Robert Bork (1978) and Scherer. The effects of large numbers on cartel stability and collusive agreements is discussed by Telser (1972). Sanford Grossman and Oliver Hart (1980) discuss the difficulty of taking over mismanaged firms when there are numerous stockholders to buy out.} Section I formalizes this notion and uses it to show that the costs of preemption are greater the more sources of capacity that there are to capture, holding total new capacity constant. As a consequence, for $N$ sufficiently large, preemption of all sources is unprofitable, and the power of the leader must erode with new entry. This limiting value of $N$ may be small. I present a plausible example where it is unprofitable for the dominant firm to preempt all of the capacity units whenever $N$ exceeds one.

A second factor affecting market structure is the ability of the leading firm to engage in preacquisition behavior to reduce the costs of preemption later on. Section II characterizes two devices (which to my knowledge have not been discussed in the literature) the dominant firm may employ to make entry less profitable. One method is for the leader to divest itself of some existing capacity prior to the time new firms may enter the industry. It is not obvious why the leader would voluntarily sell a portion of its capacity now only to acquire additional units later on. In short, divestiture reduces the size of the dominant firm, which renders future entry by fringe firms less profitable. I show that, on balance, the reduction in the costs of future preemption exceeds the amount lost from the current sale of capacity. This method of deterrence is to be compared with the capacity expansion strategies of A. Michael Spence (1977), Avinash Dixit (1979, 1980), and Eaton and Lipsey (1980, 1981).

The other strategy I examine requires that the leader sign binding long-term forward contracts for the delivery of its product at reduced prices. In the process he credibly demonstrates to his rivals that the returns from future entry are reduced. This is in contrast to predatory pricing, which relies on temporary reductions in price to deter uninformed outsiders from entering an industry.

In Section II, I show that the two strategies are equivalent in that they yield the same equilibrium price and the same profits for the dominant firm. The section is concluded with a discussion of the implications of preemption, divestiture, and forward contracting for antitrust analysis and for industry performance in dominated markets.

\section{A Model of Preemption without Divestiture or Forward Contracting}

\subsection{Assumptions}

Consider an industry producing a homogeneous good dominated by one large firm that is confronted by some number (perhaps zero) of small price-taking competitive fringe suppliers.\footnote{The issue of how some firms emerge as leading producers is not considered here, but it is discussed by Dennis Carlton (1982) and by Richard Harris and myself (1982).} To produce in this industry, a firm must have access to some essential input, and it is assumed that each supplier’s production capacity is proportional to the amount of the input it owns. Hence I refer to capacity and inputs interchangeably in what follows. This is a strong assumption which is obviously not in the spirit of the Dixit-
Eaton-Lipsey-Spence-type models where capacity can be "created" without access to special inputs. The model presented here comes closest to describing some of the refining industries in which the only firms that can produce are those with access to raw materials.

Initially, \( X^d \) and \( X^c \) units of the input (units of capacity) are owned by the dominant firm and competitive fringe suppliers, respectively. All firms, including those outside the industry, realize that an additional \( E \) units of capacity may be created by the discovery of raw material deposits or the development of new production processes. For simplicity, I assume that \( E \) is known with certainty, though this does not seem crucial to the analysis. The new capacity, \( E \), is found in equal amounts, \( \Delta \), among a number, \( N \), of different sources so that \( E = \Delta N \) or \( \Delta = E/N \). The restriction that new inputs be equally distributed among different sources simplifies the analysis, and it allows one to characterize the degree of dispersion of new capacity by \( N \).

The incentive for firms to acquire capacity is determined by the present value stream of profits that they expect to earn. For analytical tractability I assume that the \( N \) input sources are more or less discovered simultaneously so that acquisition occurs over a short period of time. After acquisition, the leading firm continues to set industry prices. This assumption simplifies the analysis, and it seems plausible if the amount of new capacity \( E \) is "small" compared to the existing capacity.

Since total capacity is fixed at \( X = X^d + X^c + E \), one can describe the postacquisition equilibrium by \( Z \), the final capacity controlled by the leader. For now \( Z \) equals \( X^d \) plus the portion of new capacity preempted (in Section II, I assume that the leader can sell some capacity to the fringe). It is assumed that all firms can compute resulting equilibrium prices and outputs after the new capacity is divided up between the leader and the existing and new competitive fringe firms.

Assume that the owner of a unit of capacity can produce up to a unit of output at zero (constant) marginal costs. Market demand as a function of price is \( D(p) \), with \( D' < 0 \). For a given price, \( p \), and assuming zero marginal costs, the excess demand function facing the dominant firm after acquisition is \( D(p) - (X - Z) \). Notice that fringe fully utilizes its capacity \( (X - Z) \) whenever \( p > 0 \). Let \( V(Z) \) be the present value flow of profits to the dominant firm,

\[
(1) \quad V(Z) = \max_p \left[ D(p) - (X - Z) \right]/r,
\]

where \( r \) is the market discount rate.\(^6\) To illustrate results in what follows, I will occasionally consider the case when demand is linear so that \( D(p) = a - bp \), where \( a, b > 0 \). Letting \( p^*(Z) \) be the solution to equation (1), we obtain \( p^*(Z) = (a - (X - Z))/2b \). The price schedule \( p^*(Z) \) is depicted in Figure 1. Solving for equilibrium industry output, we obtain \( D(p^*(Z)) = (a + (X - Z))/2 \). This expression illustrates the free ride that fringe suppliers enjoy. As \( Z \) increases, the dominant firm only utilizes one-half of each unit of acquired capacity, whereas if this unit were owned by a fringe supplier it would be fully utilized. As a result, market price increases and industry output decreases as the

\(^6\)A model of preemption that allows for more general cost and demand assumptions is analyzed in an earlier version of this paper which is available from the author.
dominant firm controls a larger share of capacity.⁷

B. Preemptive Acquisition

Following Gilbert and Newbery, I assume that all firms have the same ability to compete for any of the sources, that there is a deterministic process for discovering the inputs, and that each source is eventually acquired by the firm that spends the most to discover it.⁸ The means of competition, whether it be exploration, bidding, or research and development, will depend on the source of new capacity.

First, suppose that the leading firm intends to acquire all E new capacity units and that there is simultaneous competition for the N supplies. Assuming consistent expectations, a potential entrant who competes for one of the N sources realizes that the dominant firm must obviously capture the N - 1 other sources in order to preempt all the new capacity. Let \( W(Z) = p^*(Z)/r \) be the value of owning one unit of capacity given that the leader controls Z units. If the entrant acquires one source, and the leader preempts the remaining N - 1 supplies, the entrant will earn \( W(X_d + (N - 1)A)A \). This quantity is the value of each of the N supplies to potential entrants.⁹ (The value of new capacity for an existing fringe firm is less because it suffers an inframarginal decrease on its existing capacity as more sources are captured by the fringe. Thus potential entrants will outspend existing fringe firms to acquire capacity.) Hence the cost to the leader of preempting N sources is equal to \( W(X_d + (N - 1)\Delta)\Delta \), or \( W(X_d + E - \Delta)E \) (recalling that \( E = NA \)). It is easy to show that the costs of total preemption will also be the same if there is sequential rather than simultaneous competition for the N sources.¹⁰

Independent of the sequence of competition, the net increase in dominant firm profits from complete preemption for a given Δ, denoted by \( R_\Delta(E) \), equals

\[
R_\Delta(E) = V(X_d + E) - V(X_d + E - \Delta)E.
\]

One can rewrite \( V(X_d + E) - V(X_d) \) as

\[
V(X_d + E) - V(X_d) = V'(\xi)E \quad \xi \in (X_d, X_d + E),
\]

where the first equality follows from the in-

⁷ In general, price is an increasing function of Z. Assuming \( \bar{X} \) is sufficiently large, the solution to (1) is characterized by \( D(P^*) = (\bar{X} - Z) + P^*D'(P^*) = 0 \). Totally differentiating this expression with respect to Z, we obtain \( dP^*/dZ = -(2D'(P^*) + P^*D'')^{-1} \), since \( (2D'(P^*) + P^*D'')^{-1} \) must be negative to satisfy this second-order condition for a maximum.

⁸ Jennifer Reinganum (1983) analyzes the case where the discovery process is stochastic and shows that the incentives for preemption may be reduced in some instances. Michael Porter and Spence (1982) and Telser (1982) also argue that the existence of uncertainty with regard to future market conditions may cause firms to be more cautious in trying to establish dominant positions in the market.

⁹ If we are modeling the acquisition of new capacity formally as a strategic game, we assume that the leading firm gets to decide first on an amount to spend for each source while taking into account the response of the fringe producers. The dominant firm is thus a Stackelberg leader in acquisition strategies. The difficulties of other modeling approaches to the acquisition game are discussed in Dasgupta and Stiglitz, and Dasgupta.

¹⁰ Assume that \( \Delta = E/2 \) so that there are just two new sources of capacity (the argument generalizes for \( N > 2 \)) and that the lag between the acquisition of the first and second sources can be ignored in calculating present value profits. As before, assume that all firms have consistent expectations about the preemption process. Potential entrants realize the value of capturing the first source depends on whether or not the dominant firm intends to acquire the second source. In turn, the net return to the leader of preempting the second source depends on who captures the first source. Suppose the leader captures source 1. Then the value of the second and last source to a potential entrant is \( W(X_d + (N - 1)\Delta) = W(X_d + E/2)E/2 \) and the net increase in profits to the dominant firm of preempting source 2 is \( V(X_d + E) - V(X_d + E/2) - W(X_d + E/2)E/2 \), which can easily be shown to be positive. So, in this case, the leader acquires source 2. A similar argument suffices to show that it will also be profitable for the dominant firm to capture source 2 if a fringe supplier acquires source 1. Hence fringe producers know that the second source will always go to the dominant firm. But this implies that the value of the first source to a potential entrant is also \( W(X_d + E/2)E/2 \). The cost of total preemption to the dominant firm is thus \( 2W(X_d + E/2)E/2 = W(X_d + E - \Delta)E \), which coincides with the cost of acquisition when there is simultaneous competition for all sources.
Table 1—Returns From Preemption for the Linear Demand Case

\( \text{Table 1—Returns From Preemption for the Linear Demand Case} \)

\( (D(P) = 150 - P; X^d = 60, X^c = 20, E = 20) \)

<table>
<thead>
<tr>
<th>Sources Preempted</th>
<th>( \Delta = 20 ), ( N = 1 )</th>
<th>( \Delta = 10 ), ( N = 2 )</th>
<th>( \Delta = 5 ), ( N = 4 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity After Preemption</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Net Payoff*</td>
<td>80</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>( R_A(F) )</td>
<td>100</td>
<td>25</td>
<td>0</td>
</tr>
</tbody>
</table>

*aThese are normalized payoffs so that \( r \), the rate of discount, equals one.

To illustrate this, let \( F \) be the capacity acquired by the leader and define

\[
R_A(F) = V(X^d + F) - V(X^d) - W(X^d + F - \Delta)F
\]

as the net return of preempting \( F \leq E \) units. Table 1 lists the returns to preempting different amounts of capacity for a linear demand example where \( D(p) = 150 - p \), initially the leader controls 60 units of capacity, and the fringe collectively owns 20 units, and there are 20 more units yet to be acquired. Notice that the table implies that whenever there is more than one supply of new capacity, it is only profitable for the leader to preempt one source. (This is true whenever \( p^*(Z) \) is concave.)

In this example, whenever \( N > 2 \), the leader’s market share of capacity will decline over time. Prior to acquiring new capacity, the leader’s share will be 60/80 = .75, whereas he will control 70 percent or less of the market capacity afterwards.

The ability of the fringe to free ride off the leader as it becomes larger causes the cost of acquiring capacity to increase. The example illustrates that total preemption may fail to occur even though the new capacity is more valuable when controlled by the dominant firm. That such a collectively irrational outcome can occur is a result of the noncooperative behavior among the firms.

The dispersion of new capacity among independent sources establishes the extent of free riding that occurs in a dominated in-

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11Differentiating the expression for \( R_A(F) \) with respect to \( F \) one obtains

\[
R'_A(F) = W(X^d + F) - W(X + F - \Delta) - W'(X^d + F - \Delta)F
\]

which is strictly negative for all \( F > \Delta \) whenever \( W(Z) = p^*(Z)/r \) is concave. Hence it is profitable for the leader to acquire one source only.
industry. This suggests that one might find an inverse correlation between the degree of concentration and the dispersion of available capacity sources, within an industry. One finds at least some empirical support for this prediction by comparing standard concentration measures for some of the natural resource refining and processing industries.\textsuperscript{12} For example, in one of the least concentrated natural resource industries, the petroleum industry, one finds that the basic ingredient necessary for production, oil, is found in numerous separate locations. On the other hand, the primary sources for production in some of the more concentrated molybdenum, copper, and silver resource markets are typically found among a few sources in large quantities.

II. Preemption, Divestiture, and Forward Contracting

Suppose the leader decides to acquire $F \leq E$ outstanding units of capacity. The per unit acquisition cost $W(\cdot)$ is strictly increasing in the amount of capacity it ultimately controls. It can reduce this cost by divesting itself of some capacity prior to preemption. Assume the leader sells some amount, $Q$, of its available capacity to the fringe. Then the net capacity of the leader after the divestiture of $Q$ and the acquisition of $F$ is equal to $Z = X^d + F - Q$. Assuming that all firms hold consistent expectations about the capacity that the leader will ultimately control, then he will receive $W(X^d + F - Q)$ for each unit of divested capacity that he sells.

Alternatively, the leader may sign long-term binding forward contracts with consumers agreeing to set output prices at $p^*(X^d + F - Q)$. Notice (see Figure 1) this is the equilibrium price that occurs when the leading firm controls $X^d + F - Q$ capacity units, so that the effects of divestiture and forward contracting on industry output and price, and on the profits of the leader and the fringe, are the same.\textsuperscript{13}

An entry-deterring device only works if it is a credible activity which outside firms can observe prior to entry. The sale of capacity from the leader to the fringe would be the most sure form of commitment. By contrast, the use of forward contracts to deter entry might be less credible, since the leader would want to default on its long-term agreements once the acquisition of new capacity were completed in order to charge higher final product prices. However, the use of long-term binding contracts is well established in some markets.\textsuperscript{14}

Notice that in deterring entry, the leader is also depreciating the value of its own capacity. It can be shown, however, that the decreased cost of preempting more capacity outweighs the reduction in capacity value caused by divestiture or forward contracting. Assuming the dominant firm holds capacity $X^d + F - Q$ after divestiture and preemption, then it will receive the market value $W(X^d + F - Q)$ for each unit of divested capacity, and it must spend $W(X^d + F - Q - \Delta)$ for each new unit of capacity that it preempts. (The argument for the case of long-term contracting is identical.) Let $R_A(F, Q) = V(X^d + F - Q) + QW(X^d + F - Q) - FW(X^d + F - Q - \Delta) - V(X^d)$ be the return to the leader of acquiring $F$ units at a total cost of $FW(X^d + F - Q - \Delta)$, given that $Q$ units are to be divested and sold at a price $W(X^d + F - Q)$. Partially differentiating $R_A(F, Q)$ with respect to $Q$ and evaluating the expression at $Q = 0$ yields $\partial R_A(F, 0)/\partial Q = FW(X^d + F - \Delta)$ which is strictly positive. Hence it is always profitable for the leader to sell some of its capacity prior to preemption.\textsuperscript{15}

The ability of the leading firm to engage in preacquisition behavior will affect the amount $F$ that it can profitably preempt. Let $Q(F)$

\textsuperscript{12}I am grateful to Margaret Slade for this observation.

\textsuperscript{13}The strategic use of forward contracts is also discussed by Carlton and by Porter and Spence in models that differ from the one presented here.

\textsuperscript{14}For example, the delivery of coal according to long-term forward (or service) contracts is routine in many regional coal markets. Some of the antitrust implications of forward contracting are discussed in the United States v. General Dynamic Case, 415 U.S., pp. 486–527.

\textsuperscript{15}There is some evidence of this behavior as it has been suggested that AMAX, the leading U.S. molybdenum producer, has depressed current selling prices to decrease the future costs of acquiring reserves. See U.S. Department of Interior, Molybdenum.
denote the optimal divestiture for a given $F$. Substituting for $Q(F)$ into the expression for $R_A(F, Q)$ and totally differentiating with respect to $F$, one obtains

$$dR_A(F, Q(F))/dF = W(X^d + F - Q(F))$$

$$- W(X^d + F - Q(F) - \Delta) > 0,$$

since $W$ is increasing in its argument.\(^{16}\) This implies that complete preemption becomes profitable when the leader can credibly divest itself of capacity or engage in forward contracting prior to acquisition.

The quantitative impact of divestiture (or forward contracting) on the amount of preemption is conceivably large. With divestiture, total preemption is always profitable, whereas without it just one new capacity source may be acquired, as in the example summarized in Table 1. The returns from preemption combined with forward contracting or divestiture are listed in Table 2 for the same example. Comparing row 2 of Table 1 with row 1 of Table 2, the combined effect of divestiture and preemption may be to reduce the amount of capacity which is effectively controlled by the leader. When the firm can engage in preacquisition behavior, it sells off all the new capacity that it acquires so that $Z = X^d.\(^{17}\) (Or equivalently, it sets forward prices at $p^*(X^d).$) In this case the return from divestiture and preemption is given by $R_A(E, Q) = [W(X^d) - W(X^d - \Delta)]E$. Essentially, the leader sells some of his existing capacity to the fringe for $W(X^d)$ while he acquires new units at a cost of $W(X^d - \Delta)$. At least for this example, the added return to the leader of divesting prior to preemption is quite large, and the ability to divest becomes relatively more important with larger values of $N$. (Compare row 3 of Table 1 with row 2 of Table 2.) However looking at the expression for $R_A(E, Q)$ above, one sees that the returns from entry deterrence tend to be small when there is multiple entry and $\Delta$ is small. This is consistent with the observation that deterrence strategies including the various forms of predation are typically not profitable when there are multiple threats of entry.\(^{18}\)

I have identified capacity reduction as a strategy which reduces the value to potential entrants of acquiring production capability. This is to be contrasted with the capacity expansion procedures for limiting entry put forth by Spence, Dixit (1980), Eaton and Lipsey (1980, 1982), and discussed by Easterbrook (pp. 289–97).\(^{19}\) My analysis incorporates two assumptions, not found in these entry models, which generate the difference in our results. First, I assume that capacity is tied to the availability of some key input. There is a fixed supply of the input and it is not possible to create capacity by purchasing capital. Second, potential entrants free ride off of the actions of the incumbent firm in my model. This contrasts

\(^{16}\)The quantity $Q(F)$ is characterized by the first-order condition, $\partial R_A(F, Q)/\partial Q = - Q W'(X^d + F - Q) + FW'(X^d + F - Q - \Delta) = 0$. Totally differentiating $R_A(F, Q(F))$ with respect to $F$ and using the expression above, one obtains

$$dR_A(F, Q(F))/dF = W(X^d + F - Q(F))$$

$$+ Q W'(X^d + F - Q(F)) - W(X^d + F - Q(F) - \Delta)$$

$$- FW'(X^d + F - Q(F) - \Delta)$$

$$= W(X^d + F - Q(F)) - W(X^d + F - Q(F) - \Delta) > 0.$$

\(^{17}\)In the linear demand case, $\partial R_A(F, Q)/\partial Q = (F - Q)/(2br)$ which implies $Q(F) = F$.

\(^{18}\)For example, see the discussions by Bork (pp. 154–55) and Frank Easterbrook (1981, pp. 313). Easterbrook provides an excellent survey of current antitrust theory relating to entry deterrence.

\(^{19}\)See also the United States v. Aluminum Co. of America, (2d Cir. 1945).

<table>
<thead>
<tr>
<th>Effective Capacity</th>
<th>$X^d + F - Q$</th>
<th>$N = 1$</th>
<th>$N = 2$</th>
<th>$N = 4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta = 20$</td>
<td>$50$</td>
<td>$50$</td>
<td>$50$</td>
<td></td>
</tr>
<tr>
<td>$\Delta = 10$</td>
<td>$100$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta = 5$</td>
<td>$200$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2—Returns From Preemption Combined With Divestiture or Forward Contracting for the Linear Demand Case

\(^{a}\)See fn. a, Table 1.
with the postentry competition assumed in most entry analyses where the entrants' profits decline with the size of the incumbent producer. Together, these assumptions show the sensitivity of the entry deterrent to the postentry equilibrium and the technological constraints on the industry. A broader interpretation of the results implies that whenever the actions of the leading firm benefit the rest of the industry, perhaps by stimulating market demand with advertising for its own product or by producing high quality goods which enhance the reputation of the industry as a whole, that the leader may underinvest in these activities to discourage entry.20

The use of forward contracting to deter entry by reducing the final product price may be difficult to distinguish from other pricing strategies even though they may work differently. For example, limit pricing and predatory pricing also require the leader to reduce final product prices. However, in these cases, the reduction in price is only temporary, whereas with forward contracting, low prices are fixed permanently. Also, with predatory or limit pricing, the leader charges low prices to signal to uninformed rivals and potential entrants that remaining in or entering the industry will not be profitable.21 In contrast to this, forward pricing works by signaling to the fully informed potential entrants that the returns from future entry are being reduced by the leader's long-term commitment to low prices.

For the leader an attractive feature of divestiture or forward contracting is that neither practice is likely to precipitate market intervention by antitrust authorities. By itself, divestiture can hardly be construed as being anticompetitive. Furthermore, divestiture temporarily reduces the market share of the leader so that he can proceed more easily to acquire new capacity without notice. With regard to forward contracting, some economists have argued that a permanent price reduction by a leading firm is not welfare reducing and should not warrant antitrust intervention.22 In addition, by committing its existing capacity to long-term contracts, the leader reduces his ability to increase prices in the future by capturing a larger share of the market.23

By itself, preemption is welfare reducing in two respects. First, it inhibits entry so that the total market surplus in postentry equilibrium will be lower than it would be with free entry. Consumers are the clear-cut losers in this case, as market prices and industry profits (and perhaps the collective profits of the fringe suppliers) increase when preemption is possible. The amount of preemptory activity and hence the degree of efficiency losses will be smallest for industries where \( N \) is large and there are multiple entry possibilities. The second undesirable feature of preemption is that it may encourage excessive expenditures on research and development and on exploration as these are the means by which firms compete with each other to obtain productive capacity in the market.24

The ability of the dominant firm to divest itself of capacity prior to entry may eliminate some of the efficiency losses from preemption, although there is no guarantee of this. In fact, divestiture may increase the social losses from preemption if it allows the leader to gain control over more capacity. I showed earlier that preemption of new capacity increases with divestiture. However, divestiture itself reduces capacity. Thus, the effect of divestiture on the net capacity which is ultimately controlled by the dominant firm is indeterminant, except for special cases such as the linear demand example. This example is also interesting because it depicts an extreme situation where the free entry and divestiture-preemption postentry equilibria are identical. Finally, divestiture or forward contracting are socially desirable in that they reduce the deadweight loss from preemption.

20The same point is made in the interesting analysis by Richard Schmalensee (1982) and Eaton and Mukesh Eswaran (1983).
22See William Baumol (1979) on this point.
23This argument was used to show that by its acquisition of large coal reserves, General Dynamics was not in violation of the section 7 of the Clayton Act. See United States v. General Dynamics.
24The deadweight loss from preemptory activity is discussed in some detail by Dasgupta and Stiglitz and by Gilbert and Newbery.
by decreasing the value and the amount that firms are willing to spend to compete for new capacity.

These conclusions need to be interpreted with care since they have been derived under special assumptions and with reference to one example. There are several extensions of this work worth investigating. One might analyze the role of preemption and divestiture for other structures besides the dominant firm-competition fringe one. Also, the results might be reexamined in a dynamic model where the acquisition of new capacity occurs over real time, and there is a lag between divestiture and preemption.

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