WORKING
PAPERS

MERGERS FOR MONOPOLY: PROBLEMS OF

EXPECTATIONS AND COMMITMENTS

Robert J. Mackay

WORKING PAPER NO. 112

July 1984

BUREAU OF ECONOMICS
FEDERAL TRADE COMMISSION
WASHINGTON, DC 20580

MERGERS FOR MONOPOLY:
PROBLEMS OF EXPECTATIONS
AND COMMITMENTS*

Robert J. Mackay**

July 1984

MERGERS FOR MONOPOLY:
PROBLEMS OF EXPECTATIONS
AND COMMITMENTS

Robert J. Mackay

"Unless there are legal restraints, anyone can monopo-
lize an industry through mergers and acquisitions,
paying for the acquisitions by permitting participation
of the former owners in the expected monopoly profits.
Since profits are thus expanded, all of the partici-
pants can be better off even after paying an
innovator's share to the enterpriser who got the idea
in the first place."

John S. McGee (1958; 139)

1. INTRODUCTION

It is often suggested that the chief obstacles to mergers
for monopoly are new entry and the antitrust statutes. With no
legal prohibitions against horizontal mergers and with entry
blocked or delayed, it is argued that a promoter would find the
creation of monopoly power a straightforward and profitable task.
By acquiring previously independent firms and merging them into a
consolidated firm under common ownership and control, the
promoter can eliminate competition between the firms thereby
creating monopoly power and monopoly profits for the merged
firms. Since the merged firms are more valuable if they can be
made to yield a monopoly return than if they remain in a competi-
tive industry, both the acquisition costs of the firms and a
return for the promoter can be financed out of the newly created
monopoly profits. Although the resulting combination may not

lead to a strict monopoly, significant concentration would result.

In contrast to the above view, the present paper argues that attempts to organize mergers for monopoly will be plagued and often frustrated by fundamental transactional problems even if entry is completely blocked and no legal restraints on mergers exist. The transactional problems involved in attempting to monopolize a previously competitive industry derive from two basic sources: rationally formed expectations on the part of participants in the market for producing monopoly and the difficulties promoters face in making binding commitments about their future behavior. In other words, promoters must overcome both a freerider problem and a hold-out problem. These problems and their logical underpinnings are presented and discussed in Section 2. A formal model of mergers for monopoly is developed in Section 3. The model incorporates both rational expectations and commitments. Finally, Section 4 contains concluding remarks.

2. THE LOGIC OF MERGERS FOR MONOPOLY

To keep the problem interesting and the analysis tractable consider an initially competitive industry in which all firms have identical costs and new entry is completely blocked. The transactional obstacles facing a promoter attempting to merge competing firms so as to create and exploit monopoly power can be clearly illustrated by drawing on and extending the logic of the theory of the dominant firm. The merged firms can be modeled as

-2-

a dominant firm with the non-merged firms treated as a competitive fringe.[1]

In this setting, the operating problem of the merged firms for any given number of mergers or acquisitions is straight-forward and familar. The merged firms act as a price setting, multi-plant monopolist facing a residual demand function given by the market demand function less the supply function of the non-merged firms remaining in the fringe. The non-merged firms act as price takers, producing where marginal cost equals the price set by the merged firms.

The promoter's problem, however, is more complex. He must determine the extent of the monopoly. That is, he must determine how many firms to acquire and include in the merger. His goal, of course, is wealth maximization and his wealth is the difference between the present value of the operating profits of the merged firms and the acquisition costs of the mergers. In choosing the optimal number of firms to merge, he will balance the marginal benefit of including an additional firm in the merger against the marginal cost of acquiring the firm. Each of these quantities must be examined in turn.

By acquiring an additional firm the promoter reduces the size of the competitive fringe and expands residual demand. The additional productive capacity may also affect the cost function of the merged firms operating as a multi-plant monopolist. The net effect of the acquisition is that the merged firms will now find it profitable to raise price and, in general, their

-3-

operating profits will also increase. The present value of the increase in operating profits is the marginal benefit to the promoter of the acquisition. Alternatively put, if one views the acquired firms as inputs into the production of monopoly, then the increase in the present value of operating profits is the marginal revenue product of the acquired firm as an input.

The marginal acquisition cost of the acquired firm is a more difficult quantity to determine. Many different views of the determinants of the marginal acquisition cost of a firm have been expressed by previous authors. Consider the following quote taken from McGee's (1958, p. 139) discussion of the advantages of mergers over predation:

> "If, instead of fighting, the would-be monopolist bought out his competitors directly, he could afford to pay them up to the discounted value of the expected monopoly profits to be gotten as a result of their extinction. Anything above the competitive value of their firms should be enough to buy them."

Or, consider the following quote taken from Posner's (1974, p. 378) discussion of the formation of U.S. Steel in 1901:

> "The organizers of the company paid so much more for the firms that they amalgamated into the company than the apparent going-concern value of those firms that they were widely believed to have defrauded the stockholders in the new company. Yet in fact those stockholders did as well over the years as stockholders in other large firms. ... This suggests that the purchase price of the acquired firms represented the capitalized value of anticipated monopoly profits. The organizers could afford to pay more than the going-concern value of the steel companies that they acquired because the assets were more valuable . . . if they could be made to yield a monopoly profit than they were worth in a competitive industry."

These comments do little to restrict the range of likely outcomes.[2]

In order to determine the marginal acquisition cost of a firm, it is necessary to be precise about the nature of the model under consideration, especially about informational assumptions. For example, the following questions are key. Are the initial owners of firms aware of the promoter's intentions? Is the proposed monopolization partial or complete? If the monopolization is only partial, do firms have the option of remaining unmolested in the fringe if they reject the merger offer?

Consider the extreme but nonetheless important case of perfect foresight or rational expectations. Suppose that all participants in the market are fully informed of demand and cost conditions and, moreover, are aware that the promoter is planning on acquiring m^* firms. In addition, suppose that each firm has the option of remaining in the fringe. Under these circumstances if the owner of a firm thinks the promoter will be successful, then he will view the opportunity cost of selling out to or merging with the promoter as the profits he could earn if instead, he refused the merger offer and stayed in the fringe taking full advantage of the price set by the firms that do merge. In other words, under rational expectations a successful promoter must pay an acquisition price for each firm that leaves the owner at least as well off as he would be in the fringe. With a sufficient number of similarly situated firms initially in the industry, competition in the market for firms will ensure that the promoter does not have to pay

an acquisition price in excess of the owners' opportunity costs.
The acquisition price, then, will equal the present value of the
profits from remaining in the fringe conditional, of course, on
the extent of the mergers planned by the promoter.

The promoter, though, is a monopsonist in the market for
firms. As a result, he will view the marginal acquisition cost
of an additional firm as the profitability of a fringe firm plus
the increase in the profitability of a fringe firm from extending
the merger by an additional firm times the number of firms he was
previously considering acquiring. The wealth maximizing number
of firms for the promoter to acquire, then, is the number that
sets marginal operating profit equal to marginal acquisition
cost.

This analytical formulation of the merger to monopoly
problem helps to reveal two transactional problems or obstacles
that a promoter must overcome before he can enjoy his share of
the monopoly profits. First, a pure promoter -- one who owns no
firms prior to organizing the mergers -- can not make a profit if
expectations are formed rationally and firms have the option of
remaining unmolested in the fringe. For a pure promoter, the
acquisition costs of the mergers always exceed the operating
profits resulting from the mergers. Since every firm has the
option of remaining in the fringe, free riding off the price
set by the merged firms, they must be paid an acquisition price
to join the merger that equals or exceeds their profitability in
the fringe if the merger is successful. Each fringe firm,

however, will maximize its profits at the price set by the merged

firms while the typical merged firm must restrict its output

below the profit maximizing level. The combined profits of the

merged firms, therefore, will not cover the acquisition costs of

a pure promoter who must pay fringe profitability for each firm

he acquires.[3]

The pure promoter's only hope for profit in this case is to

eliminate the option of remaining in the fringe by making a

simultaneous offer to all the firms in the industry in which the

participation of each firm in the merger is contingent on all

other firms also accepting the promoter's offer. By eliminating

the option of remaining in the fringe following a successful

merger, the unanimous agreement contract makes it possible for

the promoter to offer an acquisition price that is less than the

average profitability of a merged firm in strict monopoly but

greater than the opportunity cost of remaining in a competitive

industry.[4] This contract, however, creates a new problem. Since

the agreement of each and every owner is required for the

monopolization to be successful, a hold-out problem is created.

Each owner is in a position to demand a special premium from the

promoter. Moreover, the last owner to agree to the contract is

in a position to demand concessions not only from the promoter

but also from all the other owners who can not enjoy their shares

of the profits without his consent. With all the owners

similarly situated, a unanimous agreement contract is unlikely to

solve the transactional problems facing a pure promoter.

If the promoter initially owns a sufficient number of firms -- possibly because he was able to acquire them secretly before his merger plans became known -- then he may find it profitable to acquire additional firms, merging to a somewhat larger size. In this case, the promoter can usefully be thought of as playing two roles, one as a pure promoter and the other as a firm owner. He will take a loss on his activities as a pure promoter if it is more than compensated for by the resulting increase in the (implicit) value of the firms he initially owns.

A promoter, even one who initially owns a significant share of the productive capacity in an industry, faces a second obstacle to success -- a precommitment problem. If he can not precommit himself to a single round of mergers in which he acquires only a certain number of firms, then the promoter will find himself facing a hold-out problem. Owners of firms would refrain from selling out to him in what they see as only the first of several rounds of mergers, hoping to obtain a higher price in later rounds. To see why this problem occurs, suppose the promoter announces he is going to acquire only m^* firms and offers an acquisition price reflecting fringe profitability conditional on a merger of this size. If owners believe his announcement and sell out to him at this price, it will pay the promoter -- once he owns these additional firms and no longer has to worry about raising their acquisition prices -- to go back

into the market and acquire still more firms, offering a higher acquisition price to reflect the now greater profitability of being in the fringe. Owners selling out in the first round will regret doing so since they will miss the additional capital gain available in the second round. Intelligent and foresightful owners, therefore, would not sell out in the first round unless the promoter can guarantee that it is also the last round.[5] This precommitment problem can also be solved by a contingent contract requiring unanimous agreement on merging to strict monopoly. As discussed above, though, this contract would simply replace one hold-out problem with another one.

The analytical model underlying the above arguments is presented in detail in the next section.

3. A MODEL OF MERGERS FOR MONOPOLY

Consider an industry containing n identical firms, m of which have merged to form a dominant firm that acts as a multi-plant monopolist and f of which have remained in a competitive fringe acting as price takers. Entry of new firms is not possible. Market demand, denoted D, is given by:

$$Q = D(p), \tag{1}$$

where $\partial D/\partial p < 0$, Q is total industry output, and p is the price set by the merged firms. Each firm in the industry possesses the same cost function, denoted c, given by:

$$c = c(q), \tag{2}$$

where $\partial c/\partial q > 0$, $\partial^2 c/\partial q^2 > 0$, and q is the firm's output. Any fixed costs, measured by c(o), are assumed to be sunk in the sense that they can not be avoided by shutting down the firm.

The Non-Merged Firms

The non-merged firms behave as a competitive fringe. For any price set by the merged firms, they operate where marginal cost equals price. Each fringe firm, then, has a supply function, denoted s^F, given by:

$$q^F = s^F(p), \tag{3}$$

where $\partial s^F/\partial p > 0$ and q^F is the output of a fringe firm. The indirect profit function for a fringe firm shows the maximum profit obtainable in the fringe, denoted π^F, as a function of the price set by the merged firms. It is given by:

$$\pi^F(p) \equiv p \cdot s^F(p) - c[s^F(p)]. \tag{4}$$

Profit maximization by the fringe firms implies that

$$\frac{\partial \pi^F}{\partial p} = s^F(p) > 0 \text{ and } \frac{\partial^2 \pi^F}{\partial p^2} = \frac{\partial s^F}{\partial p} > 0.$$

The supply function for the entire fringe, denoted S_F, is

$$Q_F = (n-m)s^F(p) \equiv S_F(p,m), \tag{5}$$

where Q_F is the total output produced by the fringe firms and n-m is the size of the fringe.

-10-

The Merged Firms

The merged firms behave as a multi-plant monopolist. Since fixed costs are sunk and marginal cost is increasing, all firms will be utilized in production. No firms will be purchased and dismantled.[6] Moreover, with identical cost functions, each merged firm will be assigned an equal share of the total output of the merged firms. That is,

$$q^M = \frac{Q_M}{m}, \tag{6}$$

where q^M is the output of a merged firm and Q_M is the total output of the merged firms. The total costs of production for the merged firms, denoted C_M, is:

$$C_M = m \cdot c(\frac{Q_M}{m}) \equiv C_M(Q_M, m). \tag{7}$$

The merged firms face a residual demand function, denoted D_M, equal to the market demand function less the supply function of the fringe firms. That is,

$$Q_M = D(p) - S_F(p, m) \equiv D_M(p, m). \tag{8}$$

The _operating_ profits of the merged firms, denoted Π_M, can now be expressed as a function of the price set by the merged firms and the number of firms included in the mergers. Making the proper substitutions gives:

$$\Pi_M = p \cdot D_M(p,m) - C_M[D_M(p,m),m] \, , \, \equiv \Pi_M(p,m). \tag{9}$$

The marginal effect on the merged firms' operating profits of an increase in price is:

$$\frac{\partial \Pi_M}{\partial p} \equiv (p - \frac{\partial C_M}{\partial Q_M}) \frac{\partial D_M}{\partial p} + D_M. \tag{9a}$$

If the discrete nature of m is ignored and, instead, it is treated as a continuous variable, then the marginal effect on the merged firms' operating profits of adding another firm to the merger is:

$$\frac{\partial \Pi_M}{\partial m} \equiv (p - \frac{\partial C_M}{\partial Q_M}) q^F - \frac{\partial C_M}{\partial m}. \tag{9b}$$

It can also be shown that

$$\frac{\partial^2 \Pi_M}{\partial m^2} < 0 \text{ and } \frac{\partial^2 \Pi_M}{\partial p \partial m} = \frac{\partial^2 \Pi_M}{\partial m \partial p} > 0. \tag{10}$$

The operating problem for the merged firms, conditional on a given number of firms merging, can now be simply stated as:

$$\max_{p} \Pi_M(p,m). \tag{11}$$

The first order condition for profit maximization, then, is:

$$\frac{\partial \Pi_M}{\partial p}(p,m) = 0. \tag{12}$$

This condition can be solved for the merged firms' profit maximizing price, denoted $\tilde{p}$, as a function of the number of firms merging. That is,

$$p = \tilde{p}(m). \tag{13}$$

Substituting this function into equation (12) gives the first order condition in identity form and, then, differentiting with respect to m gives:

$$\frac{\partial \tilde{p}}{\partial m} \equiv - \frac{\partial^2 \Pi_M}{\partial p \partial m} \bigg/ \frac{\partial^2 \Pi_M}{\partial p^2} > 0. \tag{14}$$

The numerator is positive since adding another firm to the merger increases the marginal profitability of raising price while the denominator is negative by the second order conditions for profit maximization. In other words, the greater the number of firms that merge the higher is the profit maximizing price.

It is now possible to derive an indirect profit function for the merged firms in which their operating profit, now denoted $\tilde{\Pi}_M$, is expressed solely as a function of the number of firms merging. Their pricing decision, in other words, can be optimized out of the problem. Substituting equation (13) into equation (9) gives:

$$\tilde{\Pi}_M(m) \equiv \Pi_M[\tilde{p}(m),m]. \tag{15}$$

-13-

This function can be used to derive an expression for the marginal benefit to the promoter of acquiring an additional firm, once that firm is optimally incorporated into the operation of the merged firms and the product price is appropriately adjusted. Differentiating equation (15) with respect to m and remembering that $\partial \Pi_M / \partial p = 0$ when the price is optimally set gives:
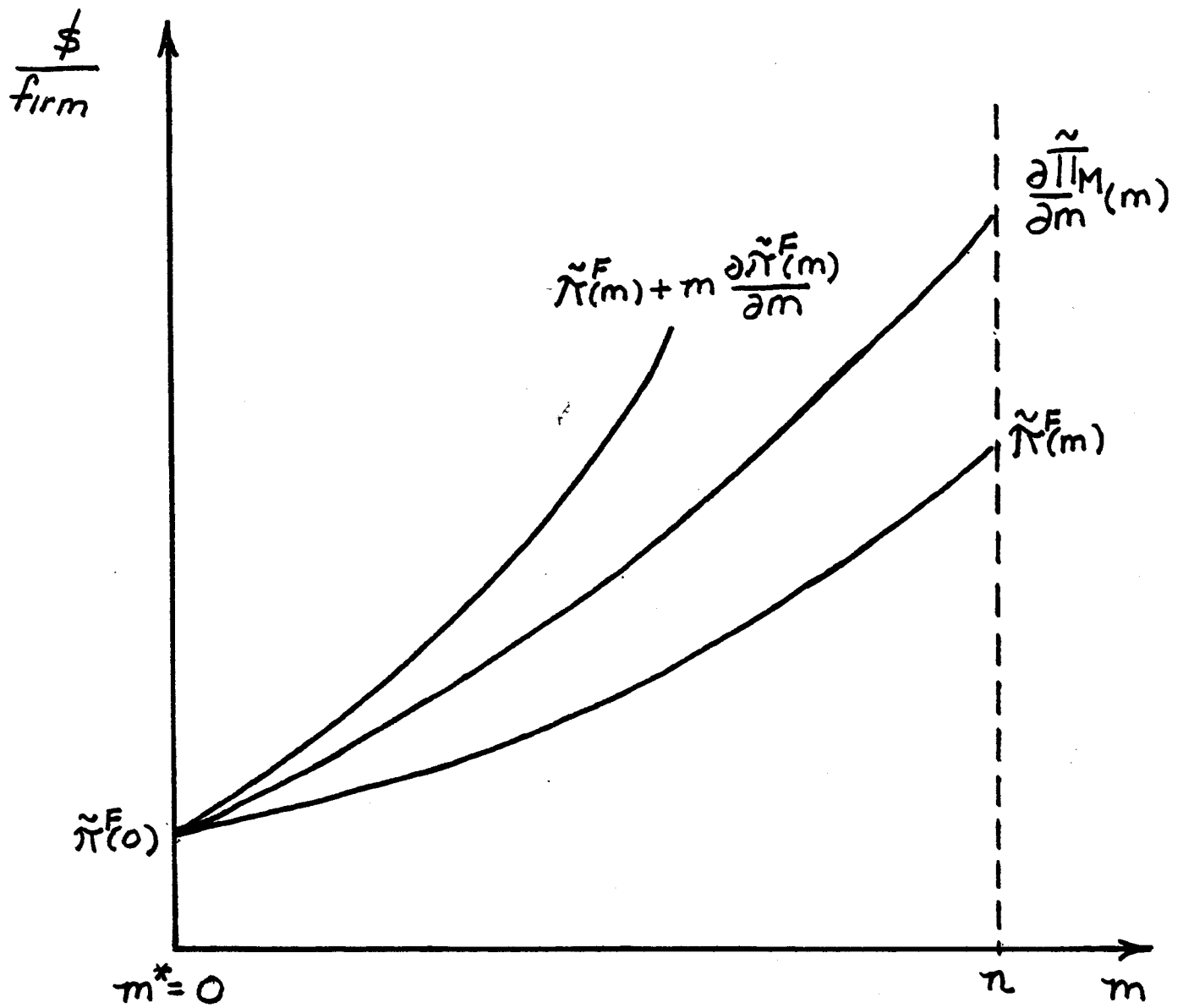
$$\frac{\partial \tilde{\Pi}_M}{\partial m}(m) \equiv \frac{\partial \Pi_M}{\partial m}[\tilde{p}(m), m] \, . \qquad (16)$$

If one views the acquired firms as inputs into the production of monopoly, then this expression is the marginal revenue product of an acquired firm and must be balanced against the marginal acquisition cost. This function is illustrated in Figure 1.

Acquisition Costs and Fringe Profitability

Under perfect foresight a successful promoter must offer an acquisition price that at least compensates the owner of an acquired firm for foregoing the profits that could be made in the fringe. With a sufficient number of firms' initially in the industry, however, competition among owners offering their firms for sale will drive the acquisition price down to the opportunity cost or reservation price as measured by fringe profitability. For any given number of firms merging, the profitability of a fringe firm, now denoted $\tilde{\pi}^F$, can be found by substituting the optimal monopoly price function, equation (13), into the indirect profit function, equation (4). That is,

-14-

FIGURE 1

$$\frac{\$}{firm}$$

$$\tilde{\pi}^F(m) + m \frac{\partial \tilde{\pi}^F(m)}{\partial m}$$

$$\frac{\partial \tilde{\tilde{\Pi}}_M(m)}{\partial m}$$

$$\tilde{\pi}^F(m)$$

$$\tilde{\pi}^F(0)$$

$$m^* = 0$$

$$n$$

$$m$$

$$\tilde{\pi}^F(m) \equiv \pi^F[\tilde{p}(m)]. \tag{17}$$

This equation is the supply of firms function to the promoter since it shows the acquisition price of a firm as a function of the number of firms merging. The organizer faces a rising supply price since

$$\frac{\partial \tilde{\pi}^F}{\partial m}(m) = q^F \cdot \frac{\partial \tilde{p}}{\partial m} > 0. \tag{18}$$

The indirect profit function, $\tilde{\pi}^F(m)$, is also shown in Figure 1.

The relationship between $\partial \bar{\Pi}_M / \partial m$, the marginal benefit of an acquired firm, and $\tilde{\pi}^F$, the acquisition price of an acquired firm is of special interest. It can easily be shown that

$$\frac{\partial \bar{\Pi}_M}{\partial m}(m) > \tilde{\pi}^F(m). \tag{19}$$

At the margin, a firm contributes more to the profitability of the merged firms than it can earn in the fringe. It is important, however, not to misinterpret this condition. In fact, it is probably a misinterpretation of this condition that underlies the optimistic view of the ease of merging to monopoly, represented so clearly by the earlier quote from McGee. This condition does not imply that complete monopolization is optimal for the promoter. If the promoter could somehow acquire the firms sequentially, paying at each step an acquisition price equal to fringe profitability at that step, then this condition would imply that a strict monopoly is optimal. In general, though, a promoter will not be able to operate in such a

discriminatory fashion. Instead, once his plans are known, he will have to offer the same price for all the firms he attempts to acquire and an expansion in the scale of the mergers will bid up not only the acquisition price of the marginal firm but also the acquisition prices of the infra-marginal firms.

It is important, therefore to distinguish between the acquisition price and the marginal acquisition cost of a firm. If a promoter is attempting to acquire m firms, then the acquisition price of a firm will be $\tilde{\pi}^F(m)$ and the total acquisition costs will be $m\tilde{\pi}^F(m)$. The marginal acquisition cost, however, is $\tilde{\pi}^F(m) + m\,\partial\tilde{\pi}^F/\partial m$ and always exceeds the acquisition price since the supply function of firms is upward sloping.

The Promoter's Problem

The promoter's wealth, denoted W, equals the operating profits of the merged firms, $\tilde{\Pi}_M(m)$, minus the acquisition costs of the mergers. If he is a pure promoter --initially does not own any firms -- then the acquisition costs of the mergers will be $m\tilde{\pi}^F(m)$. Therefore, the pure promoter's problem is:

$$\max_{m} W(m) \equiv \tilde{\Pi}_M(m) - m\tilde{\pi}^F(m). \tag{20}$$

The wealth maximizing number of firms for the promoter to acquire, denoted m*, is given by the first order condition:

$$\frac{\partial W}{\partial m}(m^*) \equiv \frac{\partial \tilde{\tilde{\Pi}} M}{\partial m}(m^*) - [\tilde{\pi}^F(m^*) + m^* \frac{\partial \tilde{\pi}^F}{\partial m}(m^*)] = 0 \tag{21}$$

Rearranging this condition gives:

$$\frac{\partial \tilde{\tilde{\Pi}} M}{\partial m}(m^*) = \tilde{\pi}^F(m^*) + m^* \frac{\partial \tilde{\pi}^F}{\partial m}(m^*). \tag{22}$$

The left-hand side of this expression is the marginal profitability from adding a firm to the merger while the right-hand side is the marginal acquisition cost of an additional firm.

Unfortunately for the pure promoter, the wealth maximizing number of firms to merge is zero! A pure promoter can not make a profit. This result is shown in Figure 1 where $m^* = 0$ since for any other m the marginal acquisition cost curve lies above the marginal profitability curve.

The difficulty facing the promoter is easily seen at this point. For any number of firms that merge, the pure promoter's wealth can be expressed as:

$$W(m) = m[\frac{\tilde{\Pi}_M(m)}{m} - \tilde{\pi}^F(m)], \tag{23}$$

where $\tilde{\Pi}_M(m)/m$ is the average profitability of the merged firms.

But, $\tilde{\pi}^F(m) > \tilde{\Pi}_M(m)/m$ since each fringe firm is producing the output that maximizes its profit at the price set by the merged firms while each merged firm must be restricting its output below the profit maximizing level. As a result, $W(m)$ must be negative for any $m > 0$.

These extreme results hold only for the pure promoter. A
promoter who initially owns, say, m_O firms can make a profit from
acquiring additional firms even if he must pay fringe profitabi-
lity for these firms. In this case, the promoter need acquire
only $m - m_O$ additional firms to create a merger of size m.
Therefore, the promoter's problem is:

$$\max_{m} W(m, m_O) \equiv \tilde{\Pi}_M(m) - (m - m_O)\tilde{\pi}^F(m). \tag{24}$$
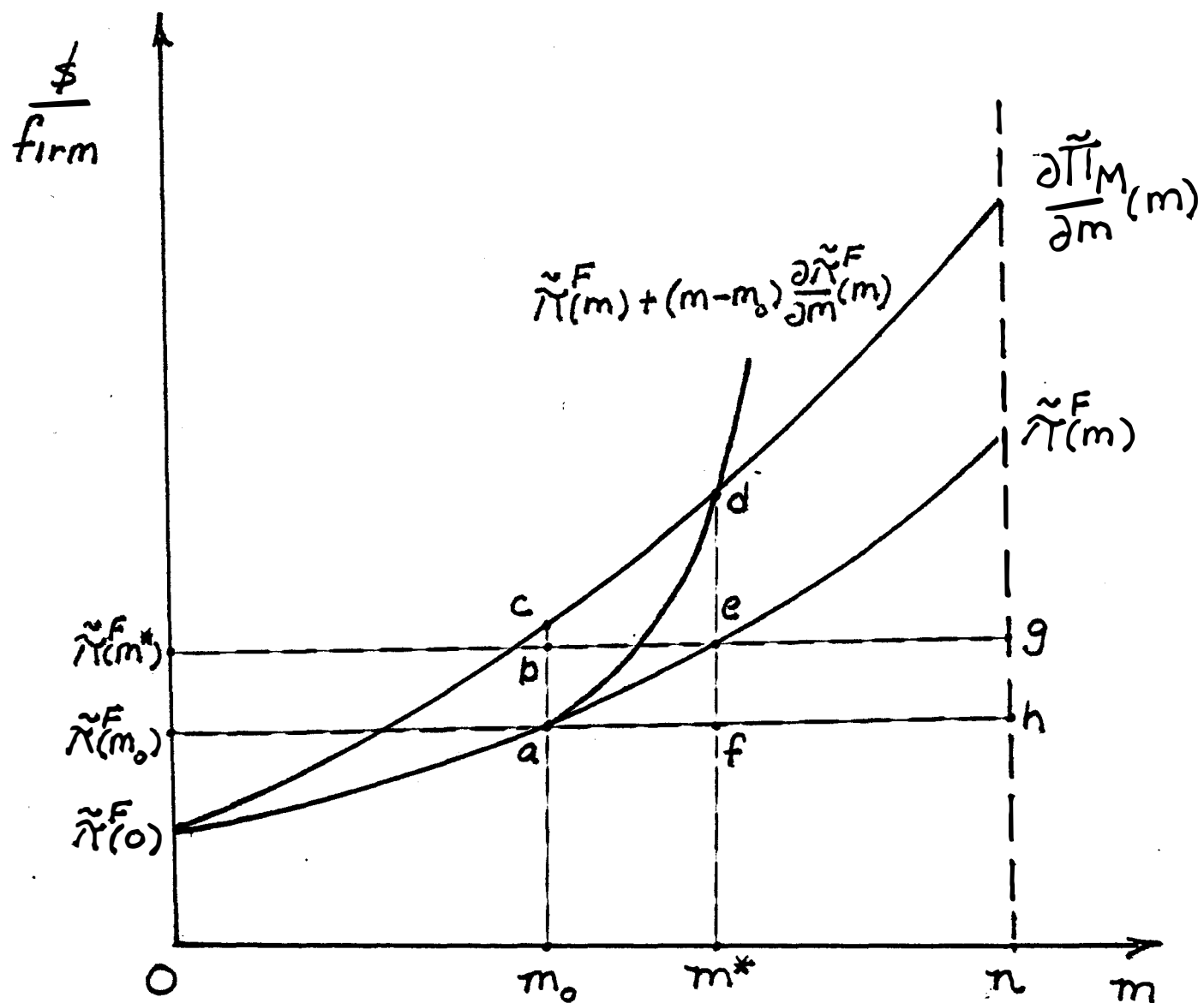
The wealth maximizing number of firms to merge, denoted m^*, or,
alternatively put, the optimal number of additional firms to
acquire, denoted $m^* - m_O$, is given by the following condition:

$$\frac{\partial \tilde{\Pi}_M}{\partial m}(m^*) = \tilde{\pi}^F(m^*) + (m^* - m_O)\frac{\partial \tilde{\pi}^F}{\partial m}(m^*). \tag{25}$$

From the promoter's perspective, the effect of initially owning
m_O firms is to reduce the marginal acquisition cost of additional
firms. That is, he does not have to worry about bidding up the
acquisition price of the firms he initially owns when he expands
the scale of the mergers. As a result, it now will always pay
the promoter to acquire additional firms, ignoring, of course,
the organizational or transactions costs involved in arranging
the mergers.

The promoter's optimum is illustrated in Figure 2. The
difference between this figure and Figure 1 is that the marginal
acquisition cost function in Figure 2 starts on the supply
function of firms at $\tilde{\pi}^F(m_O)$ instead of starting at $\tilde{\pi}^F(o)$. In

FIGURE 2

$$\frac{\$}{firm}$$

$$\tilde{\pi}^F(m) + (m-m_o)\frac{\partial\tilde{\pi}^F}{\partial m}(m)$$

$$\frac{\partial\tilde{\Pi}_M}{\partial m}(m)$$

$$\tilde{\pi}^F(m)$$

$$\tilde{\pi}^F(m^*)$$

$$\tilde{\pi}^F(m_o)$$

$$\tilde{\pi}^F(o)$$

c   d   e

b   g

a   f   h

O m_o m^* n m

other words, when m equals m_O the marginal acquisition cost is simply $\tilde{\pi}^F(m_O)$ since the promoter does not have to worry about bidding up the price of the m_O firms he already owns. The optimum number of firms to merge, m^*, is given by the intersection at point d of the marginal profitability function, $\partial \bar{\Pi}_M / \partial m$, and the marginal acquisition cost function, $\tilde{\pi}^F + (m-m_O) \partial \tilde{\pi}^F / \partial m$. The acquisition of $m^* - m_O$ additional firms increases the operating profits of the promoter by the area $m_O cdm^*$. In total, the promoter pays an acquisition cost for these firms given by the area $m_O bem^*$ which equals $\tilde{\pi}^F(m^*)(m^*-m_O)$. The increase in the promoter's wealth as a result of these acquisitions is given by the area bcde. This area equals $W(m^*,m_O) - \bar{\Pi}_M(m_O)$ and is the increase in the promoter's wealth over and above what he could make if he simply exploited the monopoly power inherent in his initial ownership of m_O firms. The increase in the market value of the firms remaining in the fringe is given by the area efgh which equals $(n-m^*) [\tilde{\pi}^F(m^*) - [\tilde{\pi}^F(m_O)]$.

There is an alternative way of formulating the promoter's problem that provides additional insight. Rearranging equation (24) gives:

$$\max_m W(m,m_O) \equiv m_O \tilde{\pi}^F(m) - [m \tilde{\pi}^F(m) - \bar{\Pi}_M(m)]. \qquad (26)$$

Each term in this expression has a natural interpretation:

$m_O \tilde{\pi}^F(m) \equiv$ <u>implicit</u> market value of the m_O firms initially owned by the promoter if he merges m firms;

$m\tilde{\pi}^F(m) - \tilde{\Pi}_M(m) \equiv$ <u>implicit</u> cost to the promoter (in his role as a <u>pure</u> promoter) of arranging the merger of m firms.

This formulation clearly reveals the two roles played by the promoter, one as a pure promoter the other as a firm owner. As a pure promoter he can be thought of as acquiring m firms including the m_O firms that he <u>implicitly</u> purchases from himself in his role as firm owner. He pays an acquisition price of $\tilde{\pi}^F(m)$ for all these firms and takes a loss as a pure promoter. He is willing to take a loss as a pure promoter since this is more than compensated for by the increase in the <u>implicit</u> market value of the firms he initially owns. In other words, the promoter is willing to bear the cost of providing the collective good of a higher price and, hence, capital gains to the owners of firms remaining in the fringe who free-ride off his activities since he, in effect, also provides this collective good to himself as owner of m_O firms. At the optimum he will balance the marginal capital gain on the firms he initially owns against his marginal loss as a pure promoter. That is, he will choose m^* so as to satisfy the following condition:

$$m_O \frac{\partial \tilde{\pi}^F}{\partial m}(m^*) = \tilde{\pi}^F(m^*) + m^* \frac{\partial \tilde{\pi}^F}{\partial m}(m^*) - \frac{\partial \tilde{\Pi}_M}{\partial m}(m). \qquad (27)$$

-22-

This formulation provides an alternative way of viewing Figure 2. The promoter's wealth is given by the area $o\tilde{\pi}^F(m^*)bm_O$, less the difference between the areas $o\tilde{\pi}^F(m^*)em^*$ and $o\tilde{\pi}^F(o)dm^*$. The first term equals $m_O\ \tilde{\pi}^F(m^*)$ while this latter difference equals $m^*\tilde{\pi}^F(m^*) - \tilde{\Pi}_M(m^*)$. The merger of m^* firms, then, maximizes the difference between these two areas.

This formulation of the problem also reveals an interesting feature of the way the participants in this market share in the monopoly profits created by the mergers. On average, the promoter does less well than the firms he acquires and less well than the firms that remain in the fringe. Those firms merging with the promoter receive an acquisition price of $\tilde{\pi}^F(m^*)$ while those firms remaining in the fringe earn equivalent profits of $\tilde{\pi}^F(m^*)$. The promoter, however, earns a lower rate of profit (per firm he initially owns) than the firms he acquires or those remaining in the fringe. More specifically, the promoter's wealth per firm he initially owns, denoted $W(m^*,m_O)/m_O$, is given by:

$$\frac{W(m^*,m_O)}{m_O} = \tilde{\pi}^F(m^*) - \frac{1}{m_O}\ [m^*\tilde{\pi}^F(m^*) - \tilde{\Pi}_M(m^*)]. \tag{28}$$

Since the promoter takes a loss in his activities as a pure promoter, it is clear that

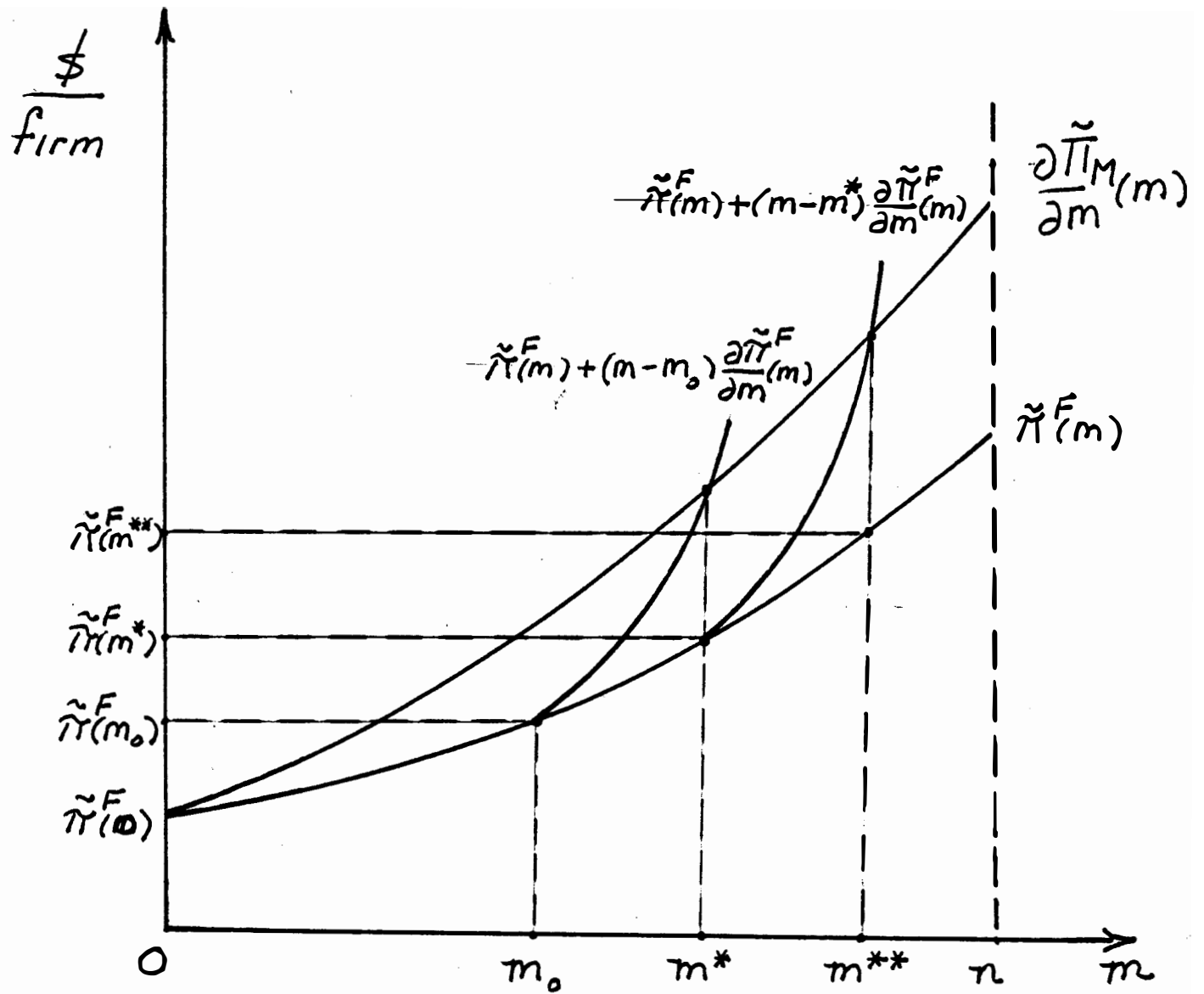$$\frac{W(m^*,m_O)}{m_O} < \tilde{\pi}^F(m^*). \tag{29}$$

-23-

The promoter, nevertheless, is better off organizing the additional mergers than simply exercising the monopoly power inherent in his initial ownership of m_O firms. That is,

$$\tilde{\Pi}_M(m_O) < W(m^*, m_O). \tag{30}$$

Because of their ability to remain in the fringe unmolested, the firms merging with the promoter are able to demand and receive a disproportionate share of the monopoly profits created by the combination.

To this point it implicitly has been assumed that the promoter can precommit himself to only a single round of mergers. If he can not commit to refrain from additional rounds of mergers, then he will face a hold-out problem reminiscent of the durable goods monopolist's problem analyzed by Coase (1972). To see the nature of this hold-out problem consider Figure 3. Suppose, as in the previous analysis, that the promoter announces he is going to acquire only m^*-m_O additional firms to complete a merger of size m^*. Further, suppose the owners of fringe firms believe his announcement and, as a result, sell out to the promoter at an acquisition price reflecting fringe profitability, $\pi^F(m^*)$. Relative to the pre-merger situation, they each make a capital gain of $\tilde{\pi}^F(m^*) - \tilde{\pi}^F(m_O)$. This round of mergers, however,

FIGURE 3

changes the promoter's incentives. Once these fringe firms have sold out to the promoter, it pays him to go back into the market for firms and acquire still more firms, offering a higher price to reflect the now greater profitability of being in the fringe. In other words, once he owns the m^* firms it pays the promoter to acquire additional firms since he no longer has to worry about bidding up the price of these firms if he chooses to expand the extent of the mergers.

In terms of Figure 3, the marginal acquisition cost curve shifts down after the first round of mergers so that it intersects the supply of firms function at point e, corresponding to an acquisition price of $\tilde{\pi}^F(m^*)$. With this new marginal acquisition cost function, it now pays the promoter to announce a second round of mergers in which he attempts to acquire $m^{**} - m^*$ additional firms, offering a price of $\tilde{\pi}^F(m^{**})$ for each of these firms. Owners of fringe firms that sold out in the first round of mergers will regret having done so since the capital gain in the first round, $\tilde{\pi}^F(m^*) - \tilde{\pi}^F(m_O)$, is less than the capital gain they would have made if, instead, they had waited and sold out in the second round, $\tilde{\pi}^F(m^{**}) - \tilde{\pi}^F(m_O)$. Alternatively put, owners of fringe firms are not indifferent between selling out in the first round and remaining in the fringe <u>after the second round</u>. As a result

of these considerations, intelligent and foresightful owners would not sell out in the first round unless the promoter can guarantee that it is also the last round.[7] Absent such a guarantee owners of fringe firms would reject the promoter's first offer of $\tilde{\pi}^F(m^*)$, preferring instead to hold-out for the higher acquisition prices available in later rounds of mergers.[8]

As mentioned earlier, a merger strategy based on contingent contracts requiring unanimous agreement on merging to strict monopoly could solve the precommitment problem since it eliminates the possibility of another round of mergers. This approach, though, simply replaces one hold-out problem with another one. Less extreme contract terms may suffice. If, for some reason, the promoter can not directly guarantee through contract terms that there will be only one round of mergers, there still may be less direct contract terms that achieve the same effect. For example, by inserting a most-favored-nation clause in the purchase contract the promoter can ensure owners of firms selling out to him that they will not forego future capital gains in the event of a later round of mergers.[9] That is, the promoter agrees that if he pays a higher price for a firm in the future, then he will pay the difference to the current seller. This contract term guarantees that he will only attempt a single round of mergers and allows him to overcome the hold-out problem. In more realistic settings, however, where firms are not identical this type of contract may be impossible to implement.

It is worth noting that the previous analysis can easily and fruitfully be translated into a cartelization story. A pure cartel organizer, because of rational expectations and the option of fringe production, will not be able to devise a profit-sharing scheme that leaves firms indifferent between joining the cartel and staying in the fringe and simultaneously provides a positive profit for the organizer. A cartel organizer who initially owns a sufficient number of firms will find it profitable to expand the size of the cartel assuming he can overcome the precommitment problem. To be successful, though, the organizer and dominant member of the cartel will find it necessary to offer the firms joining the cartel a disproportionate share of cartel profits to induce them to leave the fringe.

In addition, the hold-out problem may not be as serious in this case as in the merger case since the firms agreeing to join the cartel do not become the property of the organizer. Firms joining the cartel in an initial round of cartelization, based on a particular profit sharing agreement, may will defect and return to the fringe if the organizer attempts a second round of cartelization in which he makes still more attractive offers to firms joining at this stage. If the organizer must make the same offer to all firms joining the cartel in order to avoid defections, then only one round of cartelization will be profitable and the precommitment problem can be solved. Cartelization, then, may have advantages over mergers and acquisitions for the same reason that renting may have advantages over selling for the durable

goods monopolist.[10] Of course, the control costs involved in
monitoring and enforcing the cartel agreement may outweigh this
advantage.

4. CONCLUDING REMARKS

This paper argues that mergers for monopoly will be plagued
and often frustrated by a free-rider problem and a hold-out problem
resulting, respectively, from rational expectations in the market
for firms and an inability of promoters to make binding commitments
about their future behavior. It is important to note, however,
that these transactional problems are not unique to mergers for
monopoly. In general, the potential for these problems to arise
exists any time one attempts, either through direct acquisition or
co-operative arrangements, to consolidate control over a fixed
supply of an economic resource so as to increase the market value
of those resources and can not do so without simultaneously
increasing the market value of the stock of the resource remaining
outside one's control. For example, the model developed here, with
some modifications, could provide a formal analysis of the land
assembly problem that occurs in real estate markets when an
entrepreneur attempts to buy up dilapidated buildings and restore a
neighborhood. Like the promoter of monopoly, the developer must
devise solutions to the transactional problems created by rational
expectations and the general difficulty of making binding
commitments about his future behavior.

[1] The analysis of mergers crucially depends upon the model of oligopoly or solution concept applied in the post-merger period. See Salant, Switzer and Reynolds (1983) and Cave (1980) for analyses of mergers under alternative solution concepts. Neither of these papers, however, examines the rational expectations problem and commitment problem that are the focus of the present paper.

[2] In his discussion of cartel formation, Telser (1972, pp. 215-216) appears to agree with McGee's view when he argues that a "cartel need only offer a competitive return, and it can obtain as large a membership as it please." Telser, however, has a different starting point in mind than does McGee. In his model, a cartel organizer has the right to control entry into the industry and is allowing potential producers to bid for the right to enter the industry and join the cartel. He is not considering the case in which there are existng firms already in the industry that have the right to remain in the industry outside the cartel if they so choose. This assumption also distinguishes Telser's analysis from the analysis in the present paper.

[3] This argument is similar to Grossman and Hart's (1980) argument that take-over bids will be plagued by a free-rider problem if existing shareholders have rational expectations and can foresee the improvement in profitability that will be brought about by a raider.

[4] The option of remaining unmolested in the fringe following a successful merger may also be eliminated by credible threats of predation. To the extent these threats are credible they, of course, will affect the acquisition price the promoter must pay. See Posner (1974, pp. 368-69) for a discussion of this argument. The difficult issues raised by the possibility of predation are not considered here--instead, firms not merging with the promoter are assumed to have the option of operating freely in the fringe.

[5] This argument is similar to Coase's (1972) argument that unless a durable goods monopolist can convince buyers that future production will be limited he will face a hold-out problem as buyers attempt to avoid the capital losses resulting from additional production of the good following their purchases. See Bulow (1982) for an interesting discussion of this problem and some of the ways it may be solved by the monoplist. In the present setting by

REFERENCES

Bulow, Jeremy I. "Durable-Goods Monopolists." J.P.E. 90, no. 2 (April 1982):314-32.

Cave, Jonathan. "Losses Due to Merger." Federal Trade Commission Working Paper, 1980.

Coase, Ronald H. "Durability and Monoploy." J. Law and Econ. 15 (April 1972):143-49.

Grossman, Sanford, and Hart Oliver. "Takeover Bids, The Free Rider Problem, and the Theory of the Corporation." Bell J. Econ. 11, no. 1 (Spring 1980):42-64.

Knoeber, Charles R. "An Alternative Mechanism to Assure Contractual Reliability." J. Legal Studies XII (June 1983): 333-343.

McGee, John S. "Predatory Price Cutting: the Standard Oil (N.J.) Case." J. Law and Econ. 1 (October 1958):137-69.

Posner, Richard A. Antitrust: Cases Economic Notes, and Other Materials. (St. Paul:West Publishing Co., 1974).

Salant, Stephen, Switzer, Sheldon, and Reynolds, Robert. "Losses from Horizontal Merger: The Effects of an Exogenous Change in Industry Structure on Cournot-Nash Equilibruim." Q.J.E. XCVIII, no. 2 (May 1983):185-99.

Salop, Steven, "Practices that (Credibly) Facilitate Oligopolistic Coordination." Federal Trade Commission Working Paper, 1982.

Stigler, George J. "Monopoly and Oligopoly by Merger." In The Organization of Industry. (Chicago:University of Chicago, Press, 1968):95-107.

Telser, Lester. Competition, Collusion and Game Theory. (Chicago:Aldine-Atherton, 1972).

contrast, sellers attempt to avoid foregoing the greater capital gains available in later rounds of mergers by refusing the promoter's offers in earlier rounds.

[6] If the fixed cost are at least partially avoidable by shutting down and dismantling an acquired firm, then the promoter will have to decide not only how many firms to acquire but also how many firms or plants to operate. This consideration only complicates the analysis without in any way changing the basic conclusions.

[7] This analysis suggests a perverse way in which the antitrust laws may actually facilitate mergers for monopoly. By specifying a critical market share such that mergers creating combinations exceeding that share will be challenged, antitrust enforcement may in effect provide the promoter with the necessary restriction on his future behavior to enable him to organize a merger up to the critical market share. The antitrust laws, in other words, may enable the promoter to precommit himself to only a single round of mergers and, thus, solve the hold-out problem.

[8] Stigler (1968, p. 98) has argued that a gradual approach to mergers for monopoly may succeed where bolder action might fail:

> "If there are relatively many firms in the industry, no one firm plays an important role in the formation of the merger; and it is possible for the merger to expand in a more gradual process and acquire firms on less exacting terms."

With rational expectations, the hold-out problem discussed here will ensure the failure of this strategy. Proceeding gradually can succeed only if it somehow conceals the promoter's ultimate intentions.

[9] Price protection clauses have been used by pipelines that agree to pay each natural gas producer the highest price it pays any other producer for gas of comparable quality. See Salop (1982) for a related disscussion of how most-favored-nation clauses may facilitate oligopolistic coordination and Knoeber (1983) for a discussion of how they may be used to assure contractual reliability.

[10] See Bulow (1982) for an interesting discussion of the relative advantages to the durable-goods monopolist of renting versus selling.