WORKING PAPER
ALFRED P. SLOAN SCHOOL OF MANAGEMENT

ASSESSING COMPETITION IN THE MARKET FOR CORPORATE ACQUISITIONS

by

Richard S. Ruback

#1268-81 November 1981

ASSESSING COMPETITION IN THE MARKET FOR CORPORATE ACQUISITIONS

by

Richard S. Ruback

#1268-81 November 1981

ASSESSING COMPETITION IN THE MARKET FOR CORPORATE ACQUISITIONS

Richard S. Ruback*

Sloan School of Management
Massachusetts Institute of Technology
Cambridge, MA 02139

November 1981

Comments invited.

*I would like to thank C. Baldwin, F. Black, P. Dodd, M. Jensen, R. Merton, W. Mikkelson, A. Rosenfeld, J. Rotemberg, P. Wier, and the participants at the Finance Research Seminar, Massachusetts Institute of Technology for the their helpful comments on earlier drafts of this paper.

Abstract

This paper analyzes rivalry among bidders in the acquisitions market for two different objective functions: stockholder wealth maximization and management welfare maximization. The joint hypothesis of stockholder wealth maximization and rivalry implies that the potential gain to unsuccessful bidders at the successful offer is non-positive. If the alternative objective of managerial wealth maximization is assumed, the potential gain to the unsuccessful bidder should be less than the successful bidder's gain. These hypotheses are empirically examined using data on tender offers. The results are inconsistent with rivalry under stockholder wealth maximization, but are consistent with rivalry under managerial welfare maximization.

Assessing Competition in the Market for Corporate Acquisitions

1. Introduction

Perfect competition in the market for corporate acquisitions is often advanced as the solution to the conceptual problems associated with the separation of ownership and control.[1] In a competitive acquisitions market, firms that do not maximize market value are acquired and a value maximizing strategy is instituted. Since every firm is unique, this concept of a perfectly competitive acquisitions market is intended to capture the notion of rivalry among bidding firms. In this market, each potential bidder evaluates the target and advances a bid if it is advantageous to do so. In this paper, the implications of rivalry among bidders are analyzed and empirical tests are conducted to assess the degree of rivalry in the acquisitions market.

Rivalry in the acquisitions market defines the behavior of bidding firms and this behavior depends on the objective function of the management of bidding firms. Two different managerial objective functions are discussed in this paper: stockholder wealth maximization and managerial welfare maximization. An implication of stockholder wealth maximization is that takeovers are a positive net present value investment for successful bidders. Since positive net present value projects increase equity values, the studies which examine the wealth effects of mergers and tender offers provide empirical evidence on the managerial objective function. These studies,

---

[1] See Manne (1965), Fama (1978), and Smiley (1975).

however, present conflicting evidence on the affect of takeovers on the equity values of successful bidding firms. For example, Asquith (1981) finds that mergers have a small, but positive affect on the common stock values of successful bidders, whereas Dodd (1980) finds that mergers have a statistically significant adverse effect on the equity value of successful bidding firms. The extent to which acquisitions represent positive net present value investments, therefore, is an unresolved empirical issue.

Since the managerial objective function is unknown, I develop the conditions for rivalry under stockholder wealth maximization in section 2.1 and managerial welfare maximization in section 2.2. When an objective of shareholder wealth maximization is assumed, rivalry is characterized in terms of the gain that accrues to potential bidding firms; the price of the target firm rises until the acquisition is a nonnegative net present value investment for only the successful bidder. Under managerial welfare maximization, the offer price rises until only the successful bidder's management realizes an increase in welfare from the acquisition.

Several empirical studies of mergers and tender offers examine the changes in the value of ownership claims associated with corporate acquisitions and use the observed value changes to address the degree of competition in the market for corporate acquisitions. Mandelker (1974) and Asquith (1981) argue that the lack of significant positive abnormal performance on average for bidding firms is consistent with perfect competition in the acquisitions market. This evidence is consistent with

homogeneous stockholder wealth maximizing bidders and rivalry. It is not, however, a direct test of rivalry in the acquisition market. For example, an entry restriction could prevent potential bidders from advancing higher offers.

Ellert (1976) presents data which is inconsistent with Mandelker's findings in that bidding firms realize significant positive abnormal returns from mergers. Also, Ellert uses the behavior of the common stock return of acquired firms to infer competition in the acquisition market. Specifically, he notes that while acquired firms gain over the seven months preceding the merger, these gains are offset by prior abnormal losses. He concludes that these results are consistent with competition in the acquisitions market since the acquired firms receive "the value of the asset bases under more efficient management". Ellert's evidence is consistent with the payment of premiums by bidding firms, but does not imply that the market for corporate acquisitions is rivalrous.

Other authors, for example, Dodd and Ruback (1977) and Bradley (1980) examine the equity value changes associated with tender offers. These papers attempt to infer the degree of competition in the acquisitions market by noting that the positive abnormal return is higher for target firms than it is for bidding firms. In a rivalrous acquisition market, both bidding and target firms can realize positive abnormal returns. The definition of rivalry under stockholder wealth maximization implies that the gains to the successful target are bounded by zero and the difference between the value of the target to the successful bidder and the target's next highest

value use. The proportion of gains which accrue to the bidder and target, however, provides no basis for assessing rivalry in the acquisitions market since any split is feasible.

Rivalry in the takeover market cannot be assessed by examining the stock market reaction of the successful bidding and target firms unless the bidders are identical and wealth maximizing. An alternative method of assessing rivalry in the acquisitions market, developed in section 3, focuses on the potential gains to unsuccessful bidders at the successful offer price. Under the joint hypothesis of rivalry and stockholder wealth maximization, this potential gain should be non-positive. If the alternative objective of managerial welfare maximization is assumed, the potential gains for unsuccessful bidders should be less than the gains for successful bidders. The empirical results presented in section 5 are inconsistent with rivalry under stockholder wealth maximization, but are consistent with rivalry under managerial welfare maximization.

2. Defining the Concepts

2.1 Rivalry under stockholder wealth maximization

The first condition of rivalry when the manager's objective is assumed to be stockholder wealth maximization is that the owners of target firms are only concerned about the offer price; among competing bids for the same target firm, the highest bid is selected. Denoting P_i as the price per share offered by firm i,

$$P_s \geq P_i \quad \text{for} \quad i \neq s \quad \text{and} \quad i \in N \tag{1}$$

where the subscript "s" denotes the successful firm and N is the set of potential bidders.

The second component of rivalry incorporates the assumption that the bidding firm's management is wealth maximizing; negative net present value offers are not made. Defining $G_i(P_i)$ as the gain, or net present value to firm i from acquiring a given target firm at price P_i, this condition is

$$G_i(P_i) \geq 0 \ . \tag{2}$$

In a rivalrous market, any firm which could gain by acquiring the target firm at a price higher than the existing best offer advances a higher bid. This process continues and the offer price is bid up until only one firm, the successful bidder, realizes a gain from the acquisition. The price of the acquired firm, P_s, is set such that

$$G_i(P_s) \leq 0 \quad \text{for all} \quad i \neq s \quad \text{and} \quad i \in N \tag{3}$$

Equation (3) states that the takeover would be a non-positive net present value investment at the successful offer price for every firm except the successful bidder.

Equations (1) through (3) define rivalry when managers maximize stockholder wealth. The definition requires that firms take advantage of all profitable op-

portunities. Rivalry, therefore, excludes negative net present value takeover bids, collusion among bidders, and strategic behavior. Rivalry excludes, for example, the situation in which firm r does not bid up the price of the target even though the takeover would be a positive net present value investment at the current offer price. This could occur when firm r believes that the gains to its rival bidder, firm s, exceeds the gains to firm r, that is, $G_s(P_s) > G_r(P_s) > 0$. Firm r could rationally choose not to bid because it believes that firm s will be the successful acquirer. Equation (3) prohibits this type of behavior: rivalry requires that firms bid for targets whenever the takeover is a positive net present value investment at the highest outstanding offer price.

Equation (3) applies to all firms able to advance a takeover bid and the concept of free entry is represented by allowing the number of potential acquiring firms, N, to include all economic agents. If free entry is assumed, (3) applies to all firms, including firms which did not actually advance a bid. This concept of rivalry under free entry means that even if only one bid is observed for a given target, the bid price ensures that no gains are available to any other potential bidder at the bid price. Also, the definition of rivalry under shareholder wealth maximization embodied in conditions (1), (2), and (3) implies that

$$G_s(P_s) \geq G_i(P_s) \quad \text{for all} \quad i \neq s \quad \text{and} \quad i \in N \quad . \tag{4}$$

This implication and the assumption that the takeover is a positive net present value investment for the successful bidder implies that resources go to their highest valued use.

With free entry and rivalry under stockholder wealth maximization, the successful bidder realizes non-negative gains since equation (2) eliminates the possibility of negative net present value acquisitions. The gain to the successful bidder does not have to be zero; according to equation (3), the price of the target firm is no less than its value in its next highest valued application. Thus, unless the target is equally valuable to the successful bidder and at least one other bidder, the takeover is a positive net present value investment for the successful bidder. In the special case of homogeneous bidders, equation (2) and (3) hold as strict equalities and no rents are earned by the successful bidder.[1] This special case parallels the situation in which a competitive equilibrium is achieved by entry and exit of identical firms. Just as competition in the market for corn does not require equally efficient farmers, rivalry in the corporate acquisitions market does not require that the potential gains associated with the takeover of a given target be equal for all potential bidders. With the exception of the special case of homogeneous bidders, the successful bidder can realize positive firm specific rents in a rivalrous market for corporate acquisitions.

---

[1] See Fama and Laffer (1972).

2.2 Rivalry under managerial welfare maximization

In this section, rivalry in the market for corporate acquisitions is defined under the assumption that the management of firms maximize their own welfare. For target firms, the change in the objective function from stockholder wealth to managerial welfare does not have a major impact. In a tender offer the shareholders of the target firm are only concerned about the offer price and will tender their shares to the highest bidder; the target firm's management is not directly involved in the tendering decision.[1] Mergers allow target management to intervene in acquisitions since they have the option of not forwarding merger proposals to shareholder votes. The bidder, however, has the option of making a tender offer and thereby limiting the influence of the target's management. Thus, for both mergers and tender offers it is assumed that target firms select the highest offer price.

The managers of bidding firms maximize an objective function $W(X,E)$ where X is defined as the level of perquisite consumption and E is the value of the equity. The form of this objective function is determined by both the compensation scheme for management and the manager's tastes. The function is assumed to be increasing in both the level of perquisites and the equity value of the firm.

[1] The management of target firms often oppose tender offers. This behavior can be rationalized as an attempt to solicit a higher offer price or as a departure from shareholder wealth maximization. While these management positions may affect tendering behavior, no case in which a higher offer price was rejected in favor of a lower one is present in either the Dodd-Ruback (1977) or Bradley (1980) samples of tender offers. Of course, some bids are not made because of the opposition of the target management and this affects the wealth of the target shareholders. In this analysis the effect of eliminating potential takeover bids is treated as an entry limitation.

An acquisition changes both the level of perquisites and the equity value of the bidding firm. Since $W(X,E)$ is an increasing function of both its arguments, the managers of the bidding firm select the target that implies the highest level of perqusites from the set of targets which imply identical stock price changes. Similarly, for a fixed impact on perquisites, bidder management chooses the target which provides the greatest addition to equity value.[1] In general, the management favors any acquisition that increases its welfare. A condition for an acquisition, therefore, is:

$$\frac{\Delta W(X,E)}{\Delta A} = W_A(X_A,E_A) - W_o(X_o,E_o) > 0 \qquad (5)$$

where $\Delta W(X,E)/\Delta A$ denotes the change in managerial welfare that accompanies the acquisition, the subscript "0" denotes values before the acquisition and the subscript "A" denotes the values resulting from acquiring a particular target firm. Since $W(X,E)$ is an increasing function of both perquisites and equity value, acquisitions which decrease share value occur if the increase in the level of perquisites is sufficient to increase management's welfare.

More formally, the change in management's welfare from an acquisition is:

$$\frac{\Delta W(X,E)}{\Delta A} = \frac{\Delta W}{\Delta X}\frac{\Delta X}{\Delta A} + \frac{\Delta W}{\Delta E}\frac{\Delta E}{\Delta A} \qquad (6)$$

---

[1] This analysis ignores potential wealth transfers between stockholders and debtholders resulting from takeovers. The empirical evidence presented in Kim and McConnell (1977) indicates that mergers do not have a significant impact on bond returns. This evidence implies that the agency costs of debt are not an important consideration in takeovers.

An acquisition occurs only when $\frac{\Delta W}{\Delta A} > 0$. The change in equity value resulting from the acquisition, $\frac{\Delta E}{\Delta A} = G_i(P)$, can be negative, if, for example, a sufficiently big premium is offered for target shares. An acquisition in which $\frac{\Delta E}{\Delta A} < 0$ will occur only if the first term on the right-hand side of (6) is greater than the absolute value of the second term on the right-hand side of (6).

Once a target firm is selected, the change in the level of perquisites, $\frac{\Delta X}{\Delta A}$, is fixed. The change in the manager's welfare, however, is not fixed. Changes in the offer price affect the equity value of the bidder, and thereby affect the welfare of the manager. Increases in the offer price decrease the net present value of the acquisition, $\frac{\Delta E}{\Delta A}$.

The tradeoff between perquisites and equity value is determined by the form of the manager's objective function and it is possible that a manager's welfare could increase even if an acquisition resulted in a decrease in equity value. Several considerations, however, limit the ability of managers to engage in negative net present value investments. First, as noted by Jensen and Meckling (1976), the stockholders of the bidding firm have an incentive to monitor the behavior of its management. Second, competition in the managerial labor market limits the departures from value maximization.[1] Third, institutional and legal factors also limit the departure from value maximization. Fourth, firms that engage in substantially negative net present value takeovers could themselves become targets of takeover bids. These considerations limit, but do not eliminate, departures from value maximization by the management of bidding firms.[2]

---

[1] See Fama (1980)

[2] Jensen and Meckling (1976) show that the divergence between the objectives of the managers and shareholders results in a reduction in firm value and expenditures on monitoring and bonding the sum of which they define as the agency costs of equity.

The constraints imposed on managers that limit departures from shareholder wealth maximization are represented as a prohibition against engaging in acquisitions which decrease equity values by a given amount. For the acquisition by firm i to be allowed,

$$\frac{\Delta E_i}{\Delta A} > K_i \ . \qquad (7)$$

If managers were prohibited from engaging in negative net present value takeovers, K_i would equal zero. Under the assumption of constrained managerial welfare maximization which allows for deviations from stockholder wealth maximization, K_i will be negative. In general, the value of K_i is specific to each bidding firm. While this representation of the monitoring function is simplistic, it restricts management from solely maximizing its welfare.

Combining the notion of welfare maximization by the management of bidding firms and the monitoring constraints they face provides the definition of rivalry. In a rivalrous market where managers maximize their own welfare, the offer price for a given target firm is bid up to the point whre at least one of the following holds:

$$\frac{\Delta W_i(X_i, E_i(P_s))}{\Delta A} \leq 0 \quad \text{or} \quad \frac{\Delta E_i}{\Delta A} < K_i \quad \text{for all} \quad i \neq s \text{ and } i \in N \qquad (8)$$

At the successful offer price, only the management of the successful bidder realizes an increase in welfare and does not violate its monitoring constraint.

The condition for rivalry under the stockholder wealth maximization objective (3) and the condition for rivalry under the managerial welfare maximization objective (8) are similar. Indeed, equation (8) reduces to equation (3) when maximizing the welfare of the managers is consistent with shareholder wealth

maximization.[1] The amount of rivalry between bidders is the same under both objective functions, although the rivalrous activity is focused differently: equation (3) presumes that the rivalry is focused on the net present value of the takeover, whereas equation (8) presumes that the rivalry focuses on the change in managerial welfare resulting from the takeover.

Equations (3) and (8) also differ in their implications for resource allocation. Under stockholder wealth maximization, rivalry implies that resources flow to their highest valued use. With the objective of managerial welfare maximization, this is not an implication of rivalry. For example, suppose that firms A and B, are bidding for the same target firm. The managers have identical tastes and income but are subject to different monitoring functions: $K_A = -\$100$ and $K_B = 0$. Further, for firm A the acquisition is a zero net present value investment at the current market price of the target, whereas acquiring the target at the current market price has a net present value of \$50 for firm B. Also, assume that the welfare of the managers of both firms A and B increases if the successful offer price is less than \$60. Under these conditions, firm A will acquire the target by offering a premium in excess of \$50.

---

[1] The objective of managerial welfare maximization is consistent with stockholder wealth maximization when $\frac{\Delta W(X,E)}{\Delta A} = \frac{\Delta E}{\Delta X}$. Equation (6) shows that this condition is met when $\frac{\Delta W}{\Delta E} = 1$ and $\frac{\Delta W}{\Delta X} = 0$ or $\frac{\Delta X}{\Delta A} = 0$. Also, when the two objective functions are consistent, $K_i = 0$ for all firms and the second part of (8) is equivalent to (2).

Other examples in which resources do not flow to their highest valued use under the objective of managerial wealth maximization can be easily constructed. Without the implication that resources flow to their highest valued use, it is difficult (if not impossible) to test for rivalry in the market for corporate acquisitions because the welfare function of managers of bidding firms and the associated monitoring functions are not directly observable. To test rivalry under this objective function it is necessary to impose two additional conditions: (1) the welfare of all managers changes by the same amount as a result of an acquisition and (2) all managers face the same monitoring constraints. Under these conditions, the bidding firm which realizes the largest gain (or smallest loss) will acquire the target firm,

$$G_s(P_s) \geq G_i(P_s) \quad \text{for all} \quad i \neq s \quad \text{and} \quad i \in N \quad . \tag{9}$$

3. A Procedure for Testing Rivalry in the Takeover Market

The tests of rivalry under both the stockholder wealth and managerial welfare maximization objectives require an estimate of the net present value of the acquisition for unsuccessful bidders at the successful offer price. For rivalry under stockholder wealth maximization the test examines the empirical validity of condition (3) which states that the successful bid price exhausts all potential gains for every bidder except the successful bidder. To test rivalry under managerial welfare maximization equation (9) is empirically assessed. While actual competition for a given target in the form of competing bids is not required by either form of rivalry, these competing bids provide the basis for testing these hypotheses.

The potential gain for the unsuccessful bidder (firm u) from making a takeover offer at any given price $\$P_2$ can be measured as

$$G_u(P_s) = G_u(P_1) - n(P_s - P_1) \tag{10}$$

where n is the number of target shares sought by the bidders. That is, the potential gain to firm u from making a bid of $\$P_s$ is the net present value of the takeover if it was successful at $\$P_1$ less the larger cash outflow from the higher offer price. For example, the gain from a successful offer at $\$P_s$ could be evaluated by estimating $G_u(0)$, the gross present value of the takeover, less the acquisition costs $\$nP_s$. This construction highlights the requirement for a measure of the gains to the unsuccessful bidder from making an offer at some price; the methodology requires an observation for $G_u(P_1)$ for the unsuccessful bidder.

When there is explicit rivalry between bidders for a given target, the gain at the lower unsuccessful offer price for the unsuccessful bidder

can be estimated. If the bid of $\$P_1$ by the unsuccessful firm is unanticipated and the market presumes that the bid will be successful, $G_u(P_1)$ can be measured as the increase in the equity value of firm u associated with its bid of $\$P_1$ and $G_u(P_s)$ can be expressed in terms of observable data.

More specifically, suppose that equilibrium security returns are described by the market model,[1]

$$\tilde{r}_{jt} = \alpha_j + \beta_j \tilde{r}_{mt} + \tilde{\varepsilon}_{jt} \qquad (11)$$

where

r_{jt} = continuously compounded rate of return of security j over day t

r_{mt} = continuously compounded rate of return of a value weighted market portfolio over day t

β_j = covariance $(\tilde{r}_{jt}, \tilde{r}_{mt})$/variance$(\tilde{r}_{mt})$

$\alpha_j = E(\tilde{r}_{jt}) - \beta_j E(\tilde{r}_{mt})$

$\tilde{\varepsilon}_{jt}$ = disturbance term of security j on day t and $E(\tilde{\varepsilon}_{jt}) = 0$

---

[1] See Fama (1976, pp. 63 - 132) for a discussion of this model.

The market model (10) is estimated on 300 daily observations over the period 408 trading days before the takeover announcement through 108 days before the announcement.[1] These coefficient estimates are used to predict equilibrium returns around the announcement of a takeover and the prediction errors, (actual returns less predicted returns) are used as a proxy for abnormal returns.

Under the assumptions that the tender offer is unanticipated and the market presumes that the offer will be successful, the net present value of the offer is measured as

$$G_u(P_1) = E_{\tau-1} \cdot PE_\tau$$

where $E_{\tau-1}$ is the equity value on the day before the announced offer and PE_τ is the prediction error on the announcement day.

Previous empirical work indicates that the announcement of a tender offer is anticipated. For example, the results of Bradley (1980) suggests that information leakage regarding a tender offer occurs over the five days before the Wall Street Journal announcement. This leakage is incorporated into the analysis by summing the prediction errors over the period five days before the announcement through the announcement day. Defining this sum as

---

[1] Since the last trades of common stocks occur at different times, nonsychronous trading problems are present in daily stock return data. Scholes and Williams (1977) show that this causes bias in market model coefficients and present efficient estimators of the coefficients. This paper uses these efficient coefficient estimators.

$CPE_{t-5,t}$, the cumulative prediction error from $t-5$ through t , the gain is estimated as

$$G_u(P_1) = E_{t-6} \cdot CPE_{t-5,t} \quad .$$

The remaining difficulty in measuring the potential gains for unsuccessful bidders is the assumption that the market presumes that every tender offer will be successful. It is unlikely that this assumption is valid. Defining π_S as the probability that a given offer is successful, and abstracting from transactions costs, the measured change in equity values is,

$$E_{t-6} \cdot CPE_{t-5,t} = \pi_s G_u(P_1) \quad . \tag{12}$$

Unfortunately, I know of no procedure that provides an estimate of π_s . However, since π_s is between zero and one, the observed changes in equity values provide a bound on $G_u(P_1)$, and therefore provide a means of testing the hypothesis. Substituting the value of $G_u(P_1)$ in (12) into (10) yields

$$G_u(P_s) = \frac{E_{t-6} CPE_{t-5,t}}{\pi_s} - N(P_s - P_1) \quad . \tag{13}$$

If $CPE_{t-5,t}$ is negative, values of π_s less than one makes $G_u(P_s)$ smaller whereas if $CPE_{t-5,t}$ is positive, values of π_s less than one makes $G_u(P_s)$ larger. For rivalry under stockholder wealth maximization, $G_u(P_s)$ should be less than zero, and for rivalry under managerial welfare maximization, $G_u(P_s)$ should be less than $G_s(P_s)$. Thus, if $CPE_{t-5,t}$ is positive and the data are inconsistent with the hypothesis assuming π_s equals one, the data will also be inconsistent

for any value of π_s between zero and one. Similarly, if the data are consistent with rivalry under managerial welfare maximization when the calculation of $G_u(P_s)$ assumes π_s equal to one and $CPE_{t-5,t}$ is negative, the data will be consistent for any value of π_s. For rivalry under stockholder wealth maximization, negative values of $CPE_{t-5,t}$ violate the assumption of positive net present value bids and thus are inconsistent with the hypothesis.

There are two instances in which the data cannot unambiguously be classified as consistent or inconsistent with a given hpothesis: (i) $CPE_{t-5,t}$ is negative and the assumption of π_s equals one leads to a rejection of the hypothesis, and (ii) $CPE_{t-5,5}$ is positive and the data are consistent with hypothesis when π_s equals one. In both of these instances, there are values of π_s which reverses the result. These values can be derived from (13).

The test of rivalry under managerial welfare maximization requires a measure of $G_s(P_s)$ in addition to $G_u(P_s)$. The ex-ante probability of success for offers which are ex-post successful is not unity. However, the stock returns for the successful bidder over the period that the offer is outstanding incorporate the revisions in probability to one. Thus, the net present value of the acquisition for successful bidders are measured as

$$G_s(P_s) = E_{t_1-6} \cdot CPE_{t_1-5,t_2}$$

where t_1 is the announcement day of the first offer and t_2 is the day the successful outcome is announced.

4. Data

The test of rivalry in the acquisitions market requires competing bids for target firms. The empirical tests, therefore, examine interfirm tender offers. These data are particularly well suited for this test because the competitive bidding is accomplished by the public announcements of offers.

The data are derived from the tender offer samples used in Dodd and Ruback (1977) and Bradley (1980). The following criteria are used to select a subset of tender offers which are appropriate for this application:

1) There must be at least two bidders for the same target.
2) There must be a clear victor among the bidders. Offers in which all bidders are unsuccessful are excluded.
3) The successful offer and unsuccessful offers must be for cash.
4) The unsuccessful bidder must be listed on the New York or American Stock Exchanges and the offer must be after July 1, 1962.

The first three criteria are required by the structure of the test and the fourth requirement enables the use of the CRSP daily return files.[1] This selection process results in a sample of 22 unsuccessful bidders. Corresponding to the 22 unsuccessful bidders are 14 successful bidding firms which are listed in the daily returns filed. In two cases, two of the unsuccessful bids are for the same target and thus the tests of relative rivalry involve 16 comparisons.

---

[1] Center for Research in Security Prices of the University of Chicago.

5. Empirical Results

5.1 An Overview

Tables 1 and 2 summarize the abnormal returns associated with the announcement of tender offers by the 22 unsuccessful bidders in the sample. Table 1 presents the cumulative average prediction errors for event related time periods. These cumulative average prediction errors, which proxy for abnormal returns, are calculated by averaging the individual firm prediction errors on each event day across firms, and summing these average prediction errors over event time. Table 2 contains the frequency distribution of the event period abnormal performance.

The first line of Table 1 indicates that shareholders of unsuccessful bidding firms realize, on average, a positive abnormal return of 1.75 percent over the event period with a t-statistic of 1.63.[1] On the day of the public announcement (ED) these bidding firms earn 0.52 percent. The negative performance of -1.40 percent over the first five days following the announcement and -1.94 in the next five days reflects the information that a higher bid, by a competing bidder, is advanced. The results indicate, therefore, that positive performance is associated with the announcement of a tender offer and negative abnormal returns result from the occurence of competing bids.

---

[1] The t-statistics are calculated as

$$T = CAPE_{\tau_1,\tau_2} / \sqrt{T \cdot Var(APE_\tau) + 2(T-1)\, Cov(APE_\tau, APE_{\tau+1})}$$

where $T = \tau_2 - \tau_1 + 1$. The covariance term in the measure of the standard deviation adjusts for the first order serial dependence in the average prediction errors from the Scholes and Williams Market Model. The variance and covariance of the prediction errors are estimated using 48 prediction errors over the period t-108 through t-61.

Table 2 contains a frequency distribution of the event period abnormal performance. While the average event period abnormal return is 1.74 percent, 59 percent of the observations are negative. For most of the firms in the sample the tender offer did not have a positive expected net present value even before the competing bids were released. Indeed, the average dollar change in equity values over the event period is -$1.95 million.[1] This suggests that firms with large equity values tend to make negative net present value bids, whereas the tender offers by small bidders tend to result in positive abnormal performance.

---

[1] The average abnormal dollar change in equity values over the event period is estimated as:

$$\frac{1}{N} \sum_{j=1}^{N} E_{jt-6} \cdot CPE_{jt-5,t}$$

where E_{jt-6} the price of firm j six days before the offer.

Table 1

Percentage Cumulative Average Prediction Errors
for 22 Unsuccessful Tender Offer Announcements

	Cumulative Average Prediction Error	t-Statistic
Event period ED-5 through ED[a]	1.75	1.63
ED-60 through ED-21	- 3.34	- 1.22
ED-20 through ED-11	0.26	0.19
ED-10 through ED- 6	- 0.90	- 0.92
ED- 5 through ED- 1	1.23	1.25
ED	0.52	1.12
ED+ 1 through ED+ 5	- 1.40	- 1.42
ED+ 6 through ED+10	- 1.94	- 1.97
ED+11 through ED+20	0.06	0.04
ED+21 through ED+60	1.96	0.71

[a]ED is the day on which the tender offer was announced in the Wall Street Journal.

Table 2

Frequency Distribution of Event Period Abnormal Performance for the Sample of 22 Unsuccessful Tender Offers[a]

Abnormal Performance Range in Percent	Absolute Frequency	Relative Frequency
10.0 < X < 20.0	5	22.7%
5.0 < X < 9.99	1	4.5%
2 < X < 4.99	1	4.5%
1 < X < 1.99	2	9.1%
0 < X < 0.99	0	0
- 0.99 < X < 0	2	9.1%
- 1.99 < X < - 1.0	4	18.2%
- 4.99 < X < - 2.0	5	22.7%
- 9.99 < X < - 5.0	1	4.5%
-20.0 < X < -10.0	1	4.5%
TOTAL	22	100 %

[a]The event period is defined as ED-5 through ED, where ED is the day on which the tender offer was announced in the Wall Street Journal.

5.2 A Test of Rivalry Under Stockholder Wealth Maximization

Rivalry under stockholder wealth maximization implies that the price of the target firm rises until it is a non-negative net present value investment for the successful bidder and a non-positive net present value investment for all unsuccessful bidders. Using the methodology described in Section 4, the net present value of the takeover is estimated for each of the 22 unsuccessful bidders in the sample. These results are presented in Table 3.

At first glance, the results in Table 3 seem consistent with the hypothesis of rivalry under stockholder wealth maximization. The first column of Table 3 indicates that the potential gain to the unsuccessful bidders, $G_u(P_s)$, (calculated under the assumption that the probability of success, π_s, is one) is negative in 18 of the 22 observations. However, for 13 of these observations (column one, row one of Table 3), the negativity of $G_u(P_s)$ does not depend on π_s because the measured stock market reaction to the announcement of the bid by the unsuccessful bidder, $G_u(P_u)$, is negative. These 13 observations, therefore, violate the condition that all offers are, ex ante, positive net present value investments and are inconsistent with the objective of stockholder wealth maximization.[1]

For five observations the value of $G_u(P_s)$ would switch from negative to positive for probabilities of success less than one (column one, row two of Table 3). The minimum value of π_s for these five observations to be

[1] It is possible that the offers were positive net present value investments ex ante, but information regarding the failure of the bid became available on the announcement day. One obvious piece of information which would cause a downward revision in the probability of success is the annnouncement of a higher competing bid. Fortunately this did not occur in the 22 unsuccessful offers examined in this paper.

consistent with rivalry under stockholder wealth maximization averages 0.48. Since values of π_s below 0.48 are plausible, the consistency of the observations with the hypothesis is questionable. Also, even under the assumption that π_s equals one, the value of $G_u(P_s)$ are only 1.30 standard deviations below zero on average.[1]

Finally, the potential gain to the unsuccessful bidders is positive for four observations (column two, row one of Table 3). In these four observations the unsuccessful bidders did not match the successful offer price even though the data indicates that the takeover would have been a positive net present value investment at the successful offer price. These four observations, therefore, are inconsistent with rivalry under stockholder wealth maximization. Thus, since (i) the premise of stockholder wealth maximization is violated in 13 observations; (ii) four observations are unambiguously inconsistent with the hypothesis and (iii) the remaining five observations provide only questionable support for the hypothesis, the data indicate that rivalry under shareholder wealth maximization is not a useful description of the acquisition market.

---

[1]The standard deviation for the potential gain is estimated as:

$$E_{t-6}\sqrt{T \cdot Var(PE_\tau) + 2(T-1)Cov(PE_\tau, PE_{\tau+1})}$$

where T is the length of the cummulation interval (six days) and the variance and covariance of the prediction errors are estimated using 48 prediction errors over the period t-108 through t-61.

Table 3

Frequency of negative and positive potential gains to unsuccessful bidders at the successful offer price, $G_u(P_s)$[a/]

	$G_u(P_s) < 0$	$G_u(P_s) \geq 0$
Number of observations in which the direction of the inequality does not depend on π_s [b/]	13	4
Number of observations in which the direction of the inequality does depend on π_s [c/]	5	0

[a/] The potential gains to the unsuccessful bidders at the successful offer price is calculated as

$$G_u(P_s) = \frac{E_{t-6} CPE_{t-5,t}}{\pi_s} - n(P_s - P_u)$$

where E_{t-6} is the equity value of six days before the announcement of the unsuccessful bid, $CPE_{t-5,t}$ measures the abnormal stock return of the unsuccessful bidders, π_s is the ex-ante probability that the offer will be successful, n is the number of target shares tendered for, P_s is the successful offer price and P_u is the unsuccessful offer price. In the calculations summarized in this table, π_s is assumed to equal one.

[b/] The direction of the inequality will not depend on π_s when $G_u(P_s)$, based on π_s equal to one, and $CPE_{t-5,t}$ are of the same sign.

[c/] The direction of the inequality will depend on π_s when $G_u(P_s)$, based on π_s equal to one, and $CPE_{t-5,t}$ are of different signs.

5.3 A Test of Rivalry Under Managerial Welfare Maximization

The test of rivalry under managerial welfare maximization involves the comparison of the potential gains to the unsuccessful bidder and corresponding actual gain to the successful bidder. Specifically, this hypothesis, in the special case of homogeneous managers and monitoring constraints, implies that

$$G_i(P_s) < G_s(P_s) \quad \text{for all} \quad i \neq s \ .$$

Since the tests require stock price data on both the successful and unsuccessful bidders, the analysis is restricted to 16 observations.

The average gain to the 14 successful bidders in the sample, measured as the value of cumulative abnormal performance from five days before its first bid through the outcome announcement date, is about $6.1 million.[1] The abnormal performance is negative for 5 of the 14 observations. It appears, therefore, that the negative announcement effects observed for unsuccessful bidders is not observed for successful bidders.

The comparisons between the potential gains to the unsuccessful bidders and the gains to the successful bidders are tabulated in Table 4. Column one of Table 4 indicates that gains to the successful bidder exceed the measured potential gains to the unsuccessful bidder in 11 out of 16 cases. Furthermore, the average difference between the gains to the successful and unsuccessful bidders is 20.6 million which is 0.50 standard deviations above zero on average.

---

[1] In two cases, three bidders competed for the same target. Thus, there are 14 successful bidders, but 16 comparisons between successful and unsuccessful bidders.

In 9 out of the 11 cases in which the data is consistent with rivalry under managerial welfare maximization, the observed change in equity values for the unsuccessful bidder is negative (column one, row one of Table 4) and the consistency of the data with the hypothesis will hold for any probability of success. In the two unsuccessful offers with a positive announcement effect, the probability of success, π_s, would have to be less than 0.20 for the implication to change. Similarly, in three of the five cases which are inconsistent with the hypothesis (column two, row one of Table 4), the change in the equity value of the unsuccessful bidders is positive and thus are inconsistent with the hypothesis for any π_s. For the remaining two observations inconsistent with rivalry under managerial welfare maximization, the data imply consistency with the hypothesis for probabilities of success less than 0.08 in one case and less than 0.67 in the other.

While there is no method to extract a measure of the probability of success for a given tender offer, the proportion of successful and unsuccessful offers reported in Dodd and Ruback suggests that the unconditional probability of success is about 0.72. It seems reasonable, therefore, to presume that extreme values ($\pi_s < 0.20$) are unlikely. This assumption implies that 12 out of 16 observations are consistent with rivalry under managerial welfare maximization.

Table 4

Comparisons of the potential gains to unsuccessful bidders at the successful offer price, $G_u(P_s)$, and the gains to successful bidders, $G_s(P_s)$ [a/], [b/]

	$G_u(P_s) < G_s(P_s)$	$G_u(P_s) > G_s(P_s)$
Number of observations in which the direction of the inequality does not depend on π_s [c/]	9	3
Number of observations in which the direction of the inequality does depend on π_s [d/]	2	2

[a/] The potential gains to the unsuccessful bidders at the successful offer price is calculated as

$$G_u(P_s) = \frac{E_{t-6} CPE_{t-5,t}}{\pi_s} - n(P_s - P_u)$$

where E_{t-6} is the equity value of six days before the announcement of the unsuccessful bid, $CPE_{t-5,t}$ measures the abnormal stock return of the unsuccessful bidders, π_s is the ex-ante probability that the offer will be successful, n is the number of target shares tendered for, P_s is the successful offer price and P_u is the unsuccessful offer price. In the calculations summarized in this table, π_s is assumed to equal one.

b/ The gain to successful bidders is measured as

$$G_s(P_s) = E_{t_1-6} CPE_{t_1-5,t_2}$$

where E_{t_1-6} is the equity value six days before the announcement of the first offer by the successful bidder and CPE_{t_1-5,t_2} is the cumulative abnormal return from five days before the announcement of the offer through the announcement that the offer was successful.

c/ When $G_u(P_s)$ is calculated under the assumption that π_s equals one the direction of the inequality will not depend on π_s if $G_u(P_s) - G_s(P_s)$ and CPE_{t_1-5,t_2} are of the same sign.

d/ When $G_u(P_s)$ is calculated under the assumption that π_s equals one, the direction of the inequality will depend on π_s if $G_u(P_s) - G_s(P_s)$ and CPE_{t_1-5,t_2} are of different signs.

6. Conclusion

This paper defines the concept of rivalry in the market for corporate acquisitions under two different objective functions: stockholder wealth maximization and managerial welfare maximization. Rivalry under stockholder wealth maximization implies that the price paid for the target firm is bid up until the acquisition is a non-negative net present value investment for only the successful bidder. This form of rivalry cannot be empirically tested by examining the gains to successful bidders; rather, examining the potential gains at the successful offer price for unsuccessful bidders provides a test of this rivalry hypothesis.

Rivalry under managerial welfare maximization does not assume that bidders maximize equity values and admits the possibility of negative net present value acquisitions. The managers of bidding firms are assumed to maximize their welfare function subject to a monitoring constraint. With this objective function, rivalry implies that, among firms which are not excluded from bidding because of their monitoring constraint, the bidder which realizes the largest increase in managerial welfare from the acquisition will be successful. Since the manager's welfare function and the monitoring constraints cannot be observed, additional restrictions are required to extract empirical implications for this hypothesis. With the additional assumptions of homogeneous welfare and monitoring functions, rivalry implies that the net present value of the acquisition for the successful firm exceeds the net present value for all other bidders at the successful offer price.

Using data for 22 unsuccessful tender offers, the rivalry hypotheses are empirically explored. While this analysis is not a definitive test of these

hypotheses because of the special nature of the sample and difficulties in measuring the net present value of proposed acquisitions, it is suggestive. Rivalry under stockholder wealth maximization does not seem to be a good description of the data because the net present value of most of the tender offers appears to be negative, thereby violating an essential premise of the hypothesis. The data does seem consistent with the restricted form of rivalry under managerial welfare maximization since the gains to the successful bidders exceed the potential gains to the unsuccessful bidders.

The consistency of the data with rivalry under managerial welfare maximization and its inconsistency with rivalry under stockholder wealth maximizing has implications for the analysis of the market for corporate control. First, since acquisition attempts seem to be negative net present value investment for bidding firms, the notion that takeovers are motivated by wealth increasing inovations, such as replacing inefficient target management, is questionable. For example, it is possible that takeovers decrease the productivity of the target's assets and that the large premiums paid to target shareholders represent a failure of the market for corporate control; if the market for corporate control forced managers to behave in the best interests of the shareholder, bidding firms would be acquired and no negative net present value acquisition would be attempted. Second, rivalry under managerial wealth maximization does not insure that resources are allocated to their most productive use. Reliance on the observed rivalry in the market for corporate control to monitor management and allocate resources is, therefore, unfounded.

The special nature and small size of the sample used in this empirical analysis, however, limits the generality of the results. The observed ex-ante negative net present value for a majority of the tender offer bids in the sample is particularly unsettling since it differs from other studies of wealth affects of tender offers which are based on much larger samples. None of these studies, however, report frequency distributions of the abnormal performance; the extent to which tender offer bids are an ex-ante positive net present value investment is an unresolved empirical question. The primary concern of this paper, however, is to develop a definition of rivalry in the market for corporate acquisitions and to suggest a method of empirically assessing it.

References

Asquith, K.P., "A Two-Event Study of Merger Bids, Market Uncertainty, and Stockholder Returns," unpublished paper, Harvard University, July 1981.

Bradley, M., "Inter-firm Tender Offers and the Market for Corporate Control," Journal of Business, (1980), pp. 345-376.

Dodd, P., "Merger Proposals, Management Discretion and Stockholder Wealth," Journal of Financial Economics, (1980), pp. 105-137.

Dodd, P. and Ruback, R., "Tender Offers and Stockholder Returns: An Empirical Analysis," Journal of Financial Economics, (1977), pp. 351-373.

Ellert, J., "Mergers, Anti-trust Law Enforcement and Stockholder Returns," Journal of Finance, (1976), pp. 715-732.

Fama, E., "Agency Problems and the Theory of the Firm," Journal of Political Economy, (1980), pp. 288-307.

Fama, E., The Foundations of Finance, Basic Books, New York, (1976).

Fama, E., "The Effects of a Firm's Investment and Financing Decisions on the Welfare of its Security Holders," American Economic Review, (1978) pp. 272-284.

Fama, E. and Laffer, A., "The Number of Firms and Competition," American Economic Review, (1972), pp. 670-674.

Jensen, M., and Meckling, W., "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," Journal of Financial Economics, (1976), pp. 305-360.

Kim, H. and McConnell, J., "Corporate Mergers and Co-Insurance of Corporate Debt," Journal of Finance, (1977) pp. 349-363.

Mandelker, G., "Risk and Return: The Case of Merging Firms," Journal of Financial Economics, (1974), pp. 303-335.

Manne, H., "Mergers and the Market for Corporate Control," Journal of Political Economy, pp. 110-120.

Scholes, M. and Williams, J., "Estimating Betas from Nonsynchronous Data," Journal of Financial Economics, (1977), pp. 309-328.

Smiley, R., "Tender Offers, Transactions Costs, and the Theory of the Firm," Review of Economics and Statistics, (1976) pp. 22-32.

Date Due