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AN INTERVENTION APPROACH

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Abstract

Do Takeovers Create Value? An Intervention Approach

An unresolved issue in empirical research on corporate control is the extent to which takeovers improve target and bidder firm value. We provide estimates of value improvements that avoid the bidder-revelation bias present in previous studies. Our approach, the *intervention method*, is based on a model of the stock returns of an initial bidder when a competing bid occurs. We find five main results. First, investors perceive value improvements from cash tender offers on average to be large and positive (44.8% of target value). This is much larger than estimates based on initial bid returns. Second, in multiple bidder contests, profits on bidders' initial shareholdings in the target are on average 1.28% of target value. Third, there is no evidence that cash tender offer bidders profit from buying targets. Fourth, average estimated value improvements are similar pre- and post- Williams Act and associated legislation. Finally, estimated value improvements are similar magnitude for friendly and hostile transactions.

An unresolved issue in empirical research on corporate control is the extent to which takeovers improve target and bidder firm value. This problem is linked to important scientific and policy issues. From a scientific viewpoint, the magnitude of improvements provides information about agency problems or cognitive biases on the part of bidding and target managers. From a policy point of view, the size of the gains obviously bears on whether takeovers should be encouraged.[1] This study estimates average value improvements as perceived by investors to be on the order of 45% of the value of the target. This is much larger than estimates based on initial bid returns (on the order of 21% of target value). The estimated improvements using the intervention method are similar for hostile and friendly offers, and for pre-and post- Williams Act offers. This is smaller than, though not significantly different from the average bid premium, so there is no evidence that bidders are on average profiting by buying targets. However, most of the average successful bid premium can be explained by value improvement. Also, the estimated value improvements imply average profits from target shares owned by the bidder prior to the bid of 1.28% of target value.

Two main approaches have been followed to estimating value improvements from takeovers. The first is to examine abnormal stock returns to bidders and targets associated with the announcement and conclusion of an offer. Bradley, Desai and Kim (1988) find that the market-value-weighted average of bidder and target abnormal returns for successful takeovers during the period 1963-1984 is positive and stable over this period, with an average increase of 7.4% of combined bidder/target market value. Numerous studies find significant and large positive average abnormal returns for target shareholders.[2] The evidence regarding the profitability of takeovers for bidders is unclear. While some studies find small positive but statistically significant average abnormal returns, others find small negative and significant average abnormal returns, and still others document insignificant effects.

Several authors have emphasized that the bidder's abnormal return at the time of the bid gives a biased estimate of the market's valuation of the bidder's gain from takeover, because the form of the offer and the very fact of an offer may convey information about the bidder's stand-alone value.[3] For example, the fact of a bid may convey the good news that a bidder expects to have high cash flows, the bad news that the bidder has poor internal in-

[1]Of course, a full welfare analysis would take into account the disciplinary or distortive effect of the *threat* of takeovers on managerial behavior, the possibility of wealth redistribution between shareholders and other stakeholders, and costs of locating targets.

[2]Jensen and Ruback (1983) and Jarrell, Brickley, and Netter (1988) review this evidence; more recently, see Schwert (1996).

[3]See, e.g., Bradley, Desai and Kim (1983), Jensen and Ruback (1983), and Roll (1986).

vestment opportunities, or the bad news that the bidder's management has empire-building propensities. Similarly, a high premium can convey good or bad news about the bidder's stand-alone prospects. Also, theory suggests that the use of equity as a means of payment will convey bad news about the bidder, and the use of cash will convey good news, owing to adverse selection problems with equity issuance.[4]

The second approach used to estimate value improvement from takeover has been to examine accounting or other performance measures following completed transactions. Different studies have drawn very different conclusions about whether takeovers on average increase or decrease fundamental value. Healy, Palepu, and Ruback (1991), Jarrell (1996), Kaplan and Weisbach (1991), Opler and Weston (1990), and Jarrell (1996) find improvement in bidders' accounting performance measures. Bhagat, Shleifer, and Vishny (1990) find that target employee layoffs and bidder tax savings explain a moderate portion of hostile takeover premia.

However, Ravenscraft and Scherer (1987a,b) conclude that merging firms tend to do no better, and sometimes worse, than comparable non-merging firms.[5] Mueller (1985) finds post-acquisition market share losses for acquired firms. Some authors argue that divestitures are an indication that mergers are often inefficient (Porter [1987], Ravenscraft and Scherer (1987a).

Although such studies are quite informative, they general do not quantify the total value effect of takeovers. More importantly, these studies are potentially subject to the same revelation bias as stock market-based studies. Offers may reveal information about future accounting improvements which would have occurred even without a takeover. This paper examines stock price evidence, but attempts to avoid the revelation bias of previous studies. In doing so, it offers a method which may be useful in other contexts for disentangling revelation effects from value effects of discretionary corporate actions. Our approach, which we call the *intervention method*, focuses on the returns to the initial bidder when a competitor arrives. The associated stock return is informative about value improvement[6]

[4]See Myers and Majluf (1984), Hansen (1987), Fishman (1989), Eckbo et. al., (1990), and Berkovitch and Narayanan (1990), and the evidence of Franks et. al., [1988].

[5]A possible explanation for conflicting results is the choice of benchmark. Jarrell (1996) finds that after adjusting for analysts' pre-offer forecasts of profitability, takeovers improve long-term performance.

[6]The term "value improvement" in this paper refers to joint bidder and target shareholder gains. It therefore does not exclude redistributions from other claimants that raise shareholder value. These redistributions could be from target or bidder debtholders, employees, customers, or suppliers.

because the arrival of a second bidder has a large effect on the probability of the initial bidder's success. The abnormal return observed for the initial bidder at this event therefore implicitly reflects the size of the takeover improvement. Furthermore, this event does not occur at the discretion of the initial bidder; it is an *external intervention.* This is crucial, because it means that the arrival of a competing bid will reveal little or nothing about the stand-alone value of the initial bidder. The goal of the intervention method is to calculate the value improvement implied by the observed abnormal return of the initial bidder when a competing bid intervenes.

There are two crucial inputs to this calculation.[7] The first input is the effect of the arrival of a competing bid on the probability that the first bidder succeeds in acquiring the target. The second input is the effect of the arrival of a competing bid on the expected price that the first bidder will pay should it win the contest. Each of these quantities can be estimated directly from *ex post* data. Holding constant these quantities, the abnormal return is algebraically decreasing with the size of the takeover improvement. Inverting this relationship, the size of the takeover improvement can be inferred from the observed abnormal return. A numerical illustration is provided in the next section.

Intuitively, the hard part about estimating value improvements is that two very different scenarios are consistent with a negative market reaction. First, the acquisition may be increase value a lot for the first bidder and arrival of the second bidder decreases the probability that this value is realized by the first bidder. Second, the acquisition may decrease value for the first bidder, but the arrival of the second bidder elicits a higher successful premium from the first bidder. To disentangle the effects of shifts in success probability versus expected price paid, we model the relation between these parameters and stock prices.

Previous papers that have examined stock price reactions to events that interfere with takeovers have focused on testing for collusion and the effects of antitrust enforcement. Eckbo (1983) finds negative abnormal stock returns in merger bidders and targets on the announcement of an antitrust complaint. Wier (1983) finds negative abnormal stock returns in firms that are subject to antimerger lawsuits when the cases are decided against them. Our paper has a different focus, estimating value improvements from takeover and disentangling value changes from revelation effects.

The resulting estimates of value improvement lead to five main results. First, takeover improvements from cash tender offers are perceived by investors to be large and positive. We estimate takeover improvements to be positive in over 98% of our sample, and to be

[7] A third input, the initial shareholding of the first bidder in the target, turns out to be relatively unimportant.

on average 44.8% of target value. This is much larger than estimates based on initial bid returns of 21.7%. The conclusion that takeover improvements are on average positive is robust with respect to both model specification and empirically plausible variations in the estimated parameters.

Second, the average profits that bidders in multiple bidder contests can earn by improving the value of initial shareholdings are estimated as on average 1.28% of target value (median 0.00%). After excluding the majority of bidders whose initial holdings are zero, the mean (median) improvement is estimated as 3.36% (2.68%) of target value, or in dollar terms $5.86 million (median $3.15 million). The finding of a modest initial holdings profit is robust with respect to plausible estimates of value improvements.

Third, there is no evidence that cash tender offer bidder profit from buying targets. Average value improvements are moderately lower than, and not significantly different from, the average premia paid. Thus, most of the average successful premium paid can be explained by value improvement.[8]

Fourth, estimated average value improvements are similar pre- and post- Williams Act and associated legislation. This is interesting since several authors have documented changes in premia and several other takeover-related variables beginning at about this time (though there is not agreement as to the source of these changes). Our finding suggests that there may be equilibrating forces leading to approximate constancy in average value improvements as conditions in the corporate control market change.

Finally, value improvements seem to be of similar magnitude for friendly and hostile transactions. This suggests that both discipline of bad managers and the realization of synergies (business complementarities) may be important economic roles for takeovers.

The next section develops an empirical measure of value improvements. Section II describes the data. Results are presented in Section III. Section IV analyzes robustness and develops extensions. The final section concludes.

[8]This bears on the interpretation of studies of post-takeover performance. For example, Bhagat, Shleifer and Vishny (1991) point out that the gains from 1980's bustup takeovers may have been derived from selling off target assets at inflated prices. Kaplan and Weisbach (1991) estimate positive asset sale profits from acquisitions over several decades that were later divested. They also recognize that the possibility of systematic overpayment by later purchasers qualifies the conclusion that profitable acquisitions actually improved value. If overpayment was limited, the prices at which assets were sold during our sample period may not have been severely inflated.

I Empirical Measure of Value Improvements

A Numerical Illustration of the Intervention Method

Since competition reduces a first bidder's probability of success, *ceteris paribus* its stock price will drop if its value improvement is large compared to the expected price that will be paid, and rise if the value improvement is less than the expected purchase price. Thus the stock price reaction to a competing bid provides information about the value improvement. However, holding probability of success constant, competition should hurt the first bidder to the extent that he is forced to pay more when he wins. The problem for the intervention method is to disentangle these two effects.

The basic idea is best conveyed by a numerical example. We begin by illustrating the revelation bias inherent in the conventional approach to estimating takeover value improvements. We then show how the intervention method can eliminate this bias.

The Revelation Bias

Consider a bidder who does not own any shares of the target. To begin with, let there be no value improvement from successful takeover, so that stand-alone and post-takeover discounted value of target cash flows are both \$100. Suppose that prior to the initial bid, the market estimates the stand-alone value of the bidder to be \$200. Suppose that a bid reveals favorable news to the market about *stand-alone* bidder value, so that the post-initial-bid market assessment of stand-alone bidder value is \$250. The \$50 discrepancy is the effect the bid has on the market's assessment of stand-alone value.

The stock market's assessment of combined bidder-target value prior to the initial bid is

$$100 + 200 = 300.$$

Just after the initial bid, this assessment is revised to

$$100 + 250 = 350.$$

The combined bidder-target equity return will therefore be

$$\frac{350}{300} - 1 \approx 16.7\%.$$

If the revelation effect of the initial bid is ignored, this will be wrongly be attributed by researchers to a value improvement of $.166 \times \$300 = \$50$ (50% of target value), when in fact

the improvement is zero. As Roll (1986) points out, even a modest revelation effect for the bidder can create a large overestimate of the percentage improvement in target value from takeover, since on average bidders are much larger than targets.

The Intervention Method

The intervention method focuses on the period after the initial bid, when the market's assessment of stand-alone bidder value is \$250. We will compare a case of positive value improvement, where the value of the target managed by the bidder is \$140, with the case of zero improvement, where the post-takeover NPV of target cash flows if managed by the bidder is \$100. We begin with the positive improvement case.

Suppose that at the time of the initial offer, the probability of the initial bidder succeeding is .6, but that if a competitor makes a bid, this probability is only .4. (These overall probabilities take into account the possibility that a competing bid may be forthcoming.) Suppose that at the time of the initial offer, the expected price that the first bidder will have to pay *if he succeeds* is \$120, but that if a competitor arrives, this expected price paid by the first bidder rises to \$130. Based on this information, the stock price of the bidder after announcing his offer rises to

$$250 + .6(140 - 120) = 262.$$

If a competitor appears, the first bidder's stock price retreats to

$$250 + .4(140 - 130) = 254.$$

Thus, the first bidder's stock return on the arrival of a competing bidder is $(254-262)/262 \approx -3\%$.

The initial bidder's stock return reflects the facts that when a competing bid arrives, (1) the first bidder will have to pay more if he succeeds, and (2) the first bidder has a lower probability of succeeding. Clearly point (1) contributes negatively to the first bidder's return. Point (2) also contributes negatively to the stock return here, because a lower probability of success prevents the bidder from realizing profits. These profits are the difference between the improvement brought about by the first bidder and the expected price paid. Thus, *the first bidder's stock return on the arrival of a competing bid reflects the market's assessment of the value improvement that the first bidder can bring about.* Specifically, the larger the improvement, *ceteris paribus*, the more negative the return. And if the improvement is smaller than the expected price, then point (2) will contribute *positively* to the bidder's return.

These points are illustrated by making one change in the example. Suppose now that the takeover does not improve value, so the value of the target when acquired is the same as its stand-alone value of $100. Replacing $140 with $100 in the above calculations shows that the bidder's stock return on the arrival of a competing bidder is 0%. The negative effect of the higher price that will be paid in the event of success is offset by the positive effect of an increased probability of failure.

The intervention method uses *ex post* data to estimate the various parameters of this numerical example: the unconditional probability of success of an initial bidder, the probability of success given the arrival of a competitor, the unconditional expected price paid by an initial bidder given that he succeeds, and the expected price he pays if he succeeds given that a competing bid occurs. Given these parameters (along with the initial shareholding of the bidder in the target), the value improvement from the takeover implies a specific stock return for the first bidder. It is therefore possible to infer backwards from the observed stock return to the size of the value improvement.[9]

B Hypotheses

The primary issues to be examined are (1) do takeovers on average increase the joint value of the bidder and target firms?; and (2) do successful bidders on average gain from acquisitions? According to Roll's (1986) Hubris Hypothesis, there is no value improvement from takeover; takeovers occur because of positive valuation errors by bidding managers. Agency problems can also lead bidding managers to pay more for targets than they are worth (e.g., "empire-building," and misuse of free cash flow). We therefore call the hypothesis of zero value improvement the *Strong Agency/Hubris Hypothesis.* A weaker version would admit possible

[9]The above discussion is based an a sharp distinction between *creation* of value and *revelation* about value. It could be argued that an action can create value as a direct result of revealing value. If so, even a manager whose sole objective is to maximize fundamental value may take costly actions in order to reveal information. These issues are discussed in Appendix A. Our main point is that even if revealing information can affect fundamental value, it is still crucial to distinguish between value created and value revealed. Generally, these will be of different orders of magnitude and need not have the same sign. Thus, even in a signalling setting the increase in stock price associated with a corporate action is an invalid measure of the effect of that action on underlying value. Furthermore, even if signalling by making a takeover bid increases underlying value, this gain from signalling is not an actual benefit from combination. As discussed in Appendix A, the intervention method (1) is consistent with possible effects of value revelation on fundamental value; (2) is consistent with, but does not require signalling motivations; and (3) estimates only those value improvements that result from combination of the two firms, not those that result from value revelation.

gains from takeovers, but would assert that the price offered is so high that bidders, on average, make negative profits. We call this the *Weak Agency/Hubris Hypothesis.*

If the *Strong Agency/Hubris Hypothesis* obtains, the expected value of the target to the bidder is the pre-takeover market price of the target. If bidding costs are neglected, then the bidder makes negative profits equal in magnitude to the total premium paid for the purchased shares. If the *Weak Agency/Hubris Hypothesis* obtains, the bidder again makes negative profits. These profits include any value improvement in the initial shareholding of the bidder. Also, since tender offers are frequently for less than 100% of outstanding shares, estimated bidder profits will depend on the assumptions made about the price paid for remaining shares given that control is obtained.

For two reasons, the most natural assumption is that the same price is paid for holdouts as for the shares purchased in the tender offers.[10] First, fair-price antitakeover amendments require paying at least this much to minority shareholders. Second, even if the bidder is able to exploit control by expropriating minority shareholders, such opportunities for dilution should be fully reflected in the initial bid price, so that holdout shareholders on average receive the same price as tendering shareholders (see Grossman and Hart [1980]).

Let B be the price ultimately paid by a successful first bidder for the shares purchased in a tender offer. We will adopt the assumption that B is also the price paid for the remaining shares (excepting any 'toehold' shares already owned by the bidder).

Let V_0 be the nontakeover value of the target, and let V be the post-takeover value of the target, fully reflecting any possible synergistic or other gains from takeover. Then the *Strong/Agency Hubris Hypothesis* obtains if and only if the average improvement is zero, i.e.,

$$\frac{\bar{V}(\theta)}{V_0} - 1 = 0,$$

where θ is the market's information set.

Let $\bar{B}(\theta)$ be the expected value of the final bid conditional on the first bidder succeeding and on θ. Let $\bar{V}(\theta)$ be the expected post-takeover value of the target conditional on the first bidder succeeding and on information set θ. Let $Pr(S|\theta)$ denote the probability of success of the first bidder in acquiring the target given θ. Also, let α refer to the fraction of the target's shares owned by the first bidder prior to the bid. The *Weak Agency/Hubris Hypothesis* obtains if and only if a successful bidder on average makes negative expected

[10]Comment and Jarrell (1987) present evidence consistent with this assumption. More recently, it is not unusual for holdout investors to receive a package of securities with face value equal to the cash offer to initially-tendering investors.

profits, that is,[11]

$$\alpha[\bar{V}(\theta) - V_0] + (1-\alpha)[\bar{V}(\theta) - \bar{B}(\theta)] < 0, \tag{1}$$

or

$$\frac{\bar{B}(\theta)}{V_0} > \frac{\frac{\bar{V}(\theta)}{V_0} - \alpha}{1-\alpha}. \tag{2}$$

In other words, if the price paid is too high relative to value, the bidder loses money.[12]

A secondary issue that is closely related to the Agency/Hubris Hypotheses is whether successful bidders profit on average on the shares purchased in the tender offer. Even if a bidder loses on these shares, he may still profit from the acquisition by increasing the value of the shares accumulated prior to the offer. This distinction has theoretical interest, because some models predict that in the absence of dilution of minority shareholders, bidders will not on average profit on shares purchased in the offer (Grossman and Hart [1980], Shleifer and Vishny [1986], and Hirshleifer and Titman [1990]). The prediction that the bidder profits on shares purchased in the tender offer is termed the *Underpayment Hypothesis*, as opposed to the opposite prediction of the *Overpayment Hypothesis*. These subsidiary hypotheses are also simply stated. The Overpayment (Underpayment) Hypothesis implies that the bid premium on average exceeds (is less than) the value improvement, *i.e.*,

$$\frac{\bar{B}}{V_0} \gtrless \frac{\bar{V}}{V_0}. \tag{3}$$

C The Intervention Method of Estimating Value Changes

Let θ_0 be all public information known just prior to the first bid. Let θ_1 be all public information known just after the first bid. Let θ_2 refer to information known just prior to the arrival of a competing bid. Let θ_3 contain in addition the information conveyed by the competing bid. Let dates $t = 0, 1, 2, 3$ refer to dates at which $\theta = \theta_0, \theta_1, \theta_2$ and θ_3 respectively.

The first step is to calculate the bidder's abnormal return R_t between dates 1 and 3 in terms of the expected post-takeover value of the target $\bar{V}(\theta_t)$ at these dates.[13] Then (using

[11] As in Grossman and Hart (1980), Shleifer and Vishny (1986), and Hirshleifer and Titman (1990), our calculations are based on a conditional tender offer. Similar calculations for unconditional offers would depend on estimates of the number of shares tendered in failed offers.

[12] We have assumed in (1) and (2) no profit from the sale of the first bidder's initial shareholding to a competing bidder. If initial holding profits are small, the effect on the RHS of (2) will also be small. In Section IV, such sales are explicitly taken into account.

[13] For expositional simplicity, the model examines raw returns. For standard reasons, in implementing the model empirically abnormal returns are used.

empirical estimates of unconditional and conditional probabilities of success and expected premia, abnormal returns and other parameters) we will invert the relationship to infer $\bar{V}(\theta_t)$.

Consider the arrival of the competing bid at date 3. Let the market's assessment of the component of bidder's value not derived from the takeover be y. y may not equal the pre-offer value of the bidder as assessed by the market if the initial offer conveyed information about the bidder. We assume that the arrival of a competing bid is uninformative about the stand-alone value of the first bidder, so that y is the same at dates 1, 2 and 3 (before and after the arrival of the competing bid). Let $R_3 \equiv (P_3 - P_1)/P_1$ be the date 3 return associated with information θ_3, where P_1 is the bidder's stock price just after the initial bid, and P_3 is the price based on θ_3 after a competing bid arrives. So

$$P_3 = P_1(1 + R_3). \tag{4}$$

Let $\bar{V}(\theta_1), \bar{V}(\theta_3), \bar{B}(\theta_1)$ and $\bar{B}(\theta_3)$ be abbreviated as $\bar{V}_1, \bar{V}_3, \bar{B}_1$ and $\bar{B}_3$ respectively. To relate $\bar{V}(\theta)$ to the observables P_3 and P_1, note that

$$\begin{aligned} P_1 &= y + \bar{\pi}_1 \\ P_3 &= y + \bar{\pi}_3, \end{aligned} \tag{5}$$

where $\bar{\pi}_t$ is the bidder's expected profit from takeover conditional on information θ_t. As in (1), this is

$$\begin{aligned} \bar{\pi}_1 &= Pr(S|\theta_1)\ \{\alpha[\bar{V}_1 - V_0] + (1-\alpha)[\bar{V}_1 - \bar{B}_1]\} \\ \bar{\pi}_3 &= Pr(S|\theta_3)\ \{\alpha[\bar{V}_3 - V_0] + (1-\alpha)[\bar{V}_3 - \bar{B}_3]\}. \end{aligned} \tag{6}$$

We assume that the arrival of the competing bid at date 3 does not provide any information about the value of the target to the first bidder.[14] Hence, $\bar{V}_3 = \bar{V}_1 = \bar{V}$. The

[14]This would obtain under the Strong Agency/Hubris Hypotheses, and provides a natural null hypothesis against which to test for takeover improvements. More generally, the arrival of either an initial bid or competing bid could reveal information about target value. However, the evidence regarding the information conveyed by an initial bid is conflicting. Bradley, Desai and Kim (1983) find that average cumulative abnormal returns of targets are approximately zero among targets of failed offers that are not later acquired. This suggests that there may be no permanent informational revaluation associated with the initial bid. Pound (1988) finds that analysts do not revise upward their forecasts of target stand-alone earnings when a takeover bid is announced. However, taking into account systematic biases in analyst forecasts, Brous and Kini (1993) in contrast find that an adjusted measure of target earnings forecasts revisions is on average positive.

robustness of the results with respect to this assumption is analyzed in Section IV.[15] The unobservable y can be eliminated from (5), and the result combined with (6), giving

$$\bar{V} = \frac{P_3 - P_1}{Pr(S|\theta_3) - Pr(S|\theta_1)} + \alpha V_0 + \frac{(1-\alpha)[Pr(S|\theta_3)\bar{B}_3 - Pr(S|\theta_1)\bar{B}_1]}{Pr(S|\theta_3) - Pr(S|\theta_1)}. \tag{7}$$

Dividing both sides of (6) by V_0, gives

$$\frac{\bar{V}}{V_0} = \frac{R_3(P_1/V_0)}{Pr(S|\theta_3) - Pr(S|\theta_1)} + \alpha + (1-\alpha)[\lambda(\bar{B}_1/V_0) + (1-\lambda)(\bar{B}_3/V_0)], \tag{8}$$

where

$$\lambda = \frac{Pr(S|\theta_1)}{Pr(S|\theta_1) - Pr(S|\theta_3)}.$$

In principle, every parameter in (8) could be given an i superscript to denote the i'th takeover contest. However, we estimate certain parameters as sample means under the assumption that they are the same across contests. The terms $\bar{B}_1/V_0$ and $\bar{B}_3/V_0$ are estimated as

$$\frac{1}{n_1}\sum_{i=1}^{n_1}(B^i/V_0^i) \text{ and } \frac{1}{n_3}\sum_{i=1}^{n_3}(B^i/V_0^i),$$

where n_1 is the number of initial offers, and n_3 the number of contests in which a competing bid occurs. Similarly, $Pr(S|\theta_1)$ and $Pr(S|\theta_3)$ are estimated as the fraction of initial bids that succeed in the overall sample, and in the subsample in which a competing bid occurs, respectively. (The alternative of estimating separate transaction-specific probabilities of success using the logit model of Table III is also considered in Section III.A.1.)

The quantities R_3, P_1/V_0, and α can be calculated directly and are specific to the takeover contest. The value ratio $\bar{V}/V_0$ ("*VRATIO*") is the market's estimate of the value to the bidder of a takeover target relative to its nontakeover value. In other words, it is 1+ the ratio of the increase in combined bidder-target value to target value. Thus, *VRATIO* is greater than 1 if and only if value is improved, and exceeds 1 by the value improvement as a percentage of target value. While *VRATIO* measures improvements normalized relative to target stand-alone value, the intervention method makes no assumption whatsoever as to whether improvements are specific to the bidder, the target, or are joint synergies.

[15]This assumption is consistent with private information possessed by the second bidder. This could be information about a private component of its valuation of the target (e.g., a synergy unique to the second bidder). The second bidder can also possess information superior to that of investors about common value components (e.g., gains from remedying target management failure), so long as investors do not perceive the second bidder's information as adding to that of the first bidder.

The Strong Agency/Hubris Hypothesis implies that this ratio is one. Substituting $\bar{V}/V_0$ from (8) into (2) gives the condition for the Weak Agency/Hubris Hypothesis to obtain. The Overpayment and Underpayment Hypotheses are tested simply by comparing the average bid premium with the average estimated improvement given in (3).

The introduction (and footnote 1) mentions briefly four caveats about the use of the value improvement estimates derived here for drawing welfare conclusions. These bear explicit discussion. First, like other stock market studies, the intervention method estimates improvements *as perceived by the market.* If the market is systematically biased, the true improvements will differ from these estimates. Second, we estimate the direct effects of takeover. The *threat* of takeovers can discipline managers, but can also pressure managers into actions that are not in shareholder interest. Third, redistributions to shareholders from bondholders or other stakeholders are included as part of the value improvement. These are not a social gain. Fourth, certain costs of the takeover process are not netted from our value improvement estimates.[16]

II Data

The initial data set consists of 559 tender offers that were announced during the period October 1958 through December 1984. "It contains almost every tender offer made in the 1958-1984 period where at least one firm (the target or a bidder) was listed on the NYSE or AMEX...at some time between July 1962 and December 1984."[17] This study investigates the wealth effects on both bidders and targets for the same tender offer. Hence 232 of the 559 tender offers were deleted from the sample since either the bidder or the target was not listed on the NYSE or AMEX. Additional data-availability and data-consistency

[16]The intervention method measures the value improvement to be derived from a combination at the time of the intervention. The method will net out from the value improvement any cost which will only be realized conditional on the takeover succeeding. (Such a cost will be reflected in the stock return on the date of intervention as a lower value to the bidder of successfully acquiring the target.) However, the intervention method will not deduct costs that are incurred regardless of whether the combination actually occurs. (Such a cost will not be reflected in the intervention-date stock return.) Such costs include ex ante costs of locating a target, or some of the costs of the bidding process. However, given the size of the estimated improvements, we suspect that this consideration alone would not reverse the conclusion of positive gains from takeover.

[17]The quotation is from the write-up for the dataset compiled by Michael Bradley, Robert Comment, Anand Desai, Peter Dodd, and Richard Ruback. We thank these authors for providing us with their data.

requirements reduced the sample size to 290.[18]

To compile a history of the events that occur subsequent to a tender offer that might affect the probability of success of the bid, we used the *Wall Street Journal Index* to obtain information on the following:

1. Litigation by the target firm or its shareholders.
2. Litigation by the bidding firm or its shareholders.
3. Second and third bidders.
4. Objection raised by a regulatory agency (e.g., FTC, Department of Justice).
5. Financing-related issue.
6. Final resolution. The final resolution was classified as "favorable," "unfavorable," and "unknown."[19]

Table I records the frequency of the above mentioned events. Of the initial sample of 290 tender offers, in 150 cases no event is recorded prior to the final resolution. Litigation by the target and entry of a second bidder are the two most frequent events observed. The final resolution is in favor of the first bidder in 188 cases or 65% of the sample. The median number of business days from the announcement of the first bid through a successful final resolution is 27, through unsuccessful final resolution is 28, through announcement of litigation by target is 8, and through entry of the second bidder is 16.

One objective of this study is to measure the effect of takeovers on the wealth of bidder shareholders, while avoiding the revelation bias inherent in bidder's returns on the announcement of the offer or of its completion. As discussed earlier, we address the revelation bias in bidder stock returns emphasized by several authors by considering interventions that change the probability that the first bidder will be successful, but are not at the discretion of the first bidder. Litigation by the target, entry of a second bidder, and objection by a regulatory agency are examples of such exogenous events. In principle, one could use any

[18]12 tender offers were announced prior to July 1962. The Daily CRSP tape does not contain returns prior to this date. Our verification of tender offer announcements and name changes led to some minor changes in the database.

[19]If the first bidder was successful in acquiring the target, resolution was classified as "favorable." If there was information that the first bidder had been unsuccessful, resolution was classified as "unfavorable." Six cases for which there was no information on the final resolution were classified as "unknown."

such event (or several events) in empirical tests. Our main analysis focuses on the entry of a second bidder. We begin with an examination of the effects of various interventions in order to document that the entry of a competing bidder is an important event for the initial bidder.

Table II contains bidder abnormal returns around the announcement of litigation by the target and the announcement of entry of a second bidder. The abnormal returns are computed using the market model as the benchmark; see Dodd and Warner (1983).[20] The market model is estimated using returns from day -170 through day -21 where day 0 is the announcement of the first bid in the *WSJ*. The equally weighted CRSP index is used as the market index. Though both events have a negative impact on bidder stock price, announcement of entry of a second bidder has a more negative impact, both stastically and economically.

The effect of entry of a second bidder on the probability that the first bidder will be successful can be estimated using a logit model. Table III provides estimates of such a model. The dependent variable equals one if the first bidder is successful and zero otherwise. TLITA = 1 if the target files a lawsuit against the first bidder and zero otherwise. BID2EN = 1 if a second bidder enters the bidding contest and zero otherwise. MREACT = 1 if target management verbally opposes the first bid, and zero otherwise. α is the fraction of the target's shares held by the first bidder at the date of the initial offer. PREM is the premium offered by the first bidder using the target's price one month prior to the bid as the baseline.[21] The results indicate that target management opposition, entry of a second bidder and the premium offered are determinants of bidder success (opposition and competition having negative effects), whereas target litigation (*ceteris paribus*) is not.[22] Target opposition is a matter of degree, whereas the arrival of a competing offer is a discrete event. Thus, the latter seems a more appropriate focus for investigation.

[20]The market model is biased to the extent that bids occur after the bidder has experienced abnormally good times (see Franks, Harris, and Titman [1991]). However, for the short return cumulation window used here, the choice of benchmark is unlikely to affect results materially.

[21]Walkling (1985) found some of these variables to be significant determinants of tender offer success.

[22]The fraction of target held by the first bidder is not statistically significant, in contrast with Walkling's results. However, if the sample is restricted to offers in which there is a second bidder, the fraction of target held by the first bidder is marginally significant.

III Estimates of Value Improvements

A Value Gains to the Initial Bidder

A.1 Basic Estimates

As discussed in Section I, $\bar{V}_1/V_0$ ("*VRATIO*") provides the market's estimate of the value to a bidder of a takeover target, i.e., the joint value improvement brought about by the takeovers. If the bidder is unable to improve the value of the target, then the Strong Agency/Hubris Hypothesis obtains, and this ratio is one. If the bidder is able to improve value, then this ratio is greater than one. *VRATIO* is estimated based on equation (8).

If the market is efficient, and if no news about a competing bid arrives until the day that the bid occurs, then the abnormal return expected from date 1 (immediately after the initial bid) through date 2 (just before the competing bid) will on average be zero. Thus, equation (8), which gives $\bar{V}_1/V_0$ in terms of R_3, the return from date 1 through date 3, also applies with a return from date 2 through date 3, or by choosing some starting date between date 1 and date 2.

There is a tradeoff in using different periods. If news about a competing bid sometimes arrives between date 1 and 2, calculating the return based on the earlier starting point has the advantage of including the effects of such anticipation of the event. However, calculating the abnormal return over a longer period has the disadvantage of introducing noise arising from normal stock price fluctuations and from benchmark estimation errors.

We therefore calculate the return to be substituted for R_3 in (8) based on two different periods. First is a two-day period consisting of the day of the publication of the news of the second bid in the *WSJ* and the day before.[23] Second is the period from one day after the publication of the news of the first bid in the *WSJ* to the day of the publication of the news of the second bid. Summary statistics of the cumulative abnormal returns are in the Table II, Panel B, CAR1 and CAR3; bidder returns in both periods are significantly negative. (For comparison, we also include CAR2 as defined in footnote 2 of the table.)

- P_1/V_0 in equation (8) is the relative size of the bidder versus the target. The mean (median) figure is 2.63 (1.85).
- $Pr(S|\theta_1)$ is the probability of success of the first bidder in the full sample. In the full sample of 290 cases the first bidder is successful in 188 instances. Hence, $Pr(S|\theta_1)$ is

[23]Results are similar using a 5-day window.

estimated as .6483.

- $Pr(S|\theta_3)$ is the probability of success of the first bidder given the arrival of a competing bidder. In our sample, there are 71 cases in which a competing bidder arrives; the first bidder is successful in 21 instances. Hence $Pr(S|\theta_3)$ is estimated as $21/71 = .2958$.

- α is the fraction of the target's equity owned by the first bidder. For the 55 tender offers used to construct Table IV-A, the mean (median) α is .038 (.000). This is different from the mean fractional ownership in Table V since these 55 observations only include offers that were followed by competing bids.

- $\bar{B}_1/V_0$ is the average price (relative to the target's pre-offer price) at which the first bidder wins in the full sample. The mean (median) for this is 1.5741 (1.4679).

- $\bar{B}_3/V_0$ is the average price at which the first bidder wins given the arrival of a competing bidder. The mean (median) for this is 1.7381 (1.4720). The above figures are calculated using only all-cash offers.

Properties of the Distribution of Estimated Value Improvements

In Table IV-A, market-based estimates of the expected value to bidders of takeover targets (relative to target stand-alone value) are labeled "*VRATIO*," and calculated as in equation (8) using estimated parameters $Pr(S|\theta_1)$, $Pr(S|\theta_3)$, $\bar{B}_1/V_0$, and $\bar{B}_3/V_0$. In panel A, the average *VRATIO* is 1.448, indicating that the target is 44.8% more valuable to the bidder than the target's pre-offer value. Also, all but one estimate of *VRATIO* are greater than one.[24] This evidence is inconsistent with the Strong Agency/Hubris Hypothesis of zero value improvements in all-cash tender offers. Since 54 of 55 *VRATIO*s are greater than one, the conclusion that *VRATIO* is significantly greater than one seems highly robust.[25] In Panel B, the mean and median VRATIO estimates using a longer event window (from the day after the announcement of the initial bid through the day of announcement of the second bid) are even larger, 1.558 (1.537).

[24]Since the means and medians differ substantially for the average bid premia summarized in the preceding paragraph, we also calculated *VRATIO* based on median values of these variables. This makes virtually no difference, leading to a mean (median) *VRATIO* of 1.475 (1.456), with only 1 out of 55 being less than 1.

[25]A sign test yields $p < .001$. However, theoretically the symmetry and unbiasedness assumptions of the sign test do not necessarily obtain, owing to the nonlinearity of the *VRATIO* formula (8). Empirically the distribution of *VRATIO*s appears to be symmetric.

The next subsection A analyzes the robustness of the conclusion that value improvements are on average positive with respect to misestimation of the input parameters. A previous version of the paper developed a parametric derivation (available on request) of the distribution of the test statistic, the mean *VRATIO*, under the null hypothesis that the true value improvement is zero and given random sampling error in our estimates of $Pr(S|\theta_1)$, $Pr(S|\theta_3)$, $\bar{B}_1/V_0$, and $\bar{B}_3/V_0$. Using this model, the null hypothesis is again strongly rejected ($p < .001$).

Figure 1 provides a histogram of the *VRATIO*'s. This displays a roughly bell-shaped distribution, with almost all the mass greater than one (indicating positive value improvements). As displayed in Table IV-A, the mean is close to the median, and the skewness is -.314, indicating that the distribution is not highly asymmetric. The kurtosis is 2.810, as compared with 3 for a normal distribution. The standard deviation of *VRATIO* is .237, which for a normal distribution would imply a standard error of .0322. The t-statistic for the null hypothesis that the true *VRATIO*s, are all equal to 1 (zero value improvement) is 13.89.

Our estimate of value improvements in Table IV-A uses as inputs parameter estimates of the probability of success of the first bidder $Pr(S|\theta_1)$, $Pr(S|\theta_3)$. These probabilities are estimated as the fraction of first bidders that succeed in the full sample, and in the subsample in which a competing bid occurs. The respective parameter estimates of .6483 and .2958 are therefore not transaction specific; they are used for each of the 55 competing bid observations to estimate value improvements.

An alternative approach is to estimate separate transaction-specific probabilities of success using the logit model of Table III to obtain different probability estimates for each of the 55 transactions.[26] The benefit of this technique is that if the logit model is well-specified, applying the model fine-tunes probability estimates and improves the accuracy of *VRATIO* estimates. The cost is that any misspecification in the logit model will carry over to *VRATIO* estimates. When we apply the logit model, we obtain a mean (median) value improvement of 45.4% (47.1%), which is quite similar to the estimates obtained using the basic approach. These results are consistent with the conclusion that value improvements differ from zero and are generally positive.

Do Bidders Pay Too Much?

Since *VRATIO* is on average smaller than either $\bar{B}_1/V_0$ or $\bar{B}_3/V_0$, based on point es-

[26]The bidder's success depends on choices made by ots manager. For an analysis of the determinants of bidding managers' decisions in takeover contests, see Jennings and Mazzeo (1991).

timates the evidence provides no support for the Underpayment Hypothesis that bidders profit on the shares they purchase. We cannot reliably reject the null that the payment is on average fair. In the multiple bidder sample, the estimates indicate that 24 of the 45 successful initial bidders overpaid. However, since value improvements are large, it appears that most of the average successful premium can be explained by value improvement.[27]

Time Variation in Value Improvements

It is also of interest to compare value improvements in different categories of transactions, such as bids occurring in the pre- and post-Williams Amendment eras, and "friendly" versus "hostile" bids. This evidence is summarized in Table IV-B. The Williams Act of 1968 and associated legislation requiring disclosure and delaying completion of tender offers makes it easier for competitors to investigate after an initial bid (see Jarrell and Bradley [1980]). One would expect this to narrow the set of bidders willing to make an initial offer to those with higher valuations. In our sample, the mean value improvement in the post-Williams Amendment era was 40.8% (median 43.3%), which is fairly similar to the pre-Williams Amendment estimates of 52.4% (median 42.5%). Of course, there were many other important differences between the early and later periods.

Friendly versus Hostile Offers

Past commentators have proposed two very different economic roles for takeovers—discipline or removal of bad target managers, and exploitation of business synergies. The mean (median) estimated value improvment of 43.7% (41.6%) among transactions opposed by target management are similar to the figures for unopposed transactions, 45.0% (44.1%). Thus, takeovers seem to improve value in both friendly and hostile transactions. This evidence indicates that both of the proposed roles for takeovers are important in different transactions.

[27]This conclusion should be qualified by a possible sample selection bias. The intervention method examines initial bidder returns when a competing bidder enters, but if the initial bidder offers too much on his first bid, this will tend to discourage competitors from arriving. Thus, a bidder who offers a very generous initial offer may not end up in the return sample. On the other hand, other things equal, the arrival of a competitor raises the amount that a first bidder with given valuation will have to pay. Thus, we doubt that there is more overpayment in single-bidder contests than in multiple bidder contests. This view is consistent with evidence on competitors' stock returns (see Bradley, Desai and Kim [1988]).

A.2 Sensitivity Analysis

In this subsection we analyze the robustness of estimated value improvements with respect to parameter estimates for $\bar{R}_3$, $Pr(S|\theta_1), Pr(S|\theta_3), \bar{B}_1/V_0$, and $\bar{B}_3/V_0$. To determine the robustness of our conclusions with respect to these parameters, we conduct two further experiments. First is a sensitivity analysis of *VRATIO* with respect to the probability of success unconditionally, $Pr(S|\theta_1)$, and conditional on a competing bid, $Pr(S|\theta_3)$; with respect to the expected price paid unconditionally, $\bar{B}_1/V_0$, and conditional on a competing bid, $\bar{B}_3/V_0$; and with respect to the mean first bidder stock return on annnouncement of a competing bid, $\bar{R}_3$. Second, we compare our results to those implied by a more recent the sample studied by Bhagat, Shleifer, and Vishny (1990) (BSV).

A previous version of the paper provided tables describing the sensitivity of estimated value improvements to individual variations in each of the estimated parameters. These confirm the robustness of the conclusion of positive average value improvements to estimation errors in each of the parameters.[28] Of particular interest is the consistently positive average value improvements over a wide range of values of $\bar{B}_1/V_0$ and $\bar{B}_3/V_0$, since the sample mean of $\bar{B}_3/V_0$, 1.7381, differs substantially from the median, 1.4720.

A more stringent check of robustness is to shift each of these estimated parameters *simultaneously* in the direction of lower *VRATIO*. This check is stringent, since there is no reason to expect estimation errors all to boost the *VRATIO*. The results indicate that the conclusion of generally positive value improvements is not unduly sensitive to the parameter estimates. Even if all 4 of the estimated parameters are shifted by 7.5% of their mean values, the mean estimated *VRATIO* remains greater than 1.[29]

A limitation of the intervention method is that it provides value estimates only in those contests for which the intervention (competing bid) actually occurs. It is possible that contests that did not enter the intervention sample are different, so that the returns to the first bidder in such contests if a competing bidder had arrived would be systematically different from the first bidder returns in the actual sample. While it is impossible to address

[28]In order to obtain median *VRATIO* less than 1: (1) the true value of the parameter $Pr(S|\theta_1)$ would have to be below .4, instead of the estimated value of .6483; (2) the true value of the parameter $Pr(S|\theta_3)$ would have to be above .5, instead of the estimated value of .2958; (3) the true value of the parameter $\bar{B}_1/V_0$ would have to be below 1.35, instead of the mean estimate of 1.5741; and (4) the true value of the parameter $\bar{B}_3/V_0$ would have to be above 2.2, instead of the mean estimate of 1.7381.

[29]The probability that all 4 misestimates are in the upward direction is $(1/2)^4 = 1/16$; imposing the condition that the magnitudes of the misestimates be greater than 7.5% would reduce the probability much further.

this issue conclusively, it is interesting to observe the extreme robustness of the conclusion of positive value improvements with respect to the estimated stock returns. The sensitivity to $\bar{R}_3$ provides an indication of whether the conclusions we derive are likely to be sample specific. We recalculated *VRATIO*s substituting fictional alternative values for $\bar{R}_3$ for all first bidders. Both the mean and median value improvements remain positive even for an abnormal return as high as +5%, and a majority are positive even for an abnormal return as high as +7%.[30] These sensitivity analyses (and footnote 24) support the conclusion that value improvements are on average positive and substantial.

It is also interesting to see whether the conclusion of positive average value improvements applies in a different sample. BSV analyze an exhaustive sample of hostile takeover contests in the U.S. during 1984 through 1986 where the purchase price was $50 million or more. Their sample consists of 61 contests: 50 targets were acquired and 11 remained independent. The first bidder was successful in 29 of the 61 contests. Competing bids were observed in 30 of the 61 contests. The first bidder prevailed in the face of a competing offer in nine instances.

The above figures indicate that in the BSV sample $Pr(S|\theta_1)$, the probability of success of the first bidder in the full sample, is 29/61 or .4754. Also, $Pr(S|\theta_3)$, the probability of success of the first bidder in the presence of a competing bidder, is 9/30 or .3000. Table IV-C compares these parameter estimates with those used in this study. This table also provides the estimates of $\bar{B}_1/V_0$, and $\bar{B}_3/V_0$ implied by the BSV sample.

It is interesting that the estimated parameters from the BSV sample period (1984-6) are quite similar to that of this study (1963-1984). Also, when the BSV sample parameter estimates are substituted into the *VRATIO* formula (8), the inference about *VRATIO* (the ratio of the post-takeover value of the target to the pre-takeover target value) is unchanged, namely, we are unable to reject the hypothesis that the mean *VRATIO* is greater than one. For example, replacing the estimate of $\bar{B}_3/V_0$ from our sample with the BSV estimate of 1.4719 implies a mean *VRATIO* of 1.66. Simultaneously substituting the BSV estimates for $\bar{B}_1/V_0$, $\bar{B}_3/V_0$, $Pr(S|\theta_1)$, and $Pr(S|\theta_3)$ with other mean parameters generates a mean (median) *VRATIO* of 1.323 (1.251).

To summarize, in this subsection we have performed sensitivity analyses by varying estimated parameters, both individually and simultaneously; and by using parameter estimates

[30]Intuitively, the reason that the estimates remain positive even when intervention returns are high is that the mean bid premia are very substantial. Thus, even if the value improvement is positive, if it is smaller than the expected price to be paid, the arrival of a competing bid and the associated reduction in the probability of the first bidder succeeding can be good news.

obtained from the BSV sample. These analyses all confirm that value improvements were on average positive.

B The Bidder's Initial Shareholding in the Target

Bidders often own a significant fraction of the target's equity prior to making the bid. Bradley, Desai, and Kim (1988) report mean ownership of 9.8% (median 0%) of the target by the bidder in 236 successful tender offers during 1963-84. Shleifer and Vishny (1986) have suggested that increase in the underlying value of the bidder's initial foothold provides a potential motive for acquisition, despite the free-rider problem of Grossman and Hart (1980). This section provides an empirical analysis of the extent to which changes in bidders' wealths can be explained by increased underlying value of their initial footholds.

The expected increase in the value of the bidder's initial shareholding in the target may be estimated using the target's stock return. However, this return largely reflects investors' expectations about the likelihood of offer success and the price the bidder will pay, not the change in the underlying value of target post-takeover cash flows. *VRATIO* is used to estimate the potential increase in the underlying value of the bidder's foothold in the event of takeover by the first bidder. The post-takeover value of the foothold is the pre-takeover value multiplied by the *VRATIO*.

Table V provides details on fractional ownership of target firms by bidders during 1963-84. When the sample is restricted to tender offers in which both the target and bidder were listed on NYSE and AMEX, the mean bidder ownership is 10.2%, the median is 0%, and 138 of the 230 bidders (60%) do not own any shares in the target at the time they make the bid. 92 firms owned at least one share of the target at the time of the bid: their mean ownership is 25.6% and the median is 19.5%. It appears that conditional on a bidder owning a positive fraction of the target at the time of the bid, his initial holding is substantial.[31]

Table IV-A shows that the mean (median) change in the event of takeover in the underlying value of the initial shareholding held by the initial bidder in the event of successful takeover (calculated based on the VRATIO) is \$2.13 million (\$0.0 million).[32] This compares with McLaughlin's (1990) estimate of average investment banker advisory fees paid by bid-

[31]The offer of an initial bidder that owns shares in the target may fail. The subsequent arrival of a second bidder would increase the value of the first bidder's initial holding. In our sample the frequency of such a sequence of events is not high (12 cases).

[32]When the sample is restricted to cases where the bidder owns at least one share of the target, the mean (median) change in the underlying value of the initial shareholding is \$5.86 million (\$3.15 million).

ders of $2.7 million in a 1978-85 sample of 195 tender offer bidders during 1978-85.[33] Thus, increase in the value of the initial holdings of those initial bidders who became involved in multiple bidder contests seems to provide a fairly weak motive for takeover. In percentage terms, the change in value of initial holdings in the event of takeovers is on average 1.28% of target value (median 0.00%). After excluding contests with zero initial holdings, the mean (median) improvement is estimated as 3.36% (2.68%) of target value. This suggests that many tender offer bidders are not primarily motivated by the possibility of increase in value of their initial holding.[34,35]

This conclusion is unaffected if profit on initial shareholdings is calculated using target stock returns instead of *VRATIO*. Table VI summarizes bidder stock price movements from five days before through five days after the announcement of a tender offer bid.[36] The mean (median) bidder abnormal return is 1.2% (.6%). The mean (median) of change in the market value of the initial shareholding held by the bidder calculated based directly on the target's stock return is $1.05 million ($0.0 million).[37]

C A Comparison of The Intervention Method to Initial Bid Returns

It is interesting to compare the value improvements derived by the intervention method with the initial returns at the time the initial bid occurs. It is not entirely clear what length of event window to use for the comparison, since the degree of anticipation of the event may differ for an initial bid versus a second bid. Using a day -6 to +4 window where date 0 is

[33]This figure does not include financing, underwriting, legal, and accounting expenses, as well as the opportunity cost of managers' time. This average includes unsuccessful offers, so it is an underestimate of the fees that must be paid in order for the first bidder to realize value improvements. On the other hand, the period covered by McLaughlin's study involved larger transactions than the earlier part of our sample.

[34]Other possible motives for takeover include profits from dilution (Grossman and Hart [1980]), a manager's desire to expand his domain of power, or a desire by bidding managers to entrench themselves (Shleifer and Vishny [1990]).

[35]Note that while the calculation focuses on first bidders who become embroiled in multiple bidder contests, since the calculation is based on underlying value improvements and initial shareholdings, these bidders would earn small initial holding profits in single-bidder contests as well.

[36]Our calculations of initial holding profits based on target stock returns ignore price runup occuring from day −30 to day −6. The length of the pre-offer window of stock returns to be used is somewhat arbitrary, since initial holdings are being purchased at different dates by different bidders.

[37]When the sample is restricted to cases where the bidder owns at least one share of the target, these figures become $2.72 million ($1.25 million).

the date of the initial bid, the mean (median) weighted average of the bidder and target returns using value weights is 8.34% (8.60%), with 46 out of 55 positive. Since *VRATIO* was defined as the improvement as a percentage of target market value, for comparison we can normalize the initial returns by target value in the denominator (instead of bidder + target value). This value, which can be called *CIBR* (combined initial bid returns), is defined as

$$\text{target return} + \text{bidder return}\left(\frac{\text{bidder market value}}{\text{target market value}}\right).$$

This yields a mean (median) market value change as a percentage of target value of 21.74% (20.57%). Thus, the initial bid returns method (normalized by target-value) also yields the conclusion of significant and substantial value improvements.

However, this value is less than half the value (44.8%) obtained by the intervention method. This suggests that event date returns may be infected by a substantial negative revelation bias, possibly because bidder shareholders are disappointed to learn that the bidder has poor internal investment opportunities, or that bidding management is prone to empire-building. The mean (median) difference between *VRATIO* and *CIBR* is 23.09% (22.75%), with 44 out of 55 observations positive. This difference is highly significant, consistent with a negative revelation effect in initial returns.

Thus, the intervention method suggests that the value improvements from takeover are much greater than what is suggested using initial bid returns. The measured initial return date effect is likely to be larger if a longer pre-event date window were used. However, the start date for the initial bid window of date -6 is already longer than the (-1,0) window used for the arrival of the competing bid. A longer pre-competing-bid window is associated with a higher VRATIO estimate as well (see Table IV-A Panel B).

IV Robustness with Respect to Model Specification

Although the intervention method of estimating takeover improvements avoids the bidder-revelation bias present in previous studies, the intervention method is subject to its own potential biases. This section explores analytically and numerically the likely magnitude of such biases, and the robustness of the conclusion that value improvements are on average positive.

Competing Bidder Information

As mentioned in Section III, the arrival of a competing bid may convey information about

the either the stand-alone value of the target or its value to the initial bidder. Footnotes 14 and 15 argue that the importance of this effect may be limited. In any case, the intervention method *mitigates* this problem relative to previous studies by focusing on competing bids, since it is likely that much of the private information possessed by bidders about targets will already be conveyed by the initial offer.

If in reality $\bar{V}_3 > \bar{V}_1$, *i.e.*, the arrival of a competing bid causes an upward revision in the assessed valuation of the first bidder, then *ceteris paribus* the first bidder's abnormal return R_3 should be higher. By constraining $\bar{V}_3 = \bar{V}_1$, our estimates would tend to attribute any such higher abnormal return to the reduced probability of the initial bidder succeeding. To this extent, the estimated value improvements are biased downwards, providing conservative estimates. Thus, the conclusion that takeovers are on average associated with positive value improvements is strengthened by this consideration.[38]

To quantify this, suppose that the arrival of a competing bid reveals a larger post-takeover value of the target, $\bar{V}_3 = K\bar{V}_1$, $K \geq 1$. We abbreviate $\bar{V}_1$ as $\bar{V}$ in the following. Substituting into equations (4), (5), and (6), and solving give

$$\frac{\bar{V}}{V_0} = \frac{R_3 \frac{P_1}{V_0}}{KPr(S|\theta_3) - Pr(S|\theta_1)} + \alpha \left(\frac{Pr(S|\theta_3) - Pr(S|\theta_1)}{KPr(S|\theta_3) - Pr(S|\theta_1)} \right) + \frac{(1-\alpha)[Pr(S|\theta_3)\frac{\bar{B}_3}{V_0} - Pr(S|\theta_1)\frac{\bar{B}_1}{V_0}]}{KPr(S|\theta_3) - Pr(S|\theta_1)}. \tag{9}$$

Based on the previous discussion, we believe that K is likely to be close to one. The implied ratios, which are increasing in K, are provided for different values of K in the first two columns of Table VII. This simulation supports the conclusion of positive average value improvements. Large values of K lead to implausibly high values for $\bar{V}/V_0$.

Valuation/Success Correlation

It is likely that success of the initial bidder is positively correlated with the value improvement, because a high valuation first bidder will probably be willing to offer more. The use of logit-based probability estimates, which generated similar results to our basic analysis, addresses this issue to the extent that the independent logit variables are related to the first bidder's valuation. In any case, the potential bias is a subtle one, because estimates are based on the *change* in probability of success when a competing bid occurs.[39] Similarly,

[38] A special case of this would occur if the arrival of a competing bid was taken by shareholders as an indication that the first bid was due to an actual value improvement rather than hubris. Furthermore, a a lower likelihood that the first bidder is afflicted with hubris may be good news about bidder value independent of the contest outcome. Again, this reinforces the conservatism of our estimates.

[39] The most plausible presumption is probably that the arrival of a competitor has a smaller

it can plausibly be argued that if improvements are common across bidders, a high value improvement increases the probability of a competing bid arrives. Again, the potential bias implied by this effect is subtle, because the *ex ante* probability of a competing bid is overestimated for some contests and underestimated for others.[40] We therefore believe that it is unlikely that these effects would have much effect on the conclusions of this paper.

Future Acquisitions

Third, the analysis has assumed that success or failure of the offer has no effect on any future acquisitions that the bidder may make. More generally, if the first bidder fails to acquire the target, there is a probability that he will thereafter successfully acquire a similar target at a price similar to what he would have paid if he had been successful in acquiring the original target. If so, the stock price reaction to failure of the initial bid will be muted. Of course, a bidder whose offer fails is not certain to make an additional acquisition as a consequence of failure.[41] We model this possible dependence by allowing for some probability that failure of the offer will cause the bidder to try to acquire another comparable target at the same expected price.[42] Suppose that value improvements in takeovers are positive. Then when the arrival of a competing bid reduces the probability of success, the bidder actually

impact on probability of success when the valuation is high. Then for a high valuation first bidder, the drop in probability of success is overestimated, which implies that *VRATIO* is an underestimate. (Because the negative abnormal return is attributed excessively to the drop in probability of success rather than to a large value improvement.) Conversely, for low (but positive) valuation firms, the drop in probability of success is underestimated, so that *VRATIO* is an overestimate. Under these conditions this potential bias changes the relative magnitude of *VRATIO* for different firms, but it does not imply any obvious bias in overall sample averages.

[40]If the true improvement is high, the arrival of a competing bid would be less of a surprise than our calculations indicate. For such contests, the improvement is underestimated. On the other hand, if the true improvement is low, the arrival of a competing bid would be more of a surprise than our calculations indicate. For such contests, the improvement is overestimated. The effect on overall sample averages is unclear.

[41]There is no difficulty if the bidder intends to make other acquisitions regardless of the outcome of the first contest. The calculation of the stock price reaction associated with the arrival of a competing bid needs modification only if future acquisitions depend on the success or failure in the current contest.

[42]There are several possible reasons why this probability is less than one. First, alternative targets may seem less attractive to bidding management. For example, under Roll's hubris hypothesis, a bidder's first offer will be to the target he overvalues the most. Second, a manager may change his mind about the desirability of acquisition. Third, he may retire or be replaced before he locates another target. Fourth, if acquisition is undesirable, the initial offer may rouse large shareholders or the board to oppose further attempts. Fifth, the quality of a later acquisition may be imperfectly correlated with that of the initial attempt.

has a good chance of succeeding in another acquisition, so the actual bidder return will be greater than that implied by the basic model of Section III. This higher return implies that *VRATIO* will underestimate the actual improvement. Similarly, if value improvements are negative, *VRATIO* will overestimate the improvement. So long as failure may lead to another comparable acquisition, the basic method biases *VRATIO* toward zero, but leaves its sign unchanged.[43] A sensitivity analysis is provided in Appendix B by reestimating *VRATIO*'s in a model in which, given failure, there is a probability γ that the bidder will make another acquisition attempt of equal quality to the first. As shown in columns 3 and 4 of Table VII, the estimated value improvement is still positive and substantial for plausible values of γ.

Sale of Shares to Another Bidder

Finally, as mentioned in footnote 12, an unsuccessful initial bidder can sometimes profit by selling his holdings to a successful competing bidder (see also footnote 31). Let $Pr(S^2|\theta)$ denote the probability of arrival and success of the second bidder, and let β denote the expected winning bid of the second bidder. Then

$$\bar{\pi}_1 = Pr(S|\theta_1)[\alpha(\bar{V} - V_0) + (1-\alpha)(\bar{V} - \bar{B}_1)] + \alpha Pr(S^2|\theta_1)(\beta - V_0) \tag{10}$$

$$\bar{\pi}_3 = Pr(S|\theta_3)[\alpha(\bar{V} - V_0) + (1-\alpha)(\bar{V} - \bar{B}_3)] + \alpha Pr(S^2|\theta_3)(\beta - V_0) \tag{11}$$

$$\frac{\bar{V}}{V_0} = \frac{R_3 P_1/V_0}{Pr(S|\theta_3) - Pr(S|\theta_1)} + \alpha + \frac{(1-\alpha)(Pr(S|\theta_3)\bar{B}_3/V_0 - Pr(S|\theta_1)\bar{B}_1/V_0)}{Pr(S|\theta_3) - Pr(S|\theta_1)} - \frac{\alpha(\beta/V_0 - 1)[Pr(S^2|\theta_3) - Pr(S^2|\theta_1)]}{Pr(S|\theta_3) - Pr(S|\theta_1)}. \tag{12}$$

As a rough approximation we replace β with our estimates of the expected price paid by a successful first bidder conditional on the arrival of a competing bidder, $\bar{B}_3$. The unconditional probability of a second bidder winning is the probability that a second bidder arrives multiplied by the probability given arrival that the second bidder wins, $Pr(S^2|\theta_1) = Pr(\text{Competing Bid Occurs})Pr(S^2|\theta_3)$. $Pr(\text{Competing Bid Occurs})$ is estimated as 71/290. Thus, only one of the other two probabilities is a free variable. *VRATIO* for different possible

[43]More generally, the sign could be incorrect, but this requires a rather special scenario. For example, if the improvement is always zero in the initial contest, but after an initial failure the bidder always makes a negative NPV acquisition, then the stock return will be lower than the calculation in Section III. The negative stock return, in combination with the reduction in probability of success associated with the arrival of a competing bid, would tend to be attributed to a positive value improvement.

values of $Pr(S^2|\theta_3)$ are given in columns 5-7 of Table VII. A benchmark value for this variable is .5, the case in which, given the arrival of a competing bidder, the first and second bidder have equal probabilities of winning. Column 6 gives the estimated improvement ratio when the bidder's initial shareholding in the target is taken as its mean value of 0.038. Column 7 provides alternative numbers assuming larger initial shareholdings of 0.15. We do not extend column 5 beyond probability 0.7, since in 20 out of 71 contests with competing bids the first bidder won, implying a probability of the second bidder winning of no more than 50/71. The table shows that the estimated value improvement is insensitive with respect to the possibility of a competing bidder buying the initial bidder's foothold.

In summary, several sensitivity analyses with respect to several possible modelling variants confirm that the conclusion of positive average value improvements provided using the basic model is highly robust. For plausible parameter values, all estimates of the average value improvement are positive and substantial.

V Summary and Conclusions

Whether takeovers improve value has been an important topic of debate. Different stock market and accounting studies have drawn very different conclusions about whether takeovers on average increase or decrease fundamental value. While some stock market studies have found value improvement, the conventional event study approach is infected with a bidder revelation bias stressed by several authors (Bradley, Desai and Kim [1983], Jensen and Ruback [1983], and Roll [1986]). The problem is that a takeover bid may reveal information about the value of the bidder not arising from the deal, such as the bidder's stand-alone cash flow prospects or the empire-building propensities of management. This paper estimates whether and by how much takeovers are perceived by investors as improving target and bidder firm value. We offer an approach to estimating perceived value improvements that avoids the bidder-revelation bias. This approach, the *intervention method*, is based on a model of the stock returns of an initial bidder when a competing bid occurs.

There are five main findings in our sample of cash tender offers. First, our estimates indicate that investors perceive average value improvements to be large and positive—about 45% of the target's pre-takeover equity value. There is error in our estimates to the extent that they rely on noisy estimates of the expected price to be paid for the target and of the probability of success. However, The conclusion that takeover improvements are on average positive is robust with respect to both model specification and empirically plausible variations in the estimated parameters. Second, average profits on bidders' initial

shareholdings in the target in multiple bidder contests are 1.28% of target value, which is not large relative to costs of bidding. Third, there is no evidence that bidders profit from buying targets. Average value improvements are moderately lower than, and not significantly different from, the average premia paid. Thus, most of the average successful premium paid can be explained by value improvement. Fourth, estimated value improvements are similar pre- and post- Williams Act and associated legislation. Finally, estimated value improvements are of similar magnitude for friendly and hostile transactions.

From a policy standpoint, this evidence tends to support the view that takeovers are usually desirable, so that regulation of takeovers should be limited. However, it is important to consider (as discussed in footnote 1 and the end of Section I) some important caveats about drawing policy implications from our estimates concerning possible errors in market perceptions, redistributions of wealth from stakeholders, the disciplinary or distortive effects of the threat of takeover, and of *ex ante* costs of locating targets.

The intervention method can be used to relate value improvements to other variables suggested by intuition or theories of takeover. For example, an interesting issue that could be addressed using the intervention method is whether the arrival of white knights blocks superior hostile acquisitions. As another example, the method may be useful in for understanding how other cross-sectional variables relate to value improvements. The free cash flow theory of Jensen (1988) implies greater overpayment by bidders with high free cash flow; empirically, bidder cash flow is related to bidder stock returns (Lang, Stulz, and Walkling [1991]). Other variables have been suggested as indicating managerial motives on the part of the bidder, and hence lower value improvement, such as high target q, and lesser similarity of the target firm to the bidder (see Morck, Shleifer and Vishny [1990]). Since cross-sectional variables may be related to the information that a bid conveys about a bidder, the intervention method can be used to separate cross-sectional value versus revelation effects.

Appendix A: Value Improvements from Signalling

The discussion in Section I.A is based on the distinction between *creation* of value and *revelation* about value (recognizing, of course, that often an action does both of these to differing degrees). In concrete terms, this is the difference between the firm obtaining a chest filled with bullion and outsiders discovering that the firm already has the chest of bullion. It is sometimes argued that an action can create value as a direct result of revealing value. I.e., revealing credibly to outsiders that the firm has a chest filled with 45 gold coins may enable the firm to obtain an extra five coins.[44] Thus, even if the manager's goal is to maximize underlying value (the total number of gold coins the firm gets), there can be an incentive to take actions to signal high value.[45] Our analysis is consistent with the possibility of signalling.

Even though value creation and value revelation can interact, they are conceptually distinct. As will be illustrated momentarily, even in a signalling setting the increase in stock price associated with a corporate action is an invalid measure of the effect of that action on underlying value. Thus, even if signalling incentives were to play a significant role in the decision to make a takeover bid, it is important to have a method to disentangle the revelation effect of the takeover from its effect on underlying value.

To illustrate concretely, let us modify the previous example. Consider a bidding firm which consists of a chest filled with gold coins. Suppose the market's expectation of the number of coins in the chest is 200, but actually the chest has 245. Assume that if the market learns promptly that there are 245 coins, the firm will receive 5 more gold coins, increasing its underlying value to 250. Thus, signalling not only reveals value (245 versus 200), it creates value (250 versus 245). There is no other value improvement associated with the takeover. Suppose that a takeover bid is the only way to reveal the existence of the 45 extra coins, and that a bid is a credible signal. Then the value improvement for the bidder associated with a takeover bid is 5 (the extra 5 coins), but the stock return will reflect the favorable revelation of 45 ($= 245 - 200$) as well as the 5 extra coins, and therefore overestimates severely the underlying improvement. A naive observer would conclude that the takeover bid provides the bidder with 50 extra coins, when in fact it obtains only 5. Thus, it remains essential to distinguish value creation from value revelation even when signalling can create value.

There is a further distinction of importance here. The value created by signalling is different from creating value through combination of firms. For example, a takeover bid may

[44]For example, revealing the existence of the 45 gold coins may allow the firm to raise capital more cheaply. Customers and other stakeholders may be more willing to deal with a firm perceived to be prosperous than one perceived at risk of financial distress (Titman [1984]). On the other hand, revealing higher value may stimulate competitors to enter the industry, and hence could also *reduce* value.

[45]However, signalling incentives are probably often present even though signalling does not increase underlying firm value. For example, a manager may want to boost the short-term stock price to improve his personal reputation, even though this does not increase long-run shareholder value. In fact, in most signalling models starting with Spence, signalling does not improve the underlying characteristic being signalled.

signal value, even though, owing to target defensive measures, regulatory intervention or a competing bid, the offer is never actually consummated. Thus, it is important to distinguish between creation of value through signalling (the 5 coins, in the example) and creation of value through combination (the value improvement of 40 in the numerical example in the main text). This paper focuses on creation of value through combination, rather than through revelation.[46]

The intervention method estimates value improvements that derive from combination, not from signalling. The arrival of a competing bid says little about the stand-alone value of the first bidder. Hence, in our example, when a competing bid arrives, the first bidder's stand-alone value is still assessed by the market to be 250 (which still includes the revelation of 45 and the signalling-induced value improvement of 5). Thus, as illustrated in the numerical examples, the intervention method still extracts a value improvement of 40 if the gain from combination is 40, and 0 if the gain from combination is 0.

Appendix B: Future Acquisitions

Suppose that the first bidder can find another identical target with probability γ after failure to acquire the first target. We now return to the assumption $\bar{V}_1 = \bar{V}_3$. Then equations (6) and (8) become

$$\begin{aligned}\bar{\pi}_1 &= Pr(S|\theta_1)[\alpha(\bar{V}-V_0)+(1-\alpha)(\bar{V}-\bar{B}_1)]+ \\ &\quad \gamma Pr(S|\theta_1)[1-Pr(S|\theta_1)][\alpha(\bar{V}-V_0)+(1-\alpha)(\bar{V}-\bar{B}_1)] \qquad (13)\end{aligned}$$

$$\begin{aligned}\bar{\pi}_3 &= Pr(S|\theta_3)[\alpha(\bar{V}-V_0)+(1-\alpha)(\bar{V}-\bar{B}_3)]+ \\ &\quad \gamma Pr(S|\theta_1)[1-Pr(S|\theta_3)][\alpha(\bar{V}-V_0)+(1-\alpha)(\bar{V}-\bar{B}_1)], \qquad (14)\end{aligned}$$

$$\frac{\bar{V}}{V_0} = \frac{R_3 P_1/V_0}{Pr(S|\theta_3)-\delta} + \alpha + \frac{(1-\alpha)\left[Pr(S|\theta_3)\frac{\bar{B}_3}{V_0} - \delta\frac{\bar{B}_1}{V_0}\right]}{Pr(S|\theta_3)-\delta}, \qquad (15)$$

where $\delta \equiv Pr(S|\theta_1)\{1+\gamma[Pr(S|\theta_3)-Pr(S|\theta_1)]\}$. *VRATIO* decreases as a function of γ, but the effect is weak. As shown in columns 3 and 4 of Table VII, the estimated value improvement is still positive and substantial for plausible values of γ. It should be noted that the effect of γ on *VRATIO* would be stronger if, after a second failure, the bidder again has a probability of turning to a third target and so on.

[46]Even though *revelation* of information may be highly significant in takeovers, we think that the amount of *creation of value* resulting from such revelation may be relatively minor. As mentioned earlier, revelation of higher value may either increase or decrease fundamental value. Except in rare circumstances, it seems likely that learning about higher value will lead to a much smaller actual increase in value (real inflow of more gold coins).

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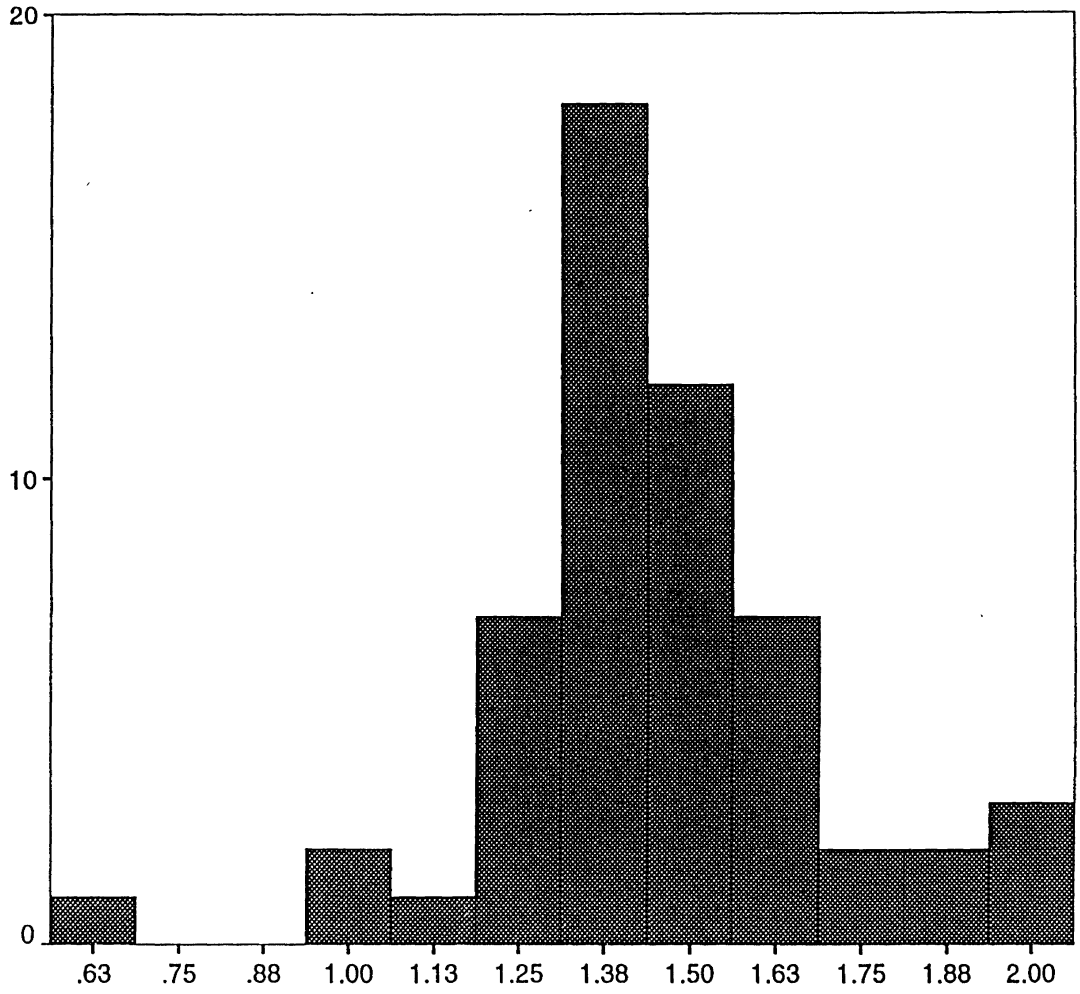

Figure 1. Frequency distribution of VRATIO.

Table I

Frequency of events that occur after a tender offer bid through final resolution. Sample consists of NYSE and AMEX target firms during 1963-1984.[1]

Sample size	290
Number of firms for which no event is recorded prior to final resolution	150
Litigation by target firm	81
Favorable resolution of litigation[2]	22
Unfavorable resolution of litigation	3
Litigation by bidder	34
Favorable resolution of litigation[3]	6
Unfavorable resolution of litigation	6
Second bidder enters the contest	71
Second bidder exits	13
Third bidder enters the contest	7
Third bidder exits	1
Regulatory agency raises objection	36
Favorable resolution of objection[4]	18
Unfavorable resolution of objection	0
Other defensive measure[5]	14

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[1]Observation was included in the sample if both target and (first) bidder were on NYSE or AMEX.

[2]Favorable/unfavorable resolution of litigation is with respect to the (first) bidder.

[3]Favorable/unfavorable resolution of litigation is with respect to the (first) bidder.

[4]Favorable/unfavorable resolution of objection raised by the regulatory agency (e.g., FTC, FCC, Dept. of Justice) is with respect to the (first) bidders.

[5]These include poison pills, sale of certain lines of business, etc., by target.

Table I (cont.)

Financing-related issue	
Favorable resolution of financing issue[6]	3
Unfavorable resolution of financing issue	1
Final resolution	
Favorable[7]	188
Unfavorable	96
Unknown[8]	6

[6]Favorable/unfavorable resolution of financing issue is with respect to (first) bidder.

[7]Favorable/unfavorable resolution of the tender offer bid is with respect to first bidder.

[8]The WSJI did not indicate the final outcome of the bid by the first bidder.

Table II

Bidder returns around various events that arise subsequent to the announcement of the bid and through the final resolution of the bid. Sample target firms are from NYSE and AMEX during 1963-1984.

Panel A
Announcement of litigation by target.

	CAR1[1]	CAR2[2]
Mean	- .005	- .031
Median	- .008	- .003
Minimum	- .092	- .591
Maximum	.152	.131
z-stat[5]	-1.63	-1.57
Sample size[6]	71	59
# positive	28	27
# negative	43	32
Wilcoxon-p[7]	.05	--[8]
Sign-p[9]	.10	--
Standardized abnormal return:[10]		
Mean	- .193	- .204
Median	- .245	- .100
Minimum	-2.25	-2.57
Maximum	3.36	2.08

Panel B
Announcement of entry of second bidder.

CAR1	CAR2[3]	CAR3[4]
- .009	- .018	- .019
- .009	- .024	- .027
- .104	- .491	- .266
.070	.472	.404
-2.15	-1.97	-2.99
64	55	62
24	17	18
40	38	44
.07	.05	.02
.06	.01	.00
- .269	- .265	- .380
- .250	- .381	- .510
-3.57	-5.15	-3.05
3.10	3.15	2.88

---

[1] Announcement period abnormal return for the bidder. Announcement period is day -1 and 0. Day 0 is the date of publication of litigation news (or entry of second bidder) in the WSJI. Mean CAR1 of -.005 implies an abnormal return of -.5 percent.

[2] Abnormal returns cumulated from one day after the publication of the first bid in the WSJI through two days prior to the publication of the item noted in the panel (e.g., Panel A: announcement of litigation by target). Mean/median/minimum/maximum number of days in this period: 10.8/5.0/1/73.

[3] Mean/median/minimum/maximum of days in the period: 18.6/13.0/1/121.

[4] Announcement returns cumulated from one day after publication of the news of the first bid in the WSJ to the day of the publication of the news of the second bid. Mean/median/minimum/maximum number of days in this period: 18.5/11.0/1/123.

[5] The z-statistic tests the hypothesis whether the abnormal returns are significantly differnt from zero. Under the null hypothesis of no abnormal performance it is distributed unit normal.

[6] Sample size for CAR2 may be smaller than for CAR1 for two reasons: missing returns; not enough trading days in the period covered by CAR2. Sample size for CAR1 and CAR2 may be less than that indicated in Table 1 for the following two reasons: missing returns; not enough returns to estimate the market model.

[7] Significance level for Wilcoxon signed rank test.

[8] -- = implies significance level is greater than .20.

[9] Significance level for Fisher sign test.

[10] Standardized abnormal returns are Ws as in Dodd and Warner (1983). Under the null hypothesis of no abnormal return, they are asympotically distributed unit normal.

Table III

Logit model estimates of the probability of success of a first bidder. Sample target firms are from NYSE and AMEX during 1963-84.

Variable[1]	Coefficient	Asymptotic t-ratio
TLITA	- .083	- .17
BID2EN	-2.343	-4.30
MREACT	-2.098	-4.08
α	- .276	- .24
PREM	1.467	2.10
Constant	- .374	- .35

Sample size = 161
Likelihood ratio Chi-square test statistic = 63.92 (with 5 degrees of freedom)

Madalla R-Square	= .3277
Cragg-Uhler R-Square	= .4460
McFadden R-Square	= .2992

[1]TLITA=1 if the target files a lawsuit against the bidder, 0 otherwise. BID2EN=1 if a second bidder enters, 0 otherwise. MREACT=1 if target management opposes the first bidder, 0 otherwise. α is the fraction of the target held by the first bidder. PREM is the premium offered by the first bidder.

Table IVA

Market estimates of value to bidders of takeover targets. Sample target firms are from NYSE and AMEX during 1963-1984.

Panel A

	VRATIO[1]	Bidder profit on initial foothold[2] ($ millions)
Mean	1.448	2.13
Median	1.431	0.00
Minimum	.602	-4.23
Maximum	2.017	21.56
Sample size[3]	55	55
Number > 1	54	-[4]
Number < 1	1	-
Number > 0	-	20
Number = 0	-	34

Panel B

	VRATIO	Bidder profit on initial foothold ($ million)
Mean	1.558	1.88
Median	1.537	0.00
Minimum	-1.752	-29.32
Maximum	3.734	23.17
Sample size	54	54
Number > 1	50	-
Number < 1	4	-
Number > 0	-	17
Number = 0	-	33

---

[1]VRATIO is the ratio of the post-takeover value of the target (to the bidder) to the pre-takeover target value. It is calculated as in equation (7). In Panel A, R_3 (abnormal return to first bidder at the time of entry of the second bidder) is calculated considering returns from the day of the publication of the news of the second bid in the WSJ and the day before. In Panel B, R_3 is calculated considering returns from one day after publication of the news of the first bid in the WSJ to the day of the publication of the news of the second bid.

[2]Bidder profit on initial foothold = number of target shares held by the first bidder * target's share price one month prior to the bid * (VRATIO - 1.0).

[3]Sample size is less than 290 since our procedure for estimating VRATIO requires that there be a competing bid for the target. 71 targets had a competing bid in our sample. Missing data on bidder returns and/or target/bidder sizes reduced the sample to 55.

[4]"-" means not provided.

Table IV-B

VRATIO relation to regulation (Williams Amendment) and mood of takeover (friendly versus hostile).

	Pre-Williams	Post-Williams	Friendly	Hostile
Mean *VRATIO*	1.524	1.408	1.450	1.437
Median *VRATIO*	1.425	1.433	1.441	1.416
N	19	36	46	9

Table IVC

Comparison of parameter estimates obtained from the Bhagat, Shleifer, and Vishny (1990) sample with that used in this study.

Parameter	Parameter Estimates	
	This study	Bhagat, Shleifer, Vishny sample
$Pr(S\|\theta_2)$	.6483	.4754
$Pr(S\|\theta_3)$	.2958	.3000
$\bar{B}_2/V_0$ [mean (median)]	1.5741 (1.4679)	1.3698 (1.3208)
$\bar{B}_3/V_0$ [mean (median)]	1.7381 (1.4720)	1.4719 (1.4169)

Table V

Fractional ownership of target firms by bidders.

Mean/Median/Minimum/Maximum/Sample size

(A) Sample: At least one of the firms (target or bidder) was on NYSE or AMEX during 1963-84.

.149 / .000 / .000 /.940 / 486

(B) Sample: Same as (B). Also bidder owned at least one share of target.

.321 / .289 / .002 / .940 / 226

(C) Sample: Both target and bidder were on NYSE or AMEX during 1963-84.

.102 / .000 / .000 / .780 / 230

(D) Sample: Same as (C). Also bidder owned at least one share of target.

.256 / .195 / .006 / .780 / 92

Table VI

Bidder wealth effects from five days before through five days after the announcement of a tender offer bid. Sample firms are from NYSE and AMEX during 1963-84.

	Bidder's cumulative abnormal return (%)	Change in bidder's equity value[1] ($ millions)	Change in value of bidder's initial foothold in target[2] ($ millions)
Mean	1.2	-11.49	1.05
Median	.6	.63	.00
Minimum	-17.5	-684.31	-14.16
Maximum	41.2	201.08	43.00
Sample size	221	221	225[3]
#positive	118	118	78
#negative	103	103	9
Wilcoxon-p[5]	.15	--[6]	.00
Sign-p[7]	---	---	.00

1 Computed as bidder's cumulative abnormal return * number of bidder shares outstanding * bidder share price one month prior to the bid.

2 Computed as target's cumulative abnormal return * number of target's shares owned by bidder at the time of bid * target's share price one month prior to the bid.

3 138 values are zero since the bidder did not own any shares in the target prior to the bid.

5 Significance level for Wilcoxon signed rank test.

6 "--" implies significance level is greater than .20.

7 Significance level for Fisher sign test.

Table VII

Sensitivity of $\bar{V}/V_0$ to Alternative Modelling Specifications

This table provides a sensitivity analysis of value improvement ratio estimates with respect to parameter values in several variations of the basic model. Columns 1 and 2 describe the effects of varying K, the ratio of the expected post-takeover value of the target to the first bidder conditional on a competing bid arriving to the unconditional expected value. Columns 3 and 4 vary γ, the probably that after failure the first bidder will seek and acquire an identical target. Columns 5-7 vary $Pr(S^2|\theta_3)$, the probability that a second bidder wins given that he enters the contest, in order to allow for the benefits derived by a defeated first bidder from selling his initial shareholding to a competing bidder. Column 6 is based on a first bidder initial shareholding of .038, and Column 7 is based on an initial shareholding of 0.15.

K	$\bar{V}/V_0$	γ	$\bar{V}/V_0$	$Pr(S^2\|\theta_3)$	$\bar{V}/V_0$ ($\alpha = .038$)	$\bar{V}/V_0$ ($\alpha = .15$)
1.00	1.448	0.0	1.448	0.0	1.448	1.400
1.05	1.511	0.1	1.440	0.1	1.454	1.424
1.10	1.581	0.2	1.432	0.2	1.460	1.447
1.15	1.656	0.3	1.422	0.3	1.466	1.471
1.20	1.740	0.4	1.411	0.4	1.472	1.495
1.25	1.832	0.5	1.398	0.5	1.478	1.519
1.30	1.935	0.6	1.381	0.6	1.484	1.542
1.35	2.050	0.7	1.361	0.7	1.490	1.566
1.40	2.179	0.8	1.335			
		0.9	1.301			
		1.0	1.255			