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The Pricing Effects of Interfirm Cash Tender Offers

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ABSTRACT

The tools provided by option-pricing theory are used to examine the wealth effects of interfirm cash tender offers. The analysis provides evidence consistent with the "synergy" theory of corporate takeovers and has implications concerning the economic effects of regulations of cash tender offers. The analysis further suggests that the market prices information uncertainty in a manner not captured by the standard Capital Asset Pricing Model. The study introduces a technique for unbundling the prices of a primary asset and a contingent claim when only the prices of the combination are observed.

ACADEMICS, THE BUSINESS COMMUNITY, and government regulators have focused considerable attention on corporate takeovers. In this paper, we extend the literature on takeovers in two ways. First, we utilize the tools provided by option-pricing theory to examine the wealth effects of interfirm cash tender offers. This analysis provides some new evidence on the possible motivations for corporate takeovers. Second, we examine the pricing of a target firm's common stock following an interfirm cash tender offer. This examination suggests that the market prices information uncertainty in a manner not captured by the standard Capital Asset Pricing Model (CAPM). In addition to providing evidence on tender offers and asset pricing, the study also introduces a technique for unbundling the prices of a primary asset and a contingent claim when only the prices of the combination are observed. This technique has the potential to be used in other applications.

Previous researchers have documented substantial wealth gains for target shareholders of interfirm tender offers.[1] There is no consensus on the sources of these gains. Generally, financial economists interpret the evidence as consistent with the notion that takeovers produce efficiency gains through such things as the replacement of inefficient managers and production synergies.[2] Roll [35], however, suggests that the evidence is equally consistent with the hypothesis that target gains are simple wealth transfers resulting from bids that are more

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[1] See Jensen and Ruback [24] for a summary of these results.

[2] See Bradley, Desai, and Kim [7] and Jensen and Ruback [24] for a discussion of the possible efficiency gains from takeovers.

than the shares are worth. Alternatively, a popular argument among critics of corporate takeovers, such as the Business Roundtable, is that bidders are simply good at identifying "undervalued" companies.[3] Under this argument, takeovers do not yield efficiency gains. Rather, the target gains stem from information about the "true" value of the target revealed by the announcement of the bid.

An interfirm cash tender offer consists of one firm making a cash bid to the shareholders of another firm for some fraction of that firm's shares. Between the announcement date and the expiration date of the offer (we refer to this period as the "tender period"), shareholders not only own common stock in the firm but also a claim against the bidding firm. This claim is similar to put options on some fraction of the target firm's shares. Therefore, during the tender period, trades in the common stock of the target firm represent trades of a portfolio, i.e., stock with put-like options. Transaction prices reflect not only the value of the common stock, but also the value of the put options.[4]

The wealth effect of an interfirm cash tender offer for target firm shareholders, therefore, consists of two components. First, there is re-evaluation of the underlying stock that may occur due to the announcement of the bid. The underlying stock reflects the value of the common stock without the value of the put included. This underlying value may change with a tender offer because of new information concerning future firm prospects (because the bidder is known to be a good "stock picker") or may occur because of the increased likelihood of additional bids in the future. The second component of the wealth effect is the put option to sell the underlying stock to the bidding firm at the offer price.

If the put option is "in the money" (i.e., the offer price is greater than the re-evaluated price of the underlying stock), one of two conditions is suggested. Either the bidding and target firms have unique synergies that allow the bidder to bid more than the market price or the bid is an overbid (consistent with Roll [35]).[5] Alternatively, if the put option is either "at the money" or "out of the money," a major source of the wealth effect is from information revealed about the value of the target stock. In this case, the bidding firm and the target firm can still have unique synergies. However, the market considers the underlying stock to be worth at least the *current* offer price. In this paper, we provide some additional insights into the sources of the wealth gains from tender offers by separating the re-evaluation of the underlying stock from the value of the put option given by the bidding firm to the target shareholders.

We begin our empirical analysis by documenting the behavior of target-firm portfolio (underlying stock plus put) prices during the tender period. We find

[3] See Pound, Lehn, and Jarrell [33].

[4] We use the following definitions in this paper: (a) "portfolio price," the observed market price of the target's stock (put + stock) during the tender period; (b) "underlying stock price," the unobservable price of the stock (net the put) during the tender period; and (c) "put price," the unobservable price of the put option during the tender period.

[5] Here we are using the work synergies in a broad sense to include any factor that requires successful acquisition of the target by the bidder to realize the full wealth gains. If so, the bidder may offer more than the underlying stock price to avoid the transaction costs of an unsuccessful bid. Also, if the target and bidder are in a unique bilateral bargaining position, the optimal strategy on the part of the bidder is not clear.

that, on average, the beta and standard deviation are substantially lower during this period than for the stock in the pre-tender period. We further document that the beta, on average, increases after the tender period expires. These findings are consistent with the predictions of option-pricing theory, that a portfolio of a stock and a put has a beta and standard deviation that are strictly less than for the stock itself, and add credence to our view that a tender offer conveys a put option to target shareholders.

After this preliminary investigation of the portfolio's price behavior during the tender period, we use the Black-Scholes option-pricing formula to analyze in more detail the pricing of the target's shares following a tender offer. We use a new iterative technique to estimate (a) the value of the underlying stock, (b) the value of the put option held by the target shareholders, and (c) the standard deviation of the underlying stock.

The results suggest that, on average, the underlying stock price of the target increases eleven percent upon announcement of the tender offer. The put option on average accounts for an additional six percent increase in the value of the target. On average, the bid price is eleven percent more than the underlying stock price *after* the information from the bid is incorporated into the price. (Note that the bid is often made for only a fraction of the outstanding shares.) These findings suggest that the wealth gains from tender offers are not solely due to information concerning the true value of the target that causes the market to re-evaluate its price. Either the bidding firm and target have unique synergies that allow the bidder to bid substantially more than the market price (re-evaluated after the bid) or the bid is an overbid (consistent with Roll [35]). A more detailed examination of this issue does not support the notion that the put option is a simple wealth transfer from bidders to targets. However, the tests have limitations and should be considered as suggestive. Our tests further indicate that the value of put options associated with tender offers has, on average, increased since the passage of the Williams Act. This result is consistent with Jarrell and Bradley [22], who argue that the Williams Act increased the costs to bidding firms in tender offers.

We also find that, while the observed portfolio standard deviation decreases during the tender period, there is, on average, a significant increase in the standard deviation of the underlying stock during the tender period. This increase in standard deviation is likely to relate to the increased likelihood of important announcements concerning the target firm (i.e., other bids, legal actions, etc.).

The portfolio beta during the tender period is shown to be, on average, lower than the beta of the stock in either the pre- or post-tender periods (both theoretically and empirically). Therefore, the CAPM would predict that a target firm during the tender period should, on average, command a lower equilibrium expected return than in either the pre- or post-tender periods.[6] Surprisingly, we find, on average, significant positive abnormal returns during the tender period for a "universe" of offers using market models estimated from both the pre- and

[6] Note that we define the tender period to exclude the announcement effects of the offer. It is well documented that target firms, on average, experience large positive abnormal returns around the announcement of tender offers.

post-tender periods. Given the downward shift in beta during the tender period, we would expect negative abnormal returns using these benchmarks under the joint hypothesis that the CAPM is correct and the market is efficient. Since the "abnormal returns" are found consistently throughout a nineteen-year period, we interpret the evidence as being inconsistent with the CAPM.

Based on the results of several recent studies, we speculate that the apparent upward shift in expected returns is due to an increase in the probability of important information arrival during the tender period (e.g., other tender offers, court actions, and managerial announcements). Under this argument, this "information risk" is a risk that is priced by the market and that is not captured in the standard CAPM; i.e., the traditionally measured "excess return" can reflect the compensation required by investors during the tender-offer event period for higher information uncertainty. Evidence consistent with this view is provided. In particular, we document a positive correlation between the size of the abnormal return and the magnitude of the shift in the standard deviation of the *underlying* stock from before to after the tender-offer announcement. (The shift in the standard deviation is used as a proxy for the level of information uncertainty.) These findings suggest the need for additional theoretical work on the pricing of information risk.

The remainder of the study is organized as follows. Section I describes our sample. Section II analyzes the behavior of the target-firm portfolio prices during the tender period. Section III estimates the value of the underlying stock and put during the tender period, as well as the standard deviation of the underlying stock. Section IV investigates the return characteristics of the target's stock during the tender period and the possible pricing of "information risk." The study concludes with a brief summary.

I. The Sample

The sample consists of 295 cash tender offers made over the period July 1962 through December 1980. The sample was taken from the "Tender Offer Data Base" compiled by Anand Desai and distributed by the Managerial Economics Research Center (MERC) at the University of Rochester. This data base is a "comprehensive collection of tender offers" announced over the sample period and contains "almost every tender offer where at least one firm was listed on the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) at some time between July 1962 and December 1980."

The sample consists of all firms in the data base receiving cash tender offers where the target firm was listed on the NYSE or AMEX at the time of the offer (i.e., returns are in the CRSP Daily Returns File). In the case of a firm receiving multiple bids during the sample period, we focus our analysis on the first.[7]

[7] We chose to limit the number of events to one per firm. For firms receiving multiple bids that overlap, the analysis may be somewhat contaminated. For example, the first option may expire, but the shareholders still may hold options from other bids. To examine whether multiple-bid firms were driving the results, all the analysis was conducted on the subsample of 225 single-bid tender offers. The results are qualitatively the same for both the total sample (which is reported in the text) and the single-bid tender offers.

Table I presents descriptive statistics for the sample by year. It includes the number of tender offers in the sample, the number of single and multiple bids, and management reactions to the offers.

II. Portfolio Price Behavior during the Tender Period

For our empirical analysis, we define three intervals. The 150-day pre-tender interval consists of trading day −170 to trading day −21 relative to the announcement date of the tender offer (day 0). The tender period is trading day +2 through one day before the expiration date of the tender offer. In the case of multiple bids, the expiration date used is the one that is first to occur. The tender period is defined in such a manner as to exclude the announcement effects of the tender offer and the outcome effects of the bid.[8] The 150-day post-tender period is defined as trading days +21 to +170 relative to the expiration date of the offer.

We argue that, during the tender period, the observed transaction prices of a target's stock are for a portfolio of the underlying stock and a fractional put (depending on what fraction, F, of the target's shares the bidder tenders for, where $0 < F \leq 1$). Option-pricing theory predicts that a portfolio of a stock and a fractional put will have a standard deviation and beta that are strictly less at every instant than for the stock itself.[9] Assuming that the beta and standard deviation of the underlying stock do not change with the announcement of the offer, the beta and standard deviation of a target's stock should be less than in the pre- or post-periods, if our argument that views the tender offer as a put is correct.[10]

While option-pricing theory predicts that the beta and standard deviation will be lower during the tender period, it also predicts that these parameters will not be constant (i.e., the instantaneous relation between portfolio risk measures and risk measures for the underlying stock change through time). Since we cannot observe instantaneous risk measures, below we estimate the beta and standard

[8] We are concerned about the tender-offer announcement effect because we know it is generally large and tends to be positive. To make sure we eliminated this announcement effect, we required that a firm's stock traded on day +1 relative to the announcement. For example, a suspension in trading may yield an announcement effect that would occur on a later trading day than for the typical firm. If it did trade on day +1, day +2 was used as the start of the interval. Otherwise, the day after the first trade following day +1 was used as the start of the interval. For example, if a firm did not trade on day +1, +2, and +3 but traded on day +4, then we would use day +5 as the start of the tender-period interval. Statistics for the number of trading days in the tender period are mean (28.97), median (19.00), minimum (3), and maximum (253).

[9] Assuming that the Black-Scholes option-pricing model holds, the instantaneous relation between the beta (B_p) of a portfolio of one stock and F puts ($0 < F \leq 1$) and the beta (B_s) of the stock is

$$B_p = B_s[S/(S + FP)][1 - F\,N(-d_1)] < B_s,$$

where S equals price of the stock, P equals price of the put, and $N(-d_1)$ is as defined in Black and Scholes [5]. The same relation holds for σ_p and σ_s, the standard deviations of the portfolio and the stock, respectively. For details on instantaneous betas and comparative statistics with respect to parameters employed in the option-pricing model, see Galai and Masulis [18] and Pettit and Singer [31]. See also Brickley and James [10].

[10] In subsequent sections of the paper, we estimate the beta and standard deviation of the underlying stock and compare them with those for the stock in the pre-tender period.

Table I

Frequency Distribution of Interfirm Cash Tender Offers in the Sample[a]

Year	Number of Tender Offers in Sample	Number of bids: Single/Multiple	Management Reaction: Support/Oppose/Other[b]
1963	13	12/1	3/2/8
1964	7	6/1	0/2/5
1965	16	15/1	0/5/11
1966	20	18/2	0/6/14
1967	22	18/4	1/9/12
1968	17	14/3	1/2/14
1969	9	7/2	1/1/7
1970	6	6/0	2/2/2
1971	2	2/0	0/0/2
1972	6	6/0	2/1/3
1973	29	26/3	5/9/15
1974	32	24/8	3/7/22
1975	20	11/9	0/6/14
1976	22	18/4	3/4/15
1977	24	16/8	5/5/14
1978	21	8/13	2/7/12
1979	24	16/8	4/12/8
1980	5	2/3	0/3/2
Total	295	225/70	32/83/180

[a] The sample consists of interfirm cash tender offers during July 1962 through December 1980 where the target firm was listed on the NYSE or AMEX at the time of the tender offer.

[b] "Other" refers to the management reaction to the tender offer being unknown or neutral or the tender offer being changed later to a merger.

deviation over the entire tender period as a way of summarizing average market sensitivity and volatility over the period.

Table II presents the mean and median betas and standard deviations for our sample firms estimated over each of the three intervals. Betas are estimated using daily returns, the standard one-factor market model, and the CRSP equally weighted "market" index. The table also presents test statistics for testing hypotheses that the beta and standard deviation for the tender period are equal to those for the two other intervals.[11] Three statistical tests are used. These tests

[11] The sample size is smaller than 295 in the tender period and the postevent period for two reasons. We required that return data be available for at least three trading days in the tender period for parameter estimation. Second, many firms were lost in the postevent period due to mergers. Because of the reliability problems inherent in estimating betas and standard deviations during the tender period from limited observations, we also conducted the analysis using a subsample that met the requirement that thirty days of return information be available for parameter estimation in the tender period. The results are very similar to those for the overall sample and are not reported here. Also, in case something inherent in our estimation technique was driving the results, we repeated all the analysis, using as the announcement date 400 trading days prior to the actual announcement date. The pre- and post-event periods were defined relative to this hypothetical announcement date. The tender period was defined as the same number of trading days relative to the hypothetical date

Table II

Changes in Risk of a Target Firm's Common Stock around the Date of an Interfirm Cash Tender Offer[a]

Panel A: Risk Measures

	Pre-event Period[b]			Tender Period[c]			Post-event Period[d]		
	Mean	Median	Sample Size	Mean	Median	Sample Size	Mean	Median	Sample Size
Beta	0.941	0.912	295	0.330	0.160	286	0.729	0.659	182
Standard Deviation	0.025	0.024	295	0.021	0.017	286	0.023	0.021	182

Panel B: Hypotheses Tests

	Hypothesis One[e]		Hypothesis Two[f]	
	Beta	Standard Deviation	Beta	Standard Deviation
Paired *t*-Test *t*-Statistic	3.96*	3.48*	2.08**	−.02
Wilcoxon Signed-Rank Test *Z*-Statistic	8.79*	4.41*	3.64*	−.66
Fisher Sign Test Significance Level	0.00[g]	0.00[h]	0.00[i]	0.29[j]

[a] The sample consists of interfirm cash tender offers during July 1962 through December 1980 where the target firm was listed on the NYSE or AMEX at the time of the tender offer.

[b] The pre-event period consists of 150 trading days beginning from 170 days before the announcement of the first tender-offer bid through twenty-one days before.

[c] The tender period runs from two days after the announcement of the first tender-offer bid through one day before the expiration of the tender offer. (See footnote 6.) During this period, observed transaction prices are for a portfolio of stock and put options. The estimated betas and standard deviations for this period are for the portfolio.

[d] The post-event period consists of 150 trading days beginning from twenty-one days after the expiration of the tender offer through 170 days after.

[e] Hypothesis One tests whether the target's *pre*-event-period beta/standard deviation is the same as the tender-period beta/standard deviation.

[f] Hypothesis Two tests whether the target's *post*-event-period beta/standard deviation is the same as the tender-period beta/standard deviation.

[g] Two hundred twenty-two observations had beta decreases from the pre-event period to the tender period; sixty-four had increases.

[h] One hundred seventy-seven observations had standard deviation decreases from the pre-event period to the tender period; 109 had increases.

[i] One hundred fifteen observations had beta increases from the tender period to the post-event period; sixty had decreases.

[j] Ninety-five observations had standard deviation increases from the tender period to the post-event period; eighty had decreases.

* Significant at 0.01 level.

** Significant at 0.05 level.

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as in the actual period. The analysis revealed no significant shifts in parameter estimates around the hypothetical tender period. We also defined another "tender period" of an equal number of trading days as in the true tender period. This "tender period" was selected just prior to the pre-event period. Parameters estimated from this hypothetical tender period were compared to the actual pre- and post-event periods. Once again, the analysis revealed no significant parameter shifts around this "tender period." These results are consistent with the notion that our findings around the true tender period are not an artifact from the use of our estimation techniques.

include a paired t-test, a paired Wilcoxon signed-rank test, and a Fisher sign test.[12]

The numbers in Panel A of Table II are consistent with the hypothesis that the risk parameters are lower during the tender period than during the pre-tender period. The average beta dropped from 0.941 to 0.330 from the pre-event interval to the tender period. The standard deviation declined from 0.025 to 0.021. All three statistical tests (presented in Panel B) allow us to reject the null hypothesis that the risk parameters are the same between these two intervals, at the 0.01 level of significance.[13]

Table II further indicates that the average beta increased from 0.330 to 0.729 between the tender and post-tender periods. The t-test allows rejection of the null hypothesis of equality at the 0.05 level. Both the Wilcoxon and sign tests allow rejection at the 0.01 level of significance. While the point estimate for the average standard deviation is higher for the post-tender period than for the tender period, none of the statistical tests is significant at conventional levels.

III. Estimation of Underlying Stock and Put Prices

The previous section presented evidence consistent with the notion that, during the tender period, the stock of a target firm is actually a portfolio of a stock and a put. In this section, we assume that the put can be valued using the Black-Scholes formula and use an iterative technique to estimate the stock and put values for each day during the tender period.[14] We also estimate the standard deviation of the underlying stock during this period. We begin by describing the subsample of firms that we use in the analysis. We then discuss our empirical technique and present our results. We conclude the section by investigating the possibility of systematic overbids on the part of bidding firms.

A. Subsample

Our analysis in this section uses a subsample of eighty-six firms meeting the following criteria:

[12] See Hollander and Wolfe [19] for a description of the Wilcoxon and Fisher sign tests. The t-test and Wilcoxon tests are paired; i.e., the estimate for a given firm's risk parameter is subtracted from the estimate of the same firm's parameter in the other period. Hypothesis tests are then done on the average (t-test) and median (Wilcoxon test) difference.

[13] It is possible that part of the drop in the risk parameters following a tender offer is due to the possibility of merging with another firm. For example, if the beta of the bidding firm is smaller than for the target firm, then a prospective merger might lower the beta of the target firm in the tender peiod. To investigate this issue, we compared the betas of the target and bidding firms in the pre-event period. The average beta for the target firms (0.941) was actually smaller than for the bidding firms (1.17). A paired t-test, Wilcoxon signed-rank test, and Fisher sign test all allow rejection of equal betas for the target and bidding firms at the 0.01 level (i.e., the bidding firm appears to have a larger beta). The effects on standard deviations from merger proposals are complicated since the correlation between the two companies' returns is also important. We do not rule out the "merger explanation" as a possible cause for the standard-deviation reduction.

[14] The Appendix discusses the institutional details of the put option given to target shareholders and compares it to a standard European put option. The differences do not appear to be substantial. Note also that the Black-Scholes model seems quite robust with respect to relaxing the basic assumptions of the model. See Merton [29, 30], Ingersoll [20], and Cox and Ross [13].

1. The firm must not have had an ex-dividend date during the tender period.
2. The *Wall Street Journal (WSJ)* article detailing the offer must indicate that the offer is official. If the bidding firm was "considering," "intending," or "planning" to make an offer, the observation was not included.
3. The tender period must be at least six trading days long.
4. The fraction tendered for by the bidding firm must be less than one.
5. Price data had to be contained in the *WSJ*.

Seventy-nine firms were not included in the analysis because they had ex-dividend dates during the tender period. Previous studies have documented anomalous price behavior around ex-dividend dates.[15] Since the tender period is usually relatively short in length, such anomalous behavior has the potential to affect the results substantially (especially our estimation of the standard deviation of the underlying stock) and to confound the interpretation of the evidence.[16]

Twenty-six firms were eliminated because the *WSJ* indicated that the offer was not firm. Our intent is to analyze actual put options, not potential options.

Eighty-two firms were not included in the analysis because the fraction sought was equal to one. As explained below, our estimation technique in general does not yield unique solutions when this fraction equals one.

Twelve firms were eliminated because price data were not contained in the *WSJ*. Ten firms were lost because the tender period was less than six days. Our estimation technique has low precision when the tender interval is very short.[17]

B. Model and Estimation Technique

We assume that the observed stock price during the tender period, P, is the price of the underlying stock, P_s, plus the value of a fractional put option, FP_p, where the fraction, F, is the proportion of the target firm's common stock (not already owned by the bidder) sought in the tender offer:[18]

$$P = P_s + FP_p. \tag{1}$$

[15] See Eades, Hess, and Kim [16], Elton and Gruber [17], and Kalay [25].

[16] Dividend announcement dates are very predictable, and so little ex post selection bias is created by eliminating observations with ex-dividend dates during the tender period. See Kalay and Loewenstein [27]. In fact, if the ex-dividend date occurs within the tender period, the dividend was most likely declared before the tender period. In this case, observations are being eliminated using an ex ante criterion.

[17] The average number of days in the tender period for which we could obtain transaction prices for our eighty-six sample firms is fifteen. The median is thirteen. The range is seven to sixty.

[18] For our analysis, we assume that the marginal investor values the tender offer based on F, the proportion of the shares sought by the bidder. In actuality, the bidder often buys a larger proportion of the shares tendered than F. For example, in the 184 cases in our sample, where the MERC data base indicated that some shares were actually tendered, the actual percentage of tendered shares purchased was 2.61 times the stated F. (The median was 1.47 times.) In only three cases did the bidder buy back less than ninety-five percent of the stated F. In seven cases, the bidder purchased greater than ninety-five percent but less than one hundred percent of the stated F. Also, when offers "fail", the offers tend to be "out of the money". (See the Appendix for discussion.) Therefore, it is likely that the actual F is close to the lower bound of the expected F used by the marginal investor to value the offer. This implies that, for an observed stock price, P, our technique is likely to underestimate the put value (since the marginal investor is given more than F puts) and overestimate the value of the underlying stock. Since our major conclusion is that the put is of substantial value, this potential bias works to make the findings even stronger than reported.

We further assume that the put can be valued accurately using the Black-Scholes formula:

$$P_p = P_e\, e^{-rt}\, N(\sigma\sqrt{t} - d) - P_s\, N(-d), \tag{2}$$

where

r = daily risk-free rate of interest,
t = days until the tender period ends,
P_e = the price per share offered by the bidding firm,
σ = standard deviation of the daily stock return,
N = the cumulative normal density function, and
d = $[\ln (P_s/P_e e^{-rt})/\sigma\sqrt{t}] + 1/2\ \sigma\sqrt{t}$.

The major difficulty in using (2) to value the put option associated with a tender offer is that neither P_s nor σ are observable. Only the portfolio price, P, is observed. Therefore, we use an iterative procedure to estimate P_s and P_p for each day during the tender period and σ, which we assume to be constant over the tender period.

For each firm in our sample, we begin with day one of the tender period. We use as starting values for P_s and σ the stock price on the day before the announcement of the tender offer and the standard deviation estimated from the pre-tender period. Using these values, we calculate P_p, employing equation (2). We then use this value in equation (1) to solve for P_s. If the estimated P_s is within \$0.0625 of our starting value, we continue to day +2 in the tender period to estimate P_s and P_p for the second day.[19] If the estimated P_s is not within \$0.0625 of the starting value, we re-estimate the put price using the calculated P_s as our new starting value. We continue this process until the starting and ending values are within the \$0.0625 limit.[20]

We repeat this procedure for each day during the tender period. When we complete this process, we have an estimated price series for both the underlying stock and the put for each day during the tender period.

We then calculate a standard deviation of daily stock returns using our price series for the underlying stock. If the standard chi-square test fails to allow rejection of the null hypothesis that the estimated standard deviation and the starting value are the same at the 0.50 level of significance, we end the procedure and use the results as our estimates of P_s, P_p, and σ.[21] If the hypothesis is rejected at the 0.50 level of significance, we start the entire procedure over using as our starting value of σ the estimated σ from our derived series. We continue this

[19] The New York Stock Exchange generally allows trades in multiples of one eighth of a point. One sixteenth of a point equals \$.0625.

[20] Usually, convergence occurred within three iterations. Note that the convergence is unique. The value of the portfolio is a monotonically increasing function of P_s. In three cases (out of over 1,300 estimated prices), "irrational" prices obtained; i.e., the portfolio price was less than implied by the Black-Scholes boundary conditions ($P < \max[FP_e e^{rt} + (1 - F)S, S]$), given the offer price. We treated these three observations as missing.

[21] A high critical level, 0.50 (twenty-five percent in each tail), is chosen so that the starting and ending values for the standard deviation are very close. The typical conversion occurs when the two standard deviations differ by less than 0.001.

process until the chi-square test does not allow rejection of the equality of starting and ending standard deviation at the 0.50 level.[22]

To determine whether our results are sensitive to our starting values, we repeat the procedure using one half and twice our original starting values for P_s and σ. In all but one case, the convergence is the same for those different starting values. For our empirical analysis below, we use the eighty-five cases where unique convergence occurred.

In contrast to $F < 1$, when $F = 1$, unique convergence generally does not obtain. If $N(-d) = 1$, a portfolio of one put and one stock is a perfect hedge. In this case, the put is very deep in the money and the portfolio sells for the discounted value of the exercise price. Increases or decreases in the stock price are exactly offset by corresponding changes in the put price. Therefore, within the region of $N(-d) = 1$ when $F = 1$, many price and standard deviation combinations yield similar portfolio prices.[23] In our sample, the puts tend to be substantially in the money. For $F = 1$, unique convergence did not occur in seventy-seven out of eighty-two cases (compared to 1 in 85 for $F < 1$). To avoid any ex post selection bias, we chose to eliminate all cases where $F = 1$ and not simply the seventy-seven cases without unique convergence.

C. Estimation Results

Table III displays the results of estimating the underlying stock and put prices during the tender period. On average, the underlying stock price for the first day of the tender period is 11.16 percent higher than on the day before the announcement of the offer (pre-offer price). This finding suggests that the market re-evaluates the underlying stock upon announcement of the offer. This re-evaluation can relate either to information revealed about the earnings potential of the firm (i.e., its intrinsic value) or to the increased probability of more or higher bids in the future.

On average, target shareholders are given a fractional put valued at \$1.35 per share. On average, the put value is 6.25 percent of the preoffer stock price.

On average, the bid is 11.14 percent more than the underlying stock price after the announcement of the offer. This finding suggests that the wealth gains from tender offers are not solely due to information about the true target-firm value that is revealed by the bid (i.e., the bidders are not simply good "stock pickers"). Either the bidding firm and target have unique synergies that allow the bidder to bid substantially more than the market price (re-evaluated after the bid) or the bid is an overbid and represents a wealth transfer from bidder to target (as suggested by Roll [35]). We investigate this issue in more detail in the next section of the paper.

[22] Usually, convergence occurred within four iterations.

[23] It is easy to show that, when $F = 1$ as $N(-d)$ approaches 1 (as the put becomes more in the money), very small changes in the starting value of σ greatly alter the estimated prices of the underlying stock, making unique convergence less likely. To show this, one constructs iso-portfolio value curves between P_s and σ. The slopes of these curves are very steep when $F = 1$ and $N(-d)$ is near 1.

Table III

Summary of Results from Estimating the Underlying Stock Price and Put Price during the Tender Period (Eighty-five Observations from the Period 1962 through 1980)

	Mean	Median	Maximum	Minimum
Changes in Underlying Stock Value upon Announcement of Offer (%)[a]	11.16	8.17	59.89	−17.50
Initial Put Value[b]	$1.35	$0.72	$9.77	$0.01
Initial Put Value as Percentage of Pre-Offer Price[c]	6.25	3.61	55.86	0.09
Offer Price Minus Initial Underlying Stock Price (after Offer Is Made)[d]	$2.71	$1.80	$17.77	−$2.34
Offer Price as a Percentage of Underlying Stock Price (after Offer Is Made)[e]	111.14	108.61	170.91	87.56

[a] Percent change in underlying stock price from day one before offer to first day of tender period (day +2 relative to the announcement date).

[b] Estimated fractional put value (FP_p) on the first day of the tender period.

[c] Estimated value of the fractional put (FP_p) on first day of the tender period as a percentage of stock price on the day before the offer.

[d] Offer price minus the estimated underlying stock price on the first day of the tender period.

[e] Offer price as a percentage of the underlying stock price on the first day of the tender period.

Our results indicate that tender offers convey valuable puts to target shareholders. The Williams Act passed in 1968 and amended in 1970 initially required that the offer be left open for at least ten days. (The period has since been extended.) This regulation has the potential to increase the value of put options associated with tender offers by precluding offers with short durations. To examine this issue, we compare the value of the put option (on the first day of the tender period) as a percentage of the preoffer price for the pre- and post-Williams Act subperiods. Prior to 1970, the put, on average, represented 4.54 percent of the preoffer price (forty observations). For the period 1970 through 1980, the average was 8.13 percent (forty-five observations). The standard difference-in-means test produces a t-statistic of 1.93. This finding is consistent with Jarrell and Bradley [22], who present evidence that the Williams Act and other regulations of tender offers have increased the costs of the bidding firms.[24] They

[24] Our results are likely to understate any increase in costs because we do not include offers of less than six days to expiration. These offers are expected to have lower valued put options and are pre-Williams Act. Of the 295 offers in our sample, 104 were made before 1970 and 191 were made after 1969. The average number of days for the tender period was 32.95 for the post-1969 events and 19.21 for the pre-1970 events. A statistic of 3.38 allows rejection of the null hypothesis that the means are the same for the two groups.

Table IV

Summary of Estimating the Standard Deviation of the Underlying Stock during the Tender Period (Eighty-five Observations from the Period 1962 through 1980)

	Mean	Median	Maximum	Minimum
Tender-Period Standard Deviation (%)	3.5	2.4	18.5	0.5
Tender-Period Standard Deviation as a Percentage of Pre-Tender-Period Standard Devition[a]	158.30	114.32	878.45	14.44

[a] Pre-tender period is day −170 to day −21 relative to the announcement date of the offer.

argue that this increase in costs is likely to deter some otherwise profitable takeovers.

Table IV displays information on the estimated standard deviations of the target firms' underlying stocks during the tender period. On average, the standard deviation of the underlying stock is 58.30 percent higher than in the pre-tender period. Paired *t*, Wilcoxon, and sign tests all reject the hypothesis that the standard deviation during the tender period for the underlying stock is the same as the standard deviation of the stock in the pre-tender period at the 0.01 level. The documented increase in the standard deviations of target firms during the tender period likely relates to the increased probability of important announcements concerning the target firm (i.e., other bids, legal actions, etc.).

D. Testing for Systematic Overbidding

Our results suggest that the bidder, on average, bids substantially more than the market's assessment of the target firm's value after the information in the bid is incorporated in the stock price. These findings are consistent with two different hypotheses concerning the sources of gains from tender offers.

First, the target firm's shares may be worth more to the bidding firm than the marginal investor in the market. For example, the bidding firm and target firm may have unique synergies that make the target firm worth more to the bidding firm than to the market participants. In this case, the bidding firm may offer more than the market price for such reasons as trying to avoid the costs associated with a failed bid.

The second hypothesis is that the managements of bidding firms, on average, overbid for targets (Roll [35]). In this case, the value of the put option is a wealth transfer from the shareholders of the bidding firm to the shareholders of the target firm. The market's assessment of the value of the underlying stock reflects its "true" value, and target shareholders are simply being given free puts by the bidding firm. Here, the overbid can be defined as the value of the put.

The "overbid hypothesis" predicts that the bidding firm will decrease in value by the total value of puts given to the target. To test this hypothesis, we assume

that the announcement-period return for the bidding firm reflects the total capitalized value of the tender offer.[25] We estimate the correlation between the announcement-period abnormal return for the bidding firm and the estimated total dollar value of all puts given to target shareholders, standardized by the bidding firm's market value of equity. We also estimate the correlation between the total announcement-period abnormal *dollar* return for the bidder and the total dollar value of puts given to the target. The overbid hypothesis predicts negative correlations between each of these pairs of variables.

In neither case do we find a significant relation. For the announcement-period percentage returns, the estimated correlation is 0.17, with a t-statistic of 1.19. For the dollar returns, the estimated correlation is −0.19, with a t-statistic of −1.36. Spearman tests yield similar results (t-statistics of .53 and −1.44, respectively).

A caveat concerning these tests is in order. The tests are meaningful only if the announcement-period returns of the bidder reflect the value to the bidder of the merger. Roll [35] argues that bidding-firm announcement-period returns may include positive information about the bidding firm's earnings. This information effect has the potential to add noise to the returns and weaken our tests. Also, if takeover activity by the bidding firm is anticipated, then the announcement period returns will not reflect the actual value of the tender offer. However, unless the market also anticipates the level of the overbid, one would still expect a cross-sectional relation between return measures and put values.

IV. Return Characteristics during the Tender Period

The option-pricing model predicts that, at each instant during the tender period, the beta of the portfolio will be less than the beta of the underlying stock. Therefore, assuming that the beta of the underlying stock is constant throughout the study period, the portfolio beta will be lower during each instant of the tender period than for the stock in either the pre- or post-tender periods. In this case, the CAPM would predict a downward shift in the expected returns during the tender period for the common stock of target firms.

In Section II, we presented evidence that the beta of the portfolio was, on average, lower during the tender period. However, this evidence is only suggestive since the portfolio beta is not constant over the tender period. As an additional check, we estimated the betas of the underlying stocks during the tender period for the eighty-five firms for which we were able to estimate the underlying stock prices. Statistical tests do not allow rejection of the null hypotheses that the average beta for the underlying stocks is equal to the average beta for either the pre- or post-periods. These findings add additional support for the notion that, on average, the portfolio beta at each instant during the tender period is lower than the average stock betas for the pre- or post-intervals.

[25] The bidder's announcement period is the announcement day of the offer and day plus one. The abnormal return is calculated using a standard market model estimated from day −170 through day −21 relative to the announcement date. The analysis in this section is conducted using the fifty-two bidding firms on the daily CRSP tape.

Table V

Cummulative Abnormal Returns (CAR) of Target Firms' Common Stock in the Tender Period[a]

Statistics Pertaining to the CARs	Benchmark Period Used to Estimate the CARs	
	Pre-event[b]	Post-event[c]
Mean CAR (%)	1.9	2.1
Z-Statistic[d]	6.23	4.84
Median CAR (%)	0.6	1.6
Wilcoxon Signed-Rank[e] Z-Statistic	2.33	2.27
Fisher Sign Test[e] Significance Level	0.05	0.08
Percent Positive	54.92	55.49
Sample Size	295	182

[a] The sample consists of interfirm cash tender offers during July 1962 through December 1980 where the target firm was listed on the NYSE or AMEX at the time of the tender offer.

The tender period runs from two days after the announcement of the first tender-offer bid through one day before the expiration of the tender offer. (See also footnote 8.) Abnormal returns are for the common stock of the target firm, which, we argue, is a portfolio of an underlying stock and put options.

[b] The pre-event period consists of 150 trading days beginning from 170 days before the announcement of the first tender-offer bid through twenty-one days before.

[c] The post-event period consists of 150 trading days beginning from twenty-one days after the expiration of the tender offer through 170 days after.

[d] The Z-statistic tests whether the mean CAR is zero.

[e] These nonparametric tests test whether the median CAR is zero.

To examine the issue of return characteristics during the tender period, we estimated cumulative abnormal returns (CARs) over the tender period for each firm using market models estimated over both the pre-event and post-event periods. Given the downward shift in beta during the tender period, the CAPM would predict *negative* CARs relative to these benchmarks. Surprisingly, we find *positive* abnormal returns.

Table V presents the average, median, and percentage of positive CARs for our sample for both benchmarks. For testing the significance of the CARs, we utilize the approach of Dodd and Warner [15]. Results of the Z-test, Wilcoxon signed-rank test, and Fisher sign test are reported in the table.[26]

[26] See the Appendix of Dodd and Warner [15] for a discussion of the Z-test.

Using either benchmark, the average CAR for the tender period is positive. For the pre-event estimation period, the average CAR is 1.9 percent. For the post-event period, the average CAR is 2.1 percent. The parametric Z-test allows rejection of the null hypothesis of no abnormal returns at the 0.01 level for each benchmark. The Wilcoxon test is significant at the 0.05 level as is the Fisher sign test for the pre-event benchmark. For the post-event benchmark, the sign test is significant at the 0.10 level and the Wilcoxon test is significant at the 0.05 level. Given the apparent decline in beta during the tender period and that purchasing the stock during the tender period is a strategy that could be adopted by market participants, the finding appears inconsistent with the joint hypothesis that the CAPM is the correct pricing model and that the market is efficient.[27]

Alternatively, the results may simply indicate that our benchmarks are mismeasured. For example, the firms in our sample may have experienced significantly negative abnormal returns in both the pre- and post-event estimation periods.[28] Also, it is possible that the benchmarks are correct but that the realized average market return during the tender period was negative, and so the average drop in beta would be expected on an ex post basis to be associated with average positive returns. We make three checks with regard to these issues. First, we examine the intercept terms of our market models for both the pre- and post-event periods. The CAPM predicts that these alphas will, on average, be near zero if the firms experienced normal performance (one minus beta times the daily risk-free rate).[29] The mean and median alphas for the pre-event period are 0.0002 and 0.0001, respectively. For the post-event period, the values are 0.0008 and 0.0008. Second, we examine the realized market returns in the pre- and post-event periods. In both periods, the average and median realized market returns are positive and significantly different from zero. Finally, we use the two hypo-

[27] Note that the suggested trading strategy is one that could have been implemented on an ex ante basis by market participants. We made sure the stock actually traded after the announcement date but before the start of the analysis interval. (See footnote 8.) The expiration date was known by market participants. We are examining a "universe" of the events during the sample period (both successful and unsuccessful offers). The strategy is to buy the target firm of a cash tender offer for a NYSE- or AMEX-listed company. The participant buys on the day +2 if the stock traded on day +1 or, if not, on the day after the first trade after the point. The stock is held until one day before the expiration date of the first offer to expire.

Gregg Jarrell suggested that our results may be due to a sample selection bias. Apparently, our data base, while including "almost all" case offers, does not include some offers with targets under litigation. It is possible that these target firms experienced, on average, negative returns that would offset the positive returns found for our sample. Jarrell provided us with his list of litigated targets (from Jarrell [21]). Comparing firms on this list with firms in or sample, we identified eighteen events that were not included in our sample. For these eighteen events, we read the relevant news articles contained in the *Wall Street Journal.* Four of the events were cash tender offers for which data were available on CRSP. We then redid the return analysis on these four events. The event-period CARs (using the pre-event benchmark) for each of these four observations were positive, with a mean of 3.5 percent.

[28] For example, using the pre-event benchmark, returns in the tender period will be bias upward if these firms supplied lower-than-equilibrium returns in the pre-event period. This might happen if the target firms become targets after a period of poor performance.

[29] Note that, since our average betas for the two intervals are less than one, we expect small but positive alphas under the null hypothesis that the CAPM is correct and that the firms had normal returns.

Table VI

Cummulative Abnormal Returns (CAR) of Target Firms' Common Stock in the Tender Period Partitioned by Subperiod[a]

	Benchmark Period Used to Estimate the CAR			
	Pre-event[b]		Post-event[c]	
Subperiod	Mean CAR (%)	Sample Size	Mean CAR (%)	Sample Size
1962–66	3.5	56	2.2	43
1967–71	2.0	56	2.7	42
1972–76	0.4	109	1.8	69
1977–80	2.7	74	1.9	28
ANOVA *F*-Statistic[d]	.71		.05	

[a] The sample consists of interfirm cash tender offers during July 1962 through December 1980 where the target firm was listed on the NYSE or AMEX at the time of the tender offer.

The tender period runs from two days after the announcement of the first tender-offer bid through one day before the expiration of the tender offer. (See also footnote 8.) The abnormal returns are for the common stock of the target, which, we argue, is a portfolio of an underlying stock and put options.

[b] The pre-event period consists of 150 trading days beginning from 170 days before the announcement of the first tender-offer bid through twenty-one days before.

[c] The post-event period consists of 150 trading days beginning from twenty-one days after the expiration of the tender offer through 170 days after.

[d] The ANOVA tests whether the mean CARs in the four subperiods are equal.

thetical tender periods described in footnote 11 to determine whether the abnormal returns found in the true tender period are an artifact of our estimated benchmarks. Using our two benchmarks (the true pre-event and post-event periods), we do not find abnormal performance in either hypothetical tender period. Based on these three checks, we conclude that the abnormal returns found during the tender period are not an artifact of our estimation technique.

To determine whether the abnormal returns are driven by one particular subperiod within our overall sample period, we partitioned the CARs based on their subperiods. Table VI presents the average CAR for four subperiods for each benchmark. In each subperiod, the CAR is positive. ANOVA tests do not allow us to reject the null hypothesis of equal means in each subperiod for either benchmark. Given the persistence of abnormal return behavior for each of the subperiods over a nineteen-year period, we interpret the evidence as being inconsistent with the CAPM (and not market efficiency).

One possible explanation for the return behavior is the pricing of information risk that may not be captured by the standard CAPM. Kalay and Loewenstein [26] argue that risk per unit of time may not be constant and many increase on

days when the potential for information releases is large.[30] These authors find abnormal returns around a universe of dividend announcements (during a given sample period). The size of the abnormal return appears too large to be explained by upward shifts in beta and suggests the pricing of some type of information risk not captured by beta.

Since tender offers may be associated with an increase in the likelihood of important information announcements (e.g., white-knight bids, court actions, merger plans, etc.), the positive CARs documented in the paper may relate to the argument of Kalay and Loewenstein [26]. If their argument is correct, one would expect that observations with the greatest likelihood of important announcements will be associated with the greatest upward shift in expected return.

To examine this issue, we utilize the change in the estimated standard deviation of the *underlying* stock (from pre-tender period to tender period) as a proxy for information uncertainty.[31] If the ex post realized change in the standard deviations of the underlying asset value were related to ex ante expectations concerning likelihood of important value altering announcements, then the Kalay and Loewenstein argument would predict a positive association between CARs and change in standard deviation.[32]

We estimate two correlation coefficients. One is a correlation between the CAR and the ratio of the estimated standard deviation of the underlying stock during the tender period to the standard deviation of the stock in the pre-tender period. The estimated correlation is 0.32, with a t-statistic of 3.07. The other estimated correlation is between the CAR and the change in the standard deviation from the pre-tender to tender period (i.e., standard deviation in the tender period minus the standard deviation of the stock in the pre-tender period). The estimated correlation is 0.31, with a t-statistic of 3.00. We also calculated Spearman correlation coefficients. The results are similar to those reported here.[33]

These findings are consistent with the notion that some type of information risk is being priced that is not captured by the CAPM. The results are particularly interesting in light of several other recent studies that suggest a similar conclusion.[34] However, as of now, there is no theoretical model concerning the pricing of this type of risk, suggesting the need for additional theoretical work in this area.[35]

[30] Robicheck and Myers [34] make a similar argument concerning the selling of claims on the uncertain cargo of a ship with a known arrival date.

[31] Sample size for this analysis is eighty-five.

[32] Note that we use the standard deviation of the underlying stock rather than the portfolio because the put value is negatively correlated with the stock value and makes the portfolio standard deviation a poorer proxy for information uncertainty. Nevertheless, we did conduct the analysis using the portfolio standard deviation as the proxy variable, and the results are similar to those using the underlying stock standard deviation.

[33] We also conducted all the analysis reported in this paragraph using standardized prediction errors (w-statistic as in Dodd and Warner [15]) instead of CARs. The results are virtually identical.

[34] See, for example, Barry and Brown [3], Brickley [9], Brickley and Schallheim [11], and Kalay and Loewenstein [26].

[35] One related theory paper is Barry and Brown [4].

V. Summary

In this paper, we examined the pricing of common stock of target firms of interfirm cash tender offers. During the postannouncement but pre-expiration period (tender period), target-firm shareholders hold an option similar to a put option on the shares of the target. Observed transaction prices are for a portfolio consisting of the underlying stock and the put option.

Consistent with option-pricing theory, we documented a statistically significant drop in both beta and standard deviation of the common stock of targets in the tender period. Furthermore, the beta increases after the tender period.

We estimate the unobservable prices of the underlying stock and put during the tender period. This estimation was carried out using the Black-Scholes put valuation formula and a new iterative technique. This technique has the potential for use in other applications.[36] We found that the underlying stock price just subsequent to the announcement was, on average, about eleven percent higher than the preannouncement stock price. The put option was found to be, on average, an important component of the announcement-period return (about six percent of the preannouncement price). Evidence that may be considered as inconsistent with the notion that the put is a wealth transfer from bidder to target was presented. These findings suggest that the bidder and target have unique synergies. These synergies allow the bidder to make a bid that is substantially higher than the price of the stock (after the information from the bid is incorporated in the price) without reducing the bidder's value. This conclusion is consistent with Bradley, Desai, and Kim [7] and Pound [32].

The study has potentially important policy implications. The findings indicate that tender offers provide targets with valuable put options. The Williams Act requires that tender offers be left open for a minimum time period. Legislators and regulators are considering whether or not to extend this time period. Such an extension would increase the value of put options associated with tender offers and could, on the margin, discourage some potential offers from bidding firms. Consistent with the notion that the Williams Act increased the costs to bidding firms, our results indicate that the average value of put options associated with tender offers was smaller before the passage of the Williams Act than after the act was passed.

Given a decline in the beta of the target's common stock during the tender period, the CAPM would predict a drop in expected return during this period. Contrary to this prediction, we found significant positive abnormal returns using both a pre- and postestimation period for the market model. We speculated that our findings may relate to the arguments of Kalay and Loewenstein [26] concerning an increase in expected return when information releases are likely. Consistent with this argument, we found in the cross-section a positive relation between abnormal returns and a proxy for the likelihood of new information arrival.

[36] For example, commodities may trade with price supports or other types of options to sell at certain prices. Also, real property, such as land, may trade with attached options. See Brennan [8] for related work relevant to the valuing of these types of assets.

Appendix

The Black-Scholes derivation assumes a standard European put option. This Appendix compares and contrasts the option associated with tender offers ("tender option") with a conventional European put option.

A bidding firm in a tender offer will often bid for less than the total number of shares outstanding.[37] Sometimes the bidding firm will specify that a minimum number of shares must be tendered for the offer to be binding. Once an offer is made, shareholders of the target firm have a put-like option. Up through some time period, shareholders may tender their shares and receive the bid price on a pro-rated number of shares (assuming that enough shares are tendered to meet the bidder's stated minimum) or alternatively choose not to tender.[38] The Williams Act initially required that a public cash tender offer be left open for at least ten days. This minimum time period has been increased over time.

The tender option is European in that a tendering shareholder does not receive cash before the expiration date for early exercise. However, the tender option is different from a conventional put in at least four ways. None of these differences appears substantial.

First, if less than the required minimum number of shares are tendered, a shareholder may not receive the bid price even though he or she tenders his or her shares. In these cases, the bidder generally reserves the right to purchase any of all shares tendered on a first-come, first-served basis. However, Bradley [6] argues that, on average, bids fail because the tender price is less than the value of the shares. If the tender price is less than the share value, the option is out of the money and a rational shareholder would not tender (as for a conventional put). In Bradley's sample of ninety-seven "unsuccessful" offers, target shareholders realized an average capital gain of forty-five percent.[39] This average postoffer return exceeded the average premium of these offers, which was twenty-nine percent.

The tender option also differs from a conventional put in that the contract to buy at the stated price is less binding for the tender option. Often the offer will have an "out" clause.[40] The out clause states that the bidder may withdraw his or her offer if certain circumstances occur. Typical circumstances include war, national emergency, banking moratoriums, suspensions of trading on the New

[37] In this Appendix, we focus on federal legislation. The major piece of federal legislation governing cash tender offers is the Williams Act, passed in 1968 and amended in 1970. While not discussed in this paper, tender offers are also regulated by state laws. Often, state laws governing tender offers are more restrictive than federal laws. State laws complicate even further the exact nature of the option held by the target firm's shareholders. See Aranow, Einhorn, and Berlstein [2, pp. 207–57] for a good discussion of state tender offer laws.

[38] Section 14(d) (6) of the Williams Act requires the bidder to purchase shares on a pro-rated basis in a successful offer from shareholders who tendered in the first ten days of the offer. (See Brown [12, p. 1645] and Aranow and Einhorn [1, p. 52].) In 1984, the SEC adopted rule 14(d) (8). (See Katz and Loeb [28, p. 483].) This rule extends pro-ration in successful offers to any shareholder who tenders before the offer expires.

[39] See Bradley [6, p. 348].

[40] See Aranow and Einhorn [1, p. 53].

York Stock Exchange, or if any material change in the capitalization or business of the target is proposed or occurs.[41] These clauses are almost never invoked.

The tender option also is different from a standard put in that tendering shareholders can reclaim tendered shares for ten business days following the announcement of another bidder's offer if the shares have not already been accepted by the original bidder.[42]

Finally, if the bidding firm increases the offer price compared to the initial bid before the offer expires, the bidder must pay this price to all tendering shareholders, even those whose shares were accepted prior to the increase.[43]

[41] Surprisingly, some offers have not contained an out clause. The status of such offers is not entirely clear under contract law. See Aranow and Einhorn [1, p. 53, footnote 18].

[42] See Katz and Loeb [28, p. 482].

[43] Section 14(d) (7) of the Williams Act.

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