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Trading Profits in Dutch Auction Self-Tender Offers

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ABSTRACT

We document abnormal trading profits in Dutch auction self-tenders. Tender period profits—buying after announcement and selling just before expiration—are 1.74 percent (Bhagat, Brickley, and Lowenstein (1987) report similar profits for interfirm tenders). Buying just before expiration and tendering yields abnormal profits of 1.36 percent (Lakonishok and Vermaelen (1990) report 9 percent for fixed-price self-tenders using a filter rule). Total profits from buying just after announcement and tendering remain positive after adjusting for bid-ask spreads. Trading profits are higher for smaller firms, and positively correlated with tender period unsystematic risk, suggesting that they arise due to the pricing of event risk.

TWO RECENT PAPERS DOCUMENT that abnormal profits can be earned by trading in the shares of firms subject to a tender offer. Bhagat, Brickley, and Lowenstein (1987) examine interfirm tender offers, and report a cumulative abnormal return of about 2 percent to a strategy of buying shares two days after announcement of the offer, and selling on the day before expiration. They point out that, due to a substantial decline in beta during the tender period, the return of 2 percent is an underestimate of abnormal profits. For fixed-price self-tenders, Lakonishok and Vermaelen (1990) find that buying shares just before expiration (using a simple filter rule), and tendering, generates abnormal returns of more than 9 percent. The abnormal returns are positive for more than 90 percent of the trades, and have not declined over time; they are 11 percent during 1980 to 1986 compared with 8 percent during 1962 to 1979.

Taken together, this evidence calls into question the efficiency of market pricing during tender offers. However, Bhagat *et al.* and Lakonishok and Vermaelen document profits from different strategies over different windows for different types of tender offers. There are also important qualitative differences in the profits they discover. Bhagat *et al.* find relatively small profits, which they argue may arise from the pricing of information risk

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during the tender period.[1] In contrast, Lakonishok and Vermaelen find extremely large profits, and suggest that profits of this magnitude are unlikely to be explained by either transaction costs or the pricing of information risk. Thus, although anomalous profits exist for both interfirm offers and fixed-price self-tenders, it is not clear whether these represent two different anomalies, or two different manifestations of the same anomaly.

This article examines the existence of trading profits in Dutch auction tender offers. Given the anomalous nature of trading profits, we hesitate to say that profits are expected in Dutch auctions. At the same time, since anomalous profits exist for both interfirm offers and fixed-price self-tenders, they may well exist in Dutch auction offers also. If so, an analysis of these profits may shed light on whether the profits documented by Bhagat *et al.* and Lakonishok and Vermaelen represent a single anomaly. We examine both the magnitude of trading profits in Dutch auctions, and their relation to information risk (we refer to this as event risk).[2] In addition, we estimate the impact of the bid-ask spread on realizable profits by recomputing profits under the assumption that trades can be executed only at bid and ask prices.

Section I describes the sample of Dutch auction repurchases. In view of the results of Bhagat *et al.*, Section II examines risk changes during the tender period relative to preoffer levels. In Section III, we report the magnitude of tender period and tendering profits. Section IV analyzes the relationship between trading profits and event risk. Our conclusions are summarized in Section V.

I. Data

The sample consists of 76 Dutch auction tender offers announced by 75 firms during the period 1981 to 1989. One offer (by Scope Industries) was excluded from the sample because of severe infrequent trading. The sample was identified from the *Standard and Poor's Corporate Daily News*, and the "Repurchased Shares" section of the *Wall Street Journal Index*. The sample includes 61 New York Stock Exchange-American Stock Exchange (NYSE-AMEX) firms, and 14 over the counter firms. Although most offers are successfully completed, there is significant uncertainty about the eventual outcome. Five offers were cancelled. One offer effectively failed (with only 0.02 percent of the outstanding shares being tendered) when the market price before expiration increased to more than the maximum tender price. Of the seventy completed offers, nine were converted to fixed-price offers. In addi-

[1] For trading profits to be related to information risk does not make them less anomalous, since information risk should be diversifiable. Even if arbitragers hold poorly diversified portfolios, and have an incentive to demand compensation for information risk, it is unclear why diversified stockholders are willing to sell on these terms.

[2] In a fixed-price offer, uncertainty about the cash flows from tendering is contributed by the postexpiration price and proration factor. In a Dutch auction offer, the tender price contributes additional uncertainty. However, due to the market-clearing nature of the auction, there may be less uncertainty about the proration factor, which tends to be close to one.

tion, offer terms were revised for two offers, competing interfirm offers materialized for two firms, and seven other offers were extended.

Descriptive statistics for the sample are presented in Table I. Preoffer equity value ranges from $6.3 million to $12.78 billion. Firms typically set the minimum tender price above the preoffer market price; the average difference is 3.30 percent.[3] However, in one case the minimum tender price was set as much as 33 percent below the preoffer price. The maximum tender price is, on average, 17.91 percent higher than the preoffer price. The average fraction of shares sought in the offer is 15.77 percent.[4] On average, 14.77 percent of outstanding shares were repurchased, at a tender price 13.99 percent higher than the preoffer price. Twenty-four offers were subject to prorationing. For these offers, the average proration factor (fraction of tendered shares purchased) is 82.38 percent; for all 70 completed offers it is 93.96 percent.

[3]This average is based on 69 offers, since seven offers did not specify a minimum tender price. The preoffer price is the price five trading days before the announcement date, which is the earlier of the announcement date in the *S & P Daily News* or the date preceding the *Wall Street Journal* publication date.

[4]Twenty-six offers specified a range for fraction sought. For these offers, the midpoint of the range is used. In July 1987, the Securities Exchange Commission required that a single number be specified.

Table I

Descriptive Statistics of the Sample

The sample consists of 76 Dutch auction tender offer stock repurchases announced during the period 1981 to 1989. Numbers other than preoffer equity value are expressed as percentages. The preoffer price is the market price of the stock five trading days before the announcement date. The minimum tender offer premium over the preoffer price is reported for the 69 offers that specified a minimum tender price. Outcome characteristics are reported for the 70 offers that were successfully completed.

	Mean	Median	Min.	Max.
Panel A. Offer Characteristics (N = 76)				
Preoffer equity value (in millions of dollars)	1738.73	684.85	6.30	12777.80
Maximum tender offer premium over preoffer price	17.91	15.54	3.75	58.33
Minimum tender offer premium over preoffer price	3.30	2.56	−33.33	29.52
Fraction of equity sought	15.77	13.32	3.65	53.00
Panel B. Outcome Characteristics (N = 70)				
Fraction of equity purchased	14.77	13.82	0.02	53.00
Fraction of tendered shares purchased	93.96	100.00	15.74	100.00
Excess of tender price over preoffer price	13.99	13.62	−8.60	56.92

II. Risk Changes during the Tender Period

Bhagat *et al.* document that both beta and standard deviation of returns decline during the tender period for interfirm offers. They ascribe the decline to the implicit put option granted to target firm stockholders by the bidding firm. During the tender period, target firm stockholders hold, in effect, a portfolio consisting of the underlying share and a fractional put on the share. As a result, the beta and standard deviation of the portfolio is less than that of the stock alone.

A Dutch auction repurchase should also induce a reduction in risk during the tender period, although the reduction may be smaller than for interfirm offers. First, in Dutch auction offers, there is additional uncertainty regarding the tender price. There is likely to be a systematic component to this uncertainty, since the price that stockholders tender at depends on the prevailing market price just before expiration. This additional systematic price uncertainty in a Dutch auction will yield higher tender period betas than for an interfirm offer. Second, in a self-tender, the put option to tendering stockholders is written by residual shareholders. Unless the expected proration factor is one, each stockholder, by virtue of being a residual stockholder, has a short position in the put that partially offsets the long position held by virtue of being a tendering stockholder. Only the net long position in the put contributes to risk reduction. This net long position is smaller than if the same offer were made by another firm.

To assess risk changes due to the tender offer, we estimate the market model over a control period of days -120 to -21 relative to announcement, using the equally weighted Center for Research in Security Prices index as the market return proxy.[5] Beta and standard deviation were reestimated over the tender period, defined as day $+2$ relative to announcement through the day before the final expiration date. The expiration date is defined as the first day on which the closing price represents a postoffer price. Thus, for an offer expiring at noon on day t, the expiration day is day t. For an offer expiring at midnight, the expiration day is day $t + 1$. The mean (median) tender period is 21.4 (18) trading days. The minimum and maximum values are 11 and 72 days.

Table II presents estimates of the risk measures over both windows. The average beta declines from 1.01 in the control period to 0.57 in the tender period. A paired t-test shows that the average decline is significantly different from zero, with a t-statistic of 4.54. A paired Wilcoxon signed rank test confirms this result. Similar results obtain for the standard deviation of daily raw returns. The average standard deviation is lower in the tender period (1.30 percent) than in the control period (1.89 percent). The t-statistic for the paired t-test is 5.03.

[5]On average, estimated alpha is -0.00019, insignificantly different from zero. Kamma, Kanatas, and Raymar (1992), using a prior estimation period, report a CAR over the same window of about 0.5 percent for their sample of 57 completed Dutch auction offers. Hence, there is no bias due to abnormal performance in the control period.

Table II

Risk Changes During the Tender Period for 76 Dutch Auction Stock Repurchases during 1981 to 1989

Risk changes during Dutch auction repurchases are assessed by comparing market model betas and the standard deviation of daily returns during the tender period to their preoffer values. The preoffer period consists of days −120 through −21, relative to the announcement date. The tender period runs from day +2 relative to announcement through the day before final expiration. Standard deviations are expressed in percentages. Numbers in parentheses are *t*-statistics for a two-tailed test of the null hypothesis of no change in the mean value; numbers in brackets are *Z*-statistics for a Wilcoxon signed rank test of the same null.

Risk Measure	Preoffer		Tender Period		Change	
	Mean	Median	Mean	Median	Mean	Median
Beta	1.01	1.06	0.57	0.50	0.43 (4.54)	0.43 [4.36]
Standard deviation	1.89	1.74	1.30	0.89	0.59 (5.03)	0.62 [5.80]

We estimated beta and standard deviation for 72 firms with returns available over a 100-day period commencing 2 days after final expiration. Beta (standard deviation) in the posttender period is 0.97 (1.75 percent) on average; for these firms, the corresponding value during the control period is 1.06 (1.85 percent). The difference in risk levels between the control and posttender period is not significant. Thus, the risk decline during the tender period is temporary.

III. Trading Profits in Dutch Auction Self-Tenders

We report profits based on raw returns as well as abnormal returns. Abnormal returns are assessed by the methodology employed in the Center for Research in Security Prices Excess Returns File, as the difference between the stock's return and the return on a control portfolio of stocks in the same beta decile. Trading profits based on transaction prices may overstate realizable profits due to bid-ask spreads. Accordingly, we examine the impact of bid-ask spreads on realizable profits for a subsample of 46 firms (out of 76) for which we were able to obtain data. Profits are recomputed under the assumption that shares can be purchased (or sold) only at the ask (or bid) price. Since trades are often executed within the bid-ask quotes, these adjusted profits should be interpreted as a lower bound for realizable profits.

Closing bid-ask prices for over the counter firms in the sample were collected from the *Standard and Poor's Daily Stock Price Record.* For NYSE and AMEX firms, we obtained closing bid-ask prices for 1988 and 1989 from the ISSM tapes. For this subsample, the average bid-ask spread on the day before expiration was 1.35 percent.

A. Tender Period Trading Profits (Postannouncement to Preexpiration)

This section examines the profits in Dutch auction repurchases over the window examined by Bhagat *et al.* for interfirm offers. Shares are bought at the closing price on the second day after announcement of the repurchase, provided this price is below the maximum tender price, and sold on the day before initial expiration. For offers extended before this selling date, the shares are sold the day before the new expiration day.[6] All sample firms actually traded on the buying and selling day.

Panel A in Table III reports the returns from the above strategy, using transaction prices. The price on the second day after announcement is less than the maximum tender price for all 76 offers. The mean holding period is 19.4 days. The average raw return over this window is 3.44 percent, while the median raw return is 2.68 percent. Further, 75 percent of the trades yield positive returns. The associated abnormal return is 1.74 percent (t-statistic = 2.47).[7] These profits are of the same order as those reported by Bhagat *et al.*

For the subsample of 46 firms for which bid-ask data were available, Panel A also compares trading profits based on transaction prices with those based on bid-ask prices. The difference is interpreted as the amount by which the bid-ask spread affects realizable profits. Transaction price–based profits for the subsample are similar to those reported for the full sample. Thus, the subsample is fairly representative. Adjusting for bid-ask prices reduces average raw profits from 3.19 to 1.81 percent. If the bid-ask spread contributed the same reduction in trading profits for the full sample, the average trading profit would decline from 3.44 to 2.06 percent. Thus, the bid-ask spread adjustment reduces, but does not eliminate, tender period profits.

An interesting question regarding tender period profits is whether they are distributed uniformly through the period. Table IV reports the rate of accumulation of trading profits over the last 15 days of the tender period. Each firm is included in the analysis only for the period that the stock is held under the trading rule. The holding period begins two days after announcement of the offer, so that announcement returns are excluded. From Panel B, the raw return over the last five days of this holding period is 2.02 percent, compared to 0.89 percent over the previous ten days. The corresponding abnormal returns are 1.62 and -0.22 percent, respectively. Thus, both raw and abnormal returns are concentrated in the last five days before expiration.

[6] If an offer is cancelled prior to the selling date thus determined, or a higher interfirm tender offer is announced, the shares are sold two days after such an announcement. Note that selling out on the day before final expiration does not yield an ex ante implementable rule since extension is often announced after initial expiration. Also, while Bhagat *et al.*'s window ends two days before expiration, we use the last day before expiration, in order to achieve a clean separation of tendering profits from tender period profits.

[7] These results exclude returns on October 19, 1987 due to the extraordinary circumstances of the market crash. This exclusion affected tender period profits for one firm (Hospital Corp.), and had no effect on the tendering profits discussed later. Raw and abnormal returns for Hospital Corp. on the day of the crash were -31 and -17 percent, respectively. Tender period profits remain significant even if these unusual returns are included.

Table III

Trading Profits (in Percentages) for 76 Dutch Auction Stock Repurchases during 1981 to 1989

Profits under three different trading strategies are reported for the full sample, as well as a subsample of 46 offers for which bid-ask data could be obtained. Raw and abnormal profits for the full sample assume that all trades are executed at transaction prices. Raw profits for the subsample are reported under this assumption, as well as the alternate assumption that shares are bought (or sold) at ask (or bid) prices. Under all three strategies, a trade is initiated only if the market price is less than the maximum tender price. Tender period profits are based on buying shares two days after announcement, and selling the day before initial expiration. Tendering profits are based on buying the day before initial expiration, and tendering. Total profits are based on buying two days after announcement, and tendering. Under the last two strategies, unaccepted shares are sold two days after final expiration. ANN refers to the announcement date, IXP the initial expiration date, and FXP the final expiration date. Abnormal profit is the difference between the raw profit and the return on a control portfolio of stocks in the same beta decile. Numbers in parentheses are t-statistics based on cross-sectional standard errors.

	Full Sample				Bid-Ask Subsample			
	Trading Profits				Trading Profits			
	Mean	Median	% > 0		Mean	Median	% > 0	
Panel A. Tender Period: (ANN + 2, IXP − 1)								
	$N = 76$				$N = 46$			
Raw profits	3.44 (5.14)	2.68	75.0	Raw profits (trans. prices)	3.19 (4.27)	2.99	87.0	
Abnormal profits	1.74 (2.47)	1.08	59.2	Raw profits (bid-ask prices)	1.81 (2.06)	1.66	65.2	
Panel B. Tendering Profits: (IXP − 1, FXP + 2)								
	$N = 69$				$N = 41$			
Raw profits	1.71 (3.35)	1.15	85.5	Raw profits (trans. prices)	1.07 (1.38)	0.53	70.7	
Abnormal profits	1.36 (2.45)	0.64	71.0	Raw profits (bid-ask prices)	0.39 (0.49)	0.34	63.4	
Panel C. Total profits: (ANN + 2, FXP + 2)								
	$N = 76$				$N = 46$			
Raw profits	5.04 (6.48)	4.45	88.2	Raw profits (trans. prices)	4.21 (4.52)	4.13	91.3	
Abnormal profits	2.89 (3.58)	2.62	72.4	Raw profits (bid-ask prices)	3.15 (3.17)	3.45	82.6	

Although the highest mean return occurs on day −3, the median return increases over the last three days, being 0.3, 0.31, and 0.48 percent, on days −3, −2, and −1, respectively.

One possible explanation for positive returns at the end of the tender period is that buying pressure just before expiration makes transactions occur systematically at ask prices. For the 46 firms with bid-ask data,

Table IV

Trading Profits (in Percentages) Preceding the Initial Expiration Date for 76 Dutch Auction Stock Repurchases during 1981 to 1989

The table reports the rate at which tender period profits accumulate over the last 15 days of the tender period. Each firm is included in the portfolio from two trading days after announcement of the offer through the day preceding initial expiration.

Panel A. Daily Returns

Day	Number of Firms in the Portfolio	Portfolio Raw Profit	Abnormal Profit
− 15	67	−0.16	−0.28
−14	69	0.26	−0.02
−13	73	−0.02	−0.12
−12	75	0.15	−0.02
−11	76	0.13	0.09
−10	76	0.19	0.15
−9	76	−0.03	−0.16
−8	76	0.16	0.06
−7	76	0.23	0.08
−6	76	−0.01	−0.03
−5	76	0.23	0.22
−4	76	0.01	−0.05
−3	76	0.83*	0.72**
−2	76	0.21	0.16
−1	76	0.74*	0.58*

Panel B. Cumulative Returns

	Raw Profits		Abnormal Profits	
Period	Mean	Std. Dev.	Mean	Std. Dev.
− 15, −11	0.36	2.57	−0.32	2.12
−10, −6	0.53	2.53	0.10	2.82
−5, −1	2.02*	4.63	1.62*	4.66

**denotes significance at the 5 percent level.
*denotes significance at the 1 percent level.

average raw returns during the last five days of the tender period are 1.54 percent when computed from transaction prices, and 1.76 percent when computed from the midpoint of bid-ask quotes. Thus, the consistently high returns during the last days of the offer are not attributable to bid-ask effects.

Interestingly, the cross-sectional standard deviation almost doubles in the last five days of the holding period, relative to the previous five-day intervals. Thus, this period is characterized by a simultaneous increase in mean returns and cross-sectional standard deviation. A possible explanation is that, in this period, there is sizable resolution of the risk associated with the

offer. This risk is contributed by the uncertain tendering response of stockholders, the possibility that the firm may revise the terms or extend the offer, and the potential for competing interfirm offers. According to Bagwell (1992), participants make their tendering decisions in the last few days of the offer. To the extent that the market price aggregates such information, there is partial resolution of uncertainty regarding the tendering response of stockholders. Furthermore, extensions or modifications of the offer are often announced just prior to expiration. Such announcements typically also reveal the extent of subscription until that date. Thus, this is a period of significant information flow regarding the offer outcome. Returns in this period may be higher in compensation for the increased risk.

B. Tendering Profits

Lakonishok and Vermaelen's trading strategy is to buy shares the day before initial expiration if the market price is at least 3 percent below the tender price, and tender. Shares returned due to prorationing are sold two days after the expiration date. This filter rule triggers 109 trades for their sample of 258 fixed-price offers. The average abnormal return is 9.61 percent, with 94.5 percent of the abnormal profits being positive. They also document that tendering profits increase with the percent difference between the tender price and the market price.

An identical trading rule cannot be implemented for Dutch auction offers, since the tender price is unknown ex ante. Potential profits exist in a Dutch auction offer only if the maximum tender price exceeds the market price. Hence, we employ the following trading rule: "Buy if the market price on the day before initial expiration (IXP − 1) is less than the maximum tender price, and tender at the minimum tender price. Sell unaccepted shares two days after final expiration (FXP + 2)." For offers extended before IXP − 1, shares are bought the day before the new expiration date. Offers cancelled, superseded by a higher interfirm offer, or converted to a fixed-price offer before IXP − 1 are excluded.[8] Tendering at the minimum tender price ensures that the bid is accepted.

No transaction costs are incurred on shares sold back to the firm. The fraction of shares acquired that have to be sold in the market due to prorationing or cancellation is typically small (mean value 13.46 percent). Thus, effectively the cost of implementing the strategy is just the one-way transaction cost of buying the shares.[9]

Panel B of Table III reports trading profits under this rule, which triggers 69 trades with a mean (median) holding period of 4.9 (3) days. The average raw return is 1.71 percent (t-statistic = 3.35), with 85.5 percent of the trades

[8]Two offers cancelled after the purchase date remain in the sample. Initial and final expiration dates differ (due to extension) for 16 offers.

[9]However, an existing stockholder liquidating for exogenous reasons would reduce transaction costs by tendering instead of selling in the secondary market, in addition to earning the tendering profit as an incremental return.

generating positive returns. The median raw return is 1.15 percent. The average abnormal return is 1.36 percent (t-statistic = 2.45).

We also examined a strategy of tendering at cost instead of at the minimum tender price. For nine trades, the bid is rejected, and the acquired shares are liquidated at the postexpiration price. The average raw profit from this strategy is 1.52 percent. The reduction in profits (from 1.71 percent) occurs because the final tender price generally exceeds the postexpiration price. An investor is better off tendering at the minimum price, ensuring that he receives the final tender price, than tendering at cost, and being forced to liquidate at the postexpiration price.

Comparing our abnormal tendering profits of 1.36 percent with Lakonishok and Vermaelen's results for interfirm offers may not be entirely appropriate, since Lakonishok and Vermaelen use a filter to select only about 40 percent of their offers for trade. In our sample, roughly the same proportion of offers is selected by requiring that the maximum tender price exceeds the preexpiration market price by at least 5 percent. For the 33 trades selected, the mean (median) raw profit is 2.30 percent (1.93 percent). The corresponding abnormal profit has a mean value of 1.65 percent. These abnormal profits are only slightly higher than those for the full sample; they are still substantially lower than the abnormal profits Lakonishok and Vermaelen report.[10] A regression of raw returns (TPROF) on the percentage difference between the maximum tender price and the preexpiration market price (FILTER) yields the following estimates (with t-statistics in parentheses):

$$\underset{}{\text{TPROF} = 0.889} + \underset{(1.43)}{0.115}\ \underset{(2.08)}{\text{FILTER}} \qquad \text{Adj.}R^2 = 0.05$$

Screening trades by the filter variable has only a small positive impact on raw profits, and does not explain much of the cross-sectional variation. In contrast, Lakonishok and Vermaelen's filter variable explains more than 75 percent of the cross-sectional variation in tendering profits for fixed-price offers. Thus, although we find significant trading profits over the tendering period for Dutch auction offers, there are two major differences from Lakonishok and Vermaelen's findings for fixed-price repurchases. Lakonishok and Vermaelen's profits are substantially higher, and the selectivity and explanatory power of their filter variable is dramatic. The weaker explanatory power of our filter variable is perhaps to be expected, since it is based on the upper bound for the tender price, whereas Lakonishok and Vermaelen are able to use the actual tender price.

Panel B of Table III also reports the impact of adjusting for bid-ask prices, for the subset of 41 firms for which bid-ask data were available. While the raw profit based on bid-ask prices for this subsample is insignificant, this results partly from the reduction in sample size (from 69), and partly from the fact that transaction price-based profits for the subsample are substan-

[10]At a 3 percent level, our filter variable selected 44 trades, with mean raw profits of 2.16 percent.

tially lower than for the full sample. Nevertheless, this subsample yields useful information about the impact of bid-ask prices on trading profits. The bid-ask spread adjustment causes the average raw profit to decline by 0.68 percent. A drop of the same magnitude for the full sample of 69 trades would reduce the average raw profit from 1.71 to 1.03 Percent.

C. Total Profits from Buying Postannouncement and Tendering

In light of the results in the previous two subsections, the natural strategy for exploiting trading profits in Dutch auction offers would be to buy immediately after announcement and tender.[11] Panel C of Table III reports raw and abnormal profits for this trading strategy. The mean (median) holding period is 24.4 (21) days, ranging from a minimum of 15 days to a maximum of 75 days in the case of a repeatedly extended offer. The average raw return is 5.04 percent, while the median is 4.45 percent. Positive returns arise in 88.2 percent of the trades. The first window (ANN + 2, IXP − 1) accounts for roughly two-thirds of the total raw profits. The average abnormal return is 2.89 percent (t-statistic = 3.58). Abnormal returns are positive for 72.4 percent of the trades.

For the subset of 46 firms with bid-ask data, raw profits decline from an average of 4.21 to 3.15 percent. A similar decline for all 76 trades would cause the average raw profit to fall from 5.04 to 3.98 percent. For the 46-firm subsample, tendering instead of selling before expiration increases the bid-ask adjusted profits by 1.34 percent (from 1.81 to 3.15 percent). This represents the opportunity cost of selling before expiration to avoid the risk of the tender offer outcome. It includes the foregone raw return, as well as the incremental transaction cost (through the bid-ask spread) of selling in the market rather than tendering.

IV. Trading Profits and Event Risk

The only explanation for trading profits consistent with market rationality is that required return increases during the tender offer period.[12] Transaction costs may explain why available profits are not fully arbitraged away, but would not explain why they exist in the first place. Bhagat *et al.* present evidence that tender period profits for interfirm offers are positively related to event risk. We examine the relation between event risk and trading profits over different holding periods for our sample.

[11] Lakonishok and Vermaelen document abnormal returns in the postexpiration period. However, for 58 NYSE-AMEX firms, for which we had relevant data, the mean (median) cumulative abnormal return during the 12 months after expiration was only 0.74 percent (0.52 percent). For equal subsamples of small and large firms, the mean (median) CARs were −0.39 and 1.87 percent (1.05 and 0.40 percent) respectively.

[12] Bagwell (1992) reports a substantial increase in trading volume during Dutch auction offers. Our sample yielded similar results. Thus, there is sufficient liquidity for profits in excess of required return to be arbitraged away. We also found no cross-sectional relationship between volume and trading profits.

A. Indirect Evidence: Firm Size

Due to greater information availability for large firms, we would expect the market to forecast the expected cash flows from tendering more precisely, leading to lower event risk. Hence, if trading profits are related to event risk, profits for small firms should exceed those for large firms. In addition, we may expect the higher event risk for small firms to induce greater cross-sectional variability in trading profits than for large firms. We divide the sample into equal halves by preoffer equity value. The smaller subgroup (lower firm size half) has a median equity value of $121 million compared to $1.86 billion for the larger subgroup.

Table V reports trading profits for both groups. Over the combined window, the smaller firms have raw profits of 6.41 percent, and abnormal profits of

Table V

Analysis of Trading Profits by Firm Size Groups for 76 Dutch Auction Stock Repurchases during 1981 to 1989

The sample of 76 offers is divided into equal halves, by the preoffer market value of equity. Raw and abnormal profits under all three trading strategies are reported for both size groups. Under all three strategies, a trade is initiated only if the market price is less than the maximum tender price. Tender period profits are based on buying shares two days after announcement, and selling the day before initial expiration. Tendering profits are based on buying the day before initial expiration, and tendering. Total profits are based on buying two days after announcement, and tendering. Under the last two strategies, unaccepted shares are sold two days after final expiration. ANN refers to the announcement date, IXP the initial expiration date, and FXP the final expiration date. Abnormal profit is the difference between the raw profit and the return on a control portfolio of stocks in the same beta decile. Numbers in parentheses are *t*-statistics based on cross-sectional standard errors.

	Lower Firm Size Half		Upper Firm Size Half	
	Mean	Median	Mean	Median
Panel A. Tender Period Profits: (ANN + 2, IXP − 1)				
Raw profits	4.58	2.79	2.30	2.55
	(3.84)		(4.07)	
Abnormal profits	2.74	0.99	0.73	1.08
	(2.16)		(1.24)	
Panel B. Tendering Profits: (IXP − 1, FXP + 2)				
Raw profits	2.06	2.24	1.39	0.67
	(2.02)		(3.86)	
Abnormal profits	1.75	1.58	1.01	0.23
	(1.58)		(2.58)	
Panel C. Total Profits: (ANN + 2, FXP + 2)				
Raw profits	6.41	5.68	3.67	3.89
	(4.52)		(6.34)	
Abnormal profits	4.08	2.87	1.70	1.79
	(2.78)		(2.63)	

4.08 percent. In contrast, the larger firms have raw and abnormal profits of 3.67 and 1.70 percent, respectively.[13] The larger firms have consistently lower trading profits in all three windows. There is also a striking difference in the cross-sectional standard deviation of trading profits across smaller and larger firms. For example, for total raw profits, the cross-sectional standard deviation of raw returns is 8.75 percent for the smaller firms and 3.57 percent for the larger firms. For tender period and tendering profits, as well, the standard deviation for smaller firms is more than twice that of the larger firms (for both raw and abnormal profits).[14] Although not conclusive, this suggests that there is greater event risk for the smaller firms.[15] In the next subsection, we directly examine whether trading profits are cross-sectionally related to event risk.

B. Cross-sectional Reqressions of Trading Profits on Event Risk

Event risk is most usefully defined as the unsystematic component of ex ante uncertainty regarding the cash flows from tendering. The unsystematic risk of returns during the tender period (UNSYS) should be a good proxy for event risk. Regressing trading profits on this variable provides a direct test of whether trading profits are systematically related to event risk.

Table VI reports the results of the cross-sectional regressions for all three holding periods. When raw returns are used as the dependent variable, we control for the systematic component of returns using CPRET, the holding period return for the stock's beta-decile control portfolio. Both raw and abnormal profits show a significant positive relationship with event risk for all holding periods. This result is consistent with the suggestion of Bhagat *et al.* that trading profits exist because required return increases during the tender offer period, in compensation for event risk.

The higher t-statistics and R^2 for tender period profits (and total profits) may arise in part due to spurious correlation. Since tender period profits are concentrated in a few trading days, large profits may induce inflated estimates of UNSYS. Such a bias also potentially affects the results of Bhagat *et al.* However, tendering profits and UNSYS are estimated from nonoverlap-

[13] Due to the skewness in firm size, we examined the results classifying the bottom two-thirds of the sample as small firms, and the remaining third as large firms. A similar but slightly smaller effect was observed.

[14] Thus, small firms have lower t-statistics due to higher cross-sectional standard deviations.

[15] Trading profits could be higher for small firms due to underestimation of required returns. However, this would yield abnormal returns that are distributed uniformly over the tender period. In fact, the concentration of profits in the last five days of the tender period reported in Table IV occurs for both small and large firms.

We also examined the impact of adjusting for bid-ask prices on the size results. The 26 large firms with bid-ask data have an average bid-ask spread of 22.2 cents or 0.58 percent; the 20 small firms have an average spread of 27.5 cents or 2.36 percent. While the bid-ask adjustment has a greater impact for small firms, trading profits remain substantial for both groups. The bid-ask adjusted profits are 4.03 percent for small firms and 2.48 percent for large firms. Thus, incorporating bid-ask prices reduces, but does not eliminate, the size effect in trading profits. However, the small sample size for both groups may qualify the reliability of these results.

Table VI

Cross-sectional Regressions of Trading Profits on Event Risk for 76 Dutch Auction Stock Repurchases during 1981 to 1989

Trading profits are regressed on unsystematic risk during the tender period (UNSYS). In raw profit regressions, we control for the systematic component of returns using the holding period return for the beta-decile control portfolio (CPRET). Under all three strategies, a trade is initiated only if the market price is less than the maximum tender price. Tender period profits are based on buying shares two days after announcement, and selling the day before initial expiration. Tendering profits are based on buying the day before initial expiration, and tendering. Total profits are based on buying two days after announcement, and tendering. Under the last two strategies, unaccepted shares are sold two days after final expiration. ANN refers to the announcement date, IXP the initial expiration date, and FXP the final expiration date. Abnormal profit is the difference between the raw profit and the return on a control portfolio of stocks in the same beta decile. Numbers in parentheses are t-statistics.

Independent Variable	Intercept	CPRET	UNSYS	Adj. R^2
Panel A. Tender Period Profits: (ANN + 2, IXP − 1)				
Raw profits	1.18	0.45	0.62	0.35
	(1.83)	(3.45)	(5.78)	
Abnormal profits	0.16		0.65	0.28
	(0.24)		(5.47)	
Panel B. Tendering Profits: (IXP − 1, FXP + 2)				
Raw profits	1.01	0.06	0.41	0.07
	(1.80)	(0.25)	(2.56)	
Abnormal profits	0.77		0.36	0.04
	(1.26)		(2.04)	
Panel C. Total Profits: (ANN + 2, FXP + 2)				
Raw profits	2.36	0.40	0.76	0.39
	(3.27)	(3.18)	(6.22)	
Abnormal profits	1.11		0.74	0.27
	(1.45)		(5.34)	

ping periods, and will not be subject to spurious correlation. The significant coefficients for UNSYS in the tendering profit regressions suggest that the relationship between trading profits and event risk is genuine.

The tendering profits documented by Lakonishok and Vermaelen for fixed-price offers are large enough relative to those we find for Dutch auction offers that the difference may be difficult to fully explain. However, examining event risk, as well as the impact of bid-ask spreads, for their sample should still shed useful light on their results. One critical aspect of Lakonishok and Vermaelen's analysis is that they use a filter to select 109 trades from 258 offers. It is possible that their filter variable systematically selects firms with large bid-ask spreads and high unsystematic risk. To begin with, firms conducting fixed-price repurchases are typically smaller than those conducting Dutch auction repurchases (Vermaelen (1981), Comment and Jarrell

(1991), Kamma, Kanatas,and Raymar (1992)). If Lakonishok and Vermaelen's filter variable systematically selects the smallest of these firms, both bid-ask spreads and unsystematic risk may be substantially higher for their final sample than for our Dutch auction sample. If so, observed trading profits would be predicted to be higher. Thus, comparing bid-ask spreads and unsystematic risk for the offers selected by their filter variable with those rejected, as well as with our sample, may help to understand why they find such large profits for fixed-price offers.

V. Conclusion

Previous research documents anomalous market pricing during interfirm tender offers and fixed-price self-tenders. Bhagat *et al.* document modest profits for interfirm tender offers from buying postannouncement and selling preexpiration; these profits appear to be cross-sectionally related to event risk. Lakonishok and Vermaelen document substantial profits for fixed-price self-tenders from buying preexpiration and tendering; they point out that these profits appear too large to be explained by transaction costs or the pricing of event risk.

We examine trading rules in Dutch auction self-tenders, and find total abnormal profits of 2.89 percent. Tender period abnormal profits—from postannouncement to preexpiration—are 1.74 percent. Abnormal tendering profits from buying the day before expiration are 1.36 percent. These trading profits do not arise from poor liquidity. They persist after adjusting for bid-ask spreads.

Direct and indirect evidence suggests that the trading profits in Dutch auctions (like those in interfirm offers) are positively related to event risk. First, small firms have higher trading profits than large firms. Further, the cross-sectional standard deviation of trading profits for small firms is double that of large firms, suggesting greater uncertainty about trading profits for small firms. Trading profits may be higher in small firms in compensation for this greater uncertainty. Second, cross-sectional regressions reveal that trading profits are positively related to unsystematic risk during the tender period.

Thus, trading profits in Dutch auction self-tenders appear to resemble those for interfirm offers—they are modest in magnitude and positively related to event risk. Lakonishok and Vermaelen's findings for fixed-price self-tenders appear enigmatic in view of our results. However, it is still possible that trading profits in all three types of tender offers are susceptible to a common explanation. The reason why Lakonishok and Vermaelen's results appear so strikingly different may lie in the fact that they use a filter that selects only 40 percent of fixed-price offers for trade. Examining bid-ask spreads and event risk for the selected (and discarded) offers in Lakonishok and Vermaelen's sample would shed light on the extent to which the three types of tender offers are susceptible to a common explanation. At a mini-

mum, such an examination would help to delineate the scope of the puzzle that Lakonishok and Vermaelen's results represent.

REFERENCES

Bagwell, L. S., 1992, Dutch auction repurchases: An analysis of shareholder heterogeneity, *Journal of Finance* 47, 71–105.

Bhagat, S., J. Brickley, and U. Lowenstein, 1987, The pricing effects of interfirm cash tender offers, *Journal of Finance* 42, 965–986.

Comment, R., and G. A. Jarrell, 1991, The relative signalling power of Dutch-auction and fixed-price self-tender offers and open-market share repurchases, *Journal of Finance* 46, 1243–1272.

Kamma, S., G. Kanatas, and S. Raymar, 1992, Dutch auction vs. fixed price self-tender offers for common stock: An empirical examination, *Journal of Financial Intermediation*, 2, 277–307.

Lakonishok, J., and T. Vermaelen, 1990, Anomalous price behavior around repurchase tender offers, *Journal of Finance* 45, 455–477.

Vermaelen, T., 1981, Common stock repurchases and market signalling: An empirical study, *Journal of Financial Economics* 9, 139–183.