

The Risk Arbitrage Performance: Failed Acquisition Attempts

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This paper explores the performance of risk arbitrage for failed acquisition attempts. We find that the return of a risk arbitrage position for a failed acquisition attempt varies with the payment method and the acquisition type. This finding supports the proposition that the payment method and the acquisition type provide informational signals relevant to both firms' values and the likelihood of the target receiving competing offers. These signals help explain the performance of a risk arbitrage position for a failed acquisition attempt. We also find that a simple prediction model based on our research may be helpful for those seeking to enhance the returns from their risk arbitrage positions.

Introduction

In this paper, we report on our study of the performance of risk arbitrage as it relates to failed acquisition attempts. Risk arbitrage is an investment/trading strategy designed to capitalize on the spreads (arbitrage) between the consideration offered (cash or stock) for a target firm's shares and the market price of those shares. To realize the spread (arbitrage) in a stock offer, risk arbitrageurs acquire a long position in the target firm's shares and usually hedge it with an offsetting short position in the would-be acquiring firm's shares. In a cash offer, however, risk arbitrageurs only need to take a long position in the target firm's stock. If the acquisition attempt is successfully consummated, the risk arbitrageurs will capture the spread between the offered price (stock or cash) and the market price paid to obtain the target firm's stock. If the acquisition attempt fails, however, individual target and/or acquiring firms' stock price movements will largely determine the risk arbitrage positions' returns (positive or more likely negative). Our focus is the performance of risk arbitrage positions for these failed acquisition attempts.

In a failed takeover attempt, a risk arbitrageur is typically long the target firm's stock (where the price generally falls) and short the acquiring firm's stock (where the price usually rises once the offer is withdrawn). Thus, the failure of an acquisition

attempt is likely to result in large losses for the risk arbitrage position. For example, the *Wall Street Journal* reports that merger funds involved in more than 100 merger deals in 2002 experienced a 5.7 percent loss, due to only six failed acquisition attempts during the year¹. As this finding suggests, the performance of each risk arbitrage position is likely to depend largely upon the success of the acquisition attempt and, to a lesser extent, on the possibility that the spread-related offer terms will change. Recently Baker and Savasoglu (2002) find acquisition completion risk to be a key determinant of the return of risk arbitrage portfolios.

While risk arbitrageurs try to be selective, not all of the acquisition attempts that they choose to invest in are successful. Accordingly, the unexpected failure of some of the acquisition attempts that they select is likely to present the risk arbitrageur with at least a few losing positions. To limit such losses, risk arbitrageurs generally do not allow any single position to represent more than 10 percent of their total portfolio's value (Mitchell and Pulvino, 2001). While somewhat helpful in managing risk, this diversification strategy is unlikely to avoid entirely the losses caused by the unexpected failure of acquisition attempts. In periods when a disproportionate number of acquisition attempts fail, diversification will be of limited help. To reduce the magnitude of unexpected losses associated with failed acquisition attempts, risk arbitrageurs want to screen only those acquisition attempts which, if they fail, are likely either to be relatively low cost or to receive competing offers (which may increase their profits). They would like to know how deal structure and firm value information can be used both to estimate the losses of failed acquisition attempts and to help select the acquisition attempts with a better chance of receiving competing offers. To date, however, these issues have not been extensively studied.

In this paper, we explore how the choice of the payment method and the acquisition type signals firms' values and the chance of receiving competing offers as well as how the information conveyed in that signal impacts the performance of risk arbitrage positions for failed acquisition attempts. Then we examine the implication of our findings vis-à-vis reducing the potential losses in risk arbitrage portfolios.

According to the information asymmetry hypothesis, the payment method reveals information relevant to the values of target and acquiring firms' shares. For example, Myer and Majluf (1986) argue that if the acquiring firm's stock is overvalued, its managers may prefer to finance acquisitions with their stock rather than cash. Shleifer and Vishny (2003) argue that firms attempting to make acquisitions with stock offers tend to exhibit signs of overvaluation. Furthermore, Hansen (1987) and Eckbo and Thorburn (2000) argue that if the acquiring firm has limited information about the target, the acquiring firm may prefer to make a stock offer and thereby

¹ *Wall Street Journal* on 3/1/2004 reports that "Merger fund...invested in stocks that were involved in more than 100 deals in 2002, but the money it committed to the six deals that didn't work out contributed to the fund's 5.7 percent loss for the year, the only year in which the fund has lost money."

share the exposure to overpayment risk with the target firm's shareholders. These considerations suggest that a cash offer may signal to the markets a greater degree of certainty regarding the wealth of target shareholders, the values of target firms, and eventually the profitability of the proposed merger. A stock offer may, in contrast, signal greater uncertainty regarding these matters. Compared with the greater certainty of a cash offer, the uncertainty signaled by a stock offer would decrease the chances that competing offers would emerge and that the stock price of the target firm would increase. Indirectly supporting this argument, Jennings and Mazzeo (1993) find that the proportion of cash in the proposed offer amount is positively related to the likelihood of bidding competition. Betton and Eckbo (2000) argue that the target firm's stock price increases with the probability of multiple bids. Thus, for an acquisition attempt that fails, the use of a stock offer would signal a lower chance of receiving competing offers. As a result, the target firm's stock price would tend to decline more than would be the case for a failed cash or cash/stock offer as a cash payment signals a higher chance of receiving competing offers. Accordingly, a failed stock offer would be expected to result in greater losses for a long position in target stocks than would be the case for a failed cash or cash/stock offer.

The greater uncertainty of the target firm's value signaled by the stock offer is also expected to influence the performance of the short position in the acquiring firms' stocks. The failure of an acquisition attempt that had involved a stock offer would signal to the market that the acquiring firm has attempted to limit its exposure regarding the uncertain value of the target firm and the uncertain profitability of the acquisition. The acquiring firm's stock price may improve as a result. Because the stock offer tends to signal the overvaluation of the acquiring firm's stock price, however, the expected price improvement resulting from limiting the uncertainty of the target firm's value may not be realized. In this situation, the acquiring firm's stock price movement would be expected to generate insignificant losses or gains from the short position. These considerations suggest our first proposition: *risk arbitrage for a failed acquisition attempt using a stock offer would tend to generate greater losses than would a failed acquisition attempt using a cash offer (where a risk arbitrage position only requires a long position in the target) or cash/stock offer.*

The acquisition type also would signal greater or lesser certainty to the market regarding the value of the target firms and the profitability of the proposed acquisition attempt. Acquisitions can be classified into two general types: merger and tender offer. A merger refers to a negotiated deal by two or more firms to combine into a single firm. Generally one firm tends to dominate the merger deal. With a tender offer, the would-be buyer offers a specified price directly to shareholders, thereby bypassing the approval of the managers or board of directors of the target firm. The failure of a tender offer usually results from serious resistance or opposition by the managers of the target firms (Walkling, 1985; Fabozzi, Ferri, Fabozzi,

and Tucker, 1987). Thus, the tender offer would indicate a strong intention by the acquiring firm to acquire the target firm, despite the chance of confronting resistance from managers of the target firms. Simultaneously, it would signal to the market certainty on the part of the proposed buyer regarding the value of the target firm and the profitability of the acquisition. The signal embedded in the choice to use a tender offer also may reflect an improved chance of receiving competing offers and thereby tends to enhance the target firm's stock price. This argument is indirectly supported by an empirical finding. Bradley, Desai, and Kim (1983) show that a large portion of failed tender offers in their sample has received successful subsequent bids. On the other hand, due to losing the positive impact that would have resulted from the proposed acquisition, the acquiring firm's stock price for a failed tender offer is expected to decrease more than it would for a failed merger attempt. Dodd (1980) finds a positive abnormal return for the acquiring firm's stock around the merger termination date. Bradley, Desai, and Kim (1983), in contrast, find a negative abnormal return for the acquiring firm's stock around the tender offer termination date. Thus, compared to a failed merger offer, a failed tender offer would tend to have lower losses from the long position in the target firm's stocks and the short position in the acquiring firm's stocks. These considerations suggest our second proposition: *risk arbitrage for a failed tender offer would tend to generate lower losses than would a failed merger.*

In a stock swap merger, an exact exchange ratio is announced at the beginning of the merger attempt. In a collar merger, in contrast, the exchange ratio is not finalized until the consummation date. The formula used in a collar merger generally is designed to provide a relatively stable dollar value for each target share exchanged, notwithstanding the varying value of the acquiring firm's stock. Thus, compared with a stock swap merger, a collar merger provides additional time for the market to evaluate the values of targets and acquirers which possibly reduces information asymmetry (Houston and Ryngaert, 1997; Fuller, 2003). At the same time, the use of a collar merger offer implies that managers of the acquiring firms are more comfortable with the valuation of target firms and/or the positive effect of the proposed merger attempt, compared to the case of a stock swap merger offer. Thus, the use of a collar merger offer (signaling greater certainty regarding the valuation of the target firm) would tend to be associated with the chance of receiving competing offers even though the offer fails, compared to the case of a stock swap merger. The improved chance of receiving competing offers would tend to enhance the target firm's stock price (a long position) more than would be the case with a stock swap merger offer. These considerations suggest the third proposition: *risk arbitrage for a failed collar merger attempt would tend to generate lower losses than would be the case for a failed stock swap merger attempt.*

Our test results provide support for our proposition that the payment method and the acquisition type impact the performance of risk arbitrage for failed acquisition

attempts. We find that during the period when the offer is on the table, failed acquisition attempts using a stock offer tend to generate greater risk arbitrage losses than do failed acquisition attempts using a cash or cash/stock offer. Failed tender offers tend to generate lower losses for risk arbitrageurs than do failed merger attempts. Failed stock swap mergers show worse performance for risk arbitrageurs, on average, than do failed collar mergers. Furthermore, we find that the power for the payment methods and the acquisition types to help explain risk arbitrage performance is significantly associated with bidding competition. These findings support our view that the payment method and the acquisition type may provide useful signals regarding the values of target firms, thereby inviting competing offers. The level of the invited competing offers has a major impact on the performance of risk arbitrage for failed acquisition attempts. We also show that a prediction model based on these findings may be able to assist risk arbitrageurs in their efforts to reduce the potential losses from failed acquisitions.

Literature Review

The topic of risk arbitrage for failed takeover attempts has not been extensively explored. Several scholars have researched the changing stock prices of targets and acquiring firms around a termination announcement, however, as well as the impact of subsequent or competing offers on the target firms' stock prices. Dodd and Ruback (1977) and Bradley (1980) show that the price of the target stock involved in a failed tender offer usually doesn't return to its pre-offer price level around the termination announcement. Bradley, Desai, and Kim (1983) and Davidson, Dutia, and Cheng (1989) contend that if no subsequent offers appear after the termination announcement, however, the bid premiums on the target's stock price generally disappear. The target stock price tends to return to its pre-offer price level. Bradley, Desai, and Kim (1988) and Betton and Eckbo (2000) find that the existence of a second bidder or competing bids tend to improve the market price of target stocks. As for determinants of competing offers, Chowdhry and Nanda (1993) argue that the acquiring firm's debt level may negatively relate to the level of bidding competition. The acquiring firm with a high debt level is willing to bid aggressively because a portion of the bidding costs may be borne by the debt holders. The high bid premium would deter bidding competition. Palepu (1986) and Comment and Schwert (1995) argue that a low market-to-book ratio for a firm suggests that the market may undervalue the firm or the firm may lack sufficient investment options. Such a firm tends to become a takeover target. Barclay, Watts, and Smith (1997), however, argue that a high market-to-book ratio suggests attractive growth opportunities for the firm. These considerations imply that, depending on the takeover goals of the acquiring firms, the level of the market-to-book ratio relates to the likelihood of receiving competing offers. Fishman (1989) suggests that the choice of payment method is related to the level of competing offers. Because a cash payment would signal a high

valuation for the acquiring firms, the cash payment would discourage other potential competitors from bidding for the target and would thereby tend to preempt competing offers. Jennings and Mazzeo (1993) do not find evidence supporting the idea that a cash payment would preempt competing offers.

On the other hand, Chang and Suk (1998) find that in failed acquisition attempts, acquirers offering their common stock for the target tend to experience a positive abnormal return, whereas those offering cash tend to experience a negative abnormal return upon the announcement of the termination of takeover attempts. Dodd (1980) finds a positive abnormal return for the acquiring firm's stock around the merger termination date. Bradley, Desai, and Kim (1983), in contrast, find a negative abnormal return for the acquiring firm's stock around the tender offer termination date. Mitchell, Pulvino, and Stafford (2004) argue that the changes in short positions of risk arbitrageurs may explain some portion of the abnormal returns for bidders who use stock offers. Their study implies that the stock price movement of the bidder in a failed takeover attempt would tend to be influenced by the unwinding of short positions of risk arbitrageurs around the termination announcement date.

In this paper, we explore how the payment method and the acquisition type signal target firms' values and their chance of receiving competing offers and thus impact the performance of risk arbitrage for failed acquisition attempts. At the same time, we develop a multivariate prediction model of failed takeover attempt/risk arbitrage performance designed to enhance portfolio construction for a risk arbitrage strategy.

Data

We collected data on 146 failed initial acquisition attempts and subsequently competing acquisition attempts during the 1992 to 2001 period, using SDC (Security Data Corporation), CompuStat, and CRSP data channels. Our data set is composed of five types of failed acquisitions: stock swap mergers (44 percent), collar mergers (9 percent), cash mergers (27 percent), cash/stock tender offers (6 percent), and cash tender offers (14 percent). The failed acquisitions are reclassified in terms of payment methods—cash (cash mergers and cash tender offers), stock (stock swap and collar mergers), and cash/stock (cash/stock tender offers) offers—and acquisition types—mergers (cash, stock swap, and collar mergers) and tender offers (cash and cash/stock tender offers).

Table 1 reveals that the average transaction size for failed acquisition attempts in our sample is \$1,455.5 million. Failed acquisitions using a cash/stock offer tend to involve a higher average transaction size (\$3,858.9 million) compared with those using a stock (\$1,239.2 million) or cash offer (\$1,374.9 million). Failed tender offers (\$2,675.8 million) tend to involve a higher average transaction size than failed mergers (\$1,153.1 million). The average merger duration/period for the failed acquisition attempts of our sample is 117 business days. Compared to acquisitions

using a stock (103 business days) or cash offer (129 business days), acquisitions using a cash/stock offer (158 business days) experience a longer average merger duration/period. Failed tender offers (149 business days) tend to show a longer merger duration/period than failed mergers (109 business days). Table 1 also reports the percentage of failed acquisition attempts involving bidding competition and the percentage of only failed initial acquisition attempts inviting bidding competition later in each classification. Failed acquisitions using cash (42.4 percent and 23.7 percent) and cash/stock offers (66.7 percent and 33.3 percent)² experience relatively high bidding competition, compared to those using a stock offer (11.5 percent and 10.3 percent). Tender offers (62.1 percent and 34.5 percent) also experience relatively high bidding competition, compared to mergers (18.8 percent and 12.8 percent).

Table 1—Sample Distribution

We collected 146 failed acquisition attempts during 1992 to 2001. The performances of risk arbitrage position and target and acquiring firms' stocks are evaluated during one day after an acquisition announcement date through the termination date. Average means an arithmetic average. STDEV means standard deviations

	Cash Offer	Stock Offer	Cash & Stock Offer	Merger	Tender Offer	Total
Transaction Size (Million Dollars)						
Average	1374.9	1239.2	3858.9	1153.1	2675.8	1455.5
STDEV	(4261.5)	(2787.8)	(4752.5)	(3489.4)	(3883.0)	(3608.8)
Merger Duration (Business Days)						
Average	129	103	158	109	149	117
STDEV	(106)	(86)	(84)	(93)	(100)	(95)
% Failed Acquisitions w/Competing Bid	42.4%	11.5%	66.7%	18.8%	62.1%	27.4%
% Failed Initial Acquisitions w/Competing Bid	23.7%	10.3%	33.3%	12.8%	34.5%	17.1%
Risk Arbitrage Performance						
Average	0.031	-0.130	0.166	-0.089	0.123	-0.047
STDEV	(0.241)	(0.283)	(0.182)	(0.274)	(0.219)	(0.276)
Target Firms' Stock Performance						
Average	0.031	-0.159	0.110	-0.108	0.099	-0.067
STDEV	(0.241)	(0.315)	(0.285)	(0.299)	(0.242)	(0.299)
Acquiring Firms' Stock Performance						
Average	0.048	-0.052	-0.024	-0.012	0.000	-0.010
STDEV	(0.194)	(0.276)	(0.299)	(0.262)	(0.204)	(0.251)

Risk Arbitrage Return Calculations

Equation (1) illustrates the return calculation employed in closing the position for failed acquisitions using a cash offer. If an acquisition attempt fails, the risk arbitrage positions' capital gains (or losses) and dividend payments during the holding period represent the returns to the risk arbitrageurs.

² Due to the small number of cash/stock offers in our sample, the estimates may not well represent overall characters of cash/stock offers.

$$\text{Return} = \frac{T_F - T_1}{T_1} + \frac{CD}{T_1} \quad (1)$$

where:

T_F = Target stock price at the closing date;

T_1 = Target stock price one day after an acquisition announcement date;
and

CD = Accumulated cash dividend payments per target stock during the holding periods.

Equation (2) illustrates the return calculation employed in closing the position for failed acquisition attempts using a stock or cash/stock offer³. The risk arbitrage returns in those cases are determined largely by the capital gains (or losses) of the target and acquirer stock position during the holding period. If the exchange ratio is revised, the changed short position will impact the return, as indicated in equation (3).

$$\text{Return} = \frac{(R \times A_1 - T_1)}{T_1} - \frac{(R \times A_F - T_F)}{T_1} + \frac{CD_{T-A}}{T_1} + \frac{IS}{T_1} \quad (2)$$

$$\text{Return} = \frac{(R \times A_1 - T_1)}{T_1} - \frac{(R_F \times A_F - T_F)}{T_1} + \frac{CD_{T-A}}{T_1} + \frac{IS}{T_1} \quad (3)$$

where:

R = Announced exchange ratio;

R_F = Final exchange ratio;

A_1 = Acquirer stock price one day after an acquisition announcement date;

A_F = Acquirer stock price at the closing date;

T_1 = Target stock price one day after an acquisition announcement date;

T_F = Target stock price at the closing date;

CD_{T-A} = Accumulated difference between dividends from target stocks and acquirer stocks during the holding periods; and

IS = Interest payments from the short position during the holding periods.
Three month T-Bill rate is used to calculate the interest payments.

A collar merger offer does not specify a fixed exchange ratio. Accordingly, any attempt to lock up the initial spread in such an offer requires arbitrageurs to estimate what the exchange ratio will turn out to be. In order to calculate the raw return in cases of collar offers, using equation (3), we use a mid ratio in the formula's range of exchange ratio.

Table 1 shows the performance of our sample's risk arbitrage positions. During the acquisition attempt period (from one day after an acquisition announcement to

³ A cash portion of the cash/stock payment is canceled out in the return calculation. A stock portion largely dominates the return calculation.

the day of a termination announcement), risk arbitrage for failed acquisition attempts generates an average return of -4.7 percent. Failed acquisitions using a stock offer (-13 percent) show worse performance than those using a cash (3.1 percent) or cash/stock offer (16.6 percent)⁴. Failed mergers (-8.9 percent) tend to produce a lower average return than failed tender offers (12.3 percent). To understand which specific trading position inside risk arbitrage strategies drives the losses for failed offers, we explore the separate performances of both target and acquiring firms' stocks during the acquisition attempt period. Target and acquiring firms' stocks produce average returns of -6.7 percent and -1 percent respectively. Among the payment method and acquisition type classification, the target firms' stocks of failed stock offers and mergers show the worst average returns of -15.9 percent and -10.8 percent, respectively. Also the acquiring firms' stocks of failed stock offers and mergers produce the worst average returns of -5.2 percent and -1.2 percent. These findings suggest that the losses of risk arbitrage positions for failed acquisition attempts are largely driven by the losses of the long positions in the target stocks.

Interestingly, the frequency of bidding competition and the performance of risk arbitrage and target stock price indicate that the losses of risk arbitrageurs may relate to the bidding competition associated with the payment methods and the acquisition types.

Regression Tests

Our hypotheses suggest that the payment method and the acquisition type may signal both firms' values and the possibility of receiving competing offers. The signals would impact the performance of risk arbitrage for failed acquisition attempts. To test our propositions, we estimate regression models [equations (4), (5), and (6)].

$$r_i = \alpha + \beta_1 \times SO + \beta_2 \times TENDER + \varepsilon \quad (4)$$

$$r_i = \alpha + \beta_3 \times CO + \varepsilon \quad (5)$$

$$r_i = \alpha + \beta_1 \times SO + \beta_2 \times TENDER + \beta_3 \times CO + \beta_4 \times \text{Size} + \beta_5 \times TDebt \quad (6)$$

$$+ \beta_6 \times TMB + \beta_7 \times ADebt + \beta_8 \times AMB + \beta_9 \times MK + \beta_{10} \times CS + \varepsilon$$

where:

- r_i = Return of risk arbitrage including the dividend and interest payments during an acquisition attempt (from one day after an acquisition announcement to the day of a termination announcement);
- SO = Dummy variable for an acquisition attempt using a stock offer (stock swap and collar mergers);

⁴ Due to the small number of cash/stock offers, the estimate may not well represent the risk arbitrage return for failed cash/stock offers.

- TENDER = Dummy variable for a tender offer (cash and cash/stock tender offers);
- CO = Dummy variable for inclusion of the varying exchange ratio (collar mergers);
- Size = Ratio of target size (book value) to acquirer size (book value) prior to an acquisition announcement;
- TDebt = Ratio of total debt to market value of target prior to an acquisition announcement;
- TMB = Ratio of market value to book value of target prior to an acquisition announcement;
- ADebt = Ratio of total debt to market value of acquirer prior to an acquisition announcement;
- AMB = Ratio of market value to book value of acquirer prior to an acquisition announcement;
- MK = Daily compounded CRSP value weighted market return during an acquisition attempt; and
- CS = The change of spreads between an offer price and the market price of a target firm's stock for the three days after an acquisition announcement.

Equation (4) explores the impacts of the payment methods and the acquisition types. Equation (5) tests the impact of the inclusion of varying exchange ratios in stock offers. Equation (6) tests the significance of the payment methods and the acquisition types with other control variables such as the relative sizes of target firms as compared with the acquiring firms, financial soundness (debts), and undervaluation/growth potentials (market to book value ratio) of the targets and acquirers prior to the acquisition announcement. The market performance during the acquisition attempt period and change of spreads,⁵ which may indicate the change of trading positions of risk arbitrageurs around an acquisition announcement, also are considered. The literature (Bradley, Desai, and Kim, 1988; Chowdhry and Nanda, 1993; Comment and Schwert, 1995; Barclay, Watts, and Smith, 1997; Mitchell and Pulvino, 2001; Baker and Savasoglu, 2002; and Mitchell, Pulvino, and Stafford, 2004) suggests that these control variables are likely to influence the returns of target or acquiring firms' stocks, the performance of risk arbitrage positions, or the probability of receiving competing offers. If the signals associated with the payment method and the acquisition type help explain the performance patterns of risk arbitrage positions for failed acquisition attempts, the coefficient of the dummy variables for stock offers and tender offers may be significantly negative and positive, respectively, in the test [equation (4)]. Moreover, if the varying exchange ratio helps

⁵ *Spread* refers to the difference between an offer price and the market price of a target stock. The more trading positions of risk arbitrageurs are set up, the greater the demands on a target firm's stock and supply of acquiring firm's stock, thereby tending to decrease the spread.

explain the performance patterns, the coefficient of the dummy for collar offers is expected to be significantly positive in the test where only stock offers are considered [equation (5)]. If the payment method and the acquisition type largely determine the performance patterns of risk arbitrage positions, the coefficients of stock offer, tender offer, and collar merger dummy variables other than control variables are expected to be significant [equation (6)].

To test whether the explanatory powers of the payment method and the acquisition type structurally result from signaling the value of the target firm and the competing offers, we estimate the regression models [equations (7) and (8)], using our sample of failed takeover attempts but modified to exclude those observations involving bidding competition.

$$r_i = \alpha + \beta_1 \times SO + \beta_2 \times TENDER + \varepsilon \quad (7)$$

$$r_i = \alpha + \beta_3 \times CO + \varepsilon \quad (8)$$

If the signaling effects of the payment method and the acquisition type invite bidding competition and the bidding competition determines the performance pattern, coefficients for dummy variables of stock offers, tender offers, and collar mergers should be insignificant. For these tests, we use failed acquisition attempts during the period of 1992 to 1999.⁶

Table 2 reports our test results. We find that the performance of risk arbitrage for failed takeover offers is influenced by the payment method and the acquisition type. The significantly negative coefficient of the stock offer dummy variable ($\beta_1 = -0.120$) and the significantly positive coefficient of the tender offer dummy variable ($\beta_2 = 0.161$) in equation (4) support our first and second propositions: Failed stock offers may generate greater losses than do failed cash or cash/stock offers, and failed tender offers may generate lower losses than failed mergers. The weakly significant positive coefficient of the collar offer dummy ($\beta_3 = 0.162$) in equation (5) supports the third proposition: Failed collar mergers tend to generate lower losses than do failed stock swap mergers. Furthermore, the significant coefficients of the stock only offer ($\beta_1 = -0.162$), the tender offer ($\beta_2 = 0.169$), and the collar ($\beta_3 = 0.174$) dummy variables in equation (6) support the significant roles of the payment method and the acquisition type in determining the performance of risk arbitrage positions for failed merger attempts. The results of equations (7) and (8), however, show that the significant impacts of the payment method and the acquisition type on the performance of risk arbitrage positions disappear when those observations reflecting competing offers are excluded from the sample. Compared with the R-squares of equations (4) and (5), those of equations (7) and (8) are dramatically lower. These

⁶ In this paper, failed acquisition attempts during the period of 1992 to 1999 are used to test hypotheses and to estimate in-sample test results. Those during the period of 2000 to 2001 are used to estimate the out-of-sample test results.

findings imply that the performance patterns of risk arbitrage for failed acquisition attempts are significantly related to bidding competition. The explanatory power of our model for the payment method or the acquisition type is associated with the presence or absence of competing offers. Furthermore, these findings imply that a prediction model estimating the chance of receiving competing offers would help risk arbitrageurs manage the losses from acquisition failure.

Table 2—Return Analysis during an Acquisition Attempt

	Equation 4	Equation 5	Equation 6	Equation 7	Equation 8
Intercept	-0.012 (0.792)	-0.158* (0.000)	-0.009 (0.920)	-0.073 (0.188)	-0.201* (0.000)
SO	-0.120* (0.027)		-0.162* (0.014)	-0.108 (0.100)	
Tender	0.161* (0.021)		0.169* (0.022)	-0.075 (0.542)	
CO		0.162** (0.061)	0.174* (0.043)		0.115 (0.251)
Size			0.018 (0.471)		
TDebt			0.093 (0.293)		
TMB			0.002 (0.825)		
ADebt			-0.072 (0.568)		
AMB			-0.000 (0.960)		
MK			-0.277 (0.388)		
CS			-0.177 (0.294)		
Adj R-Sq	12.22%	4.38%	13.09%	1.09%	0.72%
Sample Size	108	59	108	74	49

Note: 1) * and ** indicate statistical significance in 95 percent and 90 percent confidence interval

2) P-values are in parentheses

The OLS regression tests use 108 failed acquisition attempts during 1992 to 1999. A dependent variable is the risk arbitrage return resulting from Equation (1), (2), and (3). SO, Tender and CO mean dummy variables for an acquisition attempt using a stock offer, a tender offer and a collar merger attempt individually. Size means a ratio of a target firm's book value to an acquiring firm's book value prior to an acquisition announcement. TDebt means a ratio of total debt to market value of target prior to an acquisition announcement. TMB means a ratio of market value to book value of target prior to an acquisition announcement. ADebt means a ratio of total debt to market value of acquirer prior to an acquisition announcement. AMB means a ratio of market value to book value of acquirer prior to an acquisition announcement. MK means a daily compounded return of value weighted CRSP index during an acquisition attempt period. CS means the change of the spreads for three days after an acquisition announcement

Implication:

Estimating the Probability of Receiving Competing Offers.

Based on our previous results, we directly test the relationships between payment methods/acquisition types and the probability of receiving competing offers and develop a model estimating the probability of receiving competing offers emerging for the period of 1992 to 1999. We apply (stepwise) logistic regressions with dummy variables for stock offers, tender offers, collar mergers, and other conditional variables used in previous tests. Equation (9) tests relationships between the payment methods and the acquisition types and the probability of receiving competing offers.

$$CM = \alpha + \beta_1 \times SO + \beta_2 \times TENDER + \beta_3 \times CO + \varepsilon \quad (9)$$

where:

CM = Dummy variable for competing offers.

The use of stock offers is expected to decrease the probability of receiving competing offers, thereby generating a significantly negative coefficient for a dummy variable for stock offers. Tender offers and collar mergers are expected to improve the probability of receiving competing offers, thereby generating significantly positive coefficients for dummy variables. For our test, if the acquisition attempt is a subsequent competing offer and fails, we use the original payment method and acquisition type offered by the original bidder as dummy variables.

Panel 1 of Table 3 shows our test results for equation (9). The significantly negative coefficient of a stock offer dummy variable ($\beta_1 = -1.381$), the positive coefficient of a tender offer dummy variable ($\beta_2 = 2.249$), and the positive coefficient of a collar merger dummy variable ($\beta_3 = 1.696$) are estimated. These findings provide supporting evidence for the proposition that the payment method and the acquisition type signal useful information regarding the possibility of receiving competing offers. The explanatory power of the payment methods and the acquisition types (which is found in the previous section) results from the possibility of receiving competing offers.

Using these findings and a stepwise logistic regression, we develop a prediction model: equation (10). Here, the entry p-value of 0.4 is applied. Then using estimated CM for each acquisition attempt resulted from the prediction model and equation (11), we calculate the probability of receiving competing offers.

$$CM = \alpha + \beta_1 \times SO + \beta_2 \times TENDER + \beta_3 \times CO + \beta_4 \times \text{Size} \\ + \beta_5 \times \text{TMB} + \beta_6 \times \text{AMB} + \varepsilon \quad (10)$$

$$\text{Pr} = \frac{\exp(E(CM))}{1 + \exp(E(CM))} \quad (11)$$

where:

E(CM) = Estimated CM from equation (10).

Pr = Probability of receiving competing offers.

To assess the goodness of fit of the prediction model statistically, we use the Hosmer and Lemeshow (HL) test. As shown in Panel 1 of Table 3, the chi-square is 8.385 and the p-value is 0.430. This high p-value indicates that the estimated probabilities from the prediction model are well matched with actual probabilities in the sample. The prediction model explains our sample well.

Table 3—Estimating Probabilities of Receiving Competing Offers

Panel 1: Estimating Probabilities of Receiving Competing Offers.		
	Equation 9	Equation 10
Intercept	-0.880* (0.382)	-1.315* (0.449)
SO	-1.381* (0.563)	-1.602* (0.605)
Tender	2.249* (0.624)	2.243* (0.637)
CO	1.696* (0.720)	1.361** (0.813)
Size		0.328 (0.341)
TMB		0.082 (0.063)
AMB		0.038 (0.043)
R-Sq	36.10%	40.40%
Sample Size	108	108
Goodness of Fit Test		
Ch-Square		8.385
P-value		0.430

Panel 2: In and Out of Sample Test Results

	In-Sample			Out-of-Sample		
	Return	STDV	Ratio	Return	STDV	Ratio
0-20%	0.111	0.220	0.507	0.160	0.151	1.064
21-40%	0.041	0.197	0.208	0.019	0.208	0.091
41-60%	-0.062	0.276	-0.225	-0.052	0.233	-0.224
61-80%	-0.104	0.300	-0.346	-0.155	0.234	-0.663
81-100%	-0.242	0.245	-0.984	-0.150	0.320	-0.468

Note: 1) * and ** indicate statistical significance in 95 percent and 90 percent confidence interval

2) The stepwise logistic regression uses an entry p-value of 0.4

3) Standard errors in Panel 1 are in parentheses

108 failed acquisition attempts during 1992 to 1999 are used to estimate the logistic regression model in Panel 1 and in-sample test results in Panel 2. 38 failed acquisition attempts during 2000 to 2001 are used to estimate Out-of-sample test results in Panel 2. SO, Tender and CO mean dummy variables for an acquisition attempt using a stock offer, a tender offer and a collar merger attempt individually. Size means a ratio of a target firm's book value to an acquiring firm's book value prior to an acquisition announcement. TMB means a ratio of market value to book value of target prior to an acquisition announcement. AMB means a ratio of market value to book value of acquirer prior to an acquisition announcement. Return means an arithmetic average return. STDV means a standard deviation. Ratio means a ratio of an average return to STDV

To test the implicational significance of whether the prediction model has a capability for reducing the losses of risk arbitrageurs, we perform in-sample (1992–1999) and out-of-sample (2000–2001) tests. In the test, we generate portfolios depending on the percentile of estimated probabilities from our competing offer prediction model. Panel 2 of Table 3 shows the results. In Panel 2, 0–20 percent refers to a portfolio composed of acquisition attempts with the top (high) 20 percent of the estimated probabilities. Return and STDEV indicate the average return and standard deviation. Ratio means a ratio of an average return to STDEV. At the top (high) percentile, a portfolio generates a positive and highest return. As the percentile increases, the portfolios in both in and out-of-sample tests tend to generate

greater losses. These results demonstrate the ability of our prediction model to identify acquisition attempts that are likely to be targets for competing offers and thus to be less costly (or more profitable) for risk arbitrageurs even if the acquisition attempts fail.

Conclusion and Comments

We find that risk arbitrage returns for failed acquisition attempts are driven by the performance of the target firms' shares held in the trader/investor's long positions. Risk arbitrage positions in failed acquisition attempts usually result in losses unless a new arbitrage potential results from competing offers. Interestingly, the risk arbitrage strategy for failed acquisition attempts shows various patterns of losses, depending upon the payment method and the acquisition types. Our test results show that the payment method and the acquisition type signal useful information regarding the potential values of the target firms and the possibility of competing offers emerging. The signals determine the performance of risk arbitrage for failed acquisition attempts. These findings imply that in constructing risk arbitrage portfolios, risk arbitrageurs need to consider factors such as the payment method, the merger type, and others that may signal the plausibility of competing offers.

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