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RISK ARBITRAGE TRADING AND THE CHARACTERISTICS OF ARBITRAGE SPREADS:

THE CANADIAN EVIDENCE

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ABSTRACT

Risk Arbitrage Trading and the Characteristics of Arbitrage Spreads:

The Canadian Evidence

Marcel Belanger

Using a sample of Canadian mergers data from Securities Data Corporation (SDC) for the 1990-1997 period, and returns data from the TSE Western database, I demonstrate that the average arbitrage spreads of Canadian mergers are significantly higher than those of their American counterparts. The arbitrage spread is defined as the percentage difference between the bid price and market price one day after the initial announcement. I also demonstrate that the cross-sectional variation of these spreads is high, and negative in some instances. Buying the targets of the entire sample and shorting their bidders does not yield abnormal returns. However, smarter trading focused on specific segments of the sample yield short-term abnormal returns. I find that trading strategies based on buying the following three categories of targets offer the highest level of abnormal return. The categories are: target firms in the largest quartile of the relative size ratio; firms subject to both cash offers and firms subject to cash tender offers. Typical of merger studies, we find that target companies experience highly significant abnormal returns on the announcement day, and slightly lower significant abnormal returns on the following day.

Acknowledgement

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I dedicate this thesis to my parents and Marie-Hélène for their continued love and support.

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Introduction

A number of studies have examined the anomalies surrounding mergers and acquisition events. Many studies have demonstrated that there are many opportunities for investors and risk arbitrageurs alike to earn abnormal returns from mergers and acquisition related activities.[1] Specifically, it has been shown that risk arbitrageurs can benefit from buying the shares of a target after an acquisition attempt in order to later tender the same shares at a profit (Jindra & Walking 1999). Other evidence is reported whereby purchasing the shares of a repurchase tender offer before the expiration date of the offer and tendering to the firm produces, on average, abnormal returns of more than 9 percent over a period shorter than one week (Lakonishok & Vermaelen, 1990).

However, a very limited number of studies have examined the implications of risk arbitrage activity on our Canadian markets. More specifically, no study has, as of yet, focused on the possibilities of risk arbitrage on acquisition price spreads after the announcement of an acquisition. This research gap constitutes the rationale for the present study. I choose to investigate the issue of merger anomalies further with two main differences with respect to the work that has already been done in this area. Firstly, my study examines companies trading on the Toronto Stock Exchange. Secondly, the

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[1] See Dodd and Ruback (1977), Kummer and Hoffmeister (1978), Dodd (1980), Asquith (1983), Bradley, Desai, and Kim (1983), Jensen and Ruback (1983), and Malatesta (1983).

data consists of mergers that are composed of different types of transactions, as opposed to examining only cash tender offers, as has typically been the case. [2]

After the announcement and filing of an acquisition bid, it is commonly observed that the price of the target's shares rises. But yet in most instances, it is also observed that the rise in price does not completely bring the targets' share price in-line with the price offered by the acquirer. Thus the price difference between the current market price and the price offered by the bidder is money apparently "left on the table." We know little about this spread and its characteristics. It thus becomes interesting to find out more about the existence and characteristics of this spread, and to determine if one can profit from it.

This study documents very large arbitrage spreads in the Canadian market. The average arbitrage spread, defined as the percentage difference between the initial bid price and the closing market price on the day after the merger announcement, has a much greater magnitude than that what has been documented in the U.S. literature. Also, the cross-sectional variation of this spread is high, ranging from a minimum of −10.71% to a maximum of 147.5%. The percentage of negative arbitrage spreads is high at 18.68%. However, an average abnormal return of 6.08% over 40 days is found from trading on the target firms in the largest quartile of the relative size ratio. This study also documents a high abnormal return of 4.21% over 40 days from trading in the shares of firms subject to

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[2] See Jindra and Walking (1999) for the American evidence on arbitrage spreads and the market pricing of proposed acquisitions.

tender offers. Also, I find high abnormal returns in the group of firms that were subject to cash offers. The highest abnormal return for this group is of 3.37% over a 25-day period. This study also demonstrates that 84% of the bids are friendly or neutral in nature, and that 42% of the bids are ultimately completed.

Finally, typical of merger studies, I find that target companies experience highly significant abnormal returns on the announcement day, and slightly lower significant abnormal returns on the following day.

The remainder of the paper is organized as follows: Section 2 discusses related literature. Section 3 briefly discusses Canadian markets and its implications for mergers and acquisition activity. Section 4 discusses risk arbitrage and risk arbitrageurs in general. Section 5 describes the sample. Section 6 describes the components of risk arbitrage returns. In section 7, research design, I outline the methodology used. Section 8 presents a description of each test that was performed on the sample. Section 9 discusses the results of these tests. Finally, my conclusions are presented in section 10.

Related Literature

It was commented by Welles (1981) that risk arbitrage has remained the last major recess in *inefficiency*, the last device by which investors have been able to beat the market not only consistently, but also dramatically. As you will see in the pages that follow, this contention seems to be generally supported by a number of studies that have examined this area. Keeping this interesting thought in mind, I decided to explore such contentions from a Canadian perspective. Studies on American risk arbitrage are numerous, but little has been done with Canadian data so far. Does this imply that Canadian risk arbitrage is not profitable or practically non-existent? This study aims to shed light on these questions.

Risk arbitrage, in its most basic form, refers to the purchase of the securities of a firm that is targeted for a takeover as well as the shortselling of the bidders' shares. Risk arbitrageurs derive their profits from the fixed spread that typically exists between the offer price and the post-announcement market price for the target firm. Of course, the spread can only be made if the merger ultimately occurs. The uncertainty surrounding the realisation of the merger is the main source of risk for the arbitrageur. Because of this, the risk arbitrageurs' primary function is to determine the likelihood that the transaction will ultimately occur.

Ivan Boesky, a well-known risk arbitrageur, is credited for taking the practice out in the open by forming one of the first risk arbitrage limited partnerships in 1975. The

practice of risk arbitrage helped Boesky's firm grow from $700,000 in capital to more than $90 million in 5 years.[3] Critics of the field say that competition among investors is such that the market for merging companies has become highly efficient, and that profitable opportunities have disappeared. Yet, risk arbitrage activities still remain active in the trading departments of the largest firms.

Jindra and Walking (1999) have examined arbitrage returns and arbitrage spreads surrounding cash tender offers between 1981 and 1995. The authors define the mean arbitrage spread as the percentage difference between the initial bid price and the closing market price on the day after the acquisition announcement. As the authors comment: "We use arbitrage in the popular sense of the word. Strictly speaking, arbitrage involves simultaneous riskless transactions exploiting price differences. Our situation is not riskless: the offer may not be consummated at the bid price."

Since little is known about the characteristics of this spread, Jindra & Walking have chosen to study this issue by using a Securities Data Corporation (SDC) sample of 362 offers for 100% of a firms' shares. They find that a simple strategy of buying the target firm one day after the acquisition announcement date, and shorting the bidder is highly profitable with a 5-day return of 1.88%, or 156% annually. Further, the abnormal

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[3] However, in 1986 Ivan Boesky was sentenced to three years of prison and charged $100 million in fines on accusations of insider trading. The settlement was just $6 million less than the entire SEC budget for 1986.

returns increase considerably with the holding period. However, there is considerable cross-sectional variation in the spread. The minimum and maximum spreads are –30% and 42%, respectively. Also, over 23% of the spreads were negative, thus meaning that some of the bids were lower than the target stock price prevailing at that time. Although the median return of the sample is positive, nearly 40% of the individual returns are negative.

Other interesting findings of the study demonstrate that over 78% of the bids are friendly or neutral in nature. Further, more than 71% of the bids involve a single bidder and almost 42% of the bids in the sample are ultimately revised. Finally, 97% of all bids are ultimately completed.

The authors find that increased run-up is consistent with the accumulation of pre-announcement positions by arbitrageurs. Thus firms with high run-up are associated with significantly lower spreads. They also find that spreads are significantly positively related to managerial ownership in hostile acquisitions. Managers with higher holdings have more power in deterring unwanted bids. Another factor affecting arbitrage spreads is the existence of multiple advisors for the bidder. It is assumed that bidders with more advisors are more likely to be taken more seriously by risk arbitrageurs, which will in turn increase arbitrage activity, consequently reducing the spread. Indeed this seems to be the case, since a dummy variable set equal to one for the 51 cases with multiple advisors produced a significantly negative coefficient.

The empirical work of Larcker & Lys (1987) demonstrated that risk arbitrageurs were able to generate private information from various sources, which they could use to assess the probability of successful or unsuccessful corporate reorganisations. In so doing, arbitrageurs were able to generate substantial abnormal returns. They report that the mean return from the average purchase price of the Arbitrageur to the offer price outstanding at the transaction date is 14.51 percent, and the mean return from the average purchase price of the Arbitrageur to the final offer price is 20.08 percent. Although it is difficult to find a comparison baseline for these raw returns, the magnitude of these returns is nevertheless large. According to Larcker & Lys, the fact that arbitrageurs earn large positive returns on their trading activities is consistent with the fact that arbitrageurs are 'better informed' about the success or failure of an organisation. Taken altogether, these results suggest that security prices are sufficiently noisy to create incentives for costly information acquisition regarding firms involved in corporate reorganisations.

Samuelson & Rosenthal (1986) examined the movement in the prices of target stocks as predictors of the ultimate success or failure of tender offers. Their findings show that movements in stock prices are indications of the success or failure of the tender. The larger the increase in the relative stock price, the greater is the chance of tender success. The authors also find that the market's probability predictions improve as the conclusion date nears. Also, with few exceptions, market prices are well calibrated, i.e., the current target price during the offer period reflects the expected (discounted) stock price at the conclusion date. Their study also documents that in the wake of a failed tender offer, the price of the target stock does not drop back to its initial price, but rather

stays significantly above its old level. Accordingly, this provides some evidence in favour of the hypothesis that the tender offer provides the market new information about the potential value of the target. The market neither accepts the tender price as the true valuation nor discounts the tender completely.

Work by Lakonishok & Vermaelen (1990) demonstrates that following a simple trading strategy of buying shares before the expiration date of a repurchase tender offer and tendering to the firm produces, on average, abnormal returns of more than 9 percent over a period shorter than one week. Furthermore, the authors find that even without a model for forecasting shareholder and managerial behaviour around repurchase tender offers, they are able to explain 75 percent of the variability of the trading profits on the basis of only one variable in their regression: the market price before the expiration day divided by the tender offer price.

In summary, the work of Lakonishok & Vermaelen (1990) demonstrates that investors can obtain positive abnormal returns by purchasing shares that are trading at a discount from the tender price and consequently tendering them to the firm. The profits from such a strategy are related to the size of the discount. Furthermore, the authors believe that returns that were realised from this simple trading rule were too large to be explained as a compensation for risk bearing, especially considering that the strategy is less risky than an average investment in common stock. Also, they do not find that these returns could be explained by the costly information acquisition theory proposed by Larcker and Lys (1987).

Shleifer and Vishny (1997), argue that arbitrageurs might not always be able to eliminate all arbitrage opportunities. Their study highlights the flaws of textbook arbitrage, which involves the simultaneous purchase and sale of the same, or essentially similar, security in two different markets. It is argued that textbook arbitrage does not closely approximate reality as it is assumed that no capital is required and that no risk is involved. They further demonstrate that performance-based arbitrage is particularly ineffective in extreme circumstances, where prices are significantly out of line and arbitrageurs are fully invested. In these circumstances, Arbitrageurs might bail out of the market when their participation is most needed.

Dukes et al. (1992), find that risk arbitrage can be very profitable. These authors report an average daily return of 0.47% for their entire sample of 761 tender offers. The average deal is reported to last about 52 days. This translates into an interesting holding-period return of approximately 25% for the average time period of slightly more than 52 days. However, the authors do not suggest that this process could be repeated on a continuous basis to earn an annualised return of almost 172%. This is hardly possible, as tender offers do not happen in a systematic way such as every week for example.

Over 89% of the tender offers in the Dukes et al. sample were successful. Even the failed tender offers generated a mean return of 0.43%. Accordingly, this is consistent with the findings of Bradley, Desai, and Kim (1983), that even an unsuccessful tender offer will lead to a positive abnormal return for the target stockholders because of the potential for the target firm to receive a competing bid soon after the failed attempt.

Brown & Raymond (1986) explored the limits of risk arbitrage in the field of mergers & acquisitions. They found that the market has the ability to evaluate tender offers that will eventually be outbid. For the set of competing tender offers examined, the average time between the initial and second registered offer was 2.39 weeks. Given that the mean length from the first offer to the eventual acquisition was approximately two and half months, it is apparent that second bidders reveal themselves relatively early in the race. This study presents considerable evidence to support the contention that the market (i.e. in this case the risk arbitrageurs) has the ability to differentiate between eventual outcomes in the post-announcement stage of a corporate takeover.

The Brown & Raymond study supports the idea that the prices of the firms involved in a takeover attempt will reflect the attitudes of the investing public. Thus the market can be useful in helping to assess the resolution of an uncertain acquisition. In sum, they find that the prices set in the post-announcement period reflects prevailing attitudes and that these attitudes are discriminating predictors of future events.

On a different note, there are a number of studies that have examined the impact of method of payment on target and bidder returns. Loughran and Vijh (1997) for example, used a sample of 947 acquisitions from the NYSE, AMEX and Nasdaq stock exchanges and found that on average, firms that complete stock mergers earn significantly negative excess returns of –25.0 percent whereas firms that complete cash tender offers earn significantly positive excess returns of 61.7 percent.

Friendly versus hostile

Martin and McConnell (1991), demonstrate that synergies and the disciplining of target managers are the two broad explanations of wealth gains from mergers. They find that tender offers, which are typically hostile, are followed by a 42 percent turnover of top managers in the first year and a 19 percent turnover in the second year. This contrasts strongly with the 10 percent rate that is usually observed in any of the five years before an acquisition.

This is also consistent with the Myers and Majluf (1984) asymmetric information hypothesis and the market underreaction hypothesis. The managers of acquiring firms maximise the value of their shareholders' wealth by purchasing the target's shares with cash when they believe their own shares might be undervalued, and purchasing the target's shares with their own stock when they believe their own stock is overpriced.

Size Differences

Due to the large number of mergers with different sizes in my sample, the findings of Loughran and Vijh (1997) are particularly interesting. The Loughran & Vijh study demonstrates that the smaller a target is with respect to its acquirer, the better are its returns. Furthermore, this finding only consistently applies to stock mergers. Contrary to what is often believed, the authors conclude that not all target shareholders benefit from acquisitions. On the other hand, those who sell out soon after the acquisition effective date gain on all acquisitions. Unfortunately, those who hold on to

the acquirer's stock received as payment find that their gains diminish with time. Worse yet, target shareholders in the top quartile of target to acquirer firm size ratio find their gains reverse and become negative.

On Method of Payment

As my study examines the different returns from risk arbitrage trading according to method of payment, the findings of Agrawal, Jaffe and Mandelker (1992) take particular significance. These authors examined the issue of post-merger performance by using a sample of merged firms trading on either the American or the New York Stock Exchange. Their sample included all firms that were removed from CRSP from 1955 to 1987. Their findings are consistent with the hypothesis that cash financing is more likely to occur when the acquirer is undervalued, and stock financing when the acquirer is overvalued. Concretely, they find that post-acquisition performance is worse for tender offers financed by equity rather than cash. However, their sample of equity-financed acquisitions comprises only 18 cases. Therefore, strong statistical inferences cannot be reached at this level. Similarly, they find that post-acquisition performance is worse for mergers financed by equity rather than cash.

Martin (1996) studied the underlying motives in the payment methods in corporate acquisitions and found that the higher the acquirer's growth opportunities, the more likely the acquirer is to use stock to finance an acquisition. Further, the probability of stock financing was found to increase with higher pre-acquisition market and acquiring

firm stock returns. It was also found to decrease with an acquirer's cash availability, higher institutional shareholdings and block holdings, and in tender offers. Mergers were more often financed with acquirer's stock whereas tender offers were predominantly cash financed. Further, Myers and Majluf (1984) show that firms preferred to finance an acquisition with cash if they felt that their stock was undervalued, and pay with stock if they felt their own stock was overly/properly valued.

Successful and Unsuccessful Merger Bids

A part of my research work was to divide my results according to successful and unsuccessful bids. The result of my Canadian research provides similar results to Asquith (1983), who found abnormal stock returns throughout the entire merger process for both successful and unsuccessful merger bids. In addition, Asquith demonstrated that increases in the probability of mergers benefit the shareholders of target firms, while decreases in the probability of mergers harm the shareholders of both bidder and targets. The evidence from Asquith also supports the contention that the market has some ability at predicting mergers.

Canadian Research

Although I was aware that doing a study on Canadian markets and using Canadian data would be an arduous task, I felt it would be very rewarding to study a sector that is under-researched. I knew that the mere fact that not enough research had been done on this market made it that much more interesting, as the chances of discovering new evidence were higher. Although the process was a lengthy one, I certainly do not regret having embarked into Canadian research, as I find that my results are quite interesting.

There are many attributes that make our Canadian equities' market unique and different from its U.S. counterparts. The size difference is obviously quite large. There are also differences within the country. On the one hand, we have the Toronto Stock Exchange, a worthy and well-regulated institution, and on the other, we have the Vancouver Stock Exchange, which is stuffed with promoters of dubious reputation and prone to manipulation of all sorts. It is argued that this market had lost its relevance since no one trusted it anymore. [4] The TSE, Canada's pre-eminent exchange for raising capital also has its share of problems. A study presented in the Globe and Mail by Carrie Cockburn (1999) has demonstrated that the share prices of almost half of the companies involved in friendly mergers or acquisitions rose more than 25 per cent between the companies' first talk, and the night before the deal was announced. As in all other

[4] See a commentary by Eric Reguly in the October 19, 1999 edition of the Globe and Mail for more details.

markets, the TSE has its share of problems and is working hard to regulate its market so that it moves in the direction of being a fair playing field for all investors.

To take a step in the right direction, Canada has inaugurated the Canadian Venture Exchange (CDNX), a market where the bulk of small capitalisation firms are now trading. This move will help the Toronto Stock Exchange achieve the higher level of prominence it deserves by sending the smallest firms, which are most often the ones subject to manipulation, to a secondary exchange.

As we stand, Canadian markets have dominant traits that make them unique from their American counterparts. Firstly, we have an economy highly based on natural resources. Hence, we obviously see a high number of such firms trading on the Toronto Stock Exchange and all the other major Canadian exchanges. This translates into many mining and oil & gas stocks. However, the boom in technology has changed this picture somewhat. When examining specifically the TSE 300 index, we see that the bulk of it is now concentrated in the big players BCE and Nortel Networks, which are now making-up more than 30% of the TSE 300's overall composition.[5] Nortel alone now has a market capitalisation that is bigger than that of the six biggest Canadian banks combined.

Liquidity

Liquidity is also a problem with our Canadian exchanges, although the Toronto Stock Exchange remains the most liquid of all Canadian exchanges, there are still a high number of TSE firms that are thinly traded and characterised by large bid-ask spreads. This was the most prominent feature influencing my study. I was often disappointed to find out that many of the firms I was interested in were so thinly traded that they could not be used in my sample to calculate the estimation periods and other essential statistics.

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[5] Refer to table 14, which gives the industry groupings and relative weights of the TSE 300 composite index as contrasted with our sample. This table provides a detailed description of the internal composition of the TSE 300.

Risk Arbitrageurs

To the risk arbitrageur, the bottom line is return. Therefore, it does not matter who wins the contest, but rather that the contest is won. For the arbitrageur, it is also favourable to have a multiple-bidder contest, as it is more likely in such instances that the price of the target's shares will be bid up, thus generating more profits. An important consideration for the arbitrageur is also the cost of funds and the length of the contest. There is a direct relationship with the cost of funds and the profits that will remain from the risk arbitrage strategy. If the arbitrageur does not have cheap access to funds, then this will reduce the returns of his strategy. Also, if the contest drags on for a lengthy period without generating good returns, then the arbitrageur suffers additional opportunity costs related to the tied-up capital that cannot be used for other profitable opportunities. Due to these constraints, it becomes favourable to have some form of prediction tool to better asses the eventuality that a contest will fail or drag on for long periods without generating returns.

Sample Description

My sample of firms includes Canadian companies only, where the target was traded on the Toronto Stock Exchange for the period starting January 1st, 1990 to December 31st 1997. The sample of merging firms was obtained from Securities Data Corp. (SDC). Daily returns data for all the firms in my sample and both a value and equally weighted index was collected from the TSE Western database for the years 1990-1998.

To calculate the market capitalisation of each company, I collected year-end shares outstanding and price data. Wherever companies had several classes of common shares, these were summed to calculate the total market capitalisation of the firm. I selected all merger and tender offer transactions where the value of the transaction was over $10 million. As an additional check on the data, I requested that the merger be announced in a major data source such as the Financial Post or in Stockwatch bulletins, a comprehensive source of Canadian corporate news.

To perform the analysis, I had to find the "correct" first formal announcement of the merger. To do this, I used the SDC database to identify the given announcement date. As a double check on the validity of this date I consulted the Financial Post Microfiche for each firm going as far back as 6 months in order to ensure that there was no prior bid activity mentioned. All of the tests assume purchase at the closing price on the day after the first formal announcement as quoted in the papers. A bid is determined as successful if it leads to the complete and successful merging of the two firms as reported in either the Financial Post or through Canada Stockwatch bulletins.

Data Attrition

I began an initial screen by selecting all the firms on the SDC database which traded on the Toronto Stock Exchange, this yielded approximately 12000 observations.[6] I then performed a second screen by keeping only the firms that belonged in the following five categories: i) merger, ii) acquisition, iii) acquired major interest, iv) acquired partial interest, and v) acquired remaining interest. This left me with approximately 2000 observations. Following this, I selected only the firms who made the first formal merger or acquisition announcement after December 31st, 1989. This left me with approximately 900 observations. I then screened this sample by selecting the deals for which the value of the transaction was above 10 million in Canadian dollars, at this point, I now had approximately 700 observations. Following this, I proceed by removing the deals for which the firms were not seeking 100% of the targets' shares; this left me with approximately 300 observations. I then eliminated all the firms for which returns data or tickers could not be found on the TSE Western database, leaving 194 observations at this point. I then eliminated the companies that were too thinly traded to be included in the sample and those that were not first bids. I only wanted the first bid of the contest since this is the relevant bid to the risk arbitrageur. This now left me with 91 deals, all of which were classified as mergers.

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[6] I required stock data only for the target firm, since adding the extra constraint of having data for both the target and the bidder would have reduced the sample size even more.

Sample differences

Please refer to tables 1-3 for descriptive information on the sample used in this study. This sample contains firms that have merged from 1990 to 1997. However, the bulk of the mergers in the sample have occurred in the later years (i.e. 1994-97). This sample differs from the Jindra & Walking sample by the fact that it covers a smaller time span (7 years versus 14). Also, Jindra & Walking use more deals (362 versus 91).

This sample contains merger transactions with different forms of payment methods. On the other hand, the Jindra & Walking sample is made up of only cash tender offers. These differences are very important, and imply that the results are likely to be different. Merger transactions are typically friendly, whereas tender offers are typically hostile as they are made directly to the shareholders of the firm. Also, tender offers are typically faster, and thus more likely to be a surprise. This is not the case for mergers, which are typically slower transaction, and are thus more likely to result in information leakage. My study is done with Canadian data only, consequently, there is a greater likelihood of thin trading and lack of liquidity when compared to a study done with U.S. data. Because of such differences, I would expect that the arbitrage spreads would be higher, and that the returns from risk arbitrage would be lower, as there is a greater likelihood that the pre-bid run up is high enough on our Canadian markets to eliminate most of the gains from risk arbitrage after the announcement.[7]

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[7] See a study presented by a group of Globe and Mail journalists in the October 19, 1999 edition of the Globe and Mail for more evidence on this issue.

Risk Arbitrage Returns

Before we move to the analysis, it is important to properly understand the functioning of risk arbitrage. In the present study, risk arbitrage is defined as the simultaneous purchase of the shares of the firm targeted by an acquisition (target), and the shortselling of the firm making the offer (bidder). If all goes well, and the offer is completed, the risk arbitrageur reverses his trades by selling the target at the new higher price, and buying back the bidder's stock at the new, lower price to reverse the short position. In so doing, the arbitrageur captures the spread, which was initially visible at the time of the announcement between announcement price (A_P), and final price (F_P).

If we assume that the arbitrageur waits until completion date to close his position, the resulting yield would be:

$$AR_i = (F_P - A_P)/A_P \qquad (1)$$

Where AR_i is the percentage return for acquisition i. Assuming that I_P is the initial announced bid price for the target's shares. Rewriting ($F_P - A_P$), we can see that the arbitrage spread has two components (AR_1 and AR_2). The first is generated from the announcement date to the first formal bid:

$$AR_1 = (I_P - A_P)/A_P \qquad (2)$$

And the other component is generated with the first bid to the subsequent bids:

$$AR_2 = (F_P - S_B)/S_B \qquad (3)$$

where S_B is the subsequent bid price. As Jindra & Walking state; "...the arbitrage spread AR_1 can be viewed as the amount "paid" for the opportunity to earn subsequent returns AR_2. Smaller spreads (less money left on the table) imply a higher price for the opportunity to earn subsequent returns."

Consequently, the arbitrage spread is very important as it is related to subsequent returns. Arbitrageurs gain or lose the difference between their purchase and subsequent selling or tendering price. The arbitrage spread is the component that can be captured in instances where the bid is successful. If the deal is successful, and there are no revisions, the arbitrageur thus captures only AR_1. But if the deal is successful following price revisions, arbitrageurs will also capture the additional component AR_2. However, if the deal is unsuccessful, the arbitrageur could loose on his long position in the target shares, and loose on the short position of his bidder shares. Estimating the probability that the bid will be successful is therefore very important to the risk arbitrageur. The main risk for the arbitrageur, is the risk of seeing the bid fail.

Research Design

In order to evaluate the returns from risk arbitrage for the whole sample, I employed an event study methodology. I designated the announcement date as day zero, and used an estimation period lasting 200 days starting 60 days before the event. The following eventus program was run on SAS:

```
FILENAME USERSTOK 'a:\filename.prn';
FILENAME REQUEST 'a:\req.txt';
libname BAB 'a:\';
EVENTUS NONCRSP;
TITLE "91 COMPANIES TARGETED BY VARIOUS FORMS OF ACQUISITION METHODS
1990-1997";
REQUEST  autodate EST=-60  ESTLEN=200;
WINDOWS (-10,10) (-10,-1) (0,10) (-5,5) (-5,-1) (0,5) (-2,0) (-1,0) (0,1) (0,2) (-1,1)
(-2,2) (-3,3) (-4,4);
EVTSTUDY POST=261 PRE=60 TAIL=2;
```

I ran the eventus program using the TSE equally weighted index in order to estimate the parameters needed to calculate the average abnormal return on the days surrounding the event day as well as the cumulative average abnormal return for several windows.

In addition to testing the original sample, I divided it into different subgroups in order to test these groups individually and determine how they contrasted with the original sample. These groups are:

- Oil & gas industry firms vs. non-oil & gas industry firms.
- Firms subject to tender offers vs. firms not subject to tender offers.

- Liquid firms vs. non-liquid firms.[8]
- Small firms vs. big firms.[9]
- Smallest relative size ratio firms vs. biggest relative size ratio firms. [10]
- Successful offers vs. unsuccessful offers.
- Friendly offers vs. hostile offers.
- Cash offers vs. non-cash offers.
- Cash tender offers only.

A more detailed description for the tests relating to these groups is presented in the "Description of Tests" section.

Also, for each of the aforementioned subgroups, and for the whole sample, the average arbitrage spread (AVs) was calculated as follows:

$$AVs = \sum[(OP - AP)/AP]/n \qquad (4)$$

Where OP is offer price, and AP is the announcement price.

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[8] Liquidity was proxied by the number of days trading over a one-year period prior to the announcement date for each firm in the sample. See the "description of tests – test 3: impact of liquidity" section for more details.

[9] Size of firm was proxied by the market capitalisation of each firm. Please refer to the sample description section for more information on how this procedure was carried out.

[10] Relative size was calculated as the result of target capitalisation divided by bidder capitalisation for each firm. See the "description of tests – test 5: impact of relative size" section for more details.

To test the hypothesis that the average arbitrage spread was significantly different from zero for each group, I computed the value of t for each sample mean as:

$$t = \frac{\overline{X} - \mu}{S/\sqrt{n}} \qquad (5)$$

with $n - 1$ degrees of freedom, where:

$\overline{X}$ is the mean of the sample.

μ is the hypothesized mean.

S is the standard deviation of the sample.

n is the sample size.

In addition, to test whether the mean average arbitrage spreads were significantly different from one another when comparing two different groups, I calculated the t value for the two-sample test of means as:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \qquad (6)$$

Where:

$\overline{x}_1$ is the mean of the first sample.

$\overline{x}_2$ is the mean of the second sample.

n_1 is the number of observations in the first sample.

n_2 is the number of observations in the second sample.

S^2_p is the pooled estimate of the population variance.

The two-sample test of means requires that S^2_p be calculated separately. S^2_p is the pooled variance of the test, and was calculated as:

$$s_p^2 = \frac{(n_1 - 1)(s_1^2) + (n_2 - 1)(s_2^2)}{n_1 + n_2 - 2} \qquad (7)$$

Where:

S_1^2 is the first sample variance.

S_2^2 is the second sample variance.

The results for each of these tests are presented in the results section.

Description of Tests

Test 1 – Impact of Tender Offers

To test if the form of transaction had an impact on both arbitrage spreads and target returns, I separated the sample into two sub-groups according to the form of transaction. The first sub-group consisted of firms that had been acquired by means of tender offers, and the second subgroup consisted of firms that were not acquired by means of tender offers.

Based on available evidence, I would expect to see that form of transaction does have an impact on both arbitrage returns and arbitrage spreads. "Mergers are usually friendly deals that enjoy the cooperation of incumbent managers. Tender offers are made directly to target shareholders, often to overcome resistance from incumbent managers, and indicate greater confidence in the acquirer's ability to realise efficiency gains from the acquisition" Loughran & Vijh (1997). "There is a large turnover of target managers during the two years following tender offers, which suggests that the acquirers in tender offers attempt to create wealth gains by removing inefficient managers" Martin and McConnell (1991). Although the current evidence examines the impact of tender offers in the long-term, if these results hold, we would expect to see some of the impact on stock price being incorporated at time t = 0. Therefore, firms that receive a cash offer should send a more positive signal to the market, and this should translate in higher target price increases for firms receiving these offers.

Test 2 – Impact of Industry Type

Given that the Canadian market is characterized by generally thinly traded stock over-represented in the resource sectors, I was interested in finding out what influence this would have on both the arbitrage spreads and the target returns of my sample. Typically, these stocks tend to be associated with high indirect transaction costs such as large bid-ask spreads and thin trading. Both of these factors are likely to have a reduction in the available returns for the risk arbitrageur.

It is also important to consider that in the context of this study, I am assuming that the arbitrageur will be buying at the closing price, as opposed to the last ask price for the stock. If Canadian firms tend to have larger bid/ask spreads on average, then this should have a negative impact on the returns from risk arbitrage, such an impact is not measured here. This also highlights an important consideration, i.e. risk arbitrageur should avoid firms that have the least liquid shares and the largest bid/ask spreads.

The subgroup that was the most M&A active in my sample was the oil & gas industry subgroup. A whopping 50.5% of the firms in the sample fell into this category, thus making further investigations justifiable.

Test 3 – Impact of Liquidity

I decided to run tests of liquidity since it was very important to determine if a Canadian risk arbitrageur could profit from the large spreads presented in our Canadian study. To the risk arbitrageur, the bottom line is short-term profit. If the arbitrageur observes large spreads on the Canadian market, but cannot take advantage of them due to lack of market depth, he will then avoid such trades since he cannot profit from them. Therefore, we would expect that non-liquid firms would have larger risk arbitrage spreads than liquid firms since these spreads cannot be reduced through the actions of the risk arbitrageur and the market in general.

To test for liquidity, I divided the sample of firms into four quartiles based on a liquidity percentage. This percentage was calculated by dividing the number of trading days a stock traded in the year before the merger announcement by the total number of trading days. These groups were then analyzed separately.[11] Therefore, if a firm had a high number of non-trading days, its liquidity ratio would be low. Conversely, if the firm had a low number of non-trading days, its liquidity ratio would be high.

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[11] For example, Dayton mining Corp traded for 252 out of 260 days. Its liquidity measure was thus calculated to be 252/260 = 96.9%.

Test 4 – Impact of Firm Size

I decided to compare arbitrage spreads and arbitrage returns for firms with different sizes in order to determine if there would be significant profitability and spread differences for firms of varying sizes. An important size related effect could potentially help the risk arbitrageur in directing his trades towards the larger or smaller firms, depending on which ones are more profitable. Furthermore, by calculating firm size I am also running a dual test of liquidity, as firm size could very well be a proxy for liquidity.

To establish size comparison between firms, I calculated the market capitalization for each one. Market capitalization was obtained by collecting year-end shares outstanding and price data. Wherever corporations had several classes of common shares, these were summed to calculate the total market capitalization of the firm. Firms were then ranked by quartiles according to market capitalization, and raw target returns along with abnormal returns were then calculated for each quartile.

Test 5 – Impact of Relative Size

I compared arbitrage spreads and arbitrage returns for firms with different relative size ratios in order to determine if there would be significant profitability and spread differences for firms with varying size ratios. Relative size is simply a measure of contrast in size between the bidder and the target. I wanted to find out if the fact that a smaller firm was acquired by a much bigger firm or vice versa would have an impact on

the results. I would expect that offers from large firms to acquire small firms would tend to have a higher probability of success, since smaller firms tend to have less resources and assets in place for resisting a bid from a larger firm.

To calculate the relative size ratio for each deal, I used the market capitalization of the target firm and divided this by the market capitalization of the bidder firm. As such, the target firms that were the smallest with respect to their bidder had the smallest relative size ratio. Conversely, the target firms that were the largest with respect to their bidders had the largest relative size ratios. Firms were then ranked according to their relative size ratio and separated into quartiles. Following this, average raw target returns along with average abnormal returns were then calculated for each quartile.

Test 6 – Impact of Offer Success

I decided to examine completed and uncompleted deals in order to determine if their corresponding returns and spreads differed from those of the whole sample. Any differences between the two groups could then be related back to the market's capacity to anticipate the outcome of the deal.

To do this test, I divided the sample according to successful and unsuccessful offers. I found that the sample of unsuccessful firms was larger than the sample of successful firms. As such, this could provide an explanation for why our arbitrage spreads are high. "If the offer is successful, the target stock will trade at (or very near)

the offer price before being delisted. If the offer proves to be unsuccessful, the stock will trade at a significantly lower value" Samuelson & Rosenthal (1986).

Test 7 – Impact of Friendly Offers

I wanted to see if there would be significant differences for spreads and returns for the companies that were the targets of hostile bids or friendly bids. On average, friendly deals have been shown to be less value-maximizing propositions for target shareholders.

Martin and McConnell (1991), demonstrated that hostile bids typically lead to stronger target stock price performance, since these transactions are typically followed by a change in management of the firm. Following this evidence, it thus made sense to test whether there were differences related to bid hostility. However, my sample of hostile bids is relatively small, as most of the deals in my sample are friendly in nature. There are 15 hostile bids, and 70 friendly bids. The remaining 6 bids were unsolicited bids.

Test 8 – Impact of Cash Payment

Loughran & Vijh (1997), demonstrated that there was a relationship between postacquisition returns and form of payment. More specifically, they found that on average, firms that complete cash tender offers earn significantly positive excess returns of 61.7 percent. To follow-up on this finding, I divided my sample into two groups. The first group corresponded to firms that had received an offer in cash, and the second group

corresponded to those who did not. I then proceeded by calculating the abnormal returns and the average arbitrage spreads for both groups.

Test 9 – Impact of Cash and Tender Offers

Jindra & Walking (1999), conducted a study on arbitrage spreads and the market pricing of proposed acquisitions using a sample consisting of only cash tender offers. To replicate a part of their study, I screened my sample to find those firms, which had been subject to a cash tender offer. Only 10 firms fell into this category, thereby limiting the inferences that could be drawn from the results of this subgroup. Using the usual methodology, I proceeded by calculating the abnormal returns and the average arbitrage spreads for this subgroup.

Test 10 – Cross-sectional Analysis

To provide a summary of all the separate tests, and to test if different effects were related such as size and liquidity for example, I performed four separate regressions. The first regression consisted of arbitrage spread as the dependent variable, with target characteristics as the independent variables. The characteristics that were used as independent variables were the same as those presented in tests 1 to 9. These characteristics were; tender offer vs. non-tender offer, active industry or not, liquidity, size, relative size, successful or not, friendly or hostile, cash or non-cash and finally, cash tender offer vs. non-cash tender offer. The second regression consisted of arbitrage returns as the independent variable, and target characteristics as the independent

variables. The third regression consisted of arbitrage spreads as the dependent variable, and bidder characteristics as the independent variables. Finally, regression number four consisted of arbitrage returns as the dependent variable, and bidder characteristics as the independent variables.

Coding

The variable "tender offer" was coded as 0 if the firm did not receive a tender offer, and 1 if the firm did receive a tender offer. The variable "active" was set to 0 if the firm did not belong in the active industry, and was set to 1 if it did. The variable "liquidity" was measured on a scale of 0.01 to 1.00. The most liquid firms were closer to 0.01 whereas the least liquid firms ranked closer to 1.00. The variable "size" was measured by taking the log of market capitalisation for each firm. Taking the log of market cap improved the predictive value of the model greatly. The variable "relative size" was simply the ratio of target firm market capitalisation divided by bidder firm market capitalisation. The variable "completed" was assigned a dummy value of 1 if the firm was successfully merged, and 0 if the bid failed. The variable "friendly" was coded as 1 if the bid was hostile in nature, and 0 if it the bid was friendly. The variable "cash" was given a dummy variable of 1 if the firm received a cash offer, and 0 if it did not. Finally, the variable "cash tender" was assigned a dummy variable of 1 if the firm received a cash tender offer, and 0 if it did not receive such an offer. The results of these four regressions are discussed in the results section.

Testing for Multicollinearity

To test for multicollinearity between the independent variables, I calculated the correlation coefficients for the variables that were significant in the first four regressions (i.e. cash, cash tender, size and liquidity), as these were the most susceptible of being correlated with one another. The four regressions were then recalculated with and without the previously stated independent variables.

Results: General Returns to Arbitrage

The general results are presented in tables 4-8. I calculated the returns around the first announcement date using different event windows. I focused on the activity surrounding the first bidder for a particular target. My results are typical of the acquisition literature: the average target firm earns 11.15% in the two-day announcement period (-1,0) and a large significant 10.89% on the announcement date.

Secondly, I examine the average arbitrage spread (AVs), and find that it is equal to 9.20%. This is quite interesting, especially when contrasted with the 1.86% found in the Jindra & Walking (1999) study. The fact that this spread is large is consistent with the evidence on the number of unsuccessful offers present in the sample. I find that 38 of the 91 bids, or 42% of the firms in the sample did not ultimately conclude the merger transaction. This is quite high when compared with the 3% rate presented in the Jindra & Walking study.

What I know from these results is that the typical price of the target firm increases to an amount slightly below the bidder's offer price at the time of the announcement. Because I chose to investigate a mix of transaction forms, as opposed to only cash tender offers, it would be expected that the difference between target price and offer price would be greater in mixed deals as opposed to cash only tender offers. This is because mergers, which comprise my entire sample, are typically slower transactions, with lengthy delays involved, which allows for more information leakage.

Also, my sample has a large percentage of friendly deals, which further contributes to information leakage.

> *"Although mergers are usually friendly to the target managers, our evidence suggests that, on average, they are not in the best interest of shareholders. Tender offers are typically hostile to the target managers, but seem to benefit shareholders" Loughran & Vijh (1997).*

Also, tender offers are unexpected and made directly to the shareholders of the target firm. Consequently, the surprise effect is typically bigger and information leakage is on average, smaller. Merger transactions are also more complicated, and more costly to arbitrage on.[12] Because of these difficulties you would expect a higher difference between actual and offer price, as the spread is more difficult to arbitrage away. Consequently, it might be more difficult to take quick in and out position in those shares without incurring extra costs. This fact alone could contribute to the increase in the spread. To verify this hypothesis, I chose to examine the sub-sample of firms that were tender offers in order to determine if this was the case.

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[12] An example of this is the three-way merger proposal by Domtar to unite with both Avenor and Repap. Another is Desjardins' bid for Laurentian financial which offered 4 different combinations of cash, stock or bonds that tendering investors could choose from. Obviously, as opposed to a cash tender offer, such transactions are much less clear-cut and more likely to be costly, as the arbitrageur is forced to buy more than one type of security.

The following section discusses the results of the tests and hypotheses that were presented in the "Description of Tests" section.

Results Test 1: Impact of Tender Offers

The results of the tests related to transaction form are presented in tables 9-11. I find that both average arbitrage spreads for the tender offer group and the non-tender offer groups are highly significant, but not significantly different from one another. The returns though, present a different picture. I find that the average returns are much higher for the tender offer group when compared to the non-tender offer group. This is consistent with what I expected, and suggests that arbitrage opportunities are more likely to be profitable when buying target firms that are subject to a tender-offer as opposed to those firms that are not.

Results Test 2: Impact of Industry Type

The results of the tests related to industry type are presented in tables 12-14. These results show that the arbitrage spreads of the firms in the M&A active industry and the arbitrage spreads of the all the other firms that were not in the M&A active industry are not significantly different from one another. However, the arbitrage spreads of both groups are significantly different from zero. As for the arbitrage returns, we find that those of the M&A active group are higher than those not in the M&A active industry.

This finding seems to point in the direction that firms that were the most M&A active in my sample had some positive influence on the overall results of the sample.

Results Test 3: Impact of Liquidity

The results of the tests on market liquidity are presented in tables 15-17. These results show that the difference in the means of both the liquid, and the non-liquid groups are significant. I also find that both the risk arbitrage spreads of the liquid firms and the risk arbitrage spreads of the non-liquid firms are significantly different from zero. The difference between the liquid and the non-liquid groups is striking. I find that the mean arbitrage spreads of the liquid firms is a relatively small 4.19%, whereas the mean arbitrage spreads from the non-liquid firms is an incredible 14.64%.

Results Test 4: Impact of Firm Size

The results of the tests on size are presented in tables 18-20. A priori, I would expect that smaller firms would tend to have higher relative spreads than larger firms. Secondly, I would expect to see that the risk arbitrage returns from trading the smaller firms would be higher than those from trading the bigger firms. This being mainly due to the fact that smaller firms, on average, tend to have lower stock prices. Therefore, even a

small change in price for the small firm can mean a large change in percentage return. [13] Since firm size is also a proxy for liquidity, lack of liquidity and large bid/ask spreads could also be associated with small firm size.

As expected, I find that there is a very significant difference between the mean arbitrage spreads of the largest targets when compared to the mean arbitrage spreads of the smallest targets in my sample. The average arbitrage spread is 22.63% for the small firms, whereas it is of only 3.94% for the large firms. Both of the arbitrage returns for these two groups are also individually significantly different from zero.

The short-term returns also differ between the two groups. The results seem to indicate that small firms under-perform when compared to their larger counterparts. Larger firms earn more returns, but yet these returns are relatively low when compared with the equal-weighted index. Not only do small firms under-perform relative to both the market equal-weighted index and vis-à-vis larger firms, they also do so in a very negative way. All the arbitrage returns for the small group are negative except for one. The positive return is very small and is generated by holding on to the stock for 25 days.

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[13] To illustrate this, I take the example of Atlantis resources, which received an offer from Grad & Walker Energy Corp. on October 12, 1994. The offer price was $2.25 cash for each share of Atlantis, whereas the shares of Atlantis could be purchased on the day following the announcement at a price of $2.10. This represents only an absolute 15¢ risk arbitrage spread, but appears to be larger when analysed on a percentage basis (i.e. 7.14%).

These results indicate that the risk arbitrageur is more likely to benefit from his trades if he concentrates on the larger firms that are being acquired. These findings suggest that small market cap firms should be avoided. This is consistent with the observation that many market professionals avoid small firms altogether given that they present liquidity and return problems such as discussed in the present paper.

Results Test 5: Impact of Relative Size

The results of the tests on size ratios are presented in tables 21-23. I would expect that when a bidder firm announces a merger, the merger is more likely to be stronger news for the target that is the smallest relative to its bidders, since it provides the target firm an immediate opportunity to increase in size. This opportunity might not have been present before.

What I found was that the mean arbitrage spreads for each of the top and bottom quartiles were individually significantly different from zero, but not significantly different from one another. As for the arbitrage returns, they were somewhat higher for the smallest relative size ratio firms when compared to the largest relative size ratio firms, but not in a convincing way. For the smallest relative size ratio group, the returns from buying the target were higher than those of the index in all cases, whereas this finding did not hold for the largest relative size ratio group. Indeed, in this group, the target's returns were all lower than those of the index.

The findings of this test seem to indicate that it would be more profitable to purchase the target firms in cases where the target is relatively small with respect to the bidder.

Results Test 6: Impact of Offer Success

The result of test number 6 is presented in tables 24-26. A priori, I would expect that if the market had any ability to predict the outcome of the contest, the spreads for subsequently uncompleted offers would be larger than those of completed offers. Also the returns of the target firm in the group of completed deals would be larger than the returns of the firms in the uncompleted deals group.

What I find is that the arbitrage spreads from both groups are individually significant, yet not significant from one another. As for the returns I find that they are, on average, larger for the offers that were not completed than the returns of the offers that were completed. These results are somewhat surprising and different than what I had expected before hand.

Results Test 7 – Impact of Friendly Offers

The results of these tests are presented in tables 27-29. I found interesting results for the two subgroups divided by hostile vs. friendly. The average arbitrage spread for the friendly group was 10.81%, whereas the average arbitrage spread for the hostile

group was of only 1.59%. The 10.81% arbitrage spread of the friendly group was very significant. On the other hand, the 1.59% average arbitrage spread of the hostile group was not significant. When testing for the difference between the means of the two groups, I found that they were marginally significant (i.e. at the 20% level). This is largely due to the small sample size of the hostile group.

On the returns side, I find striking differences in returns. The targets that were subject to a hostile bid provide the risk arbitrageur with the highest returns. The 40-day buy-and-hold return is a solid 12.66% for this subgroup. The same comparable buy-and-hold return for a 40-day period is 2.49% for the group of friendly offers. This implies that the risk arbitrageur should orient his trades towards this subgroup whenever possible. Nevertheless, we must be careful not to render hasty conclusions due to the small sample size. However, more research in this subgroup of firms could provide interesting findings that I leave to future research.

Results Test 8 – Impact of Cash Payment

Please refer to the results of the cash payment tests presented in tables 30-33. I examined firms that received cash offers and I compared them with those that did not. After doing so, I find that the target buy-and-hold returns are much larger for the firms that received cash offers when compared to those that did not. The mean arbitrage spreads for these two groups are not significantly different from one another. Furthermore, the mean arbitrage spread for the firms that received cash offers is not

significant. This is surprising, especially considering that it is 9.77%. The standard deviation of 27.16% is quite high for this group, which helps to explain this result. The average arbitrage spread for non-cash offer firms is a smaller, but significant 8.89%.

Results Test 9 – Impact of Cash and Tender Offers

The results show positive returns for the firms that received cash tender offers. On the other hand, the arbitrage spread is very large for this group at 16.80%. This large average arbitrage spread seems excessive, yet it is not even significant. Clearly this is a sign that we cannot make any serious inferences with respect to this subgroup due to too small a sample size and large standard deviation.

Results Test 10 – Cross-sectional Analysis

The result of the cross-sectional analysis is presented in table 34. The first regression, which consisted of arbitrage spread as the dependent variable and target characteristics as the independent variables had weak predictive power, with none of the independent variables being significant. Also, the regression itself was not significant. The second regression, which consisted of arbitrage returns as the dependent variable, and target characteristics as the independent variables had more predictive ability and was significant. Four of the independent variables of this regression were significant, namely; liquidity, log of market cap, cash and cash tender. The third regression, with arbitrage spread as the dependent variable, and bidder characteristics as the independent variables was not significant. Consequently, none of the independent variables were

significant for this regression. Finally, regression four generated similar results to regression two, but with slightly less significant results. The regression itself was significant, and both variables cash and cash tender were also significant.

Results of Multicollinearity Testing

The results of the regressions that were calculated in order to test for multicollinearity are presented in table 35. The first regression, which consisted of arbitrage spread as the dependent variable and target characteristics as the independent variables had stronger predictive power when the variable cash tender was removed. the variables liquidity, log of market cap, and cash were significant. Also, the regression itself was significant. The second regression, which consisted of arbitrage returns as the dependent variable, and target characteristics as the independent variables had less predictive ability without the variable cash. Three of the independent variables of this regression were significant, namely: liquidity, log of market cap, and friendly. The third regression, with arbitrage spread as the dependent variable, and bidder characteristics as the independent variables was significant. Nevertheless, only one of the independent variables was significant for this regression, which was the variable cash. Finally, regression four generated weak results. The regression itself was not significant, and none of the independent variables were found to be significant.

Overall, the regression results seem to indicate that the returns from arbitrage are strongly related to the liquidity of the firm being traded, the size of the firm (which could also be a measure of liquidity), the fact that an offer is a tender offer, and finally, if the offer is made in cash. These results indicate that such characteristics should be important to the Canadian risk arbitrageur in determining in advance the potential profitability of his trades.

Discussion and Conclusion

Although much research has been done in recent years on the topic of mergers and acquisitions, little is known about risk arbitrage trading. The bulk of available evidence is from American studies. As an improvement to this situation, this thesis examines arbitrage returns and arbitrage spreads surrounding mergers between 1990 and 1997. Using a sample of 91 firms, I find that trading strategies based on buying the target firm one day after the merger announcement date, and shorting their bidders is not profitable. Consistent with the evidence of Jindra & Walking (1999), I find that my results support the contention that spreads are negatively related to subsequent arbitrage returns. Furthermore, cross-sectional regression results suggest that firm liquidity; firm size, cash offers and cash tender offers are significant predictors of risk arbitrage profitability.

I also find that examining separate groups of the sample, and trading on these groups is potentially highly profitable. Trading strategies based on buying the following three categories of targets offer the highest level of abnormal return. The categories are; target firms in the highest quartile of the relative size ratio; firms subject to both cash tender offers and firms subject to tender offers.

This paper also documents very large arbitrage spreads in the Canadian market. The average arbitrage spread, defined as the percentage difference between the initial bid price and the closing market price on the day after the merger announcement, has a much greater magnitude than that what has been documented in the U.S. literature. Moreover, the cross-sectional variation of this spread is high, ranging from a minimum of –10.71% to a maximum of 147.5%. The percentage of negative returns is high at 37%, thus telling us that the trading rule can be quite risky. Also, this study documents that 84% of the bids in this sample are neutral or friendly in nature, and only 42% of the bids are ultimately fully completed.

Typical of merger studies, I find that target companies experience highly significant abnormal returns on the announcement day, and slightly lower significant abnormal returns on the following day.

To extend the work presented in this paper, there are a number of interesting directions that could lead to future research. First of all, it would be interesting to examine a sample of firms for which negative spreads were present in order to determine if the market correctly anticipates that there will be a takeover battle when negative spreads are present. Also, one could extend the study to a larger group of Canadian tender offers as this subgroup did very well in my tests. It would be interesting to find out if my results hold with a larger sample and a hold-out sample. Another interesting area would be to examine smarter trading based on determining which firms are more likely to come out as successful in the bidding war.

References

Agrawal, Anup, Jeffrey F. Jaffe, and Gershon N. Mandelker, 1992, The post-merger performance of acquiring firms: A re-examination of an anomaly, *Journal of Finance* 47, 1605-1622.

Asquith, Paul, 1983, Merger bids, uncertainty, and stockholder returns, *Journal of Financial Economics* 11, 51-83.

Bradley, Michael, Anand Desai, and E. Han Kim, 1983, Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms, *Journal of Financial Economics* 21, 3-40.

Brown, Keith C., and Michael V. Raymond, Risk arbitrage and the prediction of successful corporate takeovers, *Financial management*, Autumn 1986, 54-63.

Dodd, Peter, 1980, Merger proposals, management discretion, and stockholder wealth, *Journal of Financial Economics* 8, 105-138.

Dodd, Peter, and Richard Ruback, 1977, Tender offers and stockholder returns: An empirical analysis, *Journal of Financial Economics* 5, 351-373.

Dukes, William P., Cheryl J. Frohlich, and Christopher K. Ma, Risk arbitrage in tender offers, *The Journal of Portfolio Management*, Summer 1992, 47-55.

Franks, Julian, Robert Harris, and Sheridan Titman, 1991, The post-merger share-price performance of acquiring firms, *Journal of Financial Economics* 29, 81-96.

Jensen, Michael C., and Richard S. Ruback, 1983, The market for corporate control, *Journal of Financial Economics* 11, 5-50.

Jindra, Jan, and Ralph A. Walking, 1997, Arbitrage spreads and the market pricing of proposed acquisitions. *Working Paper*, Ohio State University, College of Business.

Kummer D. and R. Hoffmeister, 1978, Valuation consequences of cash tender offers, *Journal of Finance* 33, 505-516.

Lakonishok, J., Vermaelen, T., 1990. Anomalous Price Behaviour around Repurchase Tender Offers, *Journal of Finance*, Vol. XLV, No. 2, 455-477.

Larcker, D., Lys, T., 1987. An Empirical Analysis of the Incentives to Engage in Costly Information Acquisition. *Journal of Financial Economics* 18, 111-126.

Loughran, Tim, and Anand M. Vijh, 1997, Do long-term shareholders benefit from corporate acquisitions?, *Journal of Finance*, 52, 1765-1790.

Malatesta, Paul H., 1983, The Wealth effects of merger activity and the objective functions of merging firms, *Journal of Financial Economics* 11, 155-181.

Martin, Kenneth, and John McConnell, 1991, Corporate performance, corporate takeovers, and management turnover, *Journal of Finance* 46, 671-687.

Myers, Stewart C. and Nicholas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187-221.

Samuelson, W., Rosenthal, L., 1986. Price Movements as Indicators of Tender Offer Success. *Journal of Finance* Vol. XLI, No. 2, 481-499.

Schleifer, A., Vishny, R., 1997. The Limits of Arbitrage. *Journal of Finance*, 52, 35-55.

Schwert, G., William, 1996. Markup Pricing in Mergers and Acquisitions. *Journal of Financial Economics*, 41, 153-192.

Welles, C., 1981. Inside the Arbitrage Game. *Institutional Investor*, August, 41-58.

Table 1: Sample Transaction Characteristics

Year	Total Number of Acquisitions	Number of Successfully Completed Deals	Aggregate Dollar Value of All Mergers	Number of Mergers	Number of Tender Offers	Number of Cash	Number of Stock	Number of Mixed
1990	4	1	1015.3	4	1	2	2	0
1991	4	3	187.6	4	0	0	2	2
1992	5	3	1831.1	5	2	2	2	1
1993	7	4	550.9	7	2	0	5	2
1994	14	5	2809.2	14	5	4	5	5
1995	19	5	2978.9	19	11	7	3	9
1996	19	6	7174.5	19	7	3	5	11
1997	19	11	18850.5	19	8	3	6	10
Total	**91**	**38**	**35398**	**91**	**36**	**21**	**30**	**40**

Table 2: Completed and Partly Completed Merger Characteristics

Year	Total Number of Mergers	Number of Successfully Completed & Partly Completed Mergers	Number of Tender Offers	Number of Cash	Number of Stock	Number of Mixed
1990	4	1	0	0	1	0
1991	4	3	0	0	2	1
1992	5	5	2	2	2	1
1993	7	4	2	0	3	1
1994	14	6	3	2	3	1
1995	19	12	10	4	1	7
1996	19	9	5	1	2	6
1997	19	12	5	3	5	4
Total	**91**	**52**	**27**	**12**	**19**	**21**

Table 2-B: Completed Merger Characteristics

Year	Total Number of Mergers	Number of Successfully Completed Deals	Number of Tender Offers	Number of Cash	Number of Stock	Number of Mixed
1990	4	1	0	0	1	0
1991	4	3	0	0	2	1
1992	5	3	2	2	2	1
1993	7	4	2	0	3	1
1994	14	5	3	2	3	1
1995	19	5	10	4	1	7
1996	19	6	5	1	2	6
1997	19	11	5	3	5	4
Total	**91**	**38**	**27**	**12**	**19**	**21**

Table 3: Mode of Acquisition Description

Form of Payment	Merger	Tender Offer	All
Stock	24	6	30
Cash	11	10	21
Mixed	20	20	40
All	**55**	**36**	**91**

Table 3-B: 14 Industry Groupings and Relative Weights of the TSE 300 Composite Index Contrasted with my Sample

	The TSE 300	**My Sample**
Utilities	15.36 %	2.2 %
Pipelines	1.81	1.1
Oil & Gas	8.33	50.5
Real Estate	1.44	0.0
Merchandising	2.64	3.3
Conglomerates	2.81	0.0
Metals & Minerals	3.21	15.4
Financial Services	14.43	4.4
Industrial Products	31.34	0.0
Consumer Products	4.21	4.4
Paper & Forest Products	2.37	11.0
Gold & Precious Minerals	3.46	1.1
Communications & Media	6.94	6.6
Transportation & Enviromental Services	1.65	0.0
Source: The 1999 TSE Factbook	100 %	100 %

Table 4: Distribution of Acquisition Related Arbitrage Spreads

Panel A reports the distribution of average arbitrage spreads (AVs) for my sample of 91 cash and stock mergers reported from January 1, 1990 to December 31, 1997.

Panel B reports the average arbitrage spreads (AVs) by year. The average arbitrage spread is calculated as (OP - AP)/AP where AP is the first announced bid price, and OP is the bidder's offer price.

Panel A: Distribution of Arbitrage Spreads

	Mean	Min	Q1	Median	Q3	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	9,2*** (4,09)	-10.71	1.79	4.55	10.46	147.5	21.48	18.68

* Implies significance at the 0,10 level; ** Implies significance at the 0,05 level; *** Implies significance at the 0,01 level

Panel B: Average Arbitrage Spread by Year

Year	Total Mergers per year	Arbitrage Spread
1990	4	3.87%
1991	4	9.30%
1992	5	35.08%
1993	7	6.00%
1994	14	6.47%
1995	19	13.24%
1996	19	8.12%
1997	19	3.72%
Total	91	9.20%

Table 5: Post-Announcement Arbitrage Returns

This table reports post-announcement abnormal returns for trading strategies involving my 91 firm sample of mergers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g., five trading days) subsequent to day t + 1. The first two columns reports raw return for the target's stock, and target's stock minus the equal-weighted TSE index. The last two columns represent the returns from both shorting the bidder, and a combination of buying the target and shorting the bidder. 91 firms were available for calculating both the target raw returns and the equal-weighted TSE index. However, only 71 firms were available for calculating the buy target & short bidder returns as some of the bidders were private, or non-public firms. The buy target & short bidder strategy involves buying one target firm, and shorting one bidder firm, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-0.34%	-1.21%	91	-0.35%	-0.69%	66
10	-0.64%	-1.72%	91	1.39%	0.75%	66
15	-0.41%	-1.57%	91	1.34%	0.93%	66
20	0.56%	-0.76%	91	1.19%	1.75%	66
25	0.88%	-0.86%	91	0.40%	1.28%	66
30	2.08%	0.14%	91	0.66%	2.74%	66
35	2.18%	0.17%	91	0.32%	2.50%	66
40	2.43%	-0.24%	91	-0.96%	1.47%	66
Mean	0.84%	-0.76%		0.50%	1.34%	
Std. Dev (%)	11.01	9.24		9.35		

Table 6: Market Adjusted Returns, EW Index

The abnormal returns presented below are for target firms only.

Day	Average Abnormal Return	Median Abnormal Return	t	N	Positive: Negative	Generalized Sign Z
-14	0.51%	0.25%	1.00	77	41:36	1.72)
-13	-0.23%	-0.19%	-0.44	81	35:46	-0.05
-12	-0.25%	-0.17%	-0.50	82	37:45	0.30
-11	-0.31%	-0.29%	-0.60	77	32:45	-0.34
-10	-0.15%	-0.24%	-0.29	75	29:46	-0.85
-9	-0.10%	-0.16%	-0.19	75	35:40	0.55
-8	0.30%	-0.21%	0.59	80	36:44	0.27
-7	0.29%	0.24%	0.57	79	44:35	2.19 >
-6	0.30%	-0.08%	0.60	76	37:39	0.91
-5	0.56%	0.07%	1.09	75	40:35	1.72)
-4	0.32%	-0.23%	0.62	77	33:44	-0.11
-3	0.81%	0.37%	1.59	77	45:32	2.64 >>
-2	0.72%	0.18%	1.42	79	42:37	1.73)
-1	0.26%	-0.30%	0.52	80	35:45	0.04
0	10.89%	7.18%	21.41 ***	84	68:16	6.92 >>>
1	2.57%	0.66%	5.05 ***	87	50:37	2.63 >>
2	-0.09%	0.09%	-0.17	90	47:43	1.67)
3	-0.48%	-0.37%	-0.95	88	34:54	-0.92
4	-0.09%	-0.23%	-0.17	86	39:47	0.34
5	-0.41%	-0.22%	-0.80	86	33:53	-0.96
6	-0.22%	-0.24%	-0.44	84	31:53	-1.22
7	0.06%	0.11%	0.12	81	42:39	1.52
8	-0.19%	-0.53%	-0.37	83	30:53	-1.35
9	-0.70%	-0.25%	-1.38	85	31:54	-1.31
10	-1.32%	-0.29%	-2.60 **	83	30:53	-1.35
11	0.02%	0.03%	0.03	82	42:40	1.41
12	-0.09%	-0.34%	-0.17	80	31:49	-0.86
13	-0.41%	-0.36%	-0.82	79	30:49	-0.99
14	0.02%	-0.03%	0.03	82	41:41	1.19
15	-0.17%	-0.07%	-0.33	81	38:43	0.62

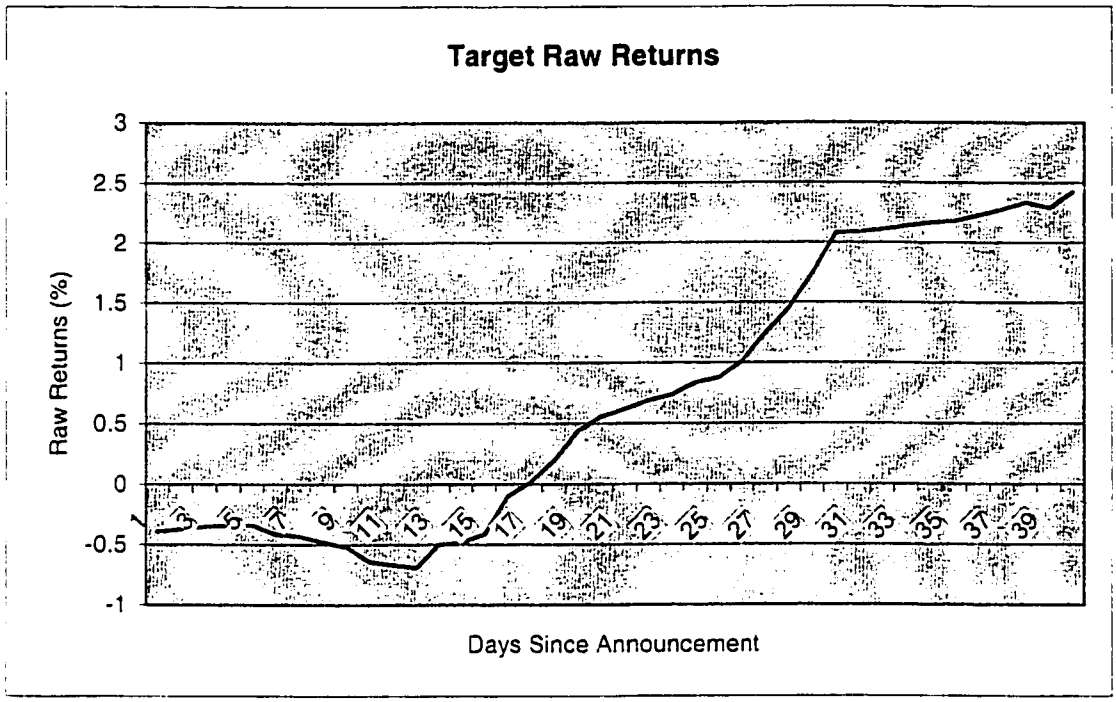
$, (,) significant at .10 *, <, > significant at .05
, <<, >> significant at .01 *, <<<, >>> significant at .001

Table 7: Market Adjusted Returns (EW Index), for Various Event Windows

The abnormal returns presented below are for target firms only.

Days	Cumulative Average Abnormal Return	Median Cumulative Abnormal Return	t	N	Positive: Negative	Gen Sign Z
(-10,+10)	13.33%	10.59%	5.72***	90	71:19	6.77>>>
(-10, -1)	3.31%	1.58%	2.06*	80	53:27	4.10>>>
(0, +10)	10.01%	8.95%	5.94***	90	66:24	5.71>>>
(-5, +5)	15.06%	11.65%	8.92***	90	73:17	7.20>>>
(-5, -1)	2.66%	0.70%	2.34*	80	53:27	4.10>>>
(0, +5)	12.39%	10.10%	9.94***	90	71:19	6.77>>>
(-2, 0)	11.87%	7.27%	13.48***	84	70:14	7.36>>>
(-1, 0)	11.15%	7.14%	15.50***	84	67:17	6.70>>>
(0, +1)	13.45%	10.61%	18.70***	87	73:14	7.60>>>
(0, +2)	13.37%	11.60%	15.17***	90	71:19	6.77>>>
(-1, +1)	13.72%	11.81%	15.57***	87	71:16	7.17>>>
(-2, +2)	14.36%	12.02%	12.62***	90	71:19	6.77>>>
(-3, +3)	14.68%	11.35%	10.91***	90	74:16	7.41>>>
(-4, +4)	14.91%	12.12%	9.77***	90	74:16	7.41>>>

Table 8: Graphs Showing Target Raw Returns & the Returns from Buying the Target & Shorting the Bidder for the 91 Firm Sample



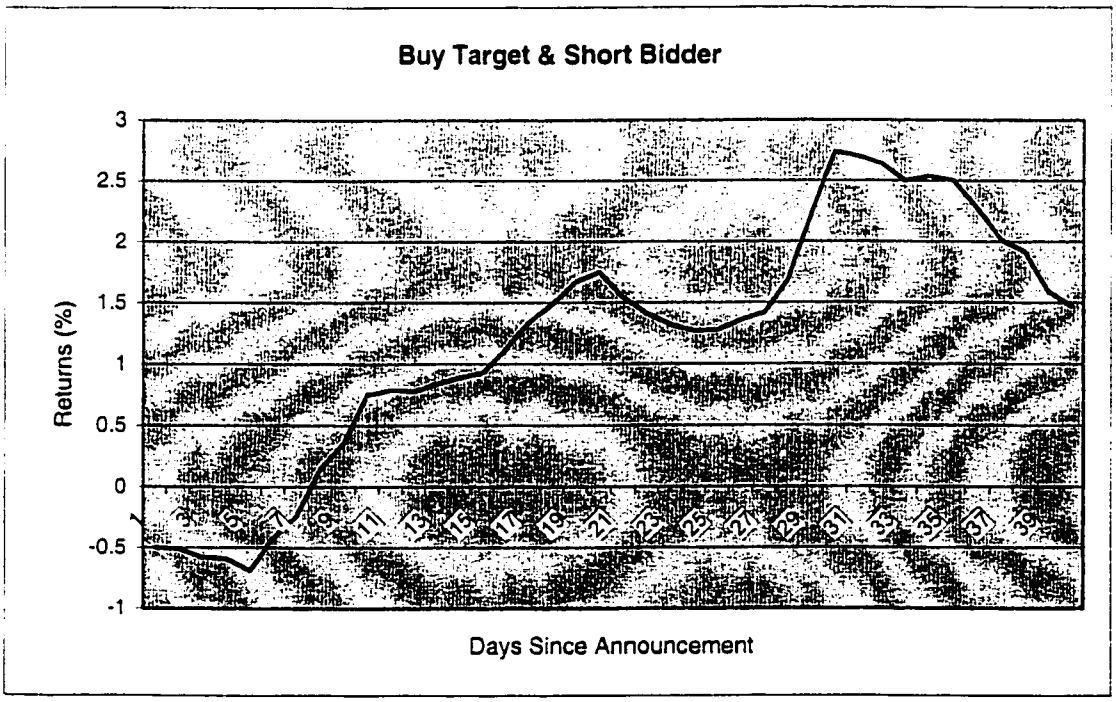


Table 9 : Distribution of Merger Related Arbitrage Spreads For Tender Offers

Panels A & B report the distribution of arbitrage spreads for tender offers and for firms not subject to tender offers.

Panel A: Distribution of Arbitrage Spreads for ***Tender Offers***						
N=36	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	11,0*** (2.89)	-5.7	5.1	127	22.84	16.66%

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Non-Tender Offers***						
N=55	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	8,01*** (2.87)	-10.71	4.40	147.5	20.67	20.00%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 10: Post-Announcement Arbitrage Returns for Non-Tender Offers

This table reports post-announcement abnormal returns for non-tender offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-0.87%	-1.64%	55	-0.85%	-1.72%	39
10	-1.87%	2.85%	55	1.49%	-0.38%	39
15	-2.13%	-3.19%	55	2.18%	0.05%	39
20	0.03%	-1.19%	55	1.96%	1.99%	39
25	-0.03%	-1.67%	55	1.36%	1.33%	39
30	-0.14%	-1.98%	55	1.45%	1.31%	39
35	1.05%	-0.86%	55	0.96%	2.01%	39
40	2.14%	0.05%	55	0.18%	2.32%	39
Mean	-0.23%	-0.95%		1.09%	0.86%	
Std. Dev (%)	10.89	8.29		9.23		

Table 11: Post-Announcement Arbitrage Returns for Tender Offers

This table reports post-announcement abnormal returns for tender offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return. ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.39%	-0.48%	36	0.38%	0.77%	27
10	1.15%	0.07%	36	1.23%	2.38%	27
15	2.70%	1.54%	36	0.11%	2.81%	27
20	3.21%	1.89%	36	0.06%	3.27%	27
25	4.62%	2.88%	36	-0.99%	3.63%	27
30	5.88%	3.94%	36	-0.48%	5.40%	27
35	6.37%	4.36%	36	-0.62%	5.75%	27
40	6.40%	4.21%	36	-2.60%	3.80%	27
Mean	3.84%	2.30%		-0.36%	3.48%	
Std. Dev (%)	8.52	6.48		9.49		

Table 12: Distribution of Merger Related Arbitrage Spreads for M&A Active Firms and Non-M&A Active Firms

Panels A & B report the distribution of arbitrage spreads for M&A active firms and non M&A active firms. I chose to study this subgroup of firms since it constituted a large portion of my sample.

Panel A: Distribution of Arbitrage Spreads for ***M&A Active Firms***						
N=46	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	12,1*** *(2,85)*	-7.7	5.37	147.5	28.85	8.80%

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Non-M&A Active Firms***						
N=45	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	6,19*** *(4,81)*	-10.71	4.40	34.56	8.64	20.00%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 13: Post-Announcement Arbitrage Returns for M&A Active Firms

This table reports post-announcement abnormal returns for M&A active firms over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.68%	-0.09%	46	-0.31%	0.37%	37
10	0.34%	-0.64%	46	1.12%	1.46%	37
15	1.43%	0.37%	46	0.46%	1.89%	37
20	3.03%	1.81%	46	-0.13%	2.90%	37
25	4.74%	3.10%	46	-0.55%	4.19%	37
30	6.19%	4.35%	46	0.13%	6.32%	37
35	6.82%	4.91%	46	-0.58%	6.24%	37
40	7.99%	5.90%	46	-1.88%	6.11%	37
Mean	3.90%	2.46%		-0.22%	3.68%	
Std. Dev (%)	10.83	7.51		9.28		

Table 14: Post-Announcement Arbitrage Returns for Non-M&A Active Firms

This table reports post-announcement abnormal returns for non-M&A active firms over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-0.80%	-1.57%	45	-0.38%	-1.18%	29
10	-1.68%	-2.66%	45	1.73%	0.05%	29
15	-1.80%	-2.86%	45	2.45%	0.65%	29
20	-0.44%	-1.66%	45	2.87%	2.43%	29
25	-1.09%	-2.73%	45	1.61%	0.52%	29
30	-1.62%	-3.46%	45	1.33%	-0.29%	29
35	-0.42%	-2.33%	45	1.46%	1.04%	29
40	-0.28%	-2.37%	45	0.21%	-0.07%	29
Mean	-1.02%	-2.46%		1.41%	0.39%	
Std. Dev (%)	8.75	6.25		9.39		

Table 15 : Distribution of Merger Related Arbitrage Spreads for Liquid and Non-Liquid Firms

Panels A & B Report arbitrage spreads for the liquid and non-liquid groups. The liquid group was defined as firms that were in the first quartile with respect to liquidity. Liquidity was measured for each firm as the percentage of days out of 260 trading days before the announcement

with a high percentage of trading days were proxied as liquid, easily tradeable firms.

Panel A: Distribution of Arbitrage Spreads for ***Liquid Firms***								
N=23	Mean	Min	Q1	Median	Q3	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	4,19%*** (2,99)	-5.88%	-1.00%	3.29%	9.05%	17.97%	6.71%	34.78%

The difference between the mean arbitrage spreads of both groups is significant at the ,10 level of significance, the t-stat is 1.72.
t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Non-Liquid Firms***								
N=23	Mean	Min	Q1	Median	Q3	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	14,64%** (2,54)	-5.76%	1.97%	7,14%**	14.16%	126.90%	27.64%	13.04%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 16: Post-Announcement Arbitrage Returns for Target Firms that were in Quartile 1 with Respect to the Liquidity Measure

This table reports post-announcement abnormal returns for target firms that were in Quartile 1 when ranked by my liquidity measure. These firms are the least liquid of the sample. I measured liquidity as the number of non-trading days divided by the number of trading days (260) in the year prior to the merger announcement. The range of illiquidity for this subset of firms was: 81,0 % (very illiquid), to 38,0 % (slightly less liquid). Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.10%	-0.67%	22	0.65%	0.75%	16
10	0.19%	-0.79%	22	3.51%	3.70%	16
15	-0.39%	-1.45%	22	3.95%	3.56%	16
20	0.75%	-0.47%	22	4.94%	5.69%	16
25	0.99%	-0.65%	22	4.11%	5.10%	16
30	0.40%	-1.44%	22	3.61%	4.01%	16
35	-0.23%	-2.14%	22	4.55%	4.32%	16
40	1.87%	-0.22%	22	1.45%	3.32%	16
Mean	0.46%	-0.98%		3.35%	3.81%	
Std. Dev (%)	14.13	11.28		8.79		

Table 17: Post-Announcement Arbitrage Returns for Target Firms that were in Quartile 4 with Respect to their Liquidity Measure

This table reports post-announcement abnormal returns for target firms that were in Quartile 4 when ranked by my liquidity measure. These firms are the most liquid of the sample. I measured liquidity as the number of non-trading days divided by the number of trading days (260) in the year prior to the merger announcement. The range of liquidity for this subset of firms was: 3,0 % (very liquid), to 0,0 % (completely liquid). Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.05%	-0.72%	23	0.33%	0.38%	19
10	-1.24%	-2.22%	23	1.75%	0.51%	19
15	-1.87%	-2.93%	23	1.76%	-0.11%	19
20	-1.20%	-2.42%	23	0.91%	-0.29%	19
25	-0.20%	-1.84%	23	2.16%	1.96%	19
30	1.20%	-0.64%	23	1.63%	2.83%	19
35	1.59%	-0.32%	23	-0.30%	1.29%	19
40	2.54%	0.45%	23	-1.06%	1.48%	19
Mean	0.11%	-1.33%		0.90%	1.01%	
Std. Dev (%)	16.44	13.25		7.63		

Table 18 : Distribution of Merger Related Arbitrage Spreads for Both Large and Small Firms

Panels A & B report the distribution of arbitrage spreads for both large and small firms.

Panel A: Distribution of Arbitrage Spreads for ***Small Firms***						
N=20	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	22,63** (2,43)	-5.76	7.58	147.5	41.52	15.00%

The difference between the mean arbitrage spreads of both groups is highly significant at the ,001 level of significance, the t-stat is 3.73.

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Big Firms***						
N=20	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	3,94** (2,85)	-5.88	3.62	19.12	6.19	30.00%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 19: Post-Announcement Arbitrage Returns for the Largest Target Firms in the Sample

This table reports post-announcement abnormal returns for the largest targets over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.09%	-0.68%	20	-1.64%	-1.55%	12
10	0.45%	-0.53%	20	-0.76%	-0.31%	12
15	1.31%	0.25%	20	-2.32%	-1.01%	12
20	1.06%	-0.16%	20	-2.59%	-1.53%	12
25	1.18%	-0.46%	20	-3.21%	-2.03%	12
30	0.26%	-1.58%	20	-2.75%	-2.49%	12
35	1.07%	-0.84%	20	-3.18%	-2.11%	12
40	1.99%	-0.10%	20	-3.48%	-1.49%	12
Mean	0.93%	-0.51%		-2.49%	-1.57%	
Std. Dev (%)	7.30	6.65		7.47		

Table 20: Post-Announcement Arbitrage Returns for the Smallest Target Firms in the Sample

This table reports post-announcement abnormal returns for the smallest targets over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-1.08%	-1.85%	20	-0.69%	-1.77%	13
10	-1.84%	-2.82%	20	2.60%	0.76%	13
15	-3.45%	-4.51%	20	4.45%	1.00%	13
20	-0.26%	-1.48%	20	5.38%	5.12%	13
25	0.04%	-1.60%	20	3.03%	3.07%	13
30	-0.64%	-2.48%	20	3.13%	2.49%	13
35	-1.42%	-3.33%	20	1.87%	0.45%	13
40	-1.41%	-0.68%	20	1.35%	-0.06%	13
Mean	-1.26%	-2.34%		2.64%	1.38%	
Std. Dev (%)	15.00	12.36		9.92		

Table 21: Distribution of Merger Related Arbitrage Spreads for Firms Ranked by Their Relative Size Ratios

Panels A & B report the distribution of arbitrage spreads for firms ranked by relative size ratios.

To calculate the relative size ratio for each deal, we used the market capitalisation of the target firm and divided this by the market capitalisation of the bidder firm. As such, the target firms which were the smallest with respect to their bidder had the smallest relative size ratio. Conversely, the target firms which were the largest with respect to their bidders had the largest relative size ratios.

Panel A: Distribution of Arbitrage Spreads for the ***Smallest Relative Size Ratio Firms (i.e.Quartile 1)***

N=23	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	6,27** (2.28)	-5.76	2.7	51.65	13.17	26.09%

The range of relative size ratios for this group is from 0,01 to 0,22.

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for the ***Biggest Relative Size Ratio Firms (i.e.Quartile 4)***

N=23	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	5,69*** (2.85)	-7.73	3.70	39.64	9.57	21.74%

The range of relative size ratios for this group is from 0,63 to 11,54.

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 22: Post-Announcement Arbitrage Returns for Target Firms that were in Quartile 1 when Ranked by their Relative Size Ratio

This table reports post-announcement abnormal returns for target firms that were in Quartile 1 when ranked by their relative size ratio. Quartile 1 firms are the smallest targets when compared to their respective bidder firm. The relative ratio was calculated for each target by dividing the targets' market capitalisation by the bidder firm's market capitalisation. As usual, these are from the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report the returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	1.64%	0.77%	23	0.81%	2.45%	22
10	3.69%	2.61%	23	2.82%	6.51%	22
15	4.25%	3.09%	23	2.73%	6.98%	22
20	3.94%	2.62%	23	2.85%	6.79%	22
25	5.66%	3.92%	23	2.63%	8.29%	22
30	7.42%	5.48%	23	3.15%	10.57%	22
35	8.43%	6.42%	23	2.97%	11.40%	22
40	8.27%	6.08%	23	1.37%	9.64%	22
Mean	5.41%	3.87%		2.42%	7.83%	
Std. Dev (%)	9.50	7.94		6.72		

Table 23: Post-Announcement Arbitrage Returns for Target Firms that were in Quartile 4 when Ranked by their Relative Size Ratio

This table reports post-announcement abnormal returns for target firms that were in Quartile 4 when ranked by their relative size ratio. Quartile 4 firms are the target firms which are the largest relative to their respective bidder firm. The relative ratio was calculated for each target by dividing the targets' market capitalisation by the bidder firm's market capitalisation. As usual, these are from the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report the returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.19%	0.77%	23	-1.24%	-1.05%	20
10	-1.00%	-1.98%	23	1.08%	0.08%	20
15	-1.87%	-2.93%	23	1.07%	-0.80%	20
20	1.92%	0.70%	23	1.33%	3.25%	20
25	2.67%	1.03%	23	1.46%	4.13%	20
30	3.87%	2.03%	23	0.44%	4.31%	20
35	4.44%	2.53%	23	1.48%	5.92%	20
40	6.11%	4.02%	23	-0.54%	5.57%	20
Mean	2.04%	0.77%		0.64%	2.68%	
Std. Dev (%)	14.95	13.68		10.88		

Table 24: Distribution of Merger Related Arbitrage Spreads for Successful and Unsuccessful Offers

Panels A & B report the distribution of arbitrage spreads for successful and unsuccessful offers.

Panel A: Distribution of Arbitrage Spreads for ***Successful Offers***						
N=53	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	9,1*** (3.35)	-10.71	4.76	126.9	19.78	18.87%

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Unsuccessful Offers***						
N=38	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	9,33** (2.40)	-7.73	4.42	147.5	23.93	18.42%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 25: Post-Announcement Arbitrage Returns for Successful Offers

This table reports post-announcement abnormal returns for successful offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-0.44%	-1.21%	38	-0.04%	-0.48%	27
10	-1.41%	-2.39%	38	1.45%	0.04%	27
15	-1.04%	-2.10%	38	2.63%	1.59%	27
20	0.26%	-0.96%	38	1.50%	1.76%	27
25	0.52%	-1.12%	38	1.15%	1.67%	27
30	1.51%	-0.33%	38	1.16%	2.67%	27
35	1.51%	-0.40%	38	1.13%	2.64%	27
40	2.58%	0.49%	38	-0.09%	2.49%	27
Mean	0.44%	-1.00%		1.11%	1.55%	
Std. Dev (%)	11.52	9.52		10.51		

Table 26: Post-Announcement Arbitrage Returns for Unsuccessful Offers

This table reports post-announcement abnormal returns for unsuccessful offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-0.28%	-1.05%	53	-0.55%	-0.83%	39
10	-0.09%	-1.07%	53	1.34%	1.25%	39
15	0.49%	-0.57%	53	0.44%	0.93%	39
20	2.08%	0.86%	53	0.97%	3.05%	39
25	2.81%	1.17%	53	-0.12%	2.69%	39
30	2.91%	1.07%	53	0.32%	3.23%	39
35	4.43%	2.52%	53	-0.25%	4.18%	39
40	4.80%	2.71%	53	-1.56%	3.24%	39
Mean	2.14%	0.71%		0.07%	2.22%	
Std. Dev (%)	10.85	8.88		8.45		

Table 27 : Distribution of Merger Related Arbitrage Spreads for Friendly vs Hostile Offers

Panels A & B report the distribution of arbitrage spreads for both friendly and hositle offers.

Panel A: Distribution of Arbitrage Spreads for ***Friendly Offers***						
N=70	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	10,81*** (3.78)	-7.73	5.17	147.5	23.95	14.00%

The difference between the mean arbitrage spreads of both groups is marginally significant at the 0.20 level of significance, the corresponding t-stat is 1.46.

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Hostile Offers***						
N=15	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	1.59	-10.71	2.13	13.42	6.12	40.00%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 28: Post-Announcement Arbitrage Returns for Friendly Offers

This table reports post-announcement abnormal returns for friendly offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-0.50%	-1.27%	68	-0.38%	-0.88%	49
10	-1.16%	-2.14%	68	1.25%	0.09%	49
15	-0.58%	-1.64%	68	1.46%	0.88%	49
20	0.59%	-0.63%	68	0.95%	1.54%	49
25	0.82%	-0.82%	68	-0.01%	0.81%	49
30	1.25%	-0.59%	68	0.11%	1.36%	49
35	1.57%	-0.34%	68	0.09%	1.66%	49
40	2.49%	0.40%	68	-1.12%	1.37%	49
Mean	0.56%	-0.88%		0.29%	0.85%	
Std. Dev (%)	10.48	8.97		9.86		

Table 29: Post-Announcement Arbitrage Returns for Hostile Offers

This table reports post-announcement abnormal returns for hostile offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	0.99%	0.22%	15	0.19%	1.18%	12
10	2.60%	1.62%	15	2.07%	4.67%	12
15	3.26%	2.20%	15	1.38%	4.64%	12
20	5.70%	4.48%	15	2.74%	8.44%	12
25	7.46%	5.82%	15	2.12%	9.58%	12
30	8.99%	7.15%	15	2.87%	11.86%	12
35	12.99%	11.08%	15	2.35%	15.34%	12
40	12.66%	10.57%	15	0.09%	12.75%	12
Mean	6.83%	5.39%		1.73%	8.56%	
Std. Dev (%)	11.79	10.29		7.71		

Table 30 : Distribution of Merger Related Arbitrage Spreads for Cash vs Non-Cash Offers

Panels A - C report the distribution of arbitrage spreads for different subgroups related to cash offers.

Panel A: Distribution of Arbitrage Spreads for ***Cash Tender Offers***						
N=10	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	16,80	-4.26	4.56	126.9	39.05	10.00%

t-test values are presented in brackets only in cases where the mean was found to be significant.

Panel B: Distribution of Arbitrage Spreads for ***Cash Offers***						
N=21	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	9,77	-4.26	3.7	126.9	27.16	9.52%

Panel C: Distribution of Arbitrage Spreads for ***Non-Cash Offers***						
N=70	Mean	Min	Median	Max	Std. Deviation	% Negative
Arbitrage Spreads (%)	8,89*** (3,68)	-10.71	5.74	147.5	20.22	23.00%

* Implies significance at the 0,10 level
** Implies significance at the 0,05 level
*** Implies significance at the 0,01 level

Table 31: Post-Announcement Arbitrage Returns for Cash Offers

This table reports post-announcement abnormal returns for cash offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	2.19%	1.42%	21	1.01%	3.20%	7
10	3.71%	2.73%	21	2.37%	6.08%	7
15	3.42%	2.36%	21	4.63%	8.05%	7
20	4.95%	3.73%	21	6.52%	11.47%	7
25	6.50%	4.86%	21	5.92%	12.42%	7
30	6.43%	4.59%	21	5.21%	11.64%	7
35	8.14%	6.23%	21	4.54%	12.68%	7
40	8.55%	6.46%	21	4.49%	13.04%	7
Mean	5.49%	4.05%		4.34%	9.82%	
Std. Dev (%)	10.92	9.58		7.43		

Table 32: Post-Announcement Arbitrage Returns for Non-Cash Offers

This table reports post-announcement abnormal returns for non-cash offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day t + 1. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	-1.92%	0.77%	70	-0.51%	-2.43%	59
10	-2.98%	0.98%	70	1.27%	-1.71%	59
15	-2.32%	1.06%	70	0.95%	-1.37%	59
20	-1.02%	1.22%	70	0.56%	-0.46%	59
25	-1.21%	1.64%	70	-0.26%	-1.47%	59
30	-0.79%	1.84%	70	0.12%	-0.67%	59
35	-0.21%	1.91%	70	-0.19%	-0.40%	59
40	0.34%	2.09%	70	-1.61%	-1.27%	59
Mean	-1.26%	1.44%		0.04%	-1.22%	
Std. Dev (%)	11.11	9.27		9.46		

Table 33: Post-Announcement Arbitrage Returns for Cash Tender Offers

This table reports post-announcement abnormal returns for cash tender offers over the 1990-1997 period. Abnormal returns are cumulated over periods of one to eight pseudo-weeks (e.g.,five trading days) subsequent to day $t+1$. The first column reports the returns from buying the target on the day following the merger announcement. The second column reports the index adjusted return, ie. target raw return minus the return from buying the equal-weighted index. The third and fourth columns report returns from shorting the bidder on the day after the announcement. Not every target firm had a publicly traded bidder on which one could shortsell. The buy target & short the bidder strategy assumes that one bidder is shorted for every target, regardless of offer terms.

Number of Trading Days	Target Raw Return	Index Adjusted Returns	N	Short the Bidder	Buy Target & Short Bidder	N
5	1.55%	0.68%	10	2.42%	3.97%	4
10	3.96%	2.88%	10	2.93%	6.89%	4
15	3.27%	2.11%	10	5.95%	9.22%	4
20	2.52%	1.20%	10	5.33%	7.85%	4
25	5.11%	3.37%	10	5.51%	10.62%	4
30	4.72%	2.78%	10	5.78%	10.50%	4
35	4.32%	2.31%	10	3.29%	7.61%	4
40	3.72%	1.53%	10	3.82%	7.54%	4
Mean	3.65%	2.11%		4.38%	8.03%	
Std. Dev (%)	8.54	8.32		6.33		

Table 34: Regressions Comparing Arbitrage Returns with Target Firm Characteristics

The first regression consists of arbitrage spread as the dependent variable, and nine different target characteristics as the independent variables. The characteristics that are used as independent variables are the same as those presented in tests 1 to 9, in the "description of tests" section. These characteristics are; tender offer vs. non-tender offer, active industry or not, liquidity, size, relative size, successful or not, friendly or hostile, cash or non-cash and finally, cash tender offer versus non-cash tender offer. The second regression consists of arbitrage returns as the independent variable, and target characteristics as the independent variables. The third regression consists of arbitrage spreads as the dependent variable, and bidder characteristics as the independent variables. Finally, regression number four consists of arbitrage returns as the dependent variable, and bidder characteristics as the independent variables. Please refer to the "coding" section (test 10) in the body of the paper for more information on how each of the regressions were conducted.

Independent Variables	1	2	3	4
Tender	-0,009 (-0,063)	0,132 (1,055)	-0,028 (-0,207)	0,102 (0,812)
Active	0.099 (0,748)	0,157 (1,281)	0,102 (0,751)	0,181 (1,419)
Liquidity	-0,045 (-0,317)	**0,259** **(2,027)****	-0,104 (-0,786)	0,172 (1,411)
Log (Market Cap.)	-0,135 (-0,934)	**-0,260** **(-2,021)****	-0,122 (-0,801)	-0,085 (-0,607)
Relative Size	-0,082 (-0,655)	0,026 (0,227)	-0,148 (-1,052)	-0,021 (-0,156)
Outcome	-0,002 (-0,011)	0,127 (1,038)	0,0135 (0,099)	0,107 (0,836)
Friendly	-0,109 (-0,767)	0,133 (1,009)	-0,106 (-0,730)	0,132 (0,958)
Cash	-0,062 (-0,371)	**0,546** **(3,055)*****	-0,084 (-0,498)	**0,538** **(2,919)*****
Cash Tender	-0,054 (-0,309)	**(-0,425)** **(-2,378)****	-0,024 (-0,134)	**-0,388** **(-2,083)****
R	0.284	0,564	0,302	0,520
R^2	0.081	0,318	0,091	0,270
F-value	0.604	2,851	0,668	2,265
p-value for F	0.789	0,008	0,734	0,031

Table 35: Testing for Multicollinearity: Regressions Comparing Arbitrage Returns with Target Firm Characteristics

The first regression consists of arbitrage spread as the dependent variable, with different target characteristics as the independent variables. The characteristics that are used are the same as those presented in table 34, except that the variables cash and/or cash tender offers have been removed since these had a correlation coefficient of 0.74 with one another, a sign of potential multicollinearity. The independent variables are presented below, almost all of the independent variables were coded as dummy variables, the exceptions are; liquidity, log(market cap) and relative size. Refer to the "coding" section (test 10) for more details on how the regressions were conducted. The second regression consists of arbitrage returns as the independent variable, and target characteristics as the independent variables. The third regression consists of arbitrage spreads as the dependent variable, and bidder characteristics as the independent variables. Finally, regression number four consists of arbitrage returns as the dependent variable, and bidder characteristics as the independent variables.

Independent Variables	1	2	3	4
Tender	0,032 (0,262)	0,049 (0,375)	0,019 (0,154)	0,027 (0,205)
Active	0,176 (1,380)	0,213 (1,642)	0,179 (1,359)	0,224 (1,656)
Liquidity	**0,269** **(2,023)****	**0,280** **(2,048)****	0,199 (1,598)	0,202 (1,564)
Log (Market Cap.)	**-0,238** **(-1,780)***	**-0,249** **(-1,809)***	-0,124 (-0,868)	-0,100 (-0,670)
Relative Size	0,037 (0,307)	0,017 (0,134)	-0,026 (-0,191)	-0,034 (-0,242)
Outcome	0,086 (0,682)	0,102 (0,779)	0,066 (0,509)	0,080 (0,592)
Friendly	0,145 (1,056)	**0,239** **(1,757)***	0,136 (0,956)	0,234 (1,649)
Cash	**0,234** **(1,852)***		**(0,258)** **(1,988)***	
Cash Tender		-0,024 (-0,189)		0,009 (0,069)
R	0,498	0,450	0,461	0,397
R^2	0,248	0,202	0,213	0,157
F-value	2,309	1,777	1,893	1,307
p-value for F	0,032	0,101	0,079	0,259