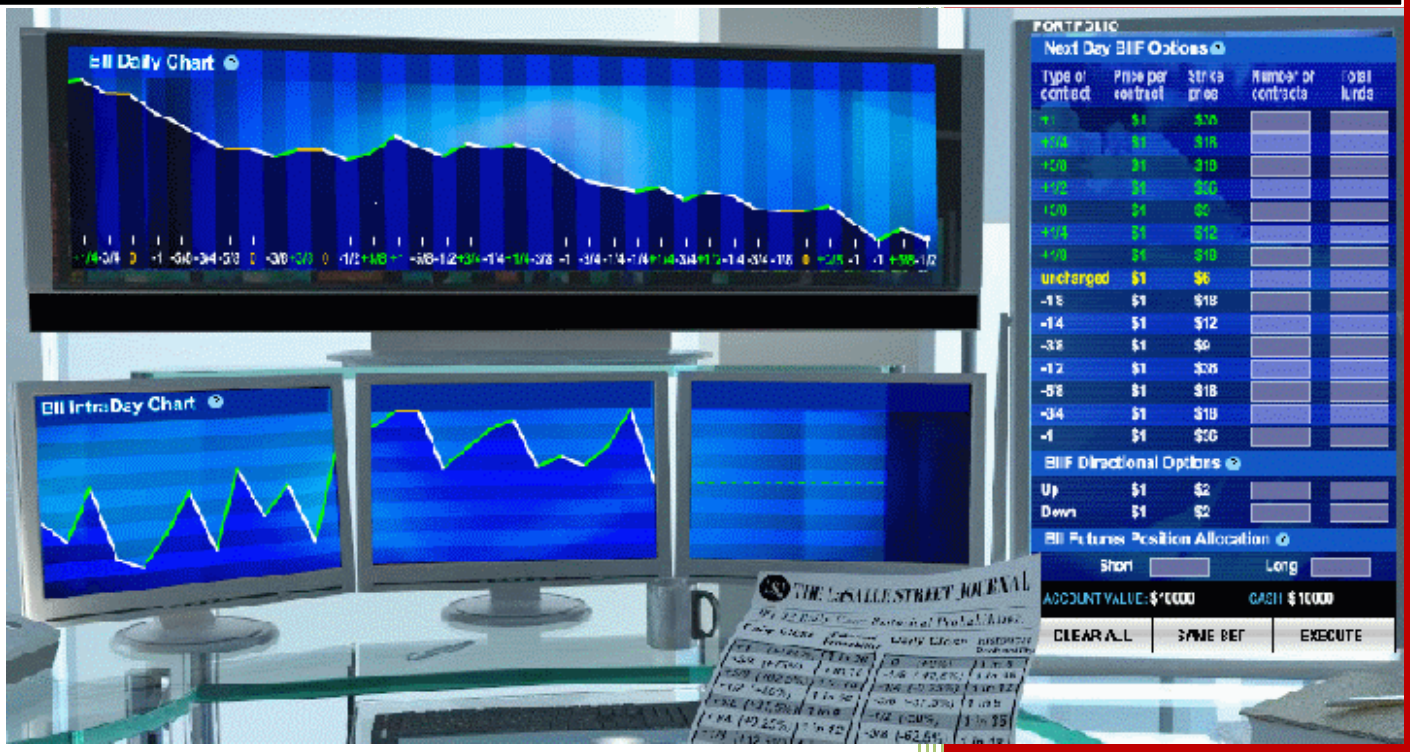
Merger Arbitrage Application



David Berglas

Igor Gimelshtein

John Neelamkavil

Kapil Mehra

Drew Shaw

Kristopher Wong

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Merger Arbitrage 101

Risk Arbitrage – Introduction

The term *arbitrage* is best defined as the simultaneous purchase and sale of an asset to take advantage of a market mispricing for a riskless profit. In theory, arbitrage is riskless, in practice, almost all arbitrage opportunities involve at least some risk element. The term arbitrage can be misleading, as it is regularly used to refer to situations in which there are no guaranteed profits and the returns are not risk free. There are several types of arbitrage methods, such as liquidation arbitrage, pairs trading, and risk arbitrage. Risk arbitrage is a type of event driven investing strategy that attempts to capitalize on announced transactions pertaining to mergers, spin-offs, takeovers, liquidations and corporate restructuring. We will focus on the merger arbitrage portion of risk arbitrage.

Merger Arbitrage Overview

Merger arbitrage attempts to achieve a riskless profit by taking advantage of the speculation spread (refer to *Financial Terminology*) after an acquisition offer has been announced. The speculation spread is referred to as the difference between the target's trading price and offer price. The bidding firm (Acquirer) must issue an offer price above the target's current share price, in order to justify accepting the offer. After the acquiring firm publicly announces its offer, the share price of the target firm will typically rise in anticipation of the deal closing. With that said, the target price does not typically rise to exactly the offer price for two reasons:

- Successful completion of the merger is not certain
- Compensation for the time value of money

Historical data suggests that, given past completion rates and periods, the difference in the offer price and the target's stock price after merger announcement is larger enough to create an arbitrage opportunity. Applying a merger arbitrage strategy has the potential to earn abnormal returns of four to ten percent.[1]

We will now explore the merger arbitrage strategy, provide a detailed explanation of our application and a guide to learn how to leverage the application when implementing your own merger arbitrage investing strategy.

The Merger Process and Characteristics

[1] Vijay Singal Ph. D, CFA, Beyond the Random Walk: A Guide to Stock Market Anomalies and Low-Risk Investing (New York: Oxford University Press, 2004) 196.

The Process

Figure 1 illustrates the typical process involved in a merger. First, the acquirer will approach the target firm with a deal offer. A deal offer consists of all of the terms that the acquirer is offering to the target. This includes the offer price, the offer consideration (i.e. cash, stock, etc.), and the tentative closing or offer removal date, among many other things. Discussions are initiated between both groups of management.

After the initial management discussions, the board of directors of the target firm are approached with the offer and are asked to approve or reject the offer, on behalf of the shareholders of the firm. Should the board of directors approve the offer, the next step is to receive regulatory approval (i.e. FTC). If the board of directors does not approve the offer, the bidding firm can go hostile and issue a tender offer directly to the shareholders. Once the deal has been approved by the shareholders, the deal has been consummated.

Figure 1 - Merger Process

Offer Consideration

The consideration of the deal offer can take a number of forms. The simplest form of consideration is an all cash offer. The next simplest form is an all stock offer. All stock offers and all cash offers are the most common forms of consideration. Over the past few decades, stock offers have become much more prevalent in the market place.[2]

There are also much more complicated forms of consideration. One example is a stock collar offer. A collar offer addresses the concerns of both the acquirer and the target with regards to a stock offer. The bidding firm uses stock to buy the target firm, like a regular stock offer. The collar stipulates that if the bidder's stock drops (rises) to a certain level, then the number of shares he bidding firm offers is increased (reduced).

Number of Bidders

A target can be pursued by numerous bidders at one time. As a target is pursued by multiple bidders, the arbitrageur is rewarded as the offer price typically increases as well as the target's current stock price.

Characteristics and Success Rates

[2] Vijay Singal Ph. D, CFA, Beyond the Random Walk: A Guide to Stock Market Anomalies and Low-Risk Investing (New York: Oxford University Press, 2004) 199.

In *Beyond the Random Walk*, Vijay Singhal looks at two data sets (one with only cash offers, one with cash and stock offers) in determining the success rates of particular types of deals.

Only Cash Deals

In the first study Singhal observed that cash offers exhibited a 97% completion rate. This suggests that there is a relatively small risk of failure in cash offers. Furthermore, cash offers were revised upwards in 39% of the cases and down in 4% of the cases. Only 7.5% of the deals resulted in negative returns.

Cash and Stock Mergers

The second study that Singhal considered includes cash and stock merger data. The data showed that the failure rate was much higher in hostile deals. This data set showed that stock deals are actually slightly more successful than cash deals. Finally, the probability that the target remains independent is 14 – 15%.

Approaching a Stock vs a Cash Offer

As arbitrageurs, we attempt to capture the aforementioned speculation spread and the potential profit. The way that we try to capture this spread is different under a stock and a cash offer.

Stock Offer

When a stock offer is made, the spread is more volatile and can change due to fluctuations in the acquiring firm's stock price. Typically, the acquirer's stock price declines as the target's price increases. This is particularly concerning for the arbitrageur. To "lock in" the spread in a stock deal, the investor simultaneously purchases the common stock of the target company and sells short the stock of the acquiring company.

Cash Offer

With a cash offer, there is no risk of a decreased offer price due to fluctuations in the acquirer's stock price. Given this fact, there is no reason to short the acquirer, simply buy the target.

Implied Probability and the Arbitrage Opportunity

There is an implied probability that the deal will be consummated for every announced merger. In order to derive this probability, the efficient markets hypothesis (EMH) must be utilized. Under EMH, the expected value of investing in a merger arbitrage strategy should be zero. Under this assumption, the following equation must hold:

$$EV = (O - C) \times P_1 + (U - C) \times P_2$$

$0 = (O - C) \times P_1 + (U - C) \times (1 - P_1)$

Where,

EV = Expected value
O = Offer price
C = Current share price
U = Unaffected share price
P_1 = Probability of deal consummation
P_2 = Probability of deal failure

Thus, the implied probability of success (the deal will be consummated) can be calculated by using the current share price, the unaffected share price, the offer price and plugging for P1 as follows:

$$P_1 = \frac{(U - C)}{(U - C) - (O - C)}$$

Knowing the implied probability of success is extremely useful for the arbitrageur. If the arbitrageur feels that the actual probability of a successful merger is greater than the implied probability, there may be an arbitrage opportunity. If the arbitrageur believes the actual probability of a successful merger is less than the implied probability, the arbitrageur has a short-selling opportunity.

Inserting the assumed probability into the expected value equation, we can find the expected value of the transaction can be found.

$EV = (O - C) \times X_1 + (U - C) \times (1 - X_1)$

Where,

X_1 = Assumed probability of deal consummation
All other variables denoted are represented as the same as above

We can use our application to help us retrieve the required data and perform the necessary calculations to capitalize on these opportunities.

Merger Deal Selection

A common merger arbitrage strategy is to hold small positions in a very broad range of mergers. This strategy can only yield average returns. To do better than average, the investor must actively manage the portfolio of merger positions, eliminate the higher risk, lower quality deals and assign larger weightings to deals with higher return profiles.[3]

[3] John Paulson, Evaluating and Implementing Hedge Fund Strategies (3rd Ed.), Chapter 7: Adding Alpha to Merger Arbitrage (New York: Institutional Investor Books, 2003) 89.

To aid in deal selection, Vijay Singhal exhibits some key criteria in evaluating merger arbitrage opportunities for the individual investor[4]:

1. **Avoid deals with collars** because they add uncertainty to an arbitrage position and require more frequent monitoring than pure cash or pure stock deals. Similarly, avoid deals that include warrants, units, preferred stock, and so on, because they complicate arbitrage positions.

2. Avoid deals that are likely to be subject to antitrust scrutiny. To identify such deals, look at the combined size of the target/acquirer relative to the size of target's market. **Any merger that will result in the merged firm accounting for more than 15-25 percent of the target's industry is cause for concern**. This is especially true if no mergers have been attempted or if none has been successful. For example, it is prudent to avoid mergers in the airline industry, where several mergers have been attempted but none successfully. The only exception to anti-trust scrutiny is a failing merger, where the firm would go bankrupt unless it merges.

3. **Select deals where target has a very large market capitalization (more than $50 billion)** because arbitrageurs may not have the resources to fully participate in these deals.

4. **Select deals where the target has a low price (less than $10)** because the arbitrageurs are unlikely to participate in these deals due to high transaction costs.

5. **Select deals where the target firm has low volume turnover (where volume of shares traded per day is less than 0.5 percent of the total number of shares outstanding)**. Arbitrageurs are unlikely to participate because they will not be able to hide their trades.

6. **Select deals with large arbitrage spreads carefully**. **Anything more than 15 percent is suspect**, although such deals also have a high profit potential.

7. **Select deals that have an arbitrage spread of at least the risk-free rate.** Your money is better invested elsewhere if the arbitrage spread is anything less than the risk-free rate (assume 3.5 percent).

[4] Vijay Singal Ph. D, CFA, Beyond the Random Walk: A Guide to Stock Market Anomalies and Low-Risk Investing (New York: Oxford University Press, 2004) 216.

The Merger Arbitrage Application

The Merger Arbitrage Application performs a number of functions to allow its users to capitalize on merger arbitrage opportunities. Lets first consider the required inputs.

Input Variables

TRXN ID: TRXN ID represents the transaction identification number that the user assigns to the specific transaction that he or she is considering. This is required as there is the potential for multiple proposed transactions for the same acquirer and bidder. Therefore, TRXN ID acts as a unique variable for the specific transaction.

ACQUIRER: The acquiring firm's stock symbol, as per Yahoo!Finance definitions.

TARGET: The target firm's stock symbol, as per Yahoo!Finance definitions.

UNAFFECTED DATE: The unaffected date represents the date immediately prior to the official announcement of a merger or acquisition offer. This date involves some discretion on behalf of the user. Most of the time, the unaffected date represents the day immediately prior to the day of announcement. However, in some cases merger rumours can impact the share price earlier than the actual announcement. The user must determine the last date that the share price reflected its standalone value.

CLOSE DATE: The close date is the anticipated date for the deal to be closed or the offer to be withdrawn, as indicated by the acquiring firm or as assumed by the model user.

CURRENT DATE: The current date represents the day that the user takes his or her position in the merger or intends to take position in the merger. It is typically desirable for this date to be the date of announcement.

CASH: The cash input variable represents the cash consideration of the deal, as per the publicly announced offer.

STOCK (or STOCK_SWAP): The number of shares of the acquiring firm provided as part or all of the consideration to the target.
STOCK = Acquiring Firm's Shares/Target Firm Share

MergerInvesting.com

The MergerInvesting.com Sub allows the user to input the ticker symbol and press the corresponding button to retrieve the MergerInvesting.com website that is potentially associated with the target's deal.

MergerInvesting.com is a website that provides the latest merger and acquisition news, merger arbitrage opportunities, a calendar of merger related events, and historical merger data.

Note: The site is pay-for-use, so free usage is limited. Furthermore, the website typically only provides deal information on U.S. deals. The ticker that is input by the user may not retrieve a valid url link, even if it is involved in an active deal, due to limitations of the website.

Merger Arbitrage Data Function

The Merger Arbitrage Data Function leverages the historical price data provided by YahooFinance!.

The following data appears as output for the function and is derived as follows:

TRXN_ID: The corresponding TRXN ID.

ACQUIRER: The corresponding acquiring firm.

TARGET: The corresponding target firm.

CURRENT_VAL: The target firm's current value per share, as dictated by the current market price.

MERGER_VAL: The target firm's value under the merger completion, as dictated by the deal terms (cash and stock consideration).

MERGER_VAL = CASH + STOCK x [Current Acquirer's Stock Price]

UNAFFECTED_VAL: The target firm's value per share, as dictated by the target's closing price at the unaffected date.

PROFIT: The profit, should the deal be consummated.

PROFIT = MERGER_VAL – CURRENT_VAL

LOSS: The loss, should the offer be withdrawn.

LOSS = CURRENT_VAL – UNAFFECTED_VAL

RETURN %: The potential return as a percentage of investment, should the deal be consummated.

RETURN % = PROFIT/CURRENT_VAL

LOSS %: The potential loss as a percentage of investment, should the offer be withdrawn and the deal not been consummated.

LOSS % = LOSS/CURRENT_VAL

ANNUALIZED RETURN: The annualized return, should the deal be consummated.

ANNUALIZED RETURN = RETURN %/(365/(CLOSE_DATE – CURRENT_DATE))

ANNUALIZED LOSS: The annualized loss, should the deal be consummated.

ANNUALIZED LOSS = LOSS %/(365/(CLOSE_DATE – CURRENT_DATE))

PROB_SUCCESS: PROB_SUCCESS represents the implied probability of success, given the current market price of the target and the expected value formula derived earlier in the report.

PROB_SUCCESS = LOSS/(LOSS – PROFIT)

PROB_FAIL: PROB_FAIL represents the implied probability of failure, given the current market price of the target and the expected value formula derived earlier in the report.

PROB_FAIL = 1 – PROB_SUCCESS

EXPECTED_VAL: EXPECTED_VAL is the expected value, given that EXPECTED PROB SUCCESS is the true underlying probability of the merger succeeding.

$EXPECTED\_VAL = P_1 \times PROFIT + (1 - P_1) \times LOSS$

Where,

P_1 = EXPECTED PROB SUCCESS

Note: The numbers have not been formatted as dollars, percentages, etc so as to avoid rounding which could cause errors in performing further calculations with these numbers.

Merger Screener Function

The merger screener function allows us to use the deal selection criteria, as established by Dr. Singhal, to act as a quick screener for investors.

With the rationale provided earlier in the report, using Singhal's research, we have derived the following screening suggestions.

Target Market Capitalization	Large Cap. Target	> $5 Billion	Recommended
	Mid Cap. Target	$1 - $5 Billion	Neutral
	Small Cap. Target	< $1 Billion	Poor
Target Share Price	Above $10		Neutral
	Below $10		Recommended
Daily Average Volume/ Shares outstanding	Widely Traded	0.5%	Recommended
	Thinly Traded	< 0.5%	Poor
Spread	High Risk	> 15%	Caution
	Standard Risk	5% - 15%	Recommended
	Very Low Risk	< 5%	
Annualized Return	Above 3.5%		Recommended
	Below 3.5%		Poor

Dilution/Accretion Function

The Dilution/Accretion Function uses financial formulas to calculate the increase in shareholder value in the combined entity. This function leverages the Key Statistics data retrievable from YahooFinance!.
Note: This function should be used with stock for stock mergers.

TRXN_ID: The corresponding TRXN ID.

ACQ_EPS: The acquiring firm's earnings per share.

ACQ_EPS = ACQ_EARNINGS / ACQ_SHARES_OUTS

ACQ_PRICE: The acquirer's P/E evaluated share price.

ACQ_PRICE = ACQ_PE x ACQ_EPS

ACQ_EST_VAL: The acquirer's estimated market capitalization, using P/E valuation.

ACQ_EST_VAL = ACQ_PRICE x ACQ_SHARES_OUTS

TAR_EPS: The acquiring firm's earnings per share.

TAR_EPS = TAR_EARNINGS / TAR_SHARES_OUTS

TAR_PRICE: The acquirer's P/E evaluated share price.

TAR_PRICE = TAR_PE x TAR_EPS

TAR_EST_VAL: The acquirer's estimated market capitalization, using P/E valuation.

TAR_EST_VAL = TAR_PRICE x TAR_SHARES_OUTS

OFFER_EST: The estimated offer, **based solely on the stock swap**.

OFFER_EST = TAR_SHARES_OUT x ACQ_PRICE x STOCK_SWAP

PREMIUM: The % premium of the offer estimate over the target's estimated value.

PREMIUM = (OFFER_EST – TAR_EST_VAL) / TAR_EST_VAL

NEW_SHARES: NEW_SHARES represents the new shares that would need to be issued to cover the estimated consideration provided to the target.

NEW_SHARES = OFFER_EST / ACQ_PRICE

TOTAL_SHARES: Total shares are the total shares outstanding, should the acquire issue the NEW_SHARES.

TOTAL_SHARES = ACQ_SHARES_OUTS + NEW_SHARES

NEW_EARNINGS: The combined earnings of the merged company.

NEW_EARNINGS = ACQ_EARNINGS + TAR_EARNINGS

NEW_EPS: The combined EPS in the merged company.

NEW_EPS = NEW_EARNINGS / TOTAL_SHARES

INCREASE_IN_EPS: The increase in EPS in the merged company over standalone EPS.

INCREASE_IN_EPS = (NEW_EPS – ACQ_EPS) / ACQ_EPS

EXPECTED_SHARE_INC: The expected increase in acquires' share price, post acquisition.

EXPECTED_SHARE_INC = INCREASE_IN_EPS x ACQ_PE

NEW_EST_VAL: The new estimated share price of the acquiring company.

NEW_EST_VAL = EXPECTED_SHARE_INC + TOTAL_SHARES

MARKET_CAP: The new estimated market cap of the acquiring company, post merger.

MARKET_CAP = NEW_EST_VAL x TOTAL_SHARES

Note: The numbers have not been formatted as dollars, percentages, etc so as to avoid rounding which could cause errors in performing further calculations with these numbers.

Finance Terminology

Abnormal Return: A term used to describe the returns generated by a given security or portfolio over a period of time that is different from the expected rate of return. The expected rate of return is the estimated return based on an asset pricing model, using a long run historical average or multiple valuation.

Acquirer: The acquirer is the firm bidding for ownership of another firm by issuing an offer price for the other firm's shareholders for their shares.

Arbitrage: The simultaneous purchase and sale of an asset in order to profit from a difference in the price. It is a trade that profits by exploiting price differences of identical or similar financial instruments, on different markets or in different forms. Arbitrage exists as a result of market inefficiencies; it provides a mechanism to ensure prices do not deviate substantially from fair value for long periods of time.

Collar: A form of consideration in which a stock offer is adjusted so that there is a minimum and maximum offer price, given the fluctuations in the acquirer's stock price. The collar stipulates that if the bidder's stock drops (rises) to a certain level, then the number of shares that the bidding firm would give is increased (reduced).

Merger Arbitrage: A hedge fund strategy in which the stocks of two merging companies are simultaneously bought and sold to create a riskless profit.

Risk Arbitrage: A broad definition for three types of arbitrage that contain an element of risk:

1) Merger and acquisition arbitrage - The simultaneous purchase of stock in a company being acquired and the sale (or short sale) of stock in the acquiring company.

2) Liquidation arbitrage - The exploitation of a difference between a company's current value and its estimated liquidation value.

3) Pairs trading - The exploitation of a difference between two very similar companies in the same industry that have historically been highly correlated. When the two company's values diverge to a historically high level you can take an offsetting position in each (e.g. go long in one and short the other) because, as history has shown, they will inevitable come to be similarly valued.

Speculation Spread: The difference between the target's trading price and the offer price. The speculation spread arises as compensation for the risk of the deal not being consummated and for the time value of money.

Target: A company that is being pursued for acquisition by another company.

Unaffected Share Price: The effective share price immediately prior to the market pricing in the probability of successful merger.

Note: Definitions are as defined by Investopedia.com, where possible.

Works Referenced

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