The Profitability and Effectiveness of Merger Arbitrage: Evidence from IBM & Red Hat

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Abstract

Contemporarily, it remains an unresolved issue whether the merger arbitrage strategy, as one of the hedge fund strategies, is really profitable for investors in today's semi-strong and efficient market. In this paper, the profitability and effectiveness of this strategy are evaluated based on an event study in terms of data analysis with the case of IBM's acquisition of Red Hat in 2018. According to the results, it is discovered that the merger will have a more positive effect on Red Hat than IBM in the short term. These results shed light on instructing junior merger arbitrage researchers and pave a path for further investigation of such a kind of strategy.

Keywords-*Merger Arbitrage; Risk Arbitrage; profitability; Event Study*

1. INTRODUCTION

Merger arbitrage, as one of six hedge fund investing strategies, has historically produced high and consistent returns, and become a major asset management approach for institutional investors. There is a merger spread because the target's stock does not immediately rise to the acquisition's target price after the announcement of the acquisition. This spread will progressively vanish if the merger is successful, thus the arbitrageur will wait for the merger to be completed and earn this spread, which is the major source of merger arbitrage profits. The most common and fundamental approaches of merger arbitrage are cash acquisitions and stock swaps. There is also a type known as Collar Offers, which is an extension of stock swaps.

The opportunity to earn these incredible profits, similar to every effective investment approach, appeals to a lot of rivals, which reduces the available benefits, but the strategy can still generate positive returns in most circumstances. Eurekahedge Arbitrage Hedge Fund Index is utilized to analyze the profitability of the arbitrage strategy. When comparing the arbitrage index annualized returns to those of the DJ Global Industrials Index and the Wilshire 5000 Index during the 22-year period from 1999 to 2021, the former exceeds the latter. The Eurekahedge Arbitrage Hedge Fund Index achieved a 6.85 % annualized return with a 3.12 % annualized volatility. The DJ Global Industrials Index has an annualized return of 6.47%, while the Wilshire 5000 Index has an annualized return of 5.34%. Furthermore, the Sharpe Ratio and Sortino Ratio illustrate that the merger arbitrage strategy outperforms the traditional stock market and is a low-risk trading strategy with a steady return. The index returns for merger arbitrage from 1999 to 2021 is shown in Fig. 1 and the statistic descriptions of Eurekahedge Arbitrage Hedge Fund Index on Feb 2022 are summarized in Table. I.

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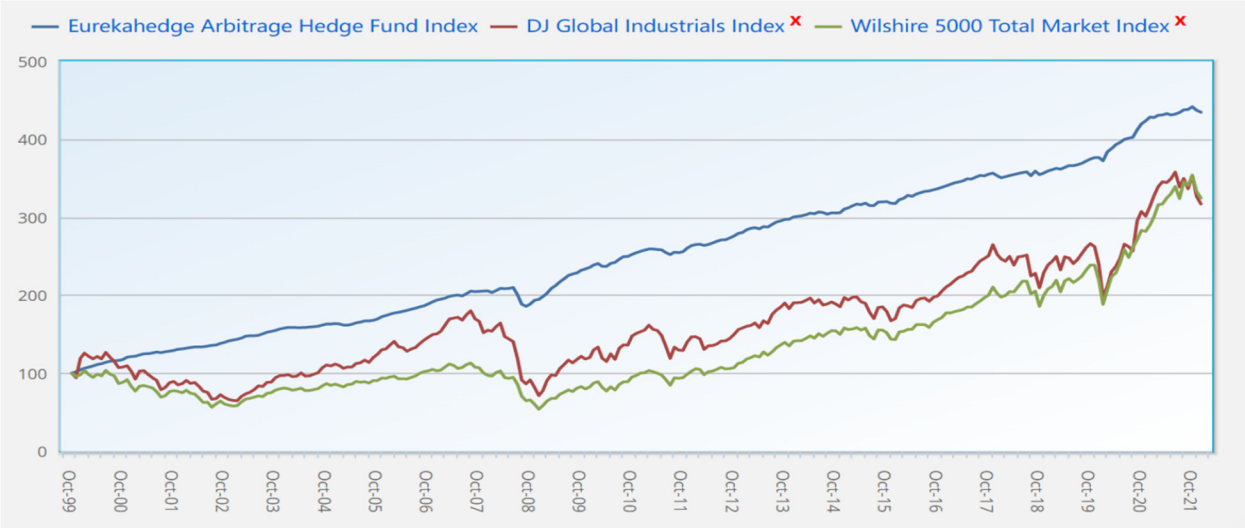

Figure 1. The index returns for merger arbitrage from 1999 to 2021. Sourced from: https://www.eurekahedge.com/.

TABLE 1. STATISTICS OF EUREKAHEDGE ARBITRAGE HEDGE FUND INDEX AS ON FEB 2022

Best Monthly Return (%)	3.08
Annualised Return (%)	6.85
Worst Monthly Return (%)	-6.02
Return Since Inception (%)	334.30
Last 3 Months (%)	-0.87
2022 Returns (%)	-1.65
2021 Returns (%)	5.28
Sharpe Ratio	1.55
Annualised Standard Deviation (%)	3.12
Downside Deviation (%)	2.01
Sortino Ratio	2.42

Merger arbitrage strategy was not well-known until the mid-1970s. The Ivan Boesky event and also a growing number of corporate takeover cases have progressively brought the merger arbitrage strategy to the limelight. Afterwards, risk arbitrage has been evoked as a way to create extraordinary profits, and more and more researchers are focusing on this field. Numerous studies have attempted to explain the excess returns of risk arbitrage. For example, Kummer & Hoffmeister specifically studied cash tender offers and found that the average abnormal shareholder reward rate of target company in the month of announcement was greater than 15% regardless of whether management opposed or supported the offer [1]. Dukes et al. [2] and Jindra & Walkling [3] found an annualized excess return of over 100%. Baker & Savasoglu argued that risk-adjusted monthly average abnormal returns of 0.6% to 0.9%, outperformed by the market and got significant positive returns [4]. Mitchell & Pulvino extended the time period to 1963 to 1998 and also enlarged the sample to 4750 M&A events and found an excess return of about 4% by constructing VWRA and RAIM return series without considering transaction costs [5]. Maheswaran & Yeoh put the studies into the Australian market and selected a sample of 193 M&A cases from January 1991 to March 2000 [6]. According to the analysis, they stated that significant excess risk-adjusted returns statistically generated before transaction costs were taken into account [6]. Besides, Li used the ARIMA model to assess the abnormal returns created by M&A arbitrage and indicated that in the Chinese stock market, stock mergers can give larger excess returns than cash mergers [7]. Jason et al. [8] tried to look at the profitability of merger arbitrage on a sample of 22 offers, presented an average excess return of 17.7% if the target company's portfolio was purchased over the long term, but return after the declaration was almost absent, as well as examining whether insider trading happened in the Chinese stock market before the target announced the offer. Furthermore, an increasing number of scholars are examining the effectiveness of Merger arbitrage, e.g., Cornelli & David [9], Liu & Wu [10], etc.

Furthermore, being a prominent and fundamental theory in finance research, the Efficient Market Hypothesis (EMH) is intimately linked to the study of merger arbitrage, which provides the theoretical basis for the operational process and case studies of merger arbitrage. In 1965, Samuelson defined market efficiency theory as follows: in a speculative market with complete competition and transparent information, price fluctuations over time are random. If price fluctuations do not follow this pattern, then any arbitrageur in the market can profit from an appropriate asset allocation and portfolio. This concept has become the core of the efficient market hypothesis. In the 1970s, Eugene Fama summarized the theory of efficient capital markets in a comprehensive way through a quantitative methodology, which enabled EMH to be thoroughly established. The efficient capital market is frequently characterized as a market in which prices completely reflect all available and usable information and the price of each security is always equal to its intrinsic value. Based upon different information group areas, financial economist classifies

the types of market efficiency into weak-form, semi-strong-form and strong-form efficient market.

In general, technical analysis is not useful in obtaining extra returns from the weak efficient market, because asset prices have completely responded to all historical information associated to the market (including all information about historical price and historical volume of transactions and all additional publicly available historical data). As for semi-strong efficient market, technical analysis or fundamental analysis cannot be used to generate excess profits, as it represents all available information about asset prices (including all historical price and volume information, all historically public data, as well as all currently public information). Regarding to strong efficient market, technical and fundamental analysis, even use inside information to trade is impractical, since asset prices already portray all relevant details (including all historical price and volume information, all other historical public information, and all current public information).

According to the analysis, it was confirmed that the current global capital market is mostly a weak or semi-strong efficient market, with little evidence of a strong efficient market. The capital markets of developed countries, such as the United States, the United Kingdom, and Canada, are at the level of semi-strong efficient markets. In theory, in such relatively efficient markets, the possibility of investors attempting to make excess profits thru arbitrage is often minimal, but the merger arbitrage strategy has been used by many hedge funds or arbitrageurs since the 1980s, particularly after Ivan Boesky's arbitrage event, and has also yielded enormous benefits, which clearly contradicts the traditional theory. Because the EMH seems unable to explain the above abnormalities in an acceptable and convincing way, the Limited Arbitrage theory was born, which believe that arbitrage cannot eliminate all mistaken arbitrage spreads. This also provides a theoretical foundation for merger arbitrage's excess return. In conclusion, merger arbitrage has become a major topic of research for academics and an investment strategy that many investors are concerned about. On this basis, the ultimate goal of this thesis is to pursue the effectiveness and profitability of merger arbitrage strategy. The rest part of the paper is organized as follows. The Sec. II will give a brief introduction to the calculation of the gross yield, then a M&A case in the technology industry in 2018 will be analyzed specifically. Subsequently, abnormal return as well as cumulative abnormal return will be measured through the event study to investigate the profitability of the merger arbitrage strategy. The Sec. III will analyze and summarize the results of whether the event will be profitable or not, then the significance test is followed with. Finally, the Sec. VI concludes the whole paper and proposes future research orientations.

2. METHODOLOGY

A brief formular that compares the two merger arbitrage approaches will be firstly discussed. Theoretically, the expected return of a cash arbitrage can be divided into two parts. The main source of return is the arbitrage spread, i.e., the spread between the stock price of the target company bought after the M&A announcement and the offer price by the bidder. Besides, the other part of the return is the dividends received during the period of holding the stock of the target company. Excluding transaction costs, the return (here can also refer to the gross rate of return) of a cash acquisition can be calculated using the following formular:

$$R = \frac{P_{close} - P_{announce}}{P_{announce}} + \frac{Div}{P_{announce}} \tag{1}$$

where R is the gross return, $P_{announce}$ is the closing price of the target's stock after the announcement of the acquisition, P_{close} is the traget's stock price at the closing day of the market, also the bidder price, and Div is the dividend paid during the trading period.

Compared to cash acquisitions, the risk arbitrage for stock swaps is more complex. A stock swap is when the acquirer exchanges a fixed number of stocks for a certain number of the target company's stocks, using shares replace cash to achieve the acquisition of the target. Therefore, some risk arbitrageurs or hedge funds through buying target's stocks to establish a long position, at the same time selling out stocks of the acquirer to build a short position after the M&A event is announced. Since this arbitrage method involves hedging operation about the arrangement of long and short positions, this arbitrage deal is more suitable for professional investors. On the premise of excluding transaction costs, the expected return of stocks M&A arbitrage consists of three parts. It is the spread between the stock price of the acquirer and the stock price of the target with equal proportion, which is the main profit of arbitrage, and the dividends spread from the short and long positions, last the interest income obtained from shorting stocks during the period of short selling must also be added. The return is calculated as follows:

$$R = \frac{EB_0 - T_0}{T_0} + \frac{D_{T-B}}{T_0} + \frac{Int}{T_0} \tag{2}$$

Here, E is the stock replacement ratio between the acquirer and the target (the number of shares of the target company that can be exchanged for the shares of the acquired company), B_0 is the closing price of the bidder's shares after the acquisition announcement, T_0 is the target's closing price after the announcement, $D_{T\text{-}B}$ is the dividend difference during the holding period between the target and the bidder, and Int represents interest earned by shorting the bidder's stocks during the period of short selling.

The case of IBM's acquisition of Red Hat (RHT) is used here to analyze the excess return (abnormal return) of merger arbitrage. In October 2018, IBM announced that it will buy Red Hat in its totality for $190 per share in cash, and on July 9, 2019, IBM announced the completion of its $34 billion acquisition of Red Hat. The event study is traditionally used to calculate the abnormal return. The CAPM model is applied to compute the normal rate of return in this case:

$$E(R) = \alpha + \beta R_{mt} \quad (3)$$

where *E(R)* denotes the expected return of the company on the T[th] trading day, R_{mt} denotes the actual return of the market on the T[th] trading day, α and β are the parameters to be estimated by the regression equation, which can be obtained by the least square method.

Finally, the expected return of the company can be calculated using the regression parameters obtained, and the abnormal return (AR) and cumulative abnormal return (CAR) may be computed:

$$AR = R_{real} - E(R) \quad (3)$$

$$CAR = \sum_{t=-5}^{5} AR \quad (4)$$

where R_{real} denotes the real return of the firm on the T^{th} trading day. Since the event was officially announced on October 28, 2018, which is a non-trading day, the 29[th] day was designated as the event day and defined as T=0. Additionally, one needs to set a window period of 5 days before and after the event date [-5,5] (excluding non-trading days) to make return measuring straightforward. The data for the calculations is collected from Bloomberg.

3. Results & Discussion

The trend lines (Figs. 2 and 3) clearly illustrate that both IBM and RHT's AR&CAR values fluctuate in the 5 days before and after the official announcement. For IBM's abnormal return trend, the values are mostly integer in the 5 days before the announcement, while the values drop and then rise in the 5 days after the announcement. Correspondingly, CAR values were positive before the announcement and negative thereafter, indicating that the event has had a negative effect on the acquirer's stock price and from the short-term analysis for IBM may be a negative news. For RHT's abnormal return trend, which AR values essentially below 0. The CAR values are of more focus to arbitrageurs, with positive values for the five days before and after the announcement, and it is intuitively visible that the announcement of the acquisition promptly lifted RHT's share price, with its CAR values peaking at 0.49 on the first trading day after the announcement, and also at a higher level for the five days after the announcement compared to the pre-announcement period. In addition to the investigation of RHT's business situation at that time, it is known that this merger event is a good piece of news for RHT. Detailed calculation data is shown in Table II. Fig. 2 gives more visual trend graph of AR & CAR during window period [-5,5] about IBM. Moreover, more visual trend graph of AR & CAR during window period [-5,5] about Red Hat is shown in Fig. 3.

In order to confirm whether the variation in CAR values of both the acquirer and the acquiree are caused by announcing the acquisition, it is necessary to run a significance test on CAR value. In this paper, a t-test was conducted applying STATA to see whether CAR is significantly different from 0 (H0: CAR = 0).

According to the results, the p-value is equal to 0.0732 for IBM, which is lower than 0.1, indicating that it is significant at the 10% confidence level and rejecting H0. Meanwhile, the p-value is equal to 0.0035 for RHT, suggesting that it is significant at 1% confidence level, i.e., there is existing an abnormal return. Therefore, one can suppose that the fluctuation of IBM and RHT's stock price is caused by the announcement of the acquisition. The cumulative abnormal return that arbitrageurs can receive is calculated by multiplying the CAR of the two firms during this span of time, which is 0.4057. As shown in Table III, the T-test value is given for the CAR values of IBM&RHT.

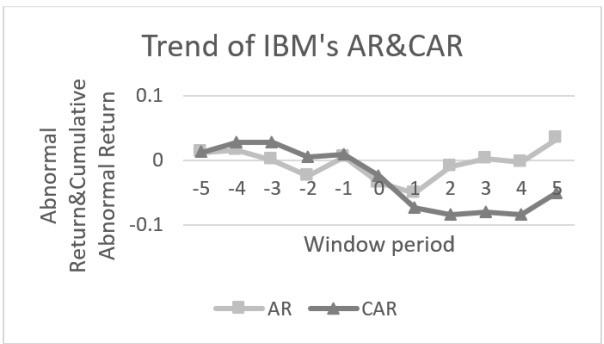

Figure 2. More visual trend graph of AR & CAR during window period [-5,5] for IBM

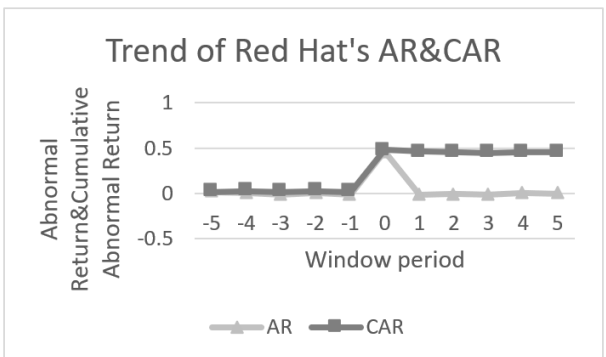

Figure 3. More visual trend graph of AR & CAR during window period [-5,5] for Red Hat

TABLE 2. ABNORMAL RETURN AND CUMULATIVE ABNORMAL RETURN OF IBM AND RED HAT IN THE FIVE DAYS BEFORE AND AFTER THE ANNOUNCEMENT OF ACQUISITION

	IBM		Red Hat	
Dif	AR	CAR	AR	CAR
-5	0.012281	0.012281	0.019489	0.019489
-4	0.015495	0.027776	0.009615	0.029104
-3	0.00068	0.028457	-0.0089	0.020204
-2	-0.02327	0.005191	0.009096	0.029299
-1	0.004783	0.009974	-0.01196	0.017341
0	-0.0339	-0.02393	0.461118	0.478459
1	-0.04983	-0.07376	-0.0165	0.461964
2	-0.00942	-0.08318	-0.0034	0.458565
3	0.002736	-0.08044	-0.00827	0.45029
4	-0.0028	-0.08324	0.006101	0.456391
5	0.033415	-0.04983	-0.00069	0.455698

According to the research, the merger arbitrage strategy can be advantageous for arbitrageurs in the short term, but this is only the ideal scenario, and earnings are constrained by a variety of factors such as taxes and institutions. Long-term abnormal returns, as most academics, including Fama, have discovered, are fragile [11]. It is an obvious limitation that this study has only chosen one case to examine the profitability of merger arbitrage. The uniqueness of things cannot adequately demonstrate the commonality. Furthermore, this study only looks at the negative arbitrage strategy, while the active arbitrage strategy of intentionally forecasting target companies and establishing positions ahead of the announcement date isn't look at.

TABLE 3. T-TEST FOR THE CAR VALUES OF IBM AND RHT

	CAR	mean	t-value	p-value
IBM	-0.0498	-0.0282	-2.0019	0.0732*
RHT	0.4557	0.2615	3.7973	0.0035***

* p<0.1, *** p<0.01

4. CONCLUSION

In summary, this paper aims to investigate the market reaction to IBM's acquisition of Red Hat, trying to demonstrate that the arbitrage strategy offers arbitrageurs with amount of wealth in the short term. Specifically, the news of merger will have a more positive effect on the Red Hat than IBM in the short time. In addition, there are various factors involved in the profitability and effectiveness of merger arbitrage. Not only for Chinese but also for international scholars, the research orientation is more on the negative arbitrage strategy mentioned above. Future research on the profitability of merger arbitrage should be enhanced in both depth and breadth. Overall, these results offer a guideline for junior merger arbitrage researchers or anyone interested in M&A of IBM and Red Hat.

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