Hedge Fund Strategies Performance in Bad Market Condition Analysis

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Abstract. In this article, the performance of hedge fund strategies is measured and analyzed by the following aspects: potential risk of the strategies excepted return of selected hedge fund and the sample performance in pressured stock market conditions. The study will provide theoretical explanations of the efficacy of Merger Arbitrage, Mutual Fund strategies, and PE ratio-related hedge fund strategies and their profitability as well as risk tolerance. Throughout equity data collection, asset markets including the S&P and NASDAQ have experienced downward pressure on systemic risk caused by inflation combined with quantitative tightening. These Macro factors have significantly contributed to the effectiveness of hedge portfolios; therefore, the article will focus on the performance of hedge fund strategies in the current market and analyze the efficiency of the strategies. According to the real-time hedge strategy trading data obtained from May/21st/2022 to July/01/2022, the Market Mutual strategy, as well as the Merger arbitrage, displayed the risk-averse characteristics of the hedging strategy during the underperforming period. On the other hand, P/E-based trades took on more systematic risk, which generated additional losses than expected.

Keywords: Hedge fund, Merger Arbitrage, Market Mutual, Volatility, PE Ratio, Beta.

1. Introduction

The financial markets in 2022 have substantial systemic uncertainty due to market risks and economic cycles. As previous monetary policy in response to COVID, unsolved supply chain issues, and the Russia-Ukraine war all contributed to the extremely rapid rise in energy and commodity prices, these factors have resulted in substantial cost increases for production costs and consumers' consumption. The CPI released on June 10, 2022, rose 1% from a year earlier and is now at 8.6%. The United States inflation rate is currently at a level that has not been reached since the 1980s. In response to unexcepted inflation data, the Federal Reserve has decided to start increasing interest rates more aggressively to suppress inflation. Whereas the market's performance considered that the presence of more substantial Quantitative Tightening and unexpected interest rate increases would take the U.S. economy into a period of economic recession. In this situation, all asset markets underwent tremendous volatility including the stock market. For instance, the S&P 500 is down 24.53% from the peak in 2022, while the Nasdaq is down 34.83% from its peak at the end of 2021. In contrast, the price of digital currency assets like Bitcoin declined by 74.52% from its previous high. During this historic period, investors inevitably suffered massive losses and asset price shrinkage. In addition, as the most attractive financial market in the world economy, the performance of the U.S. is to some extent representative of the rest of the global financial markets.

Over recent years hedge funds have increasingly captured a greater portion of the investing market and become investing targets for pension funds. Hedge funds established a systematic risk-averse feature through their leveraging and flexibility in derivatives and alternative trading, which has consistently generated profitable opportunities in the market. The operational strategy involves hedging the underlying risk by holding long and short positions, which leads to the option of choosing hedging strategies and selection of corporations with risk premiums, as well as risk management, becoming key components of market arbitrage. With diverse hedging strategy options, the performance of each strategy in rising and falling equity markets presents different returns and risk-taking. Returns in the stock market are divided into (α) returns from corporate selection and (β) market-based volatility. In the existence of companies announcing acquisitions or mergers, Merger

Arbitrage can take a position on both sides of the acquisition to capture profits. While one of the positions is always determined by market conditions, the potential opportunity for profit exists as long as the acquisition remains unregulated or uncancelled. The second Market Mutual strategy captures only the Alpha portion of a company's return by hedging out systematic risk (β). The flexibility of the strategy contributes to its popularity of this strategy among hedge funds. Strategies for PE and traditional model comparisons also are available in hedging strategies; however, such strategies contain greater systematic since investors' perspective on the PE ratio is determined by the market condition.

Metzger and Shenai analyzed the performance of hedging strategies, particularly when the market is facing a crisis. The performance of the strategies was analyzed by using persistence of performance, reward-risk ratios, correlations, and Carhart's four-factor model to the database of more than 9,500 hedge funds from the Hedge Index which contains all financial crises from June 2007 to January 2017. Some hedge fund strategies which have persistent performances are able to outperform the benchmark in some periods. The research concludes by Metzger and Shenai using the Carhart model examines that no strategy was able to generate significant alpha return during the financial crisis since the market is not efficient during a financial crisis. However, value-wise, all strategies did better than the S&P500, thereby, conserving value for investors, better than a passive investment in the S&P500 in the crisis period. However, all strategies outperformed the S&P 500 in terms of value. The passive option of investing in the S&P 500 in times of crisis represents a better decision in terms of value preserved by investors. Moreover, the analysis specifically highlights that Multi Strategy, Fixed Income Arbitrage, Long/Short Equity, Emerging markets, Long/Short Equity, Global Macro, Convertible Arbitrage and Event Driven has outperformed the S&P 500 when the market maintains its efficiency [1]. Jonsson and Karlsson conducted an analysis of the differences in risk and return structures of hedge fund strategies and subsequently reviewed the performance of 13 hedge fund strategies in the Credit Suisse Hedge Fund Index over a 20-year period from 1995 to 2015 to capture the returns and performance of the strategies. The research presents valuable information for investors on hedge funds in an analysis of performance over multiple long-term bull and bear market periods. The analysis of Standard Deviation of Strategy Indices in different investment markets and CAPM model shows that there are significant differences between the returns of different strategies and investment time periods [2]. Global Macro represents the best hedge fund strategy without considering risk over the overall time period. Also, the data supports that hedging strategies performed separately in different bull markets, but almost no strategy maintained positive returns in bear market periods. The best hedge fund strategies in bear markets are exclusively short biased while the second-best strategy is managed futures [2].

Stafylas and Andrikopoulos examined the systematic risk of hedge funds by analyzing the factors that drive the performance of hedge funds, lock-in periods, fund strategies, business cycles and distinct market conditions. Exogenous break points and a switching Markov model was used in the model analysis to determine the conditions in which the market was operating. The relationship between the size of the fund and its performance is negative, the relationship between hedge fund age and performance is negative, the relationship between fund characteristics and fund performance is not static or inconsistent across strategies in different market stress tests [3]. The return on alpha is significant when the market performs above average but tends to be negative in bad times. Liang et al. researched Merger Arbitrage's performance in the different nations by comparing Eastern financial markets to the Western after Covid-19. By considering excess return rate, quantitative cases, and sharp ratio, the conclusion drawn is that merger arbitrage achieved the best performance in mainland China, the U.S., Australia, and Hong Kong markets with 42.4%, 39.18%, 30.94%, and 10.01% portfolio excess returns, correspondingly. Due to the difference in market freedom and regulatory intensity, the Chinese market, Hong Kong, and the US market provide more arbitrage opportunities. Conversely, regulation in Japan and South Korea is limiting the performance of merger arbitrage [4]. Frahm and Huber's article conducted that the probability of Mutual funds outperforming the market is extrapolated by comparing it with benchmark returns. The conclusion suggests that within the

Brownian-motion framework, the S&P 500 and Russel 1000 should always outperform hedge funds by measuring with the traditional method because the ICV in any ETF index is correlated with mutual fund performance. New measurement OP should be considered since it is determined by ICV, and investors should be investing high ICV assets [5].

The different hedging strategies provide the opportunity to avoid and hedge risk on that segment individually, which is the reason that hedge funds do not have too many limitations. Nevertheless, In the years between 2007 and 2008, when economies faced a crisis, the collapse of the subprime mortgage market led to a more than 20% drop in assets under management for hedge funds worldwide [1]. The objective of this article is to analyze and propose hedging strategies in case of weak market performance. Also, the article will analyze the advantages and disadvantages of each trading strategy like Merger Arbitrage, Mutual fund strategy, and trades that are guided by PE ratio indicators.

2. Theory and methodology

This section of the article will reveal the profitability and risk-averse approach of each hedging strategy. The data on benchmark and performance is obtained from the Yahoo Finance database, in addition, the trading with hedging strategies used a platform that simulates global stock trading named Stocktrak to track stock price changes and to ensure objective analysis of the strategies.

2.1 Merger arbitrage

Principally, Merger Arbitrage is a trading strategy driven by the event of a merger between companies, which aims to profit by accepting the risk of uncertainty during the announcement of the merger. The selection of a hedge fund strategy determines the expected risk-taking level of the investment along with the range of returns. Since the announcement of a merger between corporations normally contains the price of the settlement, the expected return from the arbitrage in a merger is predictable. The process of acquiring companies typically takes the form of a cash transaction, stock exchange, or stock to stock exchange[6]. The trading process requires a short position against the acquiring bidder and a long position against the acquired firm. Regardless of the form of assets that are involved in the transactions, ultimately the bidder of the acquisition is required to pay the acquired party with an amount of cash or equivalent assets to complete the process. Since the acquirer's cash or equivalent assets are derived from the company's future cash flows, this would logically pressure its share price. Secondly, the acquirer will be required to pay a premium for the stock of the acquired party, in previous acquisitions. "Predating 30-90 days before the announcement, the average premium is 41% over the market value of the target company [6]." Instead, the acquiree will receive the cash equivalent of the premium price into the company, thus directly benefiting the shareholders. Simultaneous long and short positions provide a risk-free return for the hedging strategy and once the merger is successful would result in a profit for both positions. Historical data shows that the average acquisition success rate for cash transactions is 93%, while the success rate for each type of merger exceeded 80% for the period 1993-2000. This indicates that once a merger is announced there is a high probability of it becoming a reality[7]. The data will examine the profitability of this strategy in ongoing mergers and acquisitions through Biohaven's merger with Pfizer.

2.2 Market mutual strategy

As shown in Equation (1), the return of a stock is made up of two components: α and β. The alpha represents the equity's future return, while the beta represents the systematic volatility. Equation (1) is the main application of this strategy trial; the target is to obtain only the alpha return of company A by using combination β to hedge systemic risk. The systematic risk of the stock company A is hedged by (βA - (βB + βC) = 0 after seeing a bullish opportunity in Company A. The beta for companies A, B, and C are all collected from Yahoo Finance.

$$\text{Market Mutual Return} = \alpha A + (\beta A - (\beta B + \beta C) \quad (1)$$

2.3 PE trading strategy

The P/E ratio is the ratio of the share price per share to the earnings per share, which is used to measure the range of share price as it reflects the level of net profit. The PEG ratio (which is the price-earnings [PE] ratio divided by the short-term earnings growth rate) has become a popular measurement indicator of combining prices and forecasts of earnings and earnings growth into a ratio that is used as a basis for stock recommendations (implicitly for comparing expected rates of return) [8]. In this strategy experiment, the P/E ratio in Yahoo Finance is used to select undervalued stocks and test the profitability of the strategy.

3. Empirical discussions

In this section, an analysis of the three hedging strategies and their results will be included. The S&P 500 return for the same period will be considered as a target benchmark to compare with the hedging strategies return and risk-taking. Also, stock picking and influencing factors will be discussed, including risk, financial system, macroeconomic policy, and investment sectors.

3.1 Benchmark

The S&P 500 as a benchmark ranged from 415.26 to 381.24 during the data measurement period (May/31/2022-July/1/2022). The highest intraday high during the data collection period was 415.64, while the lowest was 362.17. According to the data, the decline during the period was -8.19%, as the volatility in the market came from the impact of tapering and interest rate increases, hence the individual stocks did not receive the same inflows as the S&P 500 during the market revival. The highest and lowest intra-day return was -12.86%.

Table. 1. Stocktrack experiment data for each hedging strategy

Strategy	Symbol	Action	Qty	Price Paid	Last Now	Stock Return	Strategy%
Merger Arbitrage	BHVN	Long	1100	142.96	144.42	1.20%	
	PFE	Short	-2915	53.94	50.66	6.08%	7.1%
Market Mutual	LULU	Long	338	304.08	278.56	-8.39%	
	COE	Short	-40600	1.25	1.28	-2.4%	
	PGRU	Short	-8475	5.77	4.44	23.05%	12.26%
PE Ratio	WMT	Short	796	127.46	122.02	4.27%	
	TGT	Long	632	160.52	144.52	-9.97%	-5.7%

3.2 Merger arbitrage

In the applied merger arbitrage hedging strategy, the strategy theory does not have systematic risk. I have selected the merger of Pfizer and Biohaven (Table 1). The selection of the hedging portfolio determines the ultimate return and risk-taking as this is an event-driven arbitrage strategy. The Tesla-Twitter deal at the same time was not considered a hedge due to the acquirer's own risk, even though Tesla had a more compelling cash flow. Eventually, the Tesla-Twitter merger was announced to be halted. “Expands Pfizer’s innovative Internal Medicine pipeline to drive enhanced growth through 2030 and beyond Biohaven common shareholders will receive $148.50 per Biohaven share in cash [9].” In the transaction, Pfizer had a position worth $157256as it needed to spend cash flow to complete the merger process. The capital allocation of the hedge portfolio is 1:1 and the overall return of the strategy is 7.10% (Table 1). The short Pfizer position contributed 6.08% of the return over the same period with the S&P 500 at -8.19. In contrast, the final price announced for the transaction is 148.5 per Biohaven share, and portfolio earnings without merger cancellation will be comparable to

the prior period. The data supports that Merger Arbitrage's short positions contributed returns that exceeded expectations when the S&P 500 underperformed during the same period.

3.3.1 Market mutual

Stock returns can be decomposed into systematic and idiosyncratic components [10]. Alpha return stands for companies' unique event-driven profit, such as innovative product launches or the maintenance of patents and technological breakthroughs in the industry. The core of Market Mutule's strategy is company selection and future equity Alpha returns. Market Mutule's hedging strategy tests stock picking skills, as its theory is to hedge beta to avoid volatility in the market and thus only gain alpha on stocks. Lululemon is a long-term bearish company in the hedging strategy. Sportswear will be a strong performer due to the monetary relief packages and the larger share of consumption in GDP. In addition, in calculating the return of LULU shares in the summer of 2017 concluded that it average return was as high as 30.5%, while the median rate of return is 36.73%, as shown in Table 2.

Table. 2. Lululemon Stock price performance in summers (April 1 to August 1) from 2017-2021 Stock prices are collected from Yahoo Finance

Year	April first price in USD	August first price in USD	Return Performance %	Average Performance
2017	51.6	61.73	19.63%	30.5%
2018	87.93	120.23	36.73%	
2019	165.41	191.46	15.75%	
2020	219.46	328.41	49.64%	
2021	308.23	403.02	30.75%	

The short position is a combination of COE with a beta of -0.5 and PGRU with a beta of -0.79. The overall beta of the hedging strategy converges to 0, although there will be small changes in beta. The ratio of 1:1 in both long and short positions was achieved, which resulted in a total return of 12.26% for the hedging strategy. Although Lululemon experienced outperformance losses in a macroeconomic environment with interest rate increases and recession, the overall portfolio outperformed expectations due to beta hedging. The strategy withstood the volatility of the environment in the short term and substantially outperformed the benchmark.

3.3.2 Volatility

Removing the alpha returns of a company from a combination of stock returns leaves a systematic risk called volatility. Typically, systemic risk is the result of general market performance and macroeconomic factors, such as the subprime mortgage crisis or rising interest rate moderation. Systematic risk under the influence of complex macro factors can lead to stocks not performing as expected, which is one of the factors the strategy selected during the period tested. The following Equation (2) is how volatility is calculated. Ph represents the highest price of the stock during the day, Pl presents the lowest price during the day and Pc stands for the closing price during the day. Historical data from the stock's intra-day price change interval can be visualized in a chart to facilitate analysis.

$$V=(Ph-Pl)/Pc \quad (2)$$

Figure (1) is obtained by Equation (2). The stock prices and closing prices from 06/30/2017 to 06/29/2022 are collected for the company Lululemon which constructed Figure 1 as well. The X-axis and Y-axis each stand for the stock's volatility and dates since 06/30/2017, and the results Series 1 and 2 represents the volatility from each day and average volatility. The two large peaks of historical volatility represented by Series1 in Figure1 were in the 360-day and 685-day ranges, where volatility in the previous peak came to 0.2 and the second peak came to about 0.15 and remained there for a period of time. The first peak was at the end of 2018 when the S&P 500 performed by -15.93%, and

the second peak (03/19/2020) was the multiple stock market circuit breaker triggered by COVID. Whereas the volatility of the stock has subsequently all returned to its 5-year average (Series2). Figure 1 and the calculation of volatility support that both occasions when it exceeds 0.1 are periods of systemic risk in the stock market. The volatility of the stock always returned to the 0.05 range after two systematic risks, which indicates that the stock has high volatility only during a poor market performance and eventually returns to a relatively stable condition.

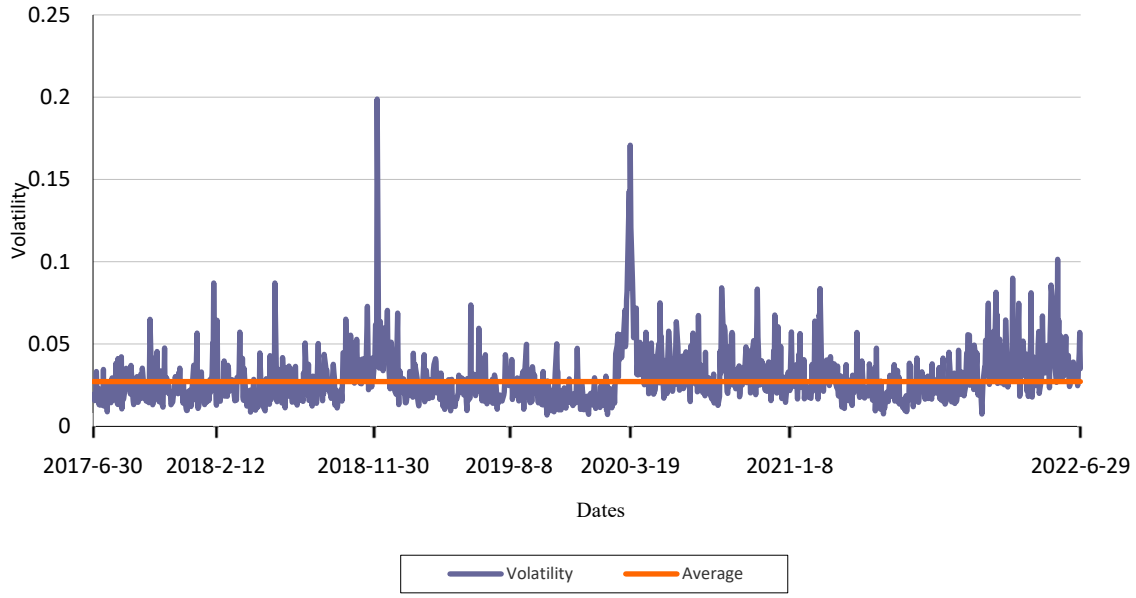


Figure.1 Lululemon's volatility since June/30/2017 vs average volatility
(Stock Volatility collected from Yahoo Finance)

3.3 PE Ratio

In order to eliminate portfolio bias in the PE ratio to the extent possible, the two stocks selected are from the consumer retail sector. Both companies have competed in the same industry to avoid bias in industry statistics although they have diverse consumer groups. The PE ratio of Walmart to Target is 26.95 and 13.35, whereas the hedge portfolio is funded one to one.

Walmart's long position generated a profit of 4.27%, and Target's long position resulted in a loss of -9.97%. The PE ratio hedge strategy did not achieve positive returns as the first two strategies did when the S&P 500 took a decline of -8%, regardless of the long position in the hedge fund portfolio that helped take some losses. The results indicate that the PE ratio measurement is insufficient to exceed the expected returns in a hedge fund portfolio. The growth of the company is not reflected in the performance of the company as measured by the PE ratio. Moreover, neither the discount rate nor the model of future profitability can be accurately represented in this portfolio.

4. Discussion

According to the Stocktrack trade simulation and analysis of Merger Arbitrage, Market Mutual Strategy, and Strategy based on PE ratio, the Merger Arbitrage hedge portfolio contributed 7.1% of the profit; Market Mutual Strategy presents a return of 12.26%; PE ratio Strategy has a performance of -6.22% when the benchmark SPY500 was performing -8.19% at the same period. Since the experiment is conducted based on the stock market performance, the following biases are observed. The first thing is that overall asset prices are trending downward, but the results of the strategy will appear to exhibit different performance results and returns in the long run. Moreover, it is emphasized that since the target of the test is the performance of the three strategies when the market is not performing well, the probability of underperforming the market, in the long run, should not be

factored into the coverage. Secondly, there are two biases in the market mutual strategy that can influence the performance of the strategy. The beta of a company changes based on its performance in the past month, therefore there would be a subsequent bias in Equation 1 where (βA-(βB+βC) does not equal 0 anymore. Although the deviations in values are not expected to fluctuate drastically after the strategy model is built, there are also deviations in the analysis of systemic volatility. The underlying macro factors that influenced the underperformance of the market are inflation, interest rate increase, and recession concerns. In fact, different sectors also perform differently in the presence of the same systematic volatility, depending on the industry and sector the company is in. The bias consists in the fact that the next systematic risk originates from distinct macro factors, and the flexibility of the strategy and stock selection causes the same strategy to perform differently.

5. Conclusion

This study utilizes hedging strategy theory with simulated position holdings of three hedging strategies to provide data results for the analysis, where the S&P 500 presents -8.19% performance over the same period from May/21st/2022 to July/01/2022. The following conclusions are drawn after analyzing risk and return, volatility, PE ratio, and historical stock performance averages. This research utilizes hedging strategy theory with simulated position holdings of three hedging strategies to provide data results for the analysis. Two of the three strategies tested achieved positive returns when macro markets underperformed. The short positions in all three hedged portfolios provided returns, which hedged the risks and losses. Merger Arbitrage performed most appropriately to theory, with both its long and short positions performing reasonably as well as generating profits beyond expectations in the market. In the Market Mutual strategy, the hedge portfolio achieved positive returns but not from theoretical alpha returns. The returns in this strategy are derived from the (βA-(βB+βC) market volatility hedge component, and it is undeniable that the strategy has successfully withstood the market volatility in the short term. However, this does not prove the success of the strategy, because the long-term alpha needs to be proven over time. The hedging strategy dominated by the PE ratio yielded no positive returns, but its returns outperformed those of the S&P 500 over the same period. The perspectives that reject the strategy are possible to question the theoretical deficiencies and long-term performance of PE itself. The data demonstrate that Merger Arbitrage and Market Mutual are worthwhile strategies when the market environment is not performing well. The PE ratio hedging strategy failed to achieve excess returns but hedged part of its losses in the short term by taking a short position, allowing it to outperform the S&P 500 over the same period. Although holding a short position is the obvious option when the market is not performing well, a balanced hedge fund portfolio is indeed an option that avoids risk and guarantees a limited return.

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