The Performances of Different Strategies Based on Time Series Analysis for the U.S. Markets

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Abstract

Contemporarily, with globalization and excess liquidity, hedge funds have achieved rapid development. The investment fields are not only limited to the traditional capital market, but also involve almost all currencies, bonds, derivatives, commodities and financial futures markets. It is of great significance for the development of financial market and institutional investors to deeply understand and study the private investment institutions such as hedge fund, especially the profit model and income of hedge fund, i.e., the pricing of hedge fund. This paper selects a variety of arbitrage strategies to analyze their performances in the American market based on time series model. After pointing out the methods adopted by different strategies, this paper summarizes the specific performance of different strategies. In addition, the shortcomings of the paper are also discussed, and the future prospects of the development of arbitrage strategy are demonstrated accordingly. Overall, these results shed light on exploring the risk of arbitrage and the wisest trading decision.

Keywords-arbitrage strategy; Equity trade; Market Neutral Trade; Momentum trade; Futures Trade; potential returns; market efficiency; risk

1. INTRODUCTION

Hedge funds are the product of financial innovation that has a long history. In order to avoid market risks, investors combine options with futures and other financial derivatives to carry out hedging and transposing. The high leverage of hedge funds quickly attracted a large number of investors with a risk appetite into the market. After several years of development, hedge fund has become an important investment tool in the financial market. The US is the world's most developed and largest hedge fund market. Therefore, it is helpful to improve the understanding of the development of the hedge fund market to learn from the experience of various strategies in the American hedge fund market.

On this basis, with the continuous development and improvement of futures market, futures are now trading more futures market participation has also increased significantly, there are still a lot of arbitrage opportunities for excess returns in the futures market. Therefore, participants of futures market pay more and more attention to the application of statistical arbitrage in futures market, they want to get more with less risk [1]. One such investment strategy involves cross-product arbitrage, across varieties of arbitrage is to use two or more than two of the difference between the futures contract deviate from its original level [1], buy or sell a futures contract at the same time to sell (or buy) and the relationship between futures contracts have a stable price for delivery in one or more of the same futures contract [2], when the difference between the futures contract to return to normal levels, unwind trades, interest income. Meanwhile, intertemporal arbitrage, cross-market arbitrage, arbitrage and other investment strategies are also used in the fund market [2].

There are many previous studies on arbitrage strategy, this paper only introduces one of them. According to the efficient market theory, the stock price should be adjusted to a new level in time after the occurrence of any event affecting the stock price, and no one can obtain excess returns [3]. Jegadeesh and Titman stated that the feasibility of momentum trading strategy is empirically tested by using data from CRSP Daily of University of Chicago Business School [4]. Based on investigation of 6 Asian stock markets, Hameed and Yuanto concluded that the extraordinary benefits of momentum trading strategies were small but still statistically significant [5]. It can be seen that most studies on the momentum trading effect of developed stock markets have reached a positive conclusion, and the use of momentum trading strategy is

effective [5]. The earliest market-neutral strategy dates back to the 1920s, when legendary American trader Jesse Livermore used the spread in his portfolio Sister Stocks to profit from long and short positions [5]. In the 1970s, some fund managers in the United States began to use the market's shorting mechanism to achieve this strategy [6]. In the 1990s, financial derivatives became popular, providing a broad space for the development of market-neutral strategies, which made a qualitative breakthrough in the number and scale of market-neutral strategy funds [6].

It can be known that arbitrage can be divided into risk-free arbitrage and statistical arbitrage [7]. The former is generally based on some economic and financial theories. When the correlation formular is not satisfied, the trading opportunity will be triggered [7]. If the trading income can offset the trading cost, it will bring profit. This arbitrage strategy usually carries little or no risk. The latter refers to the arbitrage behavior of asset subject matter with unreasonable price through statistical analysis of historical data. The main methods are mathematical statistics and financial measurement [7].

In this paper, several different arbitrage strategies are studied, and the profit and loss under different strategies are analyzed. The rest part of the paper is organized as follows. The Sec. II will show the data source and describe the data. The Sec. III will analyze the data. Eventually, a brief summary will be given in Sec. IV.

2. DATA & METHOD

Firstly, the mechanism and procedures of equity trade are introduced. In such a trade, it is mainly the equity transfer transaction between equity holders and investors who intend to hold equity. Among them, the price-earnings ratio vs. earnings growth (PEG)=Price concept is particularly important. Here, the PEG represents a stock valuation metric invented by Jim Slater. It is developed on the basis of PE (price-earnings ratio) valuation [8]. It compensates for PE's lack of dynamic growth estimates. Earnings ratio divided by the growth rate, when $(P/E)/(G*100)$ greater than 1, the investor invests in the current stock, when $(P/E)/(G*100)$ less than 1, the investor sells the current stock. In this paper, five weeks of data are used for comparative analysis, and M and DLTR are traded [8]. The buying strategy is to long Amazon and short Walmart. Amazon P/B is 12.67, P/E is 58.92, Dividend is 0 Walmart P/E is 22.32, P/B is 4.3. Dividend is 2.20. Purchase amzn100 shares and short WMT 2177 shares.

Second is Market Neutral Trade, which is a relative value investment strategy that is designed to be unaffected by the returns of the overall market (S&P 500 Index) [9]. It usually involves a long position in a security that is expected to do well and a short position in a security that is expected to do poorly, both over the same given time horizon [9]. Ideally, at the time of the trade, the long security is undervalued and the short security is overvalued. This valuation is typically based on the type of fundamental analysis done in the hedge fund and mutual fund community. The advantages of market neutral strategy include no correlation with market index, pursuit of absolute return, low risk, small volatility, huge market capacity and good liquidity [9].

The definition of market neutral strategy is that investors buy relatively undervalued stocks and sell relatively overvalued stocks simultaneously. Through one buy and one sell, the systemic risk of the portfolio is eliminated, and the profit is liquated when the stocks are recovered to a reasonable valuation level [10]. The central assumption of the strategy is that there are reasonable relative valuations between stocks, and while they will deviate from reasonable levels for some time, eventually the market will repair itself and the relative valuations will return to reasonable ranges [10]. To achieve market neutrality, investors typically hold long and short shares of equal market value. In addition, when selecting stocks, the systemic risk of the investment object will be considered comprehensively. It is better that the systemic risk of long-short stocks is roughly equal. Consequently, the systemic risk of the portfolio can be basically ignored after the long-short hedge. Known as Beta neutral: the net value of a portfolio does not change simply because the market as a whole fluctuates. In this paper, five weeks' data is used for comparative analysis, and ORCL and CERN are traded. Short orcl1009 shares, valued at $83000, and long cern882 shares, valued at $81000. The beta of ORCL is 0.81 and the beta of CERN is 0.83. Since the long price of CERN continues to rise, selling at the right time can earn the price difference, and the short price of ORCL continues to decline. Selling early is conducive to selling at a high price to obtain income.

The third is Momentum trade. In this trade,5 Day Moving average=[P(-5)+P(-4)+P(-3)+P(-2)+P(-1)]/5. If moving average greater than current price, Investors will buy. On the other hand, if moving average less than current price, investors will sell. There is no empirical evidence it works for 5, 10, 20 days or even 200 days. If current price is greater than 200 day MA, it will indicate that buy the stock or commodity. Otherwise, if current stock price is less than 200 day MA, it indicates that one ought to sell the stock or commodity. Some investors use a 50 day MA instead of the current stock price. Momentum Investing has a lot of statistical evidence to support it, which indicates markets may not be as efficient as expected. In this paper, five weeks' data is used for comparative analysis, and BP and XOM are traded.

The fourth is Futures Trade, which never adds to a losing position. Conversely, one can only ever add to a profitable position. The basis for a breakout in price action is position profit, continue to add warehouse profit, the price trend always does not fall below the position. This

paper picks a long short trade in healthcare field. In this paper, five weeks' data is selected for comparative analysis, and MRNA and GILD are traded [11]. Long
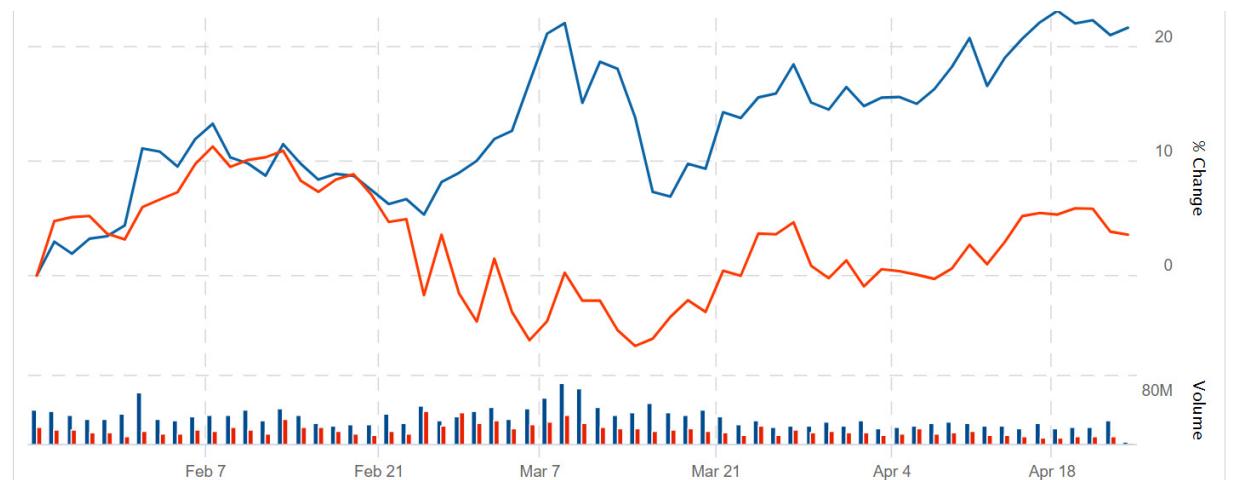
Gilead and Short Moderna, purchase GILD 100 shares and short MRNA 40 shares [12].
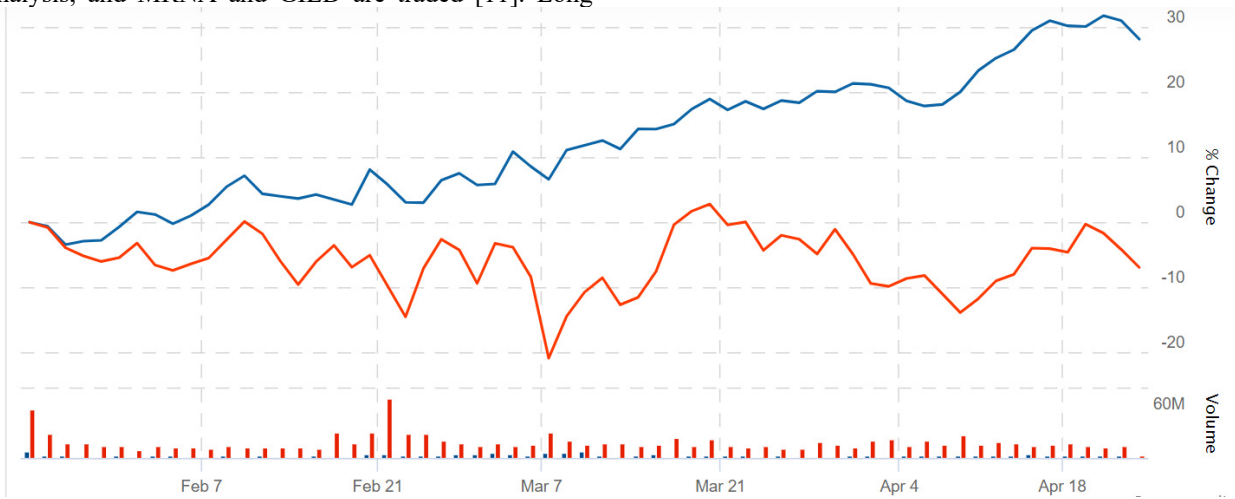
Figure 1. Percentage daily price change for M (red line) and DLTR (blue line).
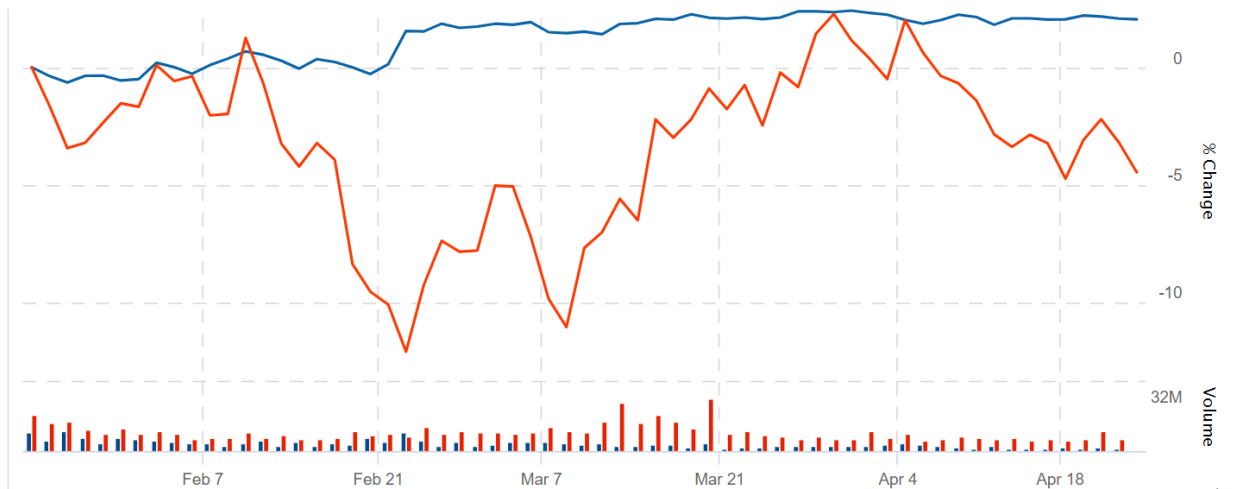
Figure 2. Percentage daily price change for ORCL (red line) and CERN (blue line).

Figure 3. Percentage daily price change for BP (red line) and XOM (blue line).

3. RESULTS & DISCUSSION

In December, New York City investment manager Mantle Ridge went down the Starboard path by nominating its own slate of directors to replace the current board members. Hilal would like to see Richard Dreiling, the CEO of Dollar General (NYSE:DG) from 2008 to 2015, hired by Dollar Tree. Mantle Ridge's $1.8-billion stake is good for 9.9% of the company. Analysts see Dreiling's hiring as a major positive for DLTR stock. Given Mantle Ridge tends to work on one company at a time and replaced CEOs of target companies in the past, shareholders should expect a continued push to appoint Dreiling to the top job. Macy's (NYSE:M) is scheduled to report fourth-quarter earnings on Feb. 21. After suffering devastating consequences at the pandemic onset when it had to shut its doors to in-person shopping. As shown in Fig. 1, one ought to long 120 shares of dollar tree stocks on 02/04/2022 with the price of 130.94, now, its price rose steadily to 142.84 and gave 9.09% of return and at the same time, short 600 shares of M stocks on 02/04/2022 with the price of 25.47, now, its price is 25.7 and gave -0.9% of return.

According to the news, ORCL will acquire CERN at a premium. Therefore, we can implement the M & A arbitrage strategy, i.e., buy the shares of the acquiree and sell the shares of the acquiree at the same time. Hence, as shown in Fig. 2, one ought to short 2009 shares of ORCL on 02/04/2022 with the price of 81.84, now its price dropped to 74.57 and the total return turns out to be 8.88%, short1769 shares on 02/04/2022 with the price of 91.51, but unfortunately, ended with a loss of -0.07%.

Although oil prices surpassed $90 for the first time since 2014, due to surging demand but limited supply. Many scholars believe that oil prices around the world will continue to rally and the foreign oil stock BP (BP) is ideal bets now. However, according to the common sense, BP shares have gained 51.2% over the past year and 25.2% over the past six months. In this case, it is overvalued since there is no notable increase in financial results during last year, as shown in Fig. 3, one should short 500 shares of BP stock on 02/04/2022 and will gain a profit of 3.58%. In order to hedge the risk, one needs to long 200 shares of XOM as Exxon (NYSE: XOM) reported earnings, guiding to flat year-on-year production volumes, although the company plans to increase Permian production by 25% in 2022. But the long leg finally ends with a loss of -5.61%.

The quality of stock information disclosure has an impact on investors' investment decisions to a certain extent. Therefore, in the momentum portfolio with a formative period of one month and three months, the momentum effect of the excellent group does not appear and the momentum effect of the good group is stronger than that of the excellent group. This phenomenon can be explained by the general momentum formation theory: for stocks with poor information disclosure quality, the information transfer speed is slow, and investors are more inclined to trust the private information they obtain, thus the momentum effect is generated

With the initially created vaccines not quite as effective as hoped at curbing the spread of the omicron variant, and even less effective against the new omicron subvariant, the world is losing interest in what increasingly looks like a never-ending chase for immunity. Denmark and England have essentially dropped all pandemic-related restrictions. Therefore, one should short a company related to covid vaccine and buy another type of pharmaceutical company as a hedge.

While MRNA was one of the most ballyhooed names in the race to create a COVID-19 vaccine, shares of the drugmaker overstepped their sustainable, justifiable long-term value in 2020 and 2021. Gilead released FY21 earnings on Feb. 1 - revenues grew by 11% to $27bn and the P/E ratio was ~9x - likely to be best in the big Pharma sector. FY22 guidance is for a fall in revenues, but COVID therapy Veklury could bolster sales after an approval in a non-hospitalized setting. Biktarvy the HIV therapy had a stellar year and maintains the Pharma's dominance in HIV. Meanwhile, the oncology division is growing through cell therapy and potential blockbuster Trodelvy. On this basis, as shown in Fig. 4, one needs to short 40 shares of Moderna on 02/04/2022 with the price of 166.64, but now its price dropped to 145.74. The total return turns out to be 12.54%, short 100 shares of GILD on 02/04/2022 with the price of 64.55, but unfortunately, ended with a loss of -5.42%. All the results are summarized in Table. I.

Apparently, these studies have limitations, and it is clear that the pricing mechanism is not risk-free for market makers. The risk is that they may offer a price, or they may accept an order at that price, and may then sell at a lower price or buy at a higher price. In fact, this risk is not just theoretical, it is real that is not impossible for prices to move against market makers. To reduce risk, market makers often offer prices that are constantly adjusted to reflect their risk, or their view of the market, while not offering prices that could induce arbitrage. Investment decisions susceptible to emotional problems are irrational investors, also known as noise traders. Nevertheless, when rational investors invest in such a market, they will only carry out limited arbitrage or even give up arbitrage, thus making the security price deviate from the actual price. Therefore, this paper studies on the premise that investors are bounded rationality. Moreover, the time of the research object in this paper is relatively short, which may not be able to reflect the actual changes of the transaction.

TABLE 1.   THE STATISTIC RESULTS OF DIFFERENT TRADES

Equity Trade	return	profit	sharp	max drawdown
M	-0.90%	-138	0.84	91.95%
DLTR	9.09%	1428	0.92	44.64%
Market Neutral Trade				
ORCL	8.88%	14600	0.51	32.97%
CERN	-0.07%	-113.96	1.54	36.84%
Momentum Trade				
BP	3.58%	590	0.76	63.91%
XOM	-5.61%	-920	1.9	62.40%
Futures Trade				
MRNA	12.54%	836	0.44	73.90%
GILD	-5.42%	-350	-0.36	45.74%
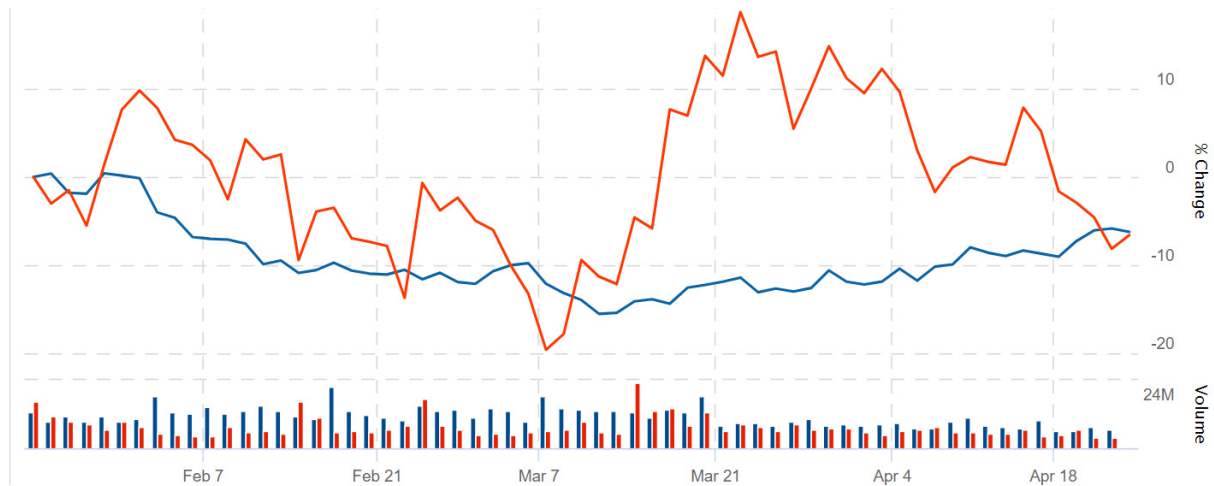
Figure 4. Percentage daily price change for MRNA (red line) and GILD (blue line).

4. CONCLUSION

In summary, this paper investigates different arbitrage strategies based on time series analysis for the U.S. markets. Specifically, different strategies have different effects. According to the analysis, when judging whether investors adopt these trades, they only need to consider whether they chase stocks with good early yield. Meanwhile, investors are more likely to observe the stocks held by investors with the same investment style and good early performance, considering the limited attention and the limitations of investment style on investors. Therefore, as long as the fund has pursued the stocks held by the fund with the same investment style and good early performance, it can be explained that the fund has used momentum trading strategy. In the future, the advantage of arbitrage lies in low risk, crossing the bull and bear, and the returns are very good. The difficulty of arbitrage lies in learning and looking for opportunities. It is the smartest trading decision to test the direction of the right path with the gain and loss of capital. If this behavior can persist, it is believed that those who do so will be able to get rich returns in the market. Improving the revenue path is not about finding the number of opportunities, but about making a big profit on a few good opportunities. Last but not least, using a familiar trading system is able to identify certain, manageable opportunities in seemingly uncertain, random market movements. Overall, these results offer a guideline for strategies performances evaluation and strategy selection.

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