

Comparison of the Performances for Mean Revision Strategy Based on Three Underlying Assets

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Abstract. The predictability of funds returns has always been a hot topic in academic circles. Relevant scholars have carried out a lot of empirical studies and found that funds prices tend to revert to the mean after rising and falling for a while. In view of the fund long-term return forecast problem, this study investigates the performances of three underlying assets, i.e., ZhongOu Medical And Health Hybrid A, Fullgoal China Securities New Energy Vehicle Index (LOF)A, and ZhongRong Securities Coal Index. To be specific, this study starts with introducing theory for mean reversion. Three analytical metrics were adopted for quantitative analysis: Sharpe Ratio, Mean-Variance and Price Discovery. Based on the evaluations, the mean-reverting of stock returns is estimated from both theoretical and empirical perspectives. Besides, the performances for the mean revision strategy are compared. According to the analysis, stock prices tend to revert after rising and falling for a while; therefore, the mean reversion phenomenon in the track stock is more obvious. These results indicate that the mean reversion is suitable for higher market maturity. These results shed light on guiding further exploration of choosing appropriate investing time and strategy.

Keywords: Mean Reversion; Sharpe Ratio; Mean-Variance; Price Discovery.

1. Introduction

Contemporarily, thanks to the big data techniques, lots of quantitative strategies are proposed [1, 2]. Thereinto, mean reversion is one of the widely applied and investigated strategies [3, 4]. Along with the improvement of the fund market, the theory of mean reversion in the fund income prediction is increasingly applied. Apparently, it's not just portfolio theory that is a historical leap but a breakthrough in the theory of stocks market predictability.

Fund market price, at any moment is reflected in a timely and adequate manner based on all available information [5]. Samuelson, the intrinsic value of the ticket and the intrinsic value is based on considering the stock issued by the public. A basic analysis of the division's expected future earnings is obtained when available, valid new information becomes available, most investors correct their attitudes to estimate earnings expectations, and these revisions will affect their stock an estimate of the intrinsic value of a ticket. So, one needs to look at stock prices on the surface it changes with the advent of new information, market internality, and changes in value estimates are related only to information, but not to prior price trends [6, 7]. It's an early discovery of stocks. Scholars of the phenomenon of mean reversion of returns. Fund prices always revolve around, its value center fluctuates up and down; neither does it fall forever, nor does it, it will go up forever. In the case where the price is higher than the intrinsic value, the fund probability that the ticket will go down increases.

On the contrary, the price is lower than the intrinsic in this case of value. The probability these funds will go up is increasing. At the end, mean reversion is bound to occur and the mean is intrinsic to the stock Value, which shows that the market has price discovery in the long run basic function of.

In order to well diversify the tail risk of the portfolio in extreme cases and significantly improve the performance of portfolio investment, this paper investigates the performance of the mean revision strategy. To be specific, Sharpe Ratio, Mean-Variance and Price Discovery are selected as the target. The rest part of the paper is organized as follows. Section 2 will introduce the data and analysis models. The Section 3 will clarify the results and offer corresponding discussions. Section. 4 will demonstrate the strategy's limitations, and a summary will be given in Section 5.

2. Data & Method

2.1 Data

As shown in Fig. 1, this article selects ZhongOu Medical And Health Hybrid A, Fullgoal China Securities New Energy Vehicle Index (LOF)A and ZhongRong Securities Coal Index 8 .17 .2020— 09 .09.2022, including 487 days of data. On the basis of closing price analysis, the foundation is affected by many factors; there are different degrees of mean reversion. Price movements are not stable by mean revision strategy set up the mean and variance calculate the Sharpe ratio function.



Fig. 1 The price evolution of three indexes.

2.2 Models & Strategies

This paper selects three index funds of the same type from the Investing database Zhongou Medical and Health Hybrid A, Fullgoal China Securities New Energy Vehicle Index (LOF), A and Zhongrong Securities coal index. Ceibs A includes 10 stocks, including top-quality listed medical companies, reflecting the changes in stock prices of the track. Fullgoal China Securities New Energy Vehicle Index (LOF)A contains 10 high-quality stocks selected by the new energy track as heavy stocks, which can represent the development status of China's high-quality new energy enterprises. Zhongrong Securities coal index as this year's coal fund performance of the best indicators, can reflect the characteristics of the industry cycle.

3. Results & Discussion

3.1 Mean-Variance Analysis

Investors utilize variance as a critical notion to assess a given venture's risk and potential returns. In order to attain a superior asset allocation, it is typically utilized as a comparative tool for performance comparison between assets in a data profile. The difference between the average mean and the values in the data profile is squared, and the square sum is divided by the typical number of values in the portfolio to determine the variance. The degree to which a set of numbers deviates from the average or mean is measured by variance. Statisticians measure the variance of a random variable's deviation from its standard value. Variance is a measure of market volatility used by traders and market researchers. Calculating the discrepancy between a forecast and the actual outcome requires the variance formula. A percentage or an integer can be used to express the variance.

To evaluate outcomes and make wise decisions for a business's future, variance analysis and the variance formula are crucial components of corporate financial planning and analysis. The variance ratio test is not the most accurate way to determine whether a model is mean reverting since the influence of micro variables is quite clear, and changing regulations and liquidity market rings will cause the variance ratio to fluctuate dramatically. To conduct security portfolio research, the theory of probabilities and linear algebra should be used [8]. The development of the Mean-Variance Portfolio model strengthens the notion that investors should consider both return and risk when making investments. The anticipated value of an investment return serves to quantify the expected return on an investment, and the variance serves to quantify the risk of a portfolio's return. Risk is measured as variance, and mean-variance analysis compares it to the expected return. To decide which investments to make, investors employ mean-variance analysis. Investors consider the level of risk they are ready to accept in exchange for various levels of profit. Using mean-variance analysis, investors can determine the greatest reward at the lowest risk or the lowest risk at the highest return. We'll go through each formula in more detail in the following paragraphs.

The variance ratio is the difference between the variance of long-term returns and the variance of short-term returns. For the variance ratio test method, previous scholars argue that Rowe and Machin Ray's test is an individual hypothesis test [9]. Because it's a centralized test, that variance ratio of a certain period in a certain period of the time, besides, the variance ratio is affected by the influence of micro factors is extremely obvious, different regulation, liquidity market ring the variance ratio will be significantly different. Therefore, the variance ratio test does not it is the most reliable mean reversion test method.

3.2 Sharpe Ratio

The Sharpe ratio is most referenced in academia and among everyday retail investors because of its relative simplicity and ease of calculation [10]. It is used to assess the risk/return of a portfolio or an individual investment – however, most use it for a basket of investments. More specifically, the Sharpe ratio helps when comparing performance among portfolios, especially when it comes to the selection of funds.

Sharpe simplified Markowitz's mean-variance model and proposed the Sharpe ratio on the basis of the capital asset pricing model (CAPM), which took the capital market line as the evaluation basis point [11-13]. When the Sharpe ratio of the portfolio is greater than the Sharpe ratio of the market benchmark portfolio, the portfolio is positioned above the capital market line and outperforms the market on the contrary, the investment group is located under the capital market line, the performance is inferior to the market.

A benchmark frequently used to measure how successfully an investment manages risk to generate a return is the Sharpe Ratio. The Sharpe ratio can be used to swiftly determine which of various investment options is better for the investors' money. It is equivalent to the investment's effective return divided by its standard deviation.

The formulas that produce the Sharpe ratio are straightforward and surprisingly simple to use in Excel, even though the original calculations can be somewhat scary. By utilizing the "=Average" formula to find the average of the "Portfolio Returns" column, one can then take the risk-free rate out of it to determine the Sharpe Ratio. Divide this amount by the portfolio returns' standard deviation, which may be calculated using the "=Stdev" formula. Alternatively, the calculation for standard deviation could be "=Stdev" depending on the version of Excel being used.

The formula would be =Average for the average of the excess return as indicated in Table. 1. The excess return's Standard Deviation. The formula for this study (seen in Table. 1) would be =Stdev. The Sharpe Ratio is then calculated by subtracting the Standard Deviation from the average of the excess return. Calling this function requires passing it two arguments: the first is a range of investment returns, and the second is a range of risk-free interest rates. The formula would be =SharpeRatio in my example. As shown in Table. 1 since the Sharpe ratio adjusts a portfolio's historical or future performance for the excess risk taken on, a higher Sharpe ratio is preferred when comparing across portfolios.

Table 1. Three Scheme comparing

	Zhongou Medical and Health Hybrid A	Fullgoal China Securities New Energy Vehicle Index (LOF)A	Zhong rong Securities coal index
Standard Deviation	0.543656964	0.201151477	0.365326
Regression	0.295562895	0.040461917	0.133463
Standard Deviation	0.502958991	0.196570807	0.340273
Sharpe ratio	0.986717354	0.988071068	0.966049

3.3 Return

As shown in Table. 2, the expected return of a portfolio provides an estimate of how much return one can get from their portfolio. The returns and the risk of the portfolio depend on the returns and risks of the individual Funds and their corresponding shares in the portfolio. The parameters of the risk and return of any fund explicitly belong to that stock; however, the investor can adjust the return to risk ratio of that portfolio to the desired level using certain measures. One such measure is to adjust the weights of the Funds in the investors' portfolio.

Table 2. Three Schemes comparison

	Zhongou Medical and Health Hybrid A	Fullgoal China Securities New Energy Vehicle Index (LOF)A	Zhongrong Securities coal index
Return	-62.10%	15.80%	121.70%

3.4 Analysis

According to the theory of mean reversion in finance, the prices of securities and other economic indicators like interest rates will typically return to their historical mean levels. When purchasing a

stock with a low PE with the expectation that it would climb to the historical average PE or industry PE, one might use the mean reversion principles. This strategy is frequently used by value investors to purchase stock for long-term investing.

The same principles can be used to develop short-term mean reversion trading strategies utilizing technical indicators. Sharpe ratio it's based on the mean-variance modulus income adjustment can effectively evaluate the investment performance. Sharpe ratio, as one of the three classical indexes to evaluate fund returns and risks, reflects the risk compensation obtained from the overall volatility of the portfolio. It can make resource allocation and performance evaluation of investment portfolio so as to provide effective decision plan and avoid investment risks, which has important guiding significance to maintain the stability of the securities exchange market and promote the rapid development of the economy.

4. Limitation & Prospects.

Nevertheless, it should be noted that the theorem of the mean revision has some defects and drawbacks. The biggest limitation of mean reversion theory it is impossible to determine the exact regression period. The mean reversion of stock returns is a long process; stock returns in the short term are mostly random characteristics, long during the period, it is mean reversion.

Meanwhile, mean reversion is asymmetric, and There is no uniform half-life for mean reversion. Using the divergence between stock price and firm value, one can buy shares at a significant discount and sell them at their value after the price has risen to lower than the stock intrinsic. Therefore, one can get excess profits, and that's mean reversion and price discovery. The great use of this theoretical approach to investing the practitioner is Warren Buffett. Same thing with funds. In the future. These three approaches may have some drawbacks. According to the efficient market hypothesis, investors cannot obtain excess returns based on historical information. However, the emergence of relevant research results, e.g., "market anomaly" and investors' irrational behavior, has raised doubts about the correctness of this conclusion. Debond and Thaler [6] and Jegadeesh [14] respectively found through empirical studies that foreign markets have both long-term and short-term mean reversion characteristics.

5. Conclusion

In summary, the mean reversion approach can only be applied to stationary or range-bound stock price series. The approach won't be effective with stock price series that exhibit long-term patterns in either direction. Such a strategy was previously used by numerous successful investors who had great success using it. Mean reversion is unavoidable as the stock price lattice always oscillates about its intrinsic value. The stock price of the lattice always fluctuates around its intrinsic value, not always above its intrinsic value in value, nor is it always below its intrinsic value. The stock market is homogeneous value regression also reveals its own price discovery function. Mean reversion is an asymmetric stock of price, and yield is asymmetric.

There is unlimited room for the stock price to go up and limited room to go down. Long-term investors like Warren Buffett use mean reversion and other contrarian investing strategies. Jim Simons, the founder of Renaissance Capital and a hedge fund, employed mean reversion trading techniques to raise money. Typical datasets where strategies of this type are applied are exchange rates between currencies, spread between long-term and short-term interest rates, spreads between interest rates in different currencies, spreads between different share classes of the same company, etc. Overall, these results offer a guideline for mean reversion that can not only evaluate the performance of different funds in the same period but also evaluate the performance of the same fund in different holding periods. Based on the results, one can find out the best investment holding period of the fund.

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