Performance and Persistence of Mutual Funds and Trading Strategy Implications

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Abstract:

This paper evaluates the fund performance employing the Treynor, the modified Sharpe, and the Jensen measures and performance persistence in Taiwan. The empirical results show that mutual fund performances are significantly consistent under these three measures. While considering the performance persistence, in the crisis period the best performing ones may be later on become the worst performing ones and vice versa. The relationships of the mutual fund performances between in the financial crisis period and in the post-crisis period under different measurements all show negatively correlated. Overall, investors should be very cautious during a financial crisis period since winners now may become losers in the future.

Keywords: Modified sharpe ratio, Value at risk, Financial crisis.

I. INTRODUCTION

According to the total number of onshore funds was 642 for a total size of NT\$2.072 trillion, while the total number of offshore funds was 1,028 for a total size of NT\$3.294 trillion at the end of October 2014 in Taiwan.

Mutual fund has become the most popular investment tool for its low transaction cost, professional management and diversified portfolio. The common issue for mutual funds is which funds are relatively efficient, and how to choose a suitable fund or an investment portfolio is an important and hard task for general investors. It is worth noticed that whether past winners are still future winners.

Investors, stock analysts and managers have for years sought reliable indicators to measure the fund's performance and persistence. The assumptions of these measures are generally on the basis of capital asset pricing model such as Treynor [1], Sharpe [2], and Jensen [3]. Dowd [4] and Chuang et al. [5] use modified Sharpe measure.

Many researchers have investigated topics concerning mutual fund performances for a long time. Hunter et al. (2014) apply the factor model and use active peer benchmarks to test mutual fund performance. We use Kendall coefficient of concordance to further analyse the consistency

of mutual funds. Several studies show that economic conditions may affect mutual funds' performance. Kosowski [6] points out that according to Jensen index, the funds perform differently in different periods.

In this study we want to examine how the 2008 global financial crisis did affect mutual funds' performances. The persistence of fund's performance is important for investors. If the fund's past performance does predict its future performance, then based on this information, investors would choose a fund that has outperformed. Sharpe [2] shows that persistence performance does not exist in mutual funds by using the Spearman correlation coefficient. Many studies examine the performance persistence such as Grinblatt and Titman [7]. Vidal-García (2013) investigates the European fund's persistence of performance and notes that there is strong evidence that benchmark adjusted returns persist for one year and longer. Gao, et al. [8] examines the Chinese equity fund's performance persistence. Deb [9] examines the fund's performance persistency. Cooper and Gregory-Allen [10] find that the increased financial regulations have some positive impact on fund's performance.

There are three objectives. First, the mutual fund's performance is measured. Second, the consistency of mutual fund performance is examined. Third, the fund's performance persistence under different methods are investigated.

II. DATA AND METHODOLOGY

The data used herein mainly come from the Taiwan Economic Journal (TEJ) database. All mutual funds are categorized by the TEJ database as domestic equity funds in the mutual funds market. For each mutual fund we obtain its monthly end net asset value (NAV). Therefore, the data of market portfolios are also from the TEJ database. TAIEX is used to represent the benchmark. According to the mutual fund performance rankings, the top 20 best-performing equity funds are selected. Moreover, we randomly choose 20 equity funds in the TEJ database in order to compare with the performances of the top 20 best-performing mutual funds.

- 2.1 Variables Definition
- 2.1.1 Monthly Return of Mutual Funds (R_i)

$$R_{i,t} = \frac{NAV_{i,t} + DIV_{i,t} - NAV_{i,t-1}}{NAV_{i,t-1}} \times 100\%$$
(1)

where DIV represents the dividend.

2.1.2 Monthly Return of the Market Portfolio (R_m)

$$R_{m,t} = Ln(TAIEX_t) - Ln(TAIEX_{t-1}) \times 100\%$$
(2)

2.1.3 Beta Coefficient (β)

$$R_{i,t} = \alpha_p + \beta_i \times R_{m,t} + \varepsilon_{i,t} \tag{3}$$

$$\beta_{i} = \frac{Cov(R_{i,t}, R_{m,t})}{Var(R_{m,t})}$$
⁽⁴⁾

where ε represents error term. β can be viewed as the systematic risk of each mutual fund. 2.2 Performance Evaluation and Ranking Consistency

There are three methods that we use in this research: the Treynor, the modified Sharpe, and the Jensen measures. A brief description of the methods runs as follows.

2.2.1 Treynor Measure (T)

$$T_i = \frac{\overline{R}_i - R_f}{\beta_i} \tag{5}$$

where \overline{R} is the average return and R_f represents the risk-free rate.

2.2.2 Modified Sharpe Measure (*S*)

$$S_i = \frac{\overline{R}_i - R_f}{VaR},\tag{6}$$

where VaR is the value at risk. S represents the portfolio's return per unit VaR. 2.2.3 Jensen Measure (J)

$$\left(\overline{R}_{i} - R_{f}\right) = J_{i} + \beta_{i} \times \left(R_{m} - R_{f}\right) + \varepsilon_{i}, \tag{7}$$

2.2.4 Kendall Coefficient of Concordance (W)

$$W = \frac{S}{1/12 \, K^2 (N^3 - N)}.\tag{8}$$

$$S = \sum_{i=1}^{N} A_i^2 - \frac{\left(\sum_{i=1}^{N} A_i\right)^2}{N},$$
(9)

where A is the sum of all the measurements ranking for fund i; K is the number of the measurements; N is the number of mutual funds. W examines the consistency and will always be between 0 and 1. Here, W equal to 0 means no agreements at all, and 1 represents perfect agreement.

2.3 Spearman Rank Correlation Coefficient (r_s)

 r_s is used to evaluate the persistence performance and as the following equation:

$$r_s = 1 - \frac{6\sum_{i=1}^N d_i^2}{N(N^2 - 1)} \tag{10}$$

$$\sum_{i=1}^{N} d_i^2 = \sum_{i=1}^{N} \{R(X_i) - R(Y_i)\}^2$$
⁽¹¹⁾

where *d* is the deviation of the performance of mutual fund *i* between these two periods; and r_s close to 1 means the better the consistency between grades, while r_s close to - 1 indicates strong reverse consistency. The student t-test is used to evaluate the significance of r_s . The equation of the student's t-test is:

$$t = \frac{r_s \sqrt{N-2}}{\sqrt{1-r_s^2}}$$
(12)

When t is higher than the critical point, r_s is significantly different from zero.

III. EMPIRICAL RESULTS

3.1 Mutual Fund Performance

TABLE I lists the past five-year performance indicators for the top 20 best-performing equity funds in 2014. TABLE II lists the sum of all the measurement rankings of the top 20 best-

performing equity funds and Kendall's coefficient of concordance. According to TABLE I and TABLE II, the rankings for each mutual fund are almost consistent. The average performances of the top 20 best-performing mutual funds under the Treynor, modified Sharpe, and Jensen measures are 0.6768, 0.0537, and 0.3499, respectively. The top three best-performing funds under the Treynor, modified Sharpe, and Jensen measures are all better than the average performance. The performances under the Treynor measure are all positive, showing that the returns are positive under per unit of risk. The performances under the modified Sharpe measure are all positive, showing that the returns are positive under 5% VaR. The performances under the Jensen measure are all positive; conversely, the performances of the top 20 best-performing mutual funds are better than the market performance.

We now use the Kendall coefficient of concordance to examine the ranking consistency of mutual funds. The Kendall's coefficient of concordance is 0.9639 with the chi-square value is 54.94286 which exceeds the critical value indicating that the rankings of funds under these three types of measurements are strongly consistent.

The results overall suggest that investors not only can consider the conventional measures, but also the modified Sharpe measure. Investors could take the modified Sharpe measure into account, because it properly captures downside risk.

| 2014 Rank | Fund | Treynor | Modified Sharpe | Jensen |
|--------------|---------------------------------|---------|-----------------|--------|
| 1 | UPAMC Quality Growth | 0.8565 | 0.0648 | 0.4987 |
| 2 | NMR Growth | 0.8911 | 0.0815 | 0.6144 |
| 3 | Fuh-Hwa High Growth | 0.7930 | 0.0666 | 0.4197 |
| 4 | Manulife Dynamic | 0.7325 | 0.0549 | 0.3885 |
| 5 | UPAMC Infrastructure | 0.6801 | 0.0451 | 0.3560 |
| 6 | UPAMC Optima | 0.6339 | 0.0505 | 0.3362 |
| 7 | Allianz Global Investors Taiwan | 0.8477 | 0.0733 | 0.5285 |
| 8 | NMR Superior Equity | 0.6286 | 0.0541 | 0.3434 |
| 9 | Yuanta 2001 | 0.5570 | 0.0447 | 0.2431 |
| 10 | Yuanta Duo Fu Equity | 0.4625 | 0.0369 | 0.1445 |
| 11 | SinoPac | 0.7934 | 0.0702 | 0.4621 |

TABLE I. Performance indicators for the top 20 best-performing mutual funds

| 12 | Fuh-Hwa | 0.9012 | 0.0669 | 0.5317 |
|----|---------------------------------|--------|--------|--------|
| 13 | Dah-Fa | 0.6586 | 0.0550 | 0.3350 |
| 14 | Hua Nan Yung Chong | 0.4765 | 0.0335 | 0.1585 |
| 15 | 15 BlackRock Baoli | | 0.0347 | 0.2278 |
| 16 | HSBC Taiwan Success | 0.7063 | 0.0557 | 0.3060 |
| 17 | Franklin Templeton SinoAm First | 0.4663 | 0.0354 | 0.1676 |
| 18 | Jih Sun Top Five | 0.7163 | 0.0573 | 0.3868 |
| 19 | Fubon Aggressive Growth | 0.4512 | 0.0341 | 0.1559 |
| 20 | Manulife Taiwan High Dividend | 0.7387 | 0.0589 | 0.3938 |
| | Average | 0.6768 | 0.0537 | 0.3499 |

TABLE II. Measure rankings and kendall's coefficient of concordance for the top 20 bestperforming mutual funds

| 2014 Rank | Fund | Treynor | Modified Sharpe | Jensen | A_i |
|--------------|---------------------------------|---------|--------------------|--------|-------|
| 1 | UPAMC Quality Growth | 3 | 6 | 4 | 13 |
| 2 | NMR Growth | 2 | 2 1 | | 4 |
| 3 | Fuh-Hwa High Growth | 6 | 5 | 6 | 17 |
| 4 | Manulife Dynamic | 8 | 11 | 8 | 27 |
| 5 | UPAMC Infrastructure | 11 | 14 | 10 | 35 |
| 6 | UPAMC Optima | 13 | 13 | 12 | 38 |
| 7 | Allianz Global Investors Taiwan | 4 | 2 | 3 | 9 |
| 8 | NMR Superior Equity | 14 | 12 | 11 | 37 |
| 9 | Yuanta 2001 | 15 | 15 | 15 | 45 |
| 10 | Yuanta Duo Fu Equity | 19 | 16 | 20 | 55 |

| 11 | SinoPac | 5 | 3 | 5 | 13 | | |
|---|---------------------------------|----|----|----|----|--|--|
| 12 | Fuh-Hwa | 1 | 4 | 2 | 7 | | |
| 13 | Dah-Fa | 12 | 10 | 13 | 35 | | |
| 14 | Hua Nan Yung Chong | 17 | 20 | 18 | 55 | | |
| 15 | BlackRock Baoli | 16 | 18 | 16 | 50 | | |
| 16 | HSBC Taiwan Success | 10 | 9 | 14 | 33 | | |
| 17 | Franklin Templeton SinoAm First | 18 | 17 | 17 | 52 | | |
| 18 | Jih Sun Top Five | 9 | 8 | 9 | 26 | | |
| 19 | Fubon Aggressive Growth | 20 | 19 | 19 | 58 | | |
| 20 | Manulife Taiwan High Dividend | 7 | 7 | 7 | 21 | | |
| Kendall's coefficient of concordance = 0.96391 ; $\chi^2 = 54.94286 > \chi^2(0.05,2) = 5.991$; p-value = 0.00023 . | | | | | | | |

Note: A_i = the sum of all three measurement rankings for fund *i*.

3.2 Performance Persistence

Performance persistence refers to whether the past performance may predict the future. It is worth noticed whether past winners are still future winners.

First, we divide samples into January 2008 to June 2011 as the crisis period and into July 2011 to December 2014 as the post-crisis period. We calculate each period's mutual fund performance by using the Treynor, modified Sharpe, and Jensen measures in TABLE III. During the crisis period, only one fund exhibits negative performance under the Treynor measure. All of the top best-performing mutual funds have positive performances under the Treynor measure. Six mutual funds under the Jensen measure show negative performance in the crisis period, but they have positive performance later. 2008 financial crisis may have caused the returns perform worse than the benchmark performance. TABLE IV lists the performance rankings and Spearman rank correlation coefficients of the top 20 best-performing equity funds by using the three different measures.

TABLE III. Performance indicators for the crisis period (2008/1~2011/6) and the postcrisis period (2011/7~2014/12) for the top 20 best-performing mutual funds

| 2014 Rank | Fund | Tro | eynor | Modifi | ied Sharpe | e Jensen | |
|--------------|------|--------|-----------------|--------|-----------------|----------|-----------------|
| | | Crisis | Post- crisis | Crisis | Post- crisis | Crisis | Post- crisis |

| 1 | UPAMC Quality Growth | 1.093 | 0.627 | 0.058 | 0.060 | 0.665 | 0.335 |
|----|------------------------------------|--------|-------|-------|-------|--------|--------|
| 2 | NMR Growth | 0.755 | 1.256 | 0.052 | 0.132 | 0.436 | 0.829 |
| 3 | Fuh-Hwa High Growth | 0.232 | 1.089 | 0.013 | 0.125 | -0.102 | 0.905 |
| 4 | Manulife Dynamic | 0.626 | 0.859 | 0.039 | 0.104 | 0.245 | 0.536 |
| 5 | UPAMC Infrastructure | 0.566 | 0.732 | 0.032 | 0.080 | 0.191 | 0.504 |
| 6 | UPAMC Optima | 0.543 | 0.679 | 0.030 | 0.073 | 0.185 | 0.474 |
| 7 | Allianz Global Investors Taiwan | 0.417 | 1.287 | 0.024 | 0.174 | 0.057 | 1.001 |
| 8 | NMR Superior Equity | 0.345 | 0.983 | 0.025 | 0.108 | -0.015 | 0.715 |
| 9 | Yuanta 2001 | 0.141 | 0.806 | 0.009 | 0.082 | -0.198 | 0.650 |
| 10 | Yuanta Duo Fu Equity | 0.190 | 0.624 | 0.009 | 0.061 | -0.146 | 0.407 |
| 11 | SinoPac | 1.194 | 0.383 | 0.057 | 0.038 | 0.769 | 0.139 |
| 12 | Fuh-Hwa | 0.751 | 0.846 | 0.039 | 0.100 | 0.325 | 0.694 |
| 13 | Dah-Fa | 0.388 | 0.849 | 0.022 | 0.091 | 0.027 | 0.626 |
| 14 | Hua Nan Yung Chong | 0.112 | 0.812 | 0.007 | 0.078 | -0.224 | 0.535 |
| 15 | BlackRock Baoli | -0.285 | 1.343 | 0.017 | 0.165 | -0.608 | 1.060 |
| 16 | HSBC Taiwan Success | 1.070 | 0.336 | 0.061 | 0.033 | 0.529 | 0.072 |
| 17 | Franklin Templeton SinoAm First | 0.574 | 0.387 | 0.036 | 0.041 | 0.228 | 0.126 |
| 18 | Jih Sun Top Five | 0.715 | 0.665 | 0.046 | 0.077 | 0.326 | 0.432 |
| 19 | Fubon Aggressive Growth | 0.844 | 0.062 | 0.051 | 0.006 | 0.511 | -0.203 |
| 20 | Manulife Taiwan High Dividend | 0.489 | 1.077 | 0.030 | 0.128 | 0.121 | 0.680 |
| | Average | 0.538 | 0.538 | 0.785 | 0.033 | 0.088 | 0.166 |

TABLE IV. Measure ranking and spearman rank correlation coefficient of the crisis period (2008/1~2011/6) and the post-crisis period (2011/7~2014/12) for the top 20 bestperforming mutual funds

| 2014 | | Treynor | | Modifie | d Sharpe | Jensen | |
|---------------------------------------|---------------------------------|---------------|-----------------|-------------|-----------------|-------------|-----------------|
| Rank | Fund | Crisis | Post- crisis | Crisis | Post- crisis | Crisis | Post- crisis |
| 1 | UPAMC Quality Growth | 2 | 15 | 2 | 16 | 2 | 16 |
| 2 | NMR Growth | 5 | 3 | 4 | 3 | 5 | 4 |
| 3 | Fuh-Hwa High Growth | 16 | 4 | 17 | 5 | 16 | 3 |
| 4 | Manulife Dynamic | 8 | 7 | 7 | 7 | 8 | 10 |
| 5 | UPAMC Infrastructure | 10 | 12 | 10 | 11 | 10 | 12 |
| 6 | UPAMC Optima | 11 | 13 | 12 | 14 | 11 | 13 |
| 7 | Allianz Global Investors Taiwan | 13 | 2 | 14 | 1 | 13 | 2 |
| 8 | NMR Superior Equity | 15 | 6 | 13 | 6 | 15 | 5 |
| 9 | Yuanta 2001 | 18 | 11 | 18 | 10 | 18 | 8 |
| 10 | Yuanta Duo Fu Equity | 17 | 16 | 19 | 15 | 17 | 15 |
| 11 | SinoPac | 1 | 18 | 3 | 18 | 1 | 17 |
| 12 | Fuh-Hwa | 6 | 9 | 8 | 8 | 7 | 6 |
| 13 | Dah-Fa | 14 | 8 | 15 | 9 | 14 | 9 |
| 14 | Hua Nan Yung Chong | 19 | 10 | 20 | 12 | 19 | 11 |
| 15 | BlackRock Baoli | 20 | 1 | 16 | 2 | 20 | 1 |
| 16 | HSBC Taiwan Success | 3 | 19 | 1 | 19 | 3 | 19 |
| 17 | Franklin Templeton SinoAm First | 9 | 17 | 9 | 17 | 9 | 18 |
| 18 | Jih Sun Top Five | 7 | 14 | 6 | 13 | 6 | 14 |
| 19 | Fubon Aggressive Growth | 4 | 20 | 5 | 20 | 4 | 20 |
| 20 | Manulife Taiwan High Dividend | 12 | 5 | 11 | 4 | 12 | 7 |
| Spearman rank correlation coefficient | | -0.5 (-2.6 | 248 158) | -0. (-1. | 4105 9101) | -0. (-2. | 5729 9655) |

Notes: Numbers in parentheses are the student-t value.

IV. CONCLUSION

This paper investigates mutual fund performances under the Treynor, modified Sharpe, and Jensen measures. Major findings and contributions are as follows.

First, the performance consistency of the funds' rankings under these three measures exists.

Second, the results present the best-performing mutual funds nowadays may perform worse than the benchmark market portfolio during a financial crisis.

Third, persistence in equity funds are not found. The reason may be due to the characteristics of equity funds that potentially generate high returns, but are tagged with high risks and volatility. The market risk was generally higher during crisis period than during normal periods. Therefore, the volatility of equity funds is higher during crisis period which may cause mutual funds' performance to exhibit no persistence.

Finally, the results suggest that performance persistence may not exist when a financial crisis causes higher market risk. Investors should be very cautious during a financial crisis period, because winners during this period may be losers in the future. These findings have significant implications for investors when making decisions on portfolio diversification, risk management, and asset allocation.

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