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# Performance Evaluation of Mutual Funds based on Modern and Postmodern Portfolio Theory Criteria: Evidence from Tehran Stock Exchange

**Mohammadbagher Mohammadinejad Pashaki[1], Reza Tehrani[2], Gholamreza jandaghi[3]**

[1] M.A. University of Tehran, Farabi Campus, Iran

*mbpmohammadi@gmail.com*

[2] Faculty of Management, University of Tehran, Iran

*rtehrani@ut.ac.ir*

[3]Faculty of Management and Accountancy, Farabi Campus, University of Tehran, Iran

*jandaghi@ut.ac.ir (Corresponding Author)*

**Abstract:** Mutual funds are moving rapidly towards financial market development in response to huge market demand in Iran.so what is needed is a useful and applicable method for appraising and selecting them. Performance evaluation is one the most important point in investment .therefore, in this research we tried to compute and compare the performance of mutual funds by different models and compare them to market. So we have chosen 14 active mutual funds during the year 2008 to 2012 and calculate the risks and returns of these mutual funds, then we analyzed hypotheses. Results show that performance evaluation of modern and postmodern theory gives different ranking. At this period some mutual funds showed better performance than market and some on the contrary .Also results show that postmodern portfolio criteria were more successful for predicting return than modern criteria. At the end results of research recommend the use of postmodern criteria which are based on downside risk.

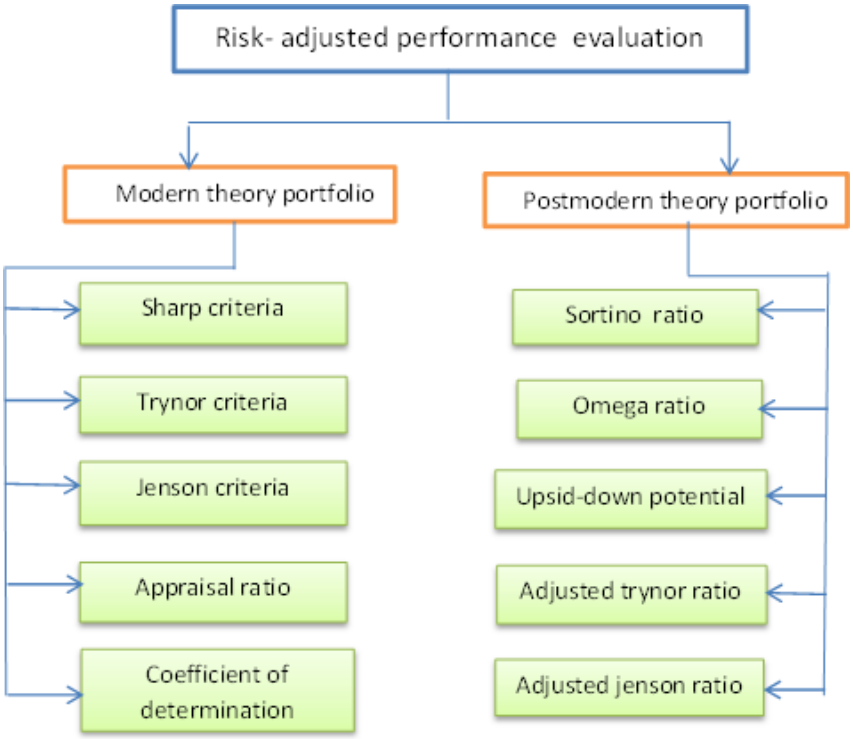
**Keywords:** Modern portfolio criteria, postmodern portfolio criteria, Mutual fund, Performance evaluation measures (Sharp, Trynor, Sortino, Omega).

## 1. Introduction

Mutual funds offer individual investor an opportunity to diversify investment and provide professional money management often with affordable minimum investment amounts. A mutual fund is a security that pools money from investors to purchase stocks, bonds, or other securities for its portfolio. As a result, investors then typically own a portion of a portfolio that includes many more stocks and bonds than they could afford to purchase individually[1]. Managers and decision – makers are always judged by the results of their decisions. In one hand, organizational managers need to increase the capability and preciseness of their used models in order to respond dynamic conditions of today markets and taking effective decisions. Additionally, rapid economic and technological growth in recent decades have changed human life seriously and have faced modern societies with complicated decision making problems. Among financial and investment scenarios, investment in mutual funds is

**Corresponding Author:** Gholamreza jandaghi

considered as a well – known financial strategy. Such funds tend to attract investors through diversification advantages, professional management, cash flow and economies of scale[2]. Mutual fund is a general title for investment companies with unfixed capital. Each mutual fund has its own investment policy expressed in its articles of association. For instance, money market investment funds use short term and low risk tools. Some funds are working in more limited fields[3]. The final step in investment management process is to assess portfolio performance albeit it can be used a feedback and control mechanism to make investment management process more effective. A main problem in performance appraisal is human propensity to focus on portfolio return and lack of sufficient attention to posed risk to acquire considered return. Therefore, performance appraisal should consist of simultaneous identification of investment "return" and "risk". The main idea in performance appraisal is to compare portfolio return to the return of several proper portfolios[4]. In a categorization, performance appraisal criteria mitigated by risk are divided into two groups based on modern portfolio theory (MPT) and postmodern portfolio theory (PMPT)(figure 1).




"Figur1.performance evaluation model"

The paper by Harry Markowitz (1952) is recognized as the origin of modern portfolio theory. Its hypotheses cause that MPT is not considered as a satisfied theory. Brian Rom believes that in PMPT, there are two fundamental progresses compared to MPT: (1) using an undesired risk rather than standard deviation as a tool to measure the risk and (2) PMPT involves also abnormal return distribution. Modern portfolio theory is clarified by the relationship between computed return and risk through standard deviation while post modern portfolio theory clarifies the behavior of investor and the criterion to select the best portfolio through the relationship between return and undesired risk[5]. Performance appraisal is important for investors. If the results of portfolio performance appraisal are not satisfactory, the reasons should be clarified in order to make necessary changes in investment policies. Portfolio appraisal is important whether someone investigates it personally or indirectly through in an investment company where he/she is

capitalized. Performance appraisal of investment companies and ranking them are important since the dealers of these shares can take necessary measures on keeping, selling or purchasing the shares of these companies in required time. Naturally, potential investors are looking for those shares of investment companies that have better performance than other investment companies and also market performance. Performance appraisal means how investment manager can make a balance between returned and accepted risk[6]. Research of evaluating the performance of investment funds and improving their investments can be a step to encourage more investment since a barrier against investment is investment risk(s)[2]. As a result, assessing their portfolio performance in different aspects is important for both investors and investees. If the results of studies indicate the well performance of investment companies to purchase the shares of such companies, shareholders would tend more to contribute in such companies. In this case, shareholders' direct investment will be replaced by indirect investment by investment companies[7]. In Iran, these funds were initially addressed by Stock Exchange Law ratified in 2005 and investment funds entered into stock exchange in 2008[8]. Concerning the importance of this issue, the author plans to study the performance of investment funds based on the rationality of MPT and PMPT as well as the efficiency and relationship between the rankings of these models. Therefore, Sharp, Trynor and standard deviation are used as the indices of modern theory to evaluate the performance and Sortino, Omega and undesired standard deviation are used as the indices of postmodern portfolio theory.

## Research goals

1. Ranking investment funds based on the indices of Sharp, Trynor, Omega and Sortino
2. Comparing the ranking of funds based on MPT and PMPT criteria
3. Comparing the performance of investment funds to market performance during surveyed period
4. Selecting a more precise measure for ranking among surveyed measures in present study

## 2. Background

Abdeh Tabrizi and Sharifian studied the impact of undesired risk of mitigated performance based on the risk of admired investment companies in Tehran Stock Exchange[9]. In this research, the relationship between ranking the companies based on Sharp criterion and desired potential was studied and they concluded that there is a relationship between them which is due to existence of negative skewness in return distribution. On this basis, using desired potential is more justified. Saeedi and Moghadasian [8] evaluated the performance of investment funds by mitigated return based on their risks and using the criteria introduced by Sharp, Trynor, Sortino and Jensen[8]. Based on results from ANOVA analysis, there is no significant difference between mitigated risk and market return. Likewise, no significant difference is seen between the performance of mutual investment funds based on the criteria by Sharp, Trynor and Sortino. However, differential return criterion by Jensen has not refused the existence of a significant difference between the performance of different investment funds in 2008 and 2008 – 2009 periods.

Roshangarzadeh and Ahmadi [10] studied the performance of investment funds based on PMPT measures and the relationship between ranking them with MPT criteria. They concluded that there is significant relationship between MPT and PMPT criteria which is not due to return normal distribution rather it is due to the negative skewness of investment funds return. Therefore, the findings indicate the preference of postmodern criteria compared to modern ones.

Bertrand and Prigent[11] studied the performance of two portfolio method guarantee which include portfolio guarantee strategies based on OBPI and CPPI by using undesired risk measure. To this end, they used indices by Kappa and Omega. Their findings indicate that CPPI has a better performance than OBPI.

Naguaz and Prigent[12] studied the return of portfolios with Jensen's distribution. Kappa's performance measures are based on undesired risks that facilitate the evaluation of risk and performance of complicated returns like hedge funds. Such measures consider all return distribution. They concluded that if skewness is positive, Kappa's measures always increase by average and standard deviation. If skewness is negative, then it decreases with standard

deviation. Swinkles and Rezingzak[13] studied the performance of investment fund managers in Poland. Their investigation involved three types of funds including stock funds, bond funds and balanced funds. Their findings indicate that investment funds in each group have positive by insignificant best-selection skill. In the meantime, there is no certification on scheduling skill of stock market and bond market by polish investment funds.

### 2.1. Hypotheses

$H_1$: ranking mutual funds by indices of Sharp, Sortino, Trynor and Omega is not identical.

$H_2$: there is a significant relationship between mutual funds ranking by indices of Sharp, Sortino, Trynor and Omega.

$H_{2.1.}$ there is a significant relationship between mutual funds ranking by indices of Sharp and Trynor.

$H_{2.2.}$ there is a significant relationship between mutual funds ranking by indices of Sortino and Omega.

$H_{2.3}$: there is a significant relationship between mutual funds ranking by indices of Sharp and Sortino.

$H_{2.4}$: there is a significant relationship between mutual funds ranking by indices of Sharp and Omega.

$H_{2.5}$: there is a significant relationship between mutual funds ranking by indices of Sortino and Trynor.

$H_{2.6}$: there is a significant relationship between mutual funds ranking by indices of Trynor and Omega.

$H_3$: there is a significant relationship between mutual funds ranking based on total risk and downside risk.

$H_4$: there is a significant difference between risk-adjusted return in mutual funds and market return.

### 2.2. Research scope

Spatial scope: spatial scope is all mutual funds active in Tehran Stock Exchange.

Time scope: it involves a four – year period study. To this end, all data for 2008 – 2011 are gathered and analyzed.

Thematic scope: it involves investment and financial management.

### 2.3. Methodology and data collection and analysis method

In terms of goal, this is an applied study and in terms of methodology, it is a correlation – type descriptive study. Information on mutual funds return was collected by their websites as well as the reports by Stock Exchange and Securities Organization. After gathering relevant data, EXCEL software was used to compute data and SPSS was also utilized to test the hypotheses. To support or refuse data, deductive statistics were used.

### 2.4. Statistical population

Statistical population of the research consists of mutual funds active in Tehran Stock Exchange between 2008 through 2011.

### 2.5. Statistical sample

Since the number of active investment funds in Tehran Stock Exchange is limited, all funds in the industry are analyzed as the sample provided that:

1. They are considered as active investment funds in Tehran Stock Exchange since the beginning of 2008 and are still in this list at the end of 2011 and their shares are dealt.
2. The data on these funds are available in the surveyed period (48 months). Therefore, those funds were deleted that lacked the conditions of paragraphs 1 and 2.

   The names of qualified mutual funds are as follows: Arian mutual funds, Agah mutual funds, Eghtesad novin mutual funds, Pasargad mutual funds, Poya mutual funds, Hafez mutual funds, Khebregan mutual funds, Sahmashena mutual funds, Tejarat bank mutual funds, Saderat bank mutual funds, Melli bank mutual funds, Iranian kaspianmehr mutual funds, Yekom Iranian mutual funds, Pishtaz mutual funds.

## 3. Portfolio performance appraisal indices

Sharp index: according to average variance measure, Sharp (1966), Trynor (1965) and Jensen (1968) developed their famous performance measures. SP measures portfolio

surplus return to risk free return rate divided on standard deviation[12].

$$S_p = \frac{R_p - R_f}{\delta_p}$$

The Treynor technique

Treynor argued that a portfolio manager should be able to diversify and eliminate all the unsystematic risk. Once this is done the appropriate the measure of risk is the systematic which is measured through the beta. The performance measure proposed by Treynor is given by

$$T_p = \frac{R_p - R_f}{b_p}$$

Where:Tp =treynor's portfolio performance measure for portfolio p over the evaluation period.

$R_p$ =the average rate of return for portfolio p over the evaluation period.

$R_f$ =the average risk free return over the evaluation period.

$B_p$ = the beta of the portfolio over the evaluation period[14].

The sortino technique

One of the most popular measures is the sortino ratio . Calculating the return in excess of a minimum acceptance rate(MAR) would be more meaningful than calculating return in excess of a risk-free rate. They also note that downside risk ,not the total variability of returns, matters to investors. Thus, rather than dividing by the standard deviation of returns, the sortino ratio divides by the downside deviation of returns. Following equation shows the sortino ratio:

Sortino Ratio= $(R_p – MAR)/DD_p$

Where MAR is the minimum acceptable rate and $DD_p$ is the downside deviation of returns of the portfolio[15].

Afterwards, Keating and Shadwick[2002]developed the performance measure omega, which divides the returns above the target rate of return by those below it. The omega measure Ω is defined as follows:

$$\Omega(r) = \frac{\int_r^b [1 - F(x)]dx}{\int_a^r F(x)dx}$$

Where r is the target rate of return ,[a,b] is the interval of returns, and F(x) is the cumulative distribution of returns[16].

## 3-1. **Test of hypothesis**

The aim of the first hypothesis is to show that whether ranking of mutual funds based on four used indices lead into similar ranking or not. In other word, is it necessary to use various indices? Friedman test is used to test this hypothesis due to the fact that variables are systematic.

**Table 1 Results of Friedman Test**

| Results | | | |
|---|---|---|---|
| **N** | Chi-square | Df | Asymp.sig. |
| **14** | 14.836 | 3 | 0.002 |

**Results interpretation:** as seen in table 1, Chi-2, freedom degree and significance rates are provided. Since significance rate is less than 5%, $H_0$ which shows identical ranking is refused which $H_1$ which shows different ranking of funds based on abovementioned indicators is supported. Therefore, the necessity to use multiple indices for investment funds' performance appraisal is proved.

**Reviewing the second and third hypotheses**

Spearman correlation coefficient is used to study the second hypothesis. The results for mutual funds are shown in below

**Table 2 Results of Spearman Rho Tets**

| Hypotheses | Variables | Frequency | Correlation coefficient | Sig | Test result | result | situation |
|---|---|---|---|---|---|---|---|
| $H_{2.1}$ | Sharp & Trynor | 14 | 0.978 | 0.000 | Reject $H_0$ at 0.01 | Accept hypothesis at 0.01 | Very strong &direct correlation |
| $H_{2.2}$ | Omega& Sortino | 14 | 0.930 | 0.000 | Reject H0 at 0.01 | Accept hypothesis at 0.01 | Very strong &direct correlation |
| $H_{2.3}$ | Sharp & Sortino | 14 | 0.556 | 0.039 | Reject $H_0$ at 0.05 | Accept hypothesis at 0.05 | Weak &direct correlation |
| $H_{2.4}$ | Sharp & Omega | 14 | 0.560 | 0.037 | Reject $H_0$ At the 0.05 | Accept hypothesis at 0.05 | Weak &direct correlation |
| $H_{2.5}$ | Trynor & Sortino | 14 | 0.525 | 0.054 | Accept $H_0$ | Reject hypotesis | No correlation |
| $H_{2.6}$ | Trynor & Omega | 14 | 0.582 | 0.029 | Reject $H_0$ at the 0.05 | Accept hypothesis at 0.05 | Weak and direct correlation |
| $H_3$ | Total Risk & Downside Risk | 14 | 0.600 | 0.023 | Reject $H_0$ at the 0.05 | Accept hypothesis at 0.05 | Weak and direct correlation |

As seen in table 2, there is a strong and direct correlation between indices by Sharp and Trynor. Likewise, a relationship is observable between indices by Omega and Sortino while such relationship is not observable among other factors which indicate a strong relation between modern and postmodern indices. No significant relationship is observable between modern and postmodern indices.

**Reviewing the forth hypothesis**

For testing this hypothesis we use ANOVA test(table 3).

$H_0$ is supported in 5% significant level. Based on results, there is a significant difference between risk-adjusted return of mutual funds and market return. We can achieve an interesting result by Tukey test: the only fund which destroys the similarity of funds and market return is Yekom Iranian mutual Fund since its β is less than market. With very low β, this fund has already changed the results of ranking through indices of Sharp and Trynor. The best fund was identified by these indices but postmodern criteria (Omega and Sortino) hedged such impact by considering downside risk and provided more precise evaluation.

Finally, to answer the question whether return prediction based on PMPT and MPT measures are identical and which mentioned measure provides a better prediction, we used linear regression as depicted in table 4.

**Table 3 Anova Analysis about Comparison between Mutual Funds and Market Return**

| | Sum of square | Df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| **Between group** | 4262088 | 14 | 304435 | 4991 | 0.000 |
| **Within groups** | 40076808 | 657 | 61000 | | |
| **total** | 44338896 | 671 | | | |

**Table 4 Conjecture of Synthetic Regression**

| variable | Regression coefficient | Std.Error | Adjusted R square | R square |
|---|---|---|---|---|
| **Sharp** | 0.485 | 0.77228 | 0.171 | 0.235 |
| **Trynor** | 0.563 | 0.72969 | 0.260 | 0.317 |
| **Sortino** | 0.926 | 0.33384 | 0.845 | 0.857 |
| **Omega** | 0.930 | 0.32362 | 0.854 | 0.866 |

Table interpretation: since Prob (significant level) of Sharp's index is greater than 0.05, we conclude that there is no significant relationship between return and SP and SP is not able to predict the return. However, other proportionate have been able to predict the return and such prediction is clearly obvious in the proportionate by Sortino and Omega as PMPT measures. Finally, to answer the question that which modern and postmodern measures provide a better prediction on return, we pay attention to determination ratio in the table. Since this ratio for proportionate by Sortino and Omega is higher that abovementioned by Sharp and Trynor, we conclude that postmodern measure provides a better prediction on return than modern measure.

## 4. Conclusion and recommendations

Undoubtedly, providing fruitful information on funds and their performance appraisal can be an important step toward attracting and using individuals' effective capitals and directing them toward optimized institutes run by professional managers and members. To this end, evaluating the performance of these funds and comparing them to market return can help investors to select active and inactive investments. The first hypothesis showed the necessity of using various indicators on mutual funds' performance appraisal. Its findings are adaptive to the results by Rushangarzadeh and Ahmadi. In the 2nd and 3rd hypotheses, the relationship between various ranking measures is addressed and the results revealed a strong relationship between modern and postmodern measures with each other. The reason is to use modern indices from similar factors such as standard deviation for risk and postmodern indices for similar factors such as undesired risk as the risk in postmodern measures. The 4th hypothesis compares funds' return to market return. The results show difference between funds and market. These findings refuse the results by

Saeedi and Moghadsian only due lower β of Yekom Iranian' Fund than Market[8].

1. It is recommended that investors and analysts should not simply rely upon modern or postmodern measures and they should consider both measures in assessment factors.
2. It is recommended that investors and analysts should emphasis more on postmodern measures that provide more precise evaluation.
3. It is recommended that a similar research should be conducted with larger population and more indices and compared to present study.
4. Studies that investigate the performance result in more trustable findings when they are conducted in longer intervals. It is recommended to conduct a test in longer intervals.

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## Authors' Profile

Mohammadbagher Mohammadinejad Pashaki is an M.A. Graduate from University of Tehran, Farabi Campus.

Reza Tehrani is an associate professors of financial Management working as a faculty member at

University of Tehran, Faculty of Management. He has supervised many students in the field of financial management.

Gholamreza Jandaghi is a Professor of Statistics working as a faculty member at University of Tehran, Farabi Campus. He has supervised many students in Master and Ph.D. level.