Middle-East Journal of Scientific Research 12 (4): 444-454, 2012
ISSN 1990-9233

DOI: 10.5829/idosi.mejsr.2012.12.4.1437

The Usefulness of the Momentum Strategy in Portfolio Selection in Tehran Stock Exchange (TSE)

[1]Mirfeiz Fallahshams and [2]Younes Ataie

[1]Management Faculty, Tehran Central Branch, Islamic Azad University, Tehran, Iran
[2]Master of Business Administration Financial, Management Faculty,
Tehran Central Branch, Islamic Azad University, Tehran, Iran

Abstract: The aim of this paper is evaluating the usefulness of the momentum strategy and effectiveness of EROV, SORTINO and M3 criteria for portfolio selecting in Tehran Stock Exchange. This study was performed on the companies that were active in portfolio management from 2006 until 2010. The winner and loser portfolio of 50 top companies were selected for evaluation of the momentum strategy based on these criteria in Tehran Stock Exchange and then they were evaluated. In this study, the Jegadeesh and Titman approach (1993) is used for evaluation of the usefulness of this criterion in the selection of an appropriate portfolio. First, the daily returns of companies were calculated and winner and loser portfolios were selected by EROV, SORTINO and M3 criteria repetitively during the realm of the study period. Then, the portfolios were maintained for the periods of 3 and six months. At the end of the maintenance period, the cumulative returns of each portfolio were calculated and their performances were compared by the mean difference test, one-way analysis of variance (ANOVA) and Tukey test. Results showed that there is a possibility of selecting an appropriate portfolio, using the EROV, SORTINO and M3 criteria in Tehran Stock Exchange. However, M3 measure was better than the other two criteria and the market. Furthermore, it was demonstrated that the EROV and SORTINO criteria didn't have better performance than the market criterion.

Key words: Portfolio selection · Momentum strategy · Post-Modern portfolio theory · Risk-Adjusted Ratios

INTRODUCTION

Markowitz assumes that all investors do their choices based on the two criteria of risk and return at the time of selecting a standard portfolio. However, many of the researches criticized the ignorance of other preferences of investors in Markowitz's model [1].

An investor usually considers conflicting goals such as return, risk and liquidity in the portfolio selection simultaneously. Some researchers introduce the liquidity of assets as one of the main criteria in the optimization of portfolio mean- variance framework [2].

However, logical investors are looking for an acceptable level of risk in order to maximize their return in the capital markets. Therefore, this question comes to mind that "what tools are efficient for portfolio selection?" Appropriate criterion should be calculable easily and also it should be of high predictive power in selecting an investment portfolio. Since the fast decision-making is one of the principles of investing in Stock Exchange, nowadays there are many approaches for asset evaluation and selection of appropriate portfolio including two cases: Technical analysis and Fundamental analysis. The momentum strategy is one of the strategies that is widely used in the technical analysis.

This strategy is known as one of the most important and most useable strategies among the analysts and portfolio managers for portfolio selection in the capital market. In this strategy, one should try to predict the best future performance and the most appropriate portfolio choice for the investment, according to the previous performances. The momentum strategy includes moving in accordance with the market and it is supposed that the past and current trends would continue in the future. This strategy is against the "efficiency market hypothesis." The momentum strategy, is analogue to the famous assumption in the market that: "the price trends tend to stay steady, until some external force interrupts them" [3].

Corresponding Author: Younes Ataie, Master of Business Administration Financial, Management Faculty,
Tehran Central Branch, Islamic Azad University, Tehran, Iran

The momentum strategy is used to select the appropriate options of investment by extant correlation in securities. In this strategy excess return is achievable by purchasing the past winning stocks and to sell the past loser stocks. The securities that have experienced a good (bad) performance in the past, they tend to continue this good (bad) return in the future. In other words, the momentum believed to continuity of historical return in a medium term horizon [4].

The aim of this research is to assist specialists with portfolio selection and efficiency evaluation of EROV, SORTINO and M3 criteria in the market.

This research is going to review the performance of EROV, SORTINO and M3 criteria in Tehran Stock Exchange. Therefore, we used these measures that had previously been used by many researchers such as Usta and Kantar [5] in Turkey Stock Exchange, Nathaphan and Chunhachinda [6], Anagnostopoulos and Mamanis [7], Zakamouline and Koekebakker [8], Quaranta and Zaffaroni [9], Chordia and Shivakumar [10] in USA Stock Exchange, Chang *et al.* [11] in Taiwan faineance and market, Li *et al.* [12], Simanjuntak *et al.* [13], Liu *et al.* [14], Werner [15] and Huang [16]. For better understanding the study is divided into seven sections that follow as:

- The First Section: Conceptual Framework and research Background.
- The Second Section: Research Method and data.
- The Third Section: Results of hypothesis testing.
- The forth Section: Conclusion.
- The fifth Section: Interpreting of the Result based on Previous Studies.
- The sixth Section: Restrictions of Research.
- The seventh Section: Suggestions for future research.

Conceptual Framework and Research Background: In connection with the performance evaluation of portfolio investment, there are various theories including the Post-Modern Portfolio Theory (PMPT). This theory believes in non normal probability distribution of returns. This method provides a framework that recognizes investors' preferences for upside over downside volatility. Accordingly, the integer indices, semi- variance and semi-deviation to measure risk are considered appropriate. "Undesirable adverse risk" as an indicator of risk considers negative swings in future economic output. Two methods exist for calculation of the undesirable adverse risk, that are: "semi- variance under the rate of mean" and "semi- variance under the rate of return". If the distribution of asset returns is normal, semi-variance criterion showed the number that is exactly half the variance. It is called semi-variance [17].

Post-modern portfolio theory (PMPT) was invented originally to improve portfolio optimization and asset allocation. However, it has been increasingly applied to measure the investment performance of portfolios, investment managers and mutual funds. One reason for this should be that, modern portfolio theory, which has been used as a basis for portfolio analysis for past four decades, uses standard deviation and assumes normal distribution in fund returns in its analysis [18]. PMPT recognizes that investment risk should be tied to each investor's specific goals. Often, the target rate of return is referred to as the minimum acceptable return (MAR). MAR represents the rate of return that must be earned to avoid failing to achieve some important financial objective [19].

One of the tools that is used by post modern portfolio theory is the "downside risk". It is measured by target semi-deviation and is termed downside deviation. Moreover, it is expressed in percentages and therefore, allows rankings in the same way as standard deviation [18, 20].

Post-Modern portfolio theory (PMPT), based on the relationship between return - adjusted risk, explains the behavior of the investor and optimal portfolio selection criteria. So based on the new model of adjusted risk and resulting improvements, Post-Modern portfolio theory has been established [21, 22]. PMPT is an appropriate criterion to evaluate the portfolio performance. This theory presents the more accurate criterion by making use of an adjusted risk indicator. In post-modern theory only returns, lower than the target are considered as a risk [17].

The momentum strategy is important, because its calculation is simple and its performance is appropriate in selecting of the investment options in short-term. Many researchers believe that single factor or multi factor models do not have needful efficiency for clarification and prediction of companies return in stock exchange, such as Fama and French Model [23]. Many researches demonstrated that the momentum strategies have a higher power to predict non normal returns in short term in the capital market and often, the return of selected portfolio by this strategy is more of post-modern portfolio theories.

In fact, in contrary to efficiency of market, success of momentum strategy represents the irregularities with returns more than the market in selection of winner portfolio. The reason is market slower reaction to information released in the market. The market showed less reaction to information in short-term horizon and it showed

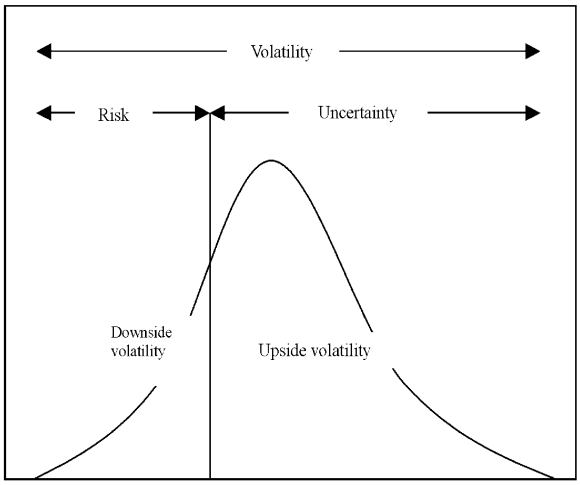

Fig. 1: The separation between upside volatility, downside volatility, risk and uncertainty in PMPT

unusual reaction to information in long-term horizon. Thus winner stock of companies would be winner and loser stock of companies would be loser [4]. Figure 1 illustrates the separation between desirable fluctuations, undesirable fluctuations, risk and uncertainty in post-modern portfolio theories [24].

Many studies have been done based upon this theory. Result of researches performed by Jegadeesh and Titman, [4, 25], Rouwen Horst, [26, 27] and Griffin *et al*. [28] demonstrated that the momentum strategies are successful in selection of winner portfolio within a long time, from 3 to 12 months. Also return of selected portfolio is more than the market. Richard, [29] showed that the momentum strategy leads to excess return (3.4 percent in a year) by monthly return in the index of 16 countries. But fifty-eight percent of loser stock had better performance than stock of winner companies on long-term horizon. Rouwen Horst [26] tested the usefulness of momentum strategy in international stock market. Findings of the research showed that the winner portfolios have more excess return, after to adjust the risk of winner and loser portfolio (more than one percent). Research of Chordia and Shivakumar, [10] indicated that multi-factor models (designed based on macroeconomic variables) are not able to predict the effect of momentum in stock exchange. In this regard Cooper *et al*. [30] indicated that the macroeconomic models are not able to predict derived return of momentum in USA Stock Exchange. Griffin *et al*. [28] investigated derived return of the momentum strategy in between different countries. Their research findings showed that benefit of momentum strategy have been significant in most countries, but the correlation between returns was in level of weak. Nathan, [31] stated that the sale of loser securities might be profitable, but he showed that it cannot rejected the efficient market hypothesis and had to do more tests. Finally the integration established between efficient hypothesis models, portfolio theory and momentum strategy. In this regard Rachev *et al*. [32] studied the usefulness of momentum strategy based on risk-return criteria. Result indicated that the strategy of cumulative return obtained more profit with to accept the higher risk. While the strategy based on risk-reward criteria accept less risk. Pesaran and Zaffaroni, [33] studied the relationship between momentum strategy and a single period portfolio models. The result of research indicated that the momentum strategy based on Markowitz model would have better performance than other criteria (VaR and CVaR). Zakamouline and Koekebakker, [8] studied the portfolio performance evaluation with generalized Sharpe ratio. This research showed that the generalized Sharpe model has better performance than the momentum strategy for investment in portfolio selection.

Research Method and Data: The research method is according to the survey method and a correlation type whose main goal is to define the relationship among some quantitative variables. This is an empirical research in the field of comparative studies or the difference between two independent samples. For testing the hypothesis, we used relevant statistic tests including Independent Samples Test and ANOVA followed by Tukey test. The duration of this research was long, lasting from 2006 until 2010. Convenient sampling was the sampling method of choice in this study, thus we just selected the companies that during the study period, their stocks were actively traded on the Stock Exchange and their relevant financial information was

Table 1: The 50 top companies in Tehran Stock Exchange

Range	Company name	Range	Company name
1	Bank kar afarin	26	Saipa azin
2	Bank mellat	27	Saipa
3	Bank parsian	28	Sar melli iran
4	Bank saderat	29	Sar boaali
5	Bank tejarat	30	Sar ghadir
6	Chadormaloo	31	Sar toseaa melli
7	Foulad mobarakeh	32	Sar shahed
8	Ghataat otomobil	33	Sar tosee maaden felezat
9	Golgohar	34	Sarmayegozari petroshimi
10	Goroh bahman	35	Siman fars va khouzestan
11	Hepko	36	Siman shargh
12	Iran khodro disel	37	Siman tehran
13	Iran transfo	38	Sina
14	Jaber	39	Sobhan
15	Joshkab yazd	40	Tooka foulad
16	Lizing iran	41	Tosee sanayee behshahr
17	Lizing sanaat va madaan	42	Sar bahman
18	Loabiran	43	Rena
19	Mapna	44	Lizing rayan saipa
20	Mashinsazi arak	45	Petroshimi arak
21	Melli mes iran	46	Petroshimi isfehan
22	Nosazi va sakhteman tehran	47	Sar goroh sanayee bahshahr
23	Omid	48	Sar sandogh bazneshastegi
24	Pars khodro	49	Foulad amirkabir
25	Ringsazi mashhad	50	Sar sanaat va madaan

available. The 50 Top companies were active in Tehran Stock Exchange and the research sample is represented in Table 1. Data were collected from different research methods. In order to analyze data, we used daily and monthly return of companies, issued by Tehran Stock Exchange. Also we used Jagadeesh and Titman method [4] for ranking and select of winner and loser portfolio by EROV, SORTINO and M3 criteria.

All in all, to portfolio selection, the blow hypotheses are supposed.

First Hypothesis: There are possible of appropriate portfolio selection by EROV, SORTINO and M3 criteria.

Second Hypothesis: EROV measure has better performance than SORTINO and M3 criteria in portfolio selection.

Third Hypothesis: EROV, SORTINO and M3 criteria have better performance than market in portfolio selection.

Models used in this research by the momentum strategy include:

Excess Return on Value-at-Risk (EROV): Excess Return on VaR is basically a Sharpe Ratio using Value-At-Risk instead of Volatility as the risk measure [34]. Assuming normally distributed returns, the VaR of a long-position is calculated as a quantile of the standard normal distribution at a certain confidence level á, using the expected value - i.e. the mean - and the standard deviation [35].

$$VaR = -(r + Z_a * \sigma)$$

α ..... Confidence level
Zα..... quantile of the standard normal distribution

When VaR is used to assess risk-adjusted performance, the measure Excess Return on VaR (EVaR) emerges. It compares the excess return of an asset to the VaR of the asset. EVaR can be calculated by the following formula [17].

$$EROV = \{r - r_f\}/VaR$$

EROV... Excess return on VaR
r... Portfolio returns
r_f... Risk free rate
VaR ... Portfolio VaR (here: parametric VaR assuming a normal distribution).

Sortino Ratio: Sortino ratio is the actual rate of return in excess of the investor's target rate of return, per unit of downside risk. A measure of excess return per unit of risk based on downside semi-variance, instead of total risk (the standard deviation of the portfolio) used by the Sharpe ratio. Since the Sortino ratio takes into account only the downside size and frequency of returns, it measures the reward to negative volatility trade-off. For the case where the target return is equal to the mean of the distribution, the LPM of order 2 corresponds to the semi-variance [36]. In all other cases it is referred to as downside variance [37]. The second LPM-based performance measure is the Sortino Ratio, which was first, introduced by Sortino and Vander Meer [38]. It is defined as the ratio of the excess return over a minimum threshold τ and the downside deviation δ^2. Originally, the Sortino Ratio (SOR) and δ^2 were calculated by the following expressions [39].

$$SOR_i(\tau) = \frac{r_i^d - \tau}{\delta^2}$$

The Sortino Ratio can be regarded as a modification of the Sharpe Ratio as it replaces the standard deviation by downside deviation which only considers the negative deviations from the mean or a minimum return threshold. Similar to Omega, downside deviation can be interpreted as the square root of the LPM of order 2 which finally leads to the version of the Sortino Ratio below in which an LPM is used as a risk measure [40].

$$SOR_i(\tau) = \frac{r_i^d - \tau}{\sqrt[2]{LPM_2(\tau)}}$$

Where:

r_i : single return realization
τ : minimum return threshold
LPM_2 : lower-partial moment of degree 2

And or:

$$SOR = (\bar{r}_p - \bar{r}_f)/\sigma_{down}$$

Where:

$\bar{r}_p$: Asset or portfolio return
$\bar{r}_f$: Risk free rate
σ_{down} : Downside deviation

Negative deviations from the return threshold are more strongly weighted due to the LPM of order 2 and thus, express a higher risk-aversion of the investor [41].

M3 Measure: This measure evaluated effect of adjusted-correlation between factors contained in portfolio, without regard to the portfolio of investment is an active, inactive or invest in securities without risk. With the M3 measures, returns are correlation-adjusted by leveraging the fund with active, passive and risk-free funds so that the resulting volatility equals benchmark volatility and the TE equals the Target TE. M3 adjusts for absolute as well as relative risks [42, 43]. It is calculated as follows:

M3 = a*avr (Portfolio) + *b*avr (benchmark)* + *(1-a-b)*rf*

With:

a = *v (benchmark)/v (Portfolio) * sqrt[{1-tc^2}/{1-c^2}]*
b = *tc - c * sqrt[{1-tc^2}/{1-c^2}]*
tc = *1 - tTE^2 / {2 * v(benchmark)^2}*

Where:

avr (.) : Average returns
rf : Risk free rate
v (.) : Volatilities
tc : Target correlation between portfolio and benchmark
c : Actual correlation between portfolio and benchmark
tTE : Target tracking error

Measure of M3 surveys factors of effectiveness based on the benchmark risk. For insisting of this criterion to a number of factors, this model describes correlation-adjusted of factors in investment funds with regard to the active portfolio management style. This measure could be a suitable measure for the portfolio structure establishment. If no systematic risk exist, then the results of M3 is equal to the M2 measure [44].

M3 is preferred to all other measures of risk-adjusted performance as (i) it includes investments in all assets, including cash and the passive benchmark, to produce the highest risk-adjusted return for a tracking error target; and (ii) it is the only measure that ranks portfolios (measured over the same time period) identical to rankings based on the confidence.

Two investment opportunities will typically have different variances and correlations to the benchmark, in turn leading to different tracking errors relative to the benchmark. This is a difficult comparison with too many moving parts. In order to compare the two, it is

recommended that the investor needs to invest in the active strategy, the risk- less asset and benchmark to ensure: (a) the volatility of this composite is equal to that of the benchmark [45]; and (b) the tracking error of this composite is equal to the target tracking error [42]. The second is achieved by ensuring that the newly created composite portfolio has a correlation equal to a target correlation (derived from the fact that there is a target tracking error and that the volatility of the benchmark and that of the composite are equal).The M3 measure extends Modigliani and Modigliani [45] by recognizing that the investor has to consider basis points of risk-adjusted performance after ensuring that correlations of various funds versus the benchmark are also equal, thereby ensuring that the tracking errors are equal [46].

M**3** is 'volatility-risk- and-correlation-risk'-adjusted-performance.
M**3** rankings differ from M**2** and rankings.
If no target tracking error exists, a = 0 and M**3** will equal M**2**.
M**3** can be used in a forward-looking sense: It can provide ex ante guidance how to structure portfolios with TE restrictions [47, 48]. In this study analysis M3, SORTINO, EROV measures and in Table 2 compares their characteristics together.

In this study, VaR, variability of reduction return, benchmark and portfolio risks and efficiency compound annual returns are considered as independent variables and M**3**, SORTINO and EROV measures are considered as dependent variables. Each of the variables has 16 and 8 times of observation during a year.

Results of Hypothesis Testing:

First Hypothesis: There are possible of appropriate portfolio selection by EROV, SORTINO and M3 criteria. To test this hypothesis, the average of winner and loser portfolios return is compared in three indicators on holding periods 3 and 6 months.

$$\begin{cases} H0: MEAN_{win} \le MEAN_{loss} \\ H1: MEAN_{win} > MEAN_{loss} \end{cases}$$

mod *el erov* : $t_{(df\,30)} = 13.943$ p =.000 $p_{ob} < p_{CR}$
mod *el sor* : $t_{(df\,30)} = 7.880$ p = .000 $p_{ob} < p_{CR}$
mod *el* m^3 : $t_{(df\,30)} = 4.612$ p = .000 $p_{ob} < p_{CR}$

Based on data collected from the sample group and t test, calculated t statistics is larger than the critical table of statistics and in other words, the calculated error is smaller than 0.05. Consequently zero hypotheses are rejected at 95 percent confidence and the research hypothesis is accepted as a safe assumption. According to a meaningful difference exists between calculated mean of winner and loser portfolio in three indicators. Therefore, there is possibility of portfolio selection by EROV, SORTINO and M3 criteria in the sample companies. The Table 3 showed the result of test.

Second Hypothesis: EROV measure has better performance than SORTINO and M3 criteria in portfolio selection. To answer this hypothesis, the difference mean of winner and loser portfolio is compared in three indicators on holding periods 3 and 6 months.

$$\begin{cases} H0: MEAN_{erov,w-1} = MEAN_{sor,w-1} = MEAN_{m3,w-1} \\ H1: ALL\ MEAN\ NOT\ EQUAL \end{cases}$$

$F_{(df2,45)} = 40.097$ p = .000 $p_{ob} < p_{CR}$ Based on 3 month data
$F_{(df2,21)} = 5.256$ p = .015 $p_{ob} < p_{CR}$ Based on 6 month data

Based on data collected from the sample group and one-way ANOVA test, calculated F statistics is larger than the critical table of statistics and in other words, the calculated error is smaller than 0.05. Consequently zero hypotheses are rejected at 95 percent confidence and the research hypothesis is accepted as a safe assumption. Because one-way ANOVA test repeated measures is a general test and it doesn't show result of detailed test, so to compare the differences between them the means Tukey test is used. Based on Tukey test, difference mean of winner and loser portfolio doesn't show a meaningful difference with SORTINO Ratio by making use of EROV. But difference mean of winner and loser portfolio by using of M3 is significantly greater than mean of EROV measure. Consequently the second hypothesis isn't accepted. The Table 4 and 5 represent the result of tests.

Third Hypothesis: EROV, SORTINO and M3 criteria have better performance than market in portfolio selection. To test this hypothesis, the difference average of winner and loser portfolio is compared in three indicators and market.

$$\begin{cases} H0: MEAN_{erov,w-1} = MEAN_{sor,w-1} = MEAN_{m3,w-1} = MEAN_{market} \\ H1: ALL\ MEAN\ NOT\ EQUAL \end{cases}$$

$F_{(df3,60)} = 27.158$ p = .000 $p_{ob} < p_{CR}$ Based on 3 month data
$F_{(df3,60)} = 5.405$ p = .005 $p_{ob} < p_{CR}$ Based on 6 month data

Table 2: Characteristics in EROV, SORTINO and M3

Title	EROV	SORTINO	M3
Risk measure	Value-At-Risk	Downside deviation	Portfolio and benchmark risk
Type of distribution	All of distributions	For Asymmetrical distribution	All of distributions
Focus of attention	Extreme of expected loss	Deviations of return adverse	Factors of effective on the benchmark risk
Type of Stock for evaluation	Species of financial tools	Species of investment portfolio	Species of portfolio
Application	Determination of asset sufficiency	Calculate Excess return on total volatilities	Forecast events ahead of investment

Tables 3: The results of First hypothesis testing by Independent Samples Test

					Levene's Test for Equality of Variances		t-test for Equality of Means			
Position	Variable	Population	Winner mean	Loser mean	F	p	t	df	p	Mean difference
3 month data	EROV	Win-loss	.0453	-.1467	5.390	.027	13.943	30	.000	.19203
	SOR	Win-loss	-.7194	-.9224	5.820	.022	7.880	30	.000	.20307
	M3	Win-loss	-.3581	-1.8684	12.965	.001	4.612	30	.000	1.51030
6 month data	EROV	Win-loss	.0180	-.1055	1.608	.225	5.513	14	.000	.12352
	SOR	Win-loss	-.7568	-.8961	.734	.406	4.588	14	.000	.13926
	M3	Win-loss	-.5607	-1.7115	9.334	.009	2.154	14	.049	1.15076

Table 4: The results of Second hypothesis testing by ANOVA

The results of Second hypothesis based on 3 month data						
Variable and group		Sum of squares	df	Mean square	F	Sig.
Difference mean of winner and loser portfolio	Between group	5482.683	2	2741.341	40.097	.000
	Within group	3076.559	45	68.368		
	Total	8559.242	47			
The results of Second hypothesis based on 6 month data						
Difference mean of winner and loser portfolio	Between group	5.543	2	2.771	5.256	.014
	Within group	11.073	21	.527		
	Total	16.615	23			

Table 5: Comparisons of three indicators by Tukey HSD

Variable	Number	Ranking at the .05 error level (3 month data)	
EROV	16	.1920	
SOR	16	.2031	
M3	16		1.5103
Error level		.896	1.000
Variable	Number	Ranking at the .05 error level (6 month data)	
EROV	8	.1235	
SOR	8	.1393	
M3	8		1.1508
Error level		.999	1.000

Table 6: The results of Third hypothesis testing by ANOVA

The results of third hypothesis based on 3 month data						
Variable and group		Sum of squares	df	Mean square	F	Sig.
Difference mean of winner and loser portfolio	Between group	22.735	3	7.578	27.158	.000
	Within group	16.743	60	.279		
	Total	39.478	63			
The results of third hypothesis based on 6 month data						
Difference mean of winner and loser portfolio	Between group	6.529	3	2.176	5.405	.005
	Within group	11.273	28	.403		
	Total	17.802	31			

Table 7: Comparisons of three indicators with market by Tukey HSD

Variable	Number	Ranking at the .05 error level (3 month data)	
Market	16	.0329	
EROV	16	.1920	
SOR	16	.2031	
M3	16		1.5103
Error level		.799	1.000

Variable	Number	Ranking at the .05 error level (6 month data)	
Market	8	.0658	
EROV	8	.1235	
SOR	8	.1393	
M3	8		1.1508
Error level		.996	1.000

Based on 3 and 6 months data collected from the sample group and one-way ANOVA test, calculated F statistics is larger than the critical table of statistics and in other words, the calculated error is smaller than 0.05. Consequently zero hypotheses are rejected at 95 percent confidence and the research hypothesis is accepted as a safe assumption. And for compare each of the indicators with market indicator, Tukey test is used. Based on Tukey test, the portfolio selection doesn't show a meaningful difference with the market indicator by using of EROV and SORTINO. But the portfolio selection by using of M3 measure show a meaningful difference with the market indicator and it is larger than market. The Tables 6 and 7 represent the result of tests.

CONCLUSION

Since the selection of appropriate portfolio, is important for investors and may lead them to a better performance in the capital market, the knowledge of the efficient and accurate criteria for investment seems to be necessary. So we must seek mechanisms that help us achieve our objectives in the current economic and market conditions.

The result of research indicated that the possibility of portfolio selection exists by using the momentum strategies. According to the research of Aragon and Ferson [44] and Zakamouline and Koekebakker [8], ratios related to post-modern portfolio theory would better define the performance of the companies. And the portfolio selection criteria based on post-modern portfolio theory (1987), counsel the professional management of portfolio performance. In this regard, M3 measure showed better performance in comparison with EROV, SORTINO and market. This finding violated efficient assumption of Tehran Stock Exchange in investment short-term period. And it indicated that investors are risk-averse. In other words, risk isn't symmetrical and it has highly skewness toward the adjustment. The researches of Usta and Kantar [5], Li *et al.* [12] and Janal *et al.* [49] emphasize using of skewness in the mean-variance model, so that it could prove role of risk-adjusted in portfolio selection. Because investors notice more on the fluctuation lower than target return rate. Result showed that M3 measure has more ability than other criteria in clarification of market conditions. Of course the researches of Muralidhar [46] and Farinelli *et al.* [50] approve the use of risk-adjusted performance evaluation measures, because these measures have more robustness in comparison with traditional measures and they do not consider normality in return distribution and are compatible with market term.

Interpreting of the Results Based on Previous Studies: This paper indicated that M3 measure is a suitable measure for portfolio selection, in contrast to other researches such as Zakamaouline and Koekebakker [8] that recommended generalized Sharpe ratio for portfolio selection. Also Sortino ratio has achieved middle position among three ratios of portfolio selection.

Current thriving markets are looking for fluctuations and fluctuations can only be ignored in the stagnant market. Moreover, it is clear that more people are risk averse. So based on Janal *et al.* [49], Liu *et al.* [14] and Pesaran and Zaffaroni [33] the model that is presented in this study to select the appropriate portfolio is good. In this regard Gozal Reyhani [51] as well as Cooper *et al.* [30], suggested investment companies to use a more optimized structure in their portfolio. In order to diminish the factors that cause to increase the level of risk and in order to be more efficient in this case, Mau [52] suggested specific strategies to control the level of systematic risks.

According to the result of research portfolio returns mean in short-term is larger than portfolio returns mean in long-term and in regard to the researches of Griffin *et al.* [28], Richards [29], Horst [26] and Cvitanic *et al.* [53], manager's focus on short-horizon than long-horizon.

In contrast to Chordia and Shivakumar [10], research models are able to predict effect of momentum in Tehran Stock Exchange.

Restrictions of Research:

- We didn't consider changes in macroeconomic conditions, political and social changes over the years of study.
- Due to limited statistical community of top 50 companies listed in Tehran Stock Exchange, generalization of results to other economic units should be done with caution.

Suggestions for Future Research:

- It is suggested that researchers should test Portfolio selection by other ratios such as Omega, Upside Potential, Omega-Sharpe and Prospect ratios.
- It is also suggested that Portfolio selection should be tested on other statistic sample groups by these Ratios.

ACKNOWLEDGEMENT

We would like to acknowledge Dr. George O.Aragon, W.P. Carey School of Business, Arizona State University, Dr. Wayne E. Ferson at Marshall School of Business, University of Southern California, Los Angeles, California, Dr. Arun S. Muralidhar, Managing Director, FX Concepts, Inc and Chairman, Mcube Investment Technologies LLC and Dr. Andreas Steiner, University of Osnabrück, Department of Economics, Osnabrück, Germany.

REFERENCES

1. Ralph, E. Steuer and Yue Qi, 2005. Suitable-Portfolio Investors, Nondominated Frontier Sensitivity and the Effect of Multiple Objectives on Standard Portfolio Selection, Terry College of Business, University of GeorgiaAthens, Georgia, pp: 30602-6253 USA.
2. Andrew W., P. Constantin and M. Wierzbicki, 2003. It Is 11 Pm- Do You Know Your Liquidity Is? The Mean-variance Liquidity Frontie"; J. Investment Management, 1(1): 55-93.
3. Hon, M.T. and I. Tonks, 2003. Momentum in the UK stock markets, J. Multinational Financial Management, 13(1): 43-70. http:// www.hec.ulg.ac.be/FR/recherche/activites/workingpapers/documents/WP_HECULg_20090201_Cogneau_Hubner.pdf.
4. Jegadeesh, N. and S. Titman, 1993. Returns to buying winners and selling losers: implications for stock market efficiency, J. Finance, 48: 65-91.
5. Ilhan, Usta and Yeliz Mert Kantar, 2011. Mean-Variance-Skewness-Entropy Measures: A Multi-Objective Approach for Portfolio Selection, Entropy, 13: 117-133.
6. Sarayut Nathaphan and Pornchai Chunhachinda, 2010. Estimation Risk Modeling in Optimal Portfolio Selection: An Empirical Study from Emerging Markets, Economics Research International, pp: 1-10.
7. Anagnostopoulos, K.P. and G. Mamanis, 2010. Using Multiobjective Algorithms to Solve the Discrete Mean-Variance Portfolio Selection,International J. Economics and Finance, 2(3): 152-162.
8. Zakamouline Valeri and Koekebakker Steen, 2009. Portfolio Performance Evaluation with Generalized Sharpe Ratios: Beyond the Mean and Variance, J. Banking and Finance, 33: 1242-1254.
9. Quaranta, A.G. and A. Zaffaroni, 2008. Robust optimization of conditional value at risk and portfolio selection, Journal of Banking & Finance. 32: 2046-2056.
10. Chordia, T. and L. Shivakumar, 2002. Momentum, business cycles and time-varying Expected Returns, J. Finance, 57: 985-1019.
11. Ping-Chen Lin and Po-Chang Ko, 2009. Portfolio value-at-risk forecasting with GA-based extreme value theory, Expert Systems with Applications, 36: 2503-2512.
12. Xiang Li, Zhongfeng Qin and Samarjit Kar, 2010. Mean-variance-skewness model for portfolio selection with fuzzy returns, European J. Operational Res., 202(1): 239-247.
13. Simanjuntak, G. Simarmata and H. Mawengkang, 2006. A Feasible Neighborhood Heuristic Search for Solving Portfolio Optimization Problems with VaR and Expected Shortfall,proceedings of the 2nd IMT-GT Regional Conference on Mathematics, Statistics and Applications Universiti Sains Malaysia,Penang, pp: 1-7.
14. Liu, S., S.Y. Wang and W. Qiu, 2003. Mean-variance-skewness model for portfolio selection with transaction costs, International J. Systems Sci., 34(4): 255-262.

15. Hürlimann Werner, 2006. A Mean-Variance Portfolio Optimal Under Utility Pricing, J. Mathematics and Statistics, 2(4): 445-452.
16. Xiaoxia Huang, 2008. Mean-semivariance models for fuzzy portfolio selection, J. Computational and Applied Mathematics, 217(1): 1-8.
17. Alexandra Wiesinger, 2010. Bachelors Thesis, Risk-Adjusted Performance Measurement-State of the Art.
18. Rom, Brian M. and W. Ferguson Kathleen, 2001. A software developer's view: using Post-Modern Portfolio Theory to improve investment performance measurement" in the book of Sortino Frank A and Satchell Stephen E; Managing downside risk in financial markets"; Butterworth-Heinemann, UK b.
19. Antto Alenius and Bachelor's Thesis, 2007. Downside Risk Measures in Evaluation of Portfolio Performance, Lappeenranta University of Technology School of Business Finance, pp: 647.
20. Rom, Brian M., 2002. Using Downside Risk to Improve Performance Measurement, Investment Technologies, taken from: www.investtech.com.
21. Estrada, J., 2000. The Cost of Equity in Emerging Markets: A Downside Risk Approach, IESE Business School of (Barcelona, Spain), Taken from: http://web.iese.edu/JEstrada.
22. Estrada, J., 2006. Downside Risk in Practice", Journal of Applied Corporate Finance, 18(1): 117-125.
23. Fama, E.F. and K.R. French, 1996. Multifactor Explanations of Asset Pricing Anomalies, Journal of Financial, 51: 55-84.
24. Rom, Brian M. and W. Kathleen Ferguson, 1993. Post-Modern Portfolio Theory Comes of Age, J. Investing, 3(3): 349-364.
25. Jegadeesh, N. and S. Titman, 1995. Overreaction, Delayed Reactionand Contrarian Profits, Review of Financial Studies, 8: 973-993.
26. Rouwen Horst, K.G., 1998. International momentum strategies, J. Finance, 53: 267-284.
27. Jegadeesh, N. and S. Titman, 2001. Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, Journal of Finance, 56: 699-720.
28. Griffin, F.J.N., X. Ji and J.S. Martin, 2003. Momentum investing and business cycle risk: Evidence from pole to pole, J. Finance, 58: 2515-2547. inance, 59: 1345-1365.
29. Richards, A.J., 1997. Winner-loser reversal in national stock market: can they be explained? J. Finance, 52(5): 2129-2144.
30. Cooper, M.J., R.C. Gutierrez and A. Hameed, 2004. Market States and Momentum, J. Finance, 59: 1345-1365.
31. Nathan, D., 2006. Returns to Buying Winners and Selling Losers: Implications for Stock Implications for Stock Market Efficiency. Working Paper.
32. Rachev, S., Y. Tokat and E. Schwartz, 2007. The Stable non-Gaussian Asset allocation: A comparison with the classical Gaussian Approach, J. Economic Dynamics and Control, 27: 937-969.
33. Pesaran, M.H. and P. Zaffaroni, 2008. Optimal Asset Allocation with Factor Models for Large Portfolios, Cambridge Working Papers in Economics 0813, Faculty of Economics, University of Cambridge.
34. Carl R. Bacon, 2004. Practical Portfolio Performance Measurement and Attribution, John Wiley and Sons Ltd, pp: 78-81.
35. Jorion, P., 2006. Value at Risk. (3rd Ed.). Singapore, McGraw-Hill.
36. Burkler, N. and S. Hunziker, 2008. Rendite, Risiko und Performance - eine Übersicht. IFZ Working Paper 003/2008.
37. Bacon, C., 2008. Practical Performance Measurement and Attribution. New York: John Wiley and Sons.
38. Sortino, F. and R. Van der Meer, 1991. Downside risk, Journal of Portfolio Management Summer, pp: 27-31
39. Sortino, F., 2001. From Alpha to Omega. In F. Sortino and S. Satchell, (Eds). Managing Downside Risk in Financial Markets Oxford: Reed Educational and Professional Publishing, pp: 51-58.
40. Kaplan, P. and J. Knowles, 2004. Kappa: A Generalized Downside Risk-Adjusted.
41. Poddig, T., H. Dichtl and K. Petersmeier, 2003. Statistik, Ökonometrie, Optimierung. (3rd Ed.). Bad Soden am Taunus: Uhlenbruch.
42. Muralidhar, Arun S., 2000. Risk-Adjusted Performance: The Correlation, Financial Analysts Journal, September/October, 56(5): 63-71.
43. Cogneau, P. and G. Hubner, 2009. 101 Ways to Measure Portfolio Performance. Working Paper. Ecole de Gestion de l'Universite de Liege. Retrieved on 12 April 2010 from.
44. George O. Aragon and Wayne E. Ferson, 2006. Portfolio Performance Evaluation, Foundations and Trends in Finance, 2(2): 83-190.

45. Modigliani, F. and L. Modigliani, 1997. Risk-Adjusted Performance, Journal of Portfolio Management, winter, pp: 45-54
46. Muralidhar, A., 2001. Optimal Risk-Adjusted Portfolios with Multiple Managers, J. Portfolio Management, 27(3).
47. Steiner Andreas, 2001. Risk-adjusted Performance Analysis, Zurich, Swiss.
48. Muralidhar, A., 2003a. Why Maximizing Information Ratios in Incorrect, Working Paper.
49. Jana1, P., T.K. Roy and S.K. Mazumder, 2007. Multi-objective Mean-variance-skewness model for Portfolio Optimization, Advanced Modeling and Optimization, 9(1).
50. Farinelli Simone *et al*., 2008. Beyond Sharpe ratio: Optimal asset allocation using different performance ratios, J. Banking and Finance, 32: 2057-2063.
51. Gozal Reyhani, A., 2012. The Investigation of Effect of Assets Structure on Performance of Accepted Companies of Tehran Stock Exchange, Journal of Basic and Applied Scientific Research, 2(2): 1086-1090.
52. Mau, Ronald R., 2009. Back to the Basics: A Process Approach for Managing Portfolio Risk, International J. Economics and Finance, 1(2): 12-20.
53. Jaksa Cvitanic, Ali Lazrakb and Tan Wang, 2008. Implications of the Sharpe ratio as a performance measure in multi-period settings, J. Economic Dynamics and Control, 32: 1622-1649.