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The Comparative Study of Behavioral Finance Approach and Standard Finance in Choosing the Optimized Portfolio: Evidence from Iran

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ABSTRACT

In standard financial model which is proposed by Markuitz, the basis of financial activity is on logical act of investors. With establishment of a branch named behavioral finance which is based on the works of Kahneman and Tuerski, the role of psychology of investors and the results of psychological and social behavior of investors, has entered into the fields of financial sciences. On the basis of the behavioral finance theories, the financial behavior of the investors in different periods of the market is not always rational and has some abnormalities. One of these abnormalities is herding behavior. In this research, considering the importance of studying herding behavior in boom and bust periods, this phenomenon is studied in Tehran stock market during 2009 to 2014 from two different aspects of standard and behavioral finance. In this research, the herding behavior of the investors is studied considering two indices of risk and efficiency in order to select the optimized portfolio. The results show that the expected efficiency in selected portfolio based on behavioral model is more than the efficiency based on standard model during boom and bust periods. The expected risk in selected portfolio based on behavioral model is less than expected risk of standard model during boom and bust periods. According these results, it can be stated that the investors in Tehran stock market, do not show independence in financial decisions making and prefer to follow the general decisions and this validate the presence of herding behavior in Tehran stock market.

JEL Classification: G11; G40.

Keywords: Optimal Portfolio; Behavioral Finance; Regression; Boom and Bust.

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1. INTRODUCTION

In the present growing economy, the investors and managers of the portfolio are always looking for suitable investment options till could gain required profit and also to increase their wealth in the long term. The investment and portfolio managers are looking for selecting the securities which are in highest returns and lowest risk. The investors have different sensitivity in buying the optimal portfolio and often focused on the expected return on the stock of year under review. The assumptions and theoretical foundations argue that the investors make decision based on their intellect and wisdom that their performance is based on it. In other words, their decisions affected by personal information, random and independent of the performance and decisions of the others, but the real-world observations show that there are contradictions between the mentioned assumptions and actual performance of financial markets, (Namazi and Mansouri, 2014). During the last decade, the financial scientists attempt to explain the causes of specific cases with the helping of other sciences such as psychological, social sciences and physics. Therefore, some interdisciplinary fields are formed like financial economy, financial econometrics, financial mathematics and decision making theory.

One of the studies in this field which rapidly expanded and partly could explain these mentioned phenomena was integration of financial theories with current theories of psychological. This matter caused creation of a field as behavioral finance. This intellectual school tends to psychology and the science of decision making because of inability of existing models that were based on perfect rationality. The fans of this school accepted the bounded rationality as default that Simon offered it and tried to build the financial models with psychology, (Raei and Falah pour, 2004).Daniel Kahneman is one of the founders of the field of financial knowledge also he is as renowned psychologist that he received the Nobel Prize in economics in year 2001 because of presentation of models in order to explain the investors' behavior under uncertainty situations (Shahrabadi and Yousefi, 2007).

2. LITERATURE REVIEW

The behavioral finance scientific field started in 1979, at time when Daniel Kahneman and Amos Tversky presented the Mercantilism theory. The Mercantilism theory is presented for understanding the effect of risk in economic decisions, (Islami bidgoli and Kordloei, 2010). This branch which commonly is perceived as psychology in financial knowledge, has become a as an important issue especially after bursting of the price bubble of stocks of technology companies in March 2000. Despite using of behavioral finance word in many specialized publications and books, so far its concept has not understood properly and globally. Perhaps one of the reasons for this matter is its similar name with topics such as behavioral science, investor psychology, cognitive psychology, behavioral economics, experimental economics and cognitive science, (Khajavi and Ghauri moghadam, 2012). The Mercantilism theory states how the individuals' decision is formed in the absence of confidence. Usually the investors formed suggestions based on potential gains and losses related to a specific origin point. Investors also tend to evaluate the gains and losses according to s-shaped function. The mentioned function is concave for profit and is convex for losses. This means that whenever losses occur so the investors announced a bad situation. But if losses occur again so they have the same feeling on bad situation. They also when are face with profit because of reinvestment so the will not have previous good feeling. In the field of financial decisions, point of origin is purchase price and increasing (decreasing) in value of assets, (Islami bidgoli and Saranj, 2008).

Izadiniya and Hajiyan nezhad (2009) explained that prices are associated with severe volatility in the stock market without any specific and reliable information about them in the market. In this study the herd behavior in the Tehran Stock Exchange has been studied and research method is based on reduction of sectional standard deviation of stock returns than the average of market tensions periods than the other courses. Badri and Kochaki (2013) evaluated the experimental test of common bias of overconfidence behavior and disposition effect in the Tehran Stock Exchange by exploring the relationship between turnover and lagged return. The results showed that there is not significant relationship between the turnover and market's lagged return and the existence of overconfidence rejected in investment in the Tehran Stock Exchange. Gol arzi and Ziyachi (2014) studied on investors' herd behavior in Tehran Stock Exchange with approach based on Turnover. The results of this study show that the herd behavior has been conducted continuously in Tehran Stock Exchange during the period of study.

Jahangiri rad and et al (2014) evaluated the rising or falling market based on Robust Regression and comparing the results of research with similar researches. They founded that investors' behavior is as herd behavior in the Tehran Stock Exchange. As well as the herd behavior is more in increasing market than decreasing market. Zanjirdar and et al (2014) evaluated the effect of behavioral factors and as mental accounting in the selection of the optimal portfolio with high returns and low risk in comparison with standard financial. The behavioral portfolio model based on Tehran Stock Exchange data show that optimal portfolio selection based on the classic financial assumptions has more returns than portfolio selection model based on behavioral finance. Also optimal portfolio selection based on behavioral finance assumptions and VAR index has less risk than the standard model. Ardakani a et al (2015) studied on the effect of the sudden economic events in investors' behaviors and decisions. The findings of this study indicate that the returns volatility increases significantly by occurrence of unexpected events. According to the results, based on good news, investors' reaction is based on prediction of vague information theory. This means that abnormal stock returns is good and positive during the period after the entering the information, but this hypothesis does not apply on the bad news. In other words, behavior after the good news follows the vague information theory which is not bout bad news. Also, for both cases the stock price adjustment was downwards.

Yang et al (2015) studied on investors' herd behavior in East Asian markets and comparison their performance with investors in America's market. Evidence shows that America's stock markets are still in their leadership and management than East Asian markets. These results are gain through comparison of available changes in stock return in the three markets of Hong Kong, Taiwan and Japan before and after these Events. Finally, the suitable strategies were presented for investing considering the existence of herd behavior in the markets of East Asia.

Vickers and et al (2016) in an article with title effect of herd behavior on the Athens capital market during the financial crisis in this country which in this paper is used of all shares listed on the capital market in Greece in the period 2007 to 2015 stated that existing of herd behavior in different markets in Greece was in this period. The existing of herd behavior at quintiles top of cross-sectional dispersion of return rate is confirmed by using quintile regression. Wang and et al (2016), studied on the effect of herd behavior on the relationship between risk and return. According to their findings, by using the multiple regressions to evaluate the effect of herd behavior on the relationship between risk and return, this relation is weak and does not have high accuracy. According to empirical observations, the effect of quintile ranking of herd behavior between the risk and return has been confirmed.

3. METHODOLOGY

This paper is correlational in aspect of nature and content and in terms of purpose is practical. The panel data is used for estimating the coefficients and hypothesis testing due to the type of studied data. Firstly is used of Chow test to determine the method of using the panel data and homogeneous or heterogeneous detection. The statistical population of this paper includes all the companies listed in the Tehran stock exchange and OTC securities. The studied period of this paper is from 2009 to 2014. Also was chosen a sample of the population of 81 companies listed on the Tehran Stock Exchange. The variables of the study such as portfolio return and risk are based on behavioral and standard model which are used to test the hypotheses after calculating and estimating. First, it assumes that investors evaluate less on about portfolio risk and return through due to portfolio returns and same time move of portfolio returns to one another which is the main idea in portfolio diversification. Second, it is that the investor considers the financial decision-making process as an optimization problem. It means that the investor selects a portfolio which has least variance among the different types of available portfolios.

The non-linear model based on absolute deviation of returns was proposed in 2000 by Chung Cheng and Khorana and is known by the same name. In this paper this model is used to investigate the existence or nonexistence of herd behavior in the Tehran Stock Exchange in the different periods. According to this model, whatever deviations of return on stocks are less than the market so the investors' tendency to follow the market will increase. In other words, the returns of companies' stock do not have any dispersion and is as market return. The CCK is a non-linear model based on cross sectional absolute deviation and follows the below standard forms:

$$CSAD_t = \gamma_0 + \gamma_1|r_{mt}| + \gamma_2 r_{mt}^2 + \varepsilon_t \qquad (1)$$

In this relation the r_{mt} is average return of the market during the weekly period leading up to the end of the t day. In this relation the CSAD is cross sectional absolute deviation of returns. In the CCK model the significant and negative value of γ_2 means existence of herd behavior on the market statistically. In other words, the significant and negative value of γ_2 means by increasing the r_{mt}^2 (when the market returns is in the top or bottom of trial of market returns Distribution) CSAD of returns will decrease. $CSAD_t$ is the dependent variable of the model which is estimated in each period as follows (In this regard r_{it} represents the return of i share during the weekly period leading up to the end of the t day):

$$\widehat{CSAD_t} = \frac{1}{n}\sum_{i=1}^{n}|r_{it} - r_{mt}| \qquad (2)$$

In order to gain the deviations of stock return of firms from the market returns need to obtain the available stock returns in the market portfolio and also market returns during the research period. Also market returns and stock returns in the portfolio are calculated daily. The amount of company's stock returns $R_{i,t}$ is obtained through the following equation:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \qquad (3)$$

$P_{i,t}$ is the current price of desired share and $P_{i,t-1}$ is price of the day before of that share. The price related to previous day will adjust when the companies have dividend and capital change. $R_{m,t}$ gain through arithmetic average of the daily returns of the n companies in the market portfolio and their relationship will be as following:

$$R_{m,t} = \frac{1}{n}\sum_{i=1}^{n} R_{i,t} \qquad (4)$$

The R-Square of the market is calculated by the return. In this paper, the market returns and R-Square of the market are as independent variables. The CCK model predicts a positive relationship between market returns and deviations of companies' returns when the market situation is not unusual that means positive coefficient of return on the market is shows increasing of deviations of companies' returns from the market returns. The expanded non-linear model based on cross-sectional absolute deviation of returns is designed as following in the presence of controlling variables:

$$CASD_t = \gamma_0 + \gamma_1|r_{mt}| + \gamma_2 r_{mt}^2 + \gamma_3 \delta_{mt} + \gamma_4 RP_{mt} + \varepsilon_t \qquad (5)$$

δ_{mt} Is a measure of market volatility and RP_{mt} is past performance factor. Usually, the herd behavior is more visible in the emerging financial markets and the Tehran Stock Exchange is also part of this category of markets. Since the arrival of investors in financial markets at a time when the market increased and booming is more than the time when these markets are bust mood and since most of these new investors do not have sufficient data on the financial markets and company's stock so they have strong tendency to follow others. Since the distribution of the dependent variable in this study (CSAD), is not normal also there is not the possibility of normalization even with the usual normalization methods so will be used of Robust Regression instead of simple linear regression. The process of implementation the study it is that we will calculate the market's average return for a specified period and then if the company's return is higher than the market's average so the assets is as risky. We will calculate the return and risk of the index for each year as a portfolio of risky assets. Then return and risk average along with return rate without risk is used as inputs of behavioral and standard model and portfolio selection, Then return and risk of the portfolios of the models are compared with each other. In this research, CCK model is as behavioral model of optimal portfolio selection. That this selection also will evaluate in boom-and-bust situation of capital market. Finally, risk and return in two standard financial (Markowitz) and behavioral finance model (Chung-Cheng-Khorana) will be validated and compared by using regression model. Also presence or absence of herd behavior will be discussed in the studied period in the Tehran Stock Exchange.

4. RESULTS AND DISCUSSION

According to the results of the reliability test, because significance level is lower than 5% we can say that these variables have been steady level during the studied period.

Table 1. Descriptive Statistics

Variable	Average	Standard deviation	Variance	Skewness	kurtosis
Expected return - Markowitz	0.1364480	0.32480905	0.106	-0.015	-0.699
Expected risk – Markowitz	0.3224709	1.92142934	3.692	0.010	-1.130
Expected returns - a behavioral model	0.1623443	0.40108953	0.161	0.066	-0.204
Expected risk - behavioral	0.4035213	2.40593788	5.789	0.036	-1.054

Source: Author's own computations.

Reliability means that the mean and variance (dispersion) of variables are constant during the studied period.

Table 2. Reliability Test

Test Name	Variable name	Test statistics	Significance level
The reliability test of the variables	Expected return – Markowitz	-21.47091	0.0000
	Expected risk – Markowitz	-21.83512	0.0000
	Expected returns - a behavioral model	-20.853321	0.0000
	Expected risk - behavioral	-21.73682	0.0000

First of all, and before testing the research hypotheses, risk and return of regression of Markowitz model and behavioral model is presented. The Null hypothesis and first hypothesis of the regression are as follows:

H_0: There is not any significant relationship between risk and return (Markowitz model). $\beta = 0$

H_1: There is significant relationship between risk and return (Markowitz model). $\beta \neq 0$

Table 3. Test of Risk and Return of Regression- Markowitz

	Sum of squares	Degree of freedom	Mean-square	F statistic	Level
Regression	40.478	1	4.0478	7608.734	0.0000
Remaining	2.144	403	0.005		
SUM	42.622	404			
The correlation coefficient:0.975 The coefficient of determination:0.950 The adjusted coefficient of determination: 0.950 Durbin – Watson statics: 1.923					

Source: Author's own computations.

The significance level is calculated about 95% confidence level for the whole model. Generally, due to the calculated significant level can confirm the significant relationship. According to the adjusted determination coefficient of the estimated model it could be argued that 95% of changes in dependent variable are explained by the independent variable. The autocorrelation is one of the defects of the standard assumptions of regression and can use of Durbin-Watson statistic in order to determining the present or absence of autocorrelation in the regression. The calculated Durbin-Watson statistic (1.923) which is among 1.5-2.5 represents the lack of autocorrelation and shows the independence of error components remains.

Table 4. Test of Regression

Variable	Standard coefficient	standard deviation	Test statistics	significance level
Constant value	-	0.004	51.582	0.000
Expected risk	0.975	0.002	87.228	0.000

Source: Author's own computations.

As it can be seen in the above table, the significant level of test statistics for expected risk is 5% lower from acceptable error level; therefore, the existing of significant relationship between expected risk and return is approved.

The null hypothesis and 1 hypothesis of the testing the regression include:

H_0: There is not any significant relationship between risk and return (behavioral model). $\beta = 0$

H_1: There is significant relationship between risk and return (behavioral model). $\beta \neq 0$

Table 5. Risk and Return Regression- Behavioral Model

	Sum of squares	Degree of freedom	Mean-square	F statistic	Level
Regression	59.095	1	59.095	4038.100	0.000
Remaining	5.898	403	0.015		
SUM	64.993	404			
The correlation coefficient:0.954 The coefficient of determination:0.909 The adjusted coefficient of determination: 0.909 Durbin – Watson statics: 1.889					

Source: Author's own computations.

The significance level is calculated about 95% confidence level for the whole model. Generally, due to the calculated significant level can confirm the significant relationship. According to the adjusted determination coefficient of the estimated model it could be argued that 90% of changes in dependent variable are explained by

the independent variable. The autocorrelation is one of the defects of the standard assumptions of regression and can use of Durbin-Watson statistic in order to determining the present or absence of autocorrelation in the regression. The calculated Durbin-Watson statistic (1.889) which is among 1.5-2.5 represents the lack of autocorrelation and shows the independence of error components remains.

Table 6. Regression

Variable name	Standard coefficient	standard deviation	Test statistics	significance level
Constant value	-	0.006	37.158	0.000
Expected risk	0.954	0.003	63.546	0.000

Source: Author's own computations.

As it can be seen in the above table, the significant level of test statistics for expected risk is 5% lower from acceptable error level; therefore, the existing of significant relationship between expected risk and return is approved.

The results of testing the first hypothesis are as follows:

H_0: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the boom cycle does not have greater expectations than selective portfolio based on the Markowitz model. In other words, there is a not significant difference between expected return based on behavioral model and the expected return based on Markowitz model on selective portfolio in the boom cycle. $\mu = \mu_0$

H_1: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the boom cycle has greater expectations than selective portfolio based on the Markowitz model. In other words, there is significant difference between expected return based on behavioral model and the expected return based on Markowitz model on selective portfolio in the boom cycle. $\mu \neq \mu_0$

Table 7. Results of Testing the First Hypothesis

					Confidence interval at 95% level	
Variable	The test statistic	Degrees of freedom	Level	difference in average	Low	High
Expected return - Markowitz	5.855	189	0.000	0.11760950	0.0779870	0.1572320
Expected returns - behavioral	5.927	189	0.000	0.11549784	0.0770556	0.1539401

Source: Author's own computations.

As it can be seen, the significant level of variables is lower than error level of 5%. Therefore, can conclude that the expected return in the selective portfolio based on behavioral model is more than the expected return in the selective portfolio based on Markowitz model in the boom cycle.

The results of the second hypothesis are as follows:

H_0: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the bust cycle does not have greater expectations than selective portfolio based on the Markowitz model. In other words, there is a not significant difference between expected return based on behavioral model and the expected return based on Markowitz model on selective portfolio in the bust cycle. $\mu = \mu_0$

H_1: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the bust cycle has greater expectations than selective portfolio based on the Markowitz model. In other words, there is significant difference between expected return based on behavioral model and the expected return based on Markowitz model on selective portfolio in the bust cycle. $\mu \neq \mu_0$

Table 8. Results of Testing the Second Hypothesis

					Confidence interval at 95% level	
Variable	test statistic	Degrees of freedom	Level	difference in average	Low	upper
Expected return - Markowitz	6.205	214	0.000	0.15309603	0.1044646	0.2017275
Expected returns - behavioral	6.146	214	0.000	0.20374349	0.1383963	0.2690907

Source: Author's own computations.

As it can be seen, the significant level of variables is lower than error level of 5%. Therefore, can conclude that the expected return in the selective portfolio based on behavioral model is more than the expected return in the selective portfolio based on Markowitz model in the bust cycle.

The results of the third hypothesis are as follows:

H_0: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the boom cycle does not have lower risk than selective portfolio based on the Markowitz model. In other words, there is a not significant difference between expected risk based on behavioral model and the expected risk based on Markowitz model on selective portfolio in the boom cycle. $\mu = \mu_0$

H_1: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the boom cycle has lower expectation risk than selective portfolio based on the Markowitz model. In other words, there is significant difference between expected risk based on behavioral model and the expected risk based on Markowitz model on selective portfolio in the boom cycle. $\mu \neq \mu_0$

Table 9. Results of Testing the Third Hypothesis

					Confidence interval at 95% level	
Variable	test statistic	Degrees of freedom	Level	difference in average	Low	upper
Expected risk - Markowitz	2.430	189	0.016	0.34947042	0.0657692	0.6331716
Expected risk - behavioral	2.480	189	0.014	0.40993526	0.0838122	0.7360584

Source: Author's own computations.

As it can be seen, the significant level of variables is lower than error level of 5%. Therefore, it can be concluded that the expected risk in the selective portfolio based on behavioral model is lower than the expected risk in the selective portfolio based on Markowitz model in the boom cycle.

The results of the fourth hypothesis are as follows:

H_0: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the bust cycle does not have lower risk than selective portfolio based on the Markowitz model. In other words, there is a not significant difference between expected risk based on behavioral model and the expected risk based on Markowitz model on selective portfolio in the bust cycle. $\mu = \mu_0$

H_1: The selective portfolio based on behavioral model with emphasizing on the herd behavior in the bust cycle has lower expectation risk than selective portfolio based on the Markowitz model. In other words, there is significant difference between expected risk based on behavioral model and the expected risk based on Markowitz model on selective portfolio in the bust cycle. $\mu \neq \mu_0$

Table 10. Results of Testing the Fourth Hypothesis

					Confidence interval at 95% level	
Variable	test statistic	Degrees of freedom	Level	difference in average	Low	upper
Expected risk - Markowitz	2.341	214	0.020	0.29861079	0.0472051	0.5500165
Expected risk - behavioral	2.317	214	0.021	0.39785321	0.0593372	0.7363692

Source: Author's own computations.

As it can be seen, the significant level of variables is lower than error level of 5%. Therefore, it can be concluded that the expected risk in the selective portfolio based on behavioral model is lower than the expected risk in the selective portfolio based on Markowitz model in the bust cycle.

5. CONCLUSION

In the standard process, the portfolio selection was determinable through determination of risk taking limit, limitations and goals on the optimal values of assets according to the mean – variance standard pattern, but the mentioned process is impossible by human beings, because they are faced with behavioral bias. For example, the individuals in facing with short term changes and long-term trends in stock will change the Portfolio. In the recent decades, the challenged economic theories based on the concept of economic man caused more attention to behavioral and psychological aspects among the financial scholars also created new approaches in the form of behavioral finance paradigm. A paradigm in which the assumption of man is as logical case that is always successful in their interests' optimization. In fact, the behavioral finance attempts to explain the nature and the manner of financing and investment from the point of view of a normal human. For example, the behavioral finance provides reasons and explanations unlike the rules, speculation bubbles and intense falling in these markets through analyzing the financial markets. It is assumed that, according to the herd behavior, the individuals will ignore their beliefs then their investment decisions are based on group movements in the market. So the behavior of stock returns is conducted in a manner that does not deviate from the returns of the overall market.

Suggestions

According to the results of the hypotheses testing in this paper suggested that the investors avoid the independent decisions in order to investment and expected efficiency also consider the market conditions in boom and bust mood. Also they follow the overall market trend for investing as well as attention to analysis of capital market generally till will have expected return and appropriate and reasonable risk. In this paper, the effect of herd behavior in Tehran Stock Exchange was studied. It is proposed that other behavioral bias like anchoring effect, halo effect and so on should be studied also can study on their presence or absence in the boom and bust period in the different capital markets like Tehran Stock Exchange. The selected behavioral model in this paper was CCK model in order to investigate the presence or absence of herd behavior in Tehran Stock Exchange. It is proposed that the other existing behavioral models been investigated the results of these models be compared to each other. The results showed that the behavioral model has good efficacy. Therefore it is recommended to the investment companies to use of potential features and benefits of behavioral model to improve performance in selection of portfolio to the investors. In conducted research, industries in the Tehran Stock Exchange do not separate. It is proposed that the studies related to behavioral finance models be done in about separation of different groups and industries in the market.

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