

Select the optimal portfolio of tracking price index (maximum return based on risk) top companies in Tehran Stock Exchange

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Abstract: One of the important issues that is raised in the capital markets and it should be noticed by investors such as real or legal, is the issue of choosing optimal investment basket and about this relationship, the study of investors about choosing the best investment basket with regard to its return has been done. Usually it is assumed that investors do not like risk and they always seek to invest in items of property which has maximum return. On the other words, investors look at the investment return as an optimal factor and they consider the variance of returns as an undesirable element. The objective of this research is to select the optimal Portfolio of tracking price index (maximum return based on risk) top companies in Tehran Stock Exchange in year of 2013. The optimal share basket is the basket which has minimum risk for determined return or maximum return for determined risk. The collection of these baskets is known as optimize efficient frontier, which the investor choose a basket among these baskets that is suitable with his or her situation. Markowitz model does not only specify an investment basket, but it shows the efficient frontier that each of these is optimal based on their definition (the compensation of determined level of risk or expected return). Therefore, in this study, it has been dealt with the response to questions with the use of optimization model with MATLAB software. According to the estimation of model, Jooshkab of Yazd and Mellat bank have best optimal baskets among fifty selected companies in this research.

Key words: *Select optimal Portfolio; Return; Risk; Top companies; Tehran Stock Exchange*

1. Introduction

Investors when taking investment decisions, they consider obtained risk and return from different factors simultaneously. If risk and return is not only the effective dimension in the tem of investment decisions, without the doubt they consider as the most important once. The objective of any investor is to maximize the assets and in the other words, maximize return with regard to managing the return fluctuations. Nowadays, people can decide to use their assets today or invest them for future. If people select investment, they can put their resources in capital assets. Nowadays, investment has become a favorite tool. The reason can be easy accessible to information and investment market. In this period, most of the people are familiar with financial market (Body, Kane and Markoos, 2011).

One of the specific features of investment opportunities is that their real return is different with their expected value considerably. Briefly, we can say that this issue has risk. The concept of financial risk is defined for potential deviations from the expected return (Yahaya, 2013). Therefore, the study of patterns and tools of risk management is considerable and advantageous for investors. This study seeks to rely on patterns of risk management and Markowitz model to extract the optimal weight

Portfolio of the top selected companies from the controlling investment risk in companies of Tehran Stock Exchange.

2. Theoretical framework and background of the study

2.1. Optimization of investment basket and maximum return with regard to risk

Investment risk is one of the most important issues that investors face to that. Generally, investors are following to tolerate less risk and maintaining shares which have high return and low risk. On the other hand, many results are conducted from traditional study and it shows there is a positive relationship between risk and return (Jalilian, 2009). Therefore, one of the most important challenges in forming shares basket is determining the ratio or optimal weight of available shares in shares basket for decreasing risk. It needs to say that conducted studies in the area of financial behavior show that unlike the traditional theories, investors might make decisions which do not have any economic justification. According to financial behavior theory, investors have priorities which are caused them to be risk-averse, but are loss aversion and therefore, they are ready to tolerate high risk. Also, it is possible that a person makes decisions, affected communities or individuals, in contrast with traditional theories (Framlet, 2001). Markowitz

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designed and solved a constrained optimization issue to obtain the optimal weight of investment in basket (it creates a condition of maximum return in determined level of risk and or in determined level of return for sighted investment basket for investor) that with using of it, we can obtain the vector optimal weight of investments in basket. In fact, Markowitz determined the amount of optimal allocation of asset of an investor to different investments that he is willing to keep them with maximum return in fix level of risk or minimization of risk of basket in determined level of return. The most important Markowitz idea was to use standard deviation of investment basket return as a criterion for risk. Therefore, in order to use Markowitz theory, it is necessary to calculate standard deviation of investment basket return which is required to estimate the conditional covariance matrix for obtained investment in basket.

2.2. Background of the study

Bidgoli and Tayebi (2014) in an article entitled “optimizing investment basket based on value at risk with using of ant colony algorithm” in order to show the efficiency of algorithm, it is used of the suggested algorithm in order to optimize shares basket form the index of available industries in Tehran Stock Exchange. Obtained results from using algorithm indicate that hybrid algorithm in all studied states gained better results to compare with obtained results from genetic algorithm.

Mlyk and Syvra (2103) in an article entitled “optimal Portfolio strategy in Indonesia with the use of Markowitz theory” have been dealt with the study of this issue in Indonesia. The main findings of this study show that the inflation is not directly effective on return, but it has effect on the power of buying it. Also the findings of this research show that the government bonds in Indonesia have had better performed to compare with foreign currency assets.

Yahaya (2013) in an article entitled “Numerical solution for optimal allocation of inrestment financial spurces in the portfolio selection problem” has been presented an optimal solution for choosing Markowitz Portfolio. This method has been shown perfectly with using a numerical example related to real shares and a collection of available data form shares market in Europe and it is authentic.

Financial investigation institution (2013) in an article entitled “management and financial stability” has been dealt with the short review on asset management industry and how to manage company about assets and its related activities in which can be effective on vulnerability, strengthen, or threaten financial stability. In this study, it has been dealt with to study this issue descriptively.

3. Mean-Variance model

We suppose that m_{it} is the real rate of return of research realized i ($i=1, \dots, G$) from the time t to $t+1$. m_{it} is unknown in time t , but it can be shown

conditional average with μ_{it} , conditional variance with σ_{iit} and conditional covariance between return of currency i and j with σ_{ijt} . Expectations are conditioned to collection of information of θ_t that in unknown in time t , $E_t(m_{it}) = E(m_{it}/\theta_t)$, that E is symbol expected in that

The issue is choosing a Portfolio which minimizes the Portfolio variance for the expected real return.

Means:

$$\begin{aligned} \min_{w_{jt}} \sigma_{Rt}^2 &= \sum_{i=1}^G \sum_{j=1}^G W_{it} W_{jt} \sigma_{ijt} & (1) \\ \text{s. t. } \mu_{Rt} &= \sum_{i=1}^G W_{it} \mu_{it} \\ \sum_{i=1}^G W_{it} &= 1 \end{aligned}$$

$$W_{it} \geq 0, i = 1, \dots, G$$

In this equation, Portfolio variance is σ_{Rt}^2 , expected real return of Portfolio is μ_{Rt} and the ratio share of i in Portfolio is W_{it} . However, this issue has no any exclusive solution, in a way that optimal solution depends on the degree of investor risk aversion. The collection of Portfolios those are the answer for this issue, are analyzed by efficient frontier. Efficient frontier is the geometric possible for all efficient Portfolio and it is called efficient Portfolio which there is no any bigger Portfolio with equal standard deviation, but with expected return and there is no any bigger Portfolio with equal return, but with less standard deviation. On order to access an exclusive response, investors must formulate the expected utility subordinate by correct financial selection.

$$(\mu_{Rt}, \sigma_{Rt}^2) = \mu_{Rt} - \rho \sigma_{Rt}^2 / 2U \quad (2)$$

Measure of risk aversion is ρ in this equation.

The easiest way to solve this equation is to present it in the variance form. We can write the Portfolio variance return as below:

$$\sigma_{Rt}^2 = W_t' \Omega_t W_t \quad (3)$$

In which

$$W_t = (W_{1t}, W_{2t}, \dots, W_{Gt})' \quad (4)$$

The equation in above is the ratio of currency share vector and Ω is the matrix variance-covariance of currency return.

$$\mu_{Rt} = W_t' M_t \quad (5)$$

$$W_t' C = 1$$

$$W_t \geq 0$$

4. Estimation of model

The most important components of one Portfolio model are credit of return and risk of varieties loan opportunities in different economic parts that each of these components are analyzed as below (Table 1).

In order to normalize the used data in this research, Min in tab software has been used.

In this research the below levels have been done:

- 1) At the beginning with regard to obtain variance- covariance matrix, it needs all data of 963 days, all days which the deal was not done, are

interpolated interpolation method with using of Matlab software and we obtain a matrix 936*49 that all entries are filled with number.

2) For testing the normality of time series of company, the Kolmogorov-Smirnov test in the level of confidence 95 percent has been used.

Table 1: the name of studied companies in this research

Sandoogh Bazneshastegi Investment	Omid Investment	Toolipers	Karafarin Bank	Electric khodroshargh
Sanat o Madan Investment	Investment Melli Bank of Iran	Yazd Jooshkab	Mellat Bank	Iran Transfo
Ghadir Investment	Boo Ali Investment	Chadormelo	Isfahan Petrochemical	Azarab
Khoozestan Cement	Tose'eh Melli Investment	Informatics	Shazand Petrochemical (Arak)	Tejarat Bank
Tehran Cement	Sarmayozari Investment	Pharmacy Jabrbnhyan	Takinkoo	Saderat Bank
Dorud Cement	Rena Investment	Ryngsazy Mashhad	Behshahr Industrial Development	Novineghtesad bank
Dorud Farsit	Shahed investment	Saipa Azin	MetalMines	Sina Bank
Mobarake steel	Amirkabir steel	Farsyt Dorud	Sipa	Iran khodro
GolGohar	Iran Behshahr Industrial	Sobhandrug	Kontorsazi	Iran Khodroparts
Niromoharake	Mehrkampars	Melli Copper	Leasing RayanSaipa	Iran Leasing

Solve Markowitz model and calculate the weights of each share in optimal capital basket for the years

As it is obvious in diagrams (1) and (2), in the optimization of Markowitz model, first of all, efficient frontier determines based on maximum return and minimum risk and then based on this, weight efficient frontier of each company chooses in optimal capital basket.

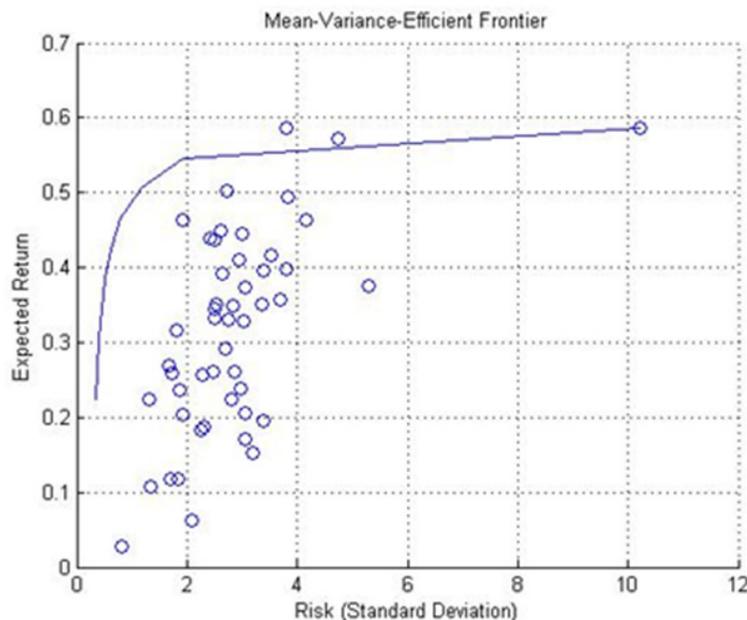


Fig. 1: efficient frontier of Markowitz model

4) Due to the fact that value at risk model is a nonlinear programming model, therefore, it is used numeral method with using of Matlab software for solving the value at risk model and obtaining the weights of optimal capital basket for the years. Due to the fact that numeral method is repeated method, it needs premier amount for solving it. Therefore, it is used from the obtained weights in Markowitz as premier amount for solving the issue in above.

5) With the use of t test in Matlab software about meaningful difference or absence of meaningful difference of obtained weights by models of Markowitz and value at risk with the weights of the years:

The table of shares of different companies is as below:

Table 3 is the shares of different companies in optimal investment basket for fifty top companies in

Tehran Stock Exchange, the companies Chadormalo and Mellat bank have more shares.

Exchange, two companies Chadormalo and Mellat bank have more shares.

On the other words, each investor allocates the capital based on profit maximization subordinate with modality risk from information of return in the year 2013.

In fact, each investor selects the best investment basket based on data of shares return of companies of Tehran Stock Exchange as daily in the year 2013.

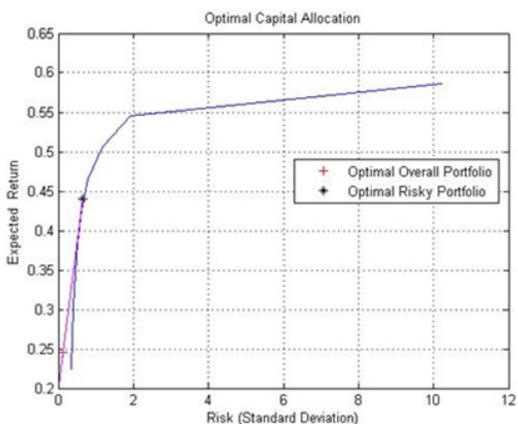


Fig. 2: select the optimal capital basket by Markowitz model

5. Conclusion

The objective of this study is to select the optimal Portfolio tracking price index (maximum return based on risk) in top companies of Tehran Stock Exchange in year of 2013. Optimal shares basket is the basket that it has less risk for certain return and or most return for certain risk. A collection of these baskets are called optimal efficient frontier, which the investor select a basket among them that has the highest proportion with its situation. Markowitz does not specify only one basket, however, it also show efficient basket which each of these are optimal based on definition (in certain level of risk or expected return). Therefore, this research has used optimal method with using of Matlab software in order to investigate and answer the question of this research. With regard to the results of research, in order to select optimal investment basket among fifty top companies of Tehran Stock Exchange, the Portfolio in below is suggested:

As it is obvious in diagram of shares of different companies in optimal investment basket of Stock

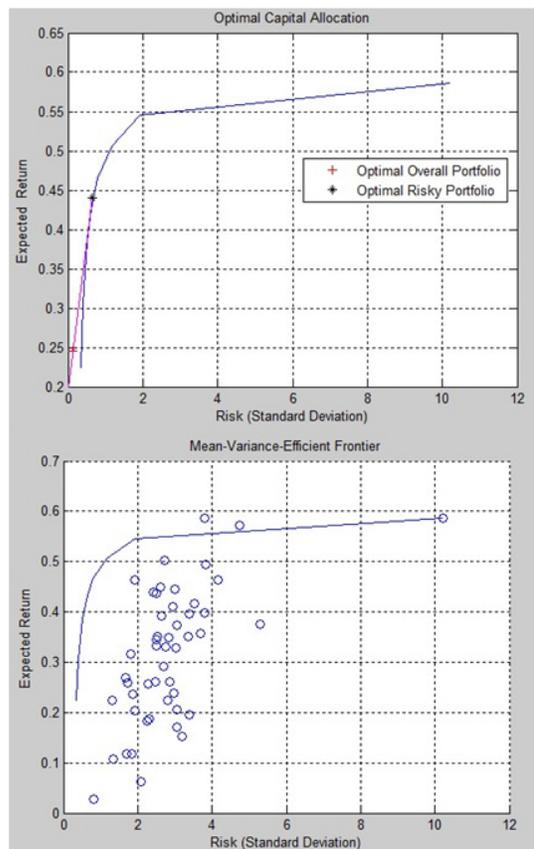


Fig. 3: weights of optimal capital basket

Table 2: optimal investment basket for 50 top companies in Tehran Stock Exchange

0.016006	TookaFoolad Investment	0.000001	Electrickhodroshargh
0.000376	Rena Investment	0.012776	Iran Transfo
0.009716	Shahed investment	0.032575	Azarab
0.00069	SandooghBazneshastegiInvestment	0.043531	Tejarat Bank
0.048233	Sanat o Madan Investment	0.000001	Saderat Bank
0.000001	GhadirInvestment	0.000001	Novineghtesad bank
0.014002	KhoozestanCement	0.000001	Sina Bank
0.006547	Tehran Cement	0.033454	Karafarin Bank
0.014327	Dorud Cement	0.164321	Mellat Bank
0.000001	Fars Cement	0.000001	Isfahan Petrochemical
0.003342	Iran khodro	0.000001	ShazandPetrochemical (Arak)
0.006703	Saipa	0.02363	Takinkoo
0.036306	DorudFarsit	0.013349	Behshahr Industrial

0.022937	Amirkabir steel	0.000001	Development Metal Mines
0.000001	Mobarake steel	0.03325	Toolipers
0.000001	Iran Khodro parts	0.22302	Yazd Jooshkab
0.000001	Kontorsazi	0.000001	Chadormelo
0.000001	Sobhan drug	0.022237	Informatics
0.005385	Iran Behshahr Industrial	0.002357	Pharmacy Jabrbnhyan
0.000001	GolGohar	0.005419	Ryngsazy Mashhad
0.019824	Iran Leasing	0.074308	SaipaAzin
0.000001	Leasing Rayan Saipa	0.012389	Omid Investment
0.002991	Melli Copper	0.022007	Investment Melli Bank of Iran
0.000001	Mehrkampars	0.022564	Boo Ali Investment
0.006451	Niromoharake	0.046543	Tose'ehMelliInvestment

Source: research findings

Table 3: ranking companies based on their shares

share	Company name	ranking	share	Company name	ranking
0.006451	Niromoharake	26	0.22302	Yazd Jooshkab	1
0.005419	Ryngsazy Mashhad	27	0.164321	Mellat Bank	2
0.005385	IranBehshahr Industrial	28	0.074308	SaipaAzin	3
0.003342	Iran khodro	29	0.048233	Sanat o Madan Investment	4
0.002991	Melli Copper	30	0.046543	Tose'ehMelliInvestment	5
0.002357	PharmacyJabrbnhyan	31	0.043531	Tejarat Bank	6
0.00069	SandooghBazneshastegiInvestment	32	0.036306	FarsytDorud	7
0.000376	Rena Investment	33	0.033454	Karafarin Bank	8
0.000001	Electrickhodroshargh	34	0.03325	Toolipers	9
0.000001	Saderat Bank	35	0.032575	Azarab	10
0.000001	Novineghtesad bank	36	0.02363	Takinkoo	11
0.000001	Sina Bank	37	0.022937	Amirkabir steel	12
0.000001	Isfahan Petrochemical	38	0.022564	Boo Ali Investment	13
0.000001	ShazandPetrochemical (Arak)	39	0.022237	Informatics	14
0.000001	MetalMines	40	0.022007	InvestmentMelli Bank of Iran	15
0.000001	Chadormelo	41	0.019824	Iran Leasing	16
0.000001	GhadirInvestment	42	0.016006	TookaFoolad Investment	17
0.000001	FarsCement	43	0.014327	Dorud Cement	18
0.000001	Mobarake steel	44	0.014002	KhoozestanCement	19
0.000001	IranKhodroparts	45	0.013349	BehshahrIndustrial Development	20
0.000001	Kontorsazi	46	0.012776	Iran Transfo	21
0.000001	Sobhandrug	47	0.012389	Omid Investment	22
0.000001	GolGohar	48	0.009716	Shahed investment	23
0.000001	LeasingRayanSaipa	49	0.006703	Saipa	24
0.000001	Mehrkampars	50	0.006547	Tehran Cement	25

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