

## Evaluating the Efficiency and Portfolio Risk of Exchange

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### ABSTRACT

Through the present article explored the some problems related to form the portfolio of the common exchange in financial markets of the developed countries and described the portfolio forming in financial markets of the U.S.A. as the main sample and presented the new model which attend the equality between efficiency and risk by attention to the classical model of portfolio of the Markowitz type.

**KEY WORDS:** exchanges, financial portfolio, risk, investment, index, portfolio risk, efficiency

### INTRODUCTION

The experiences accessed from the universal financial markets show that scientific exploring the markets is possible by accepting the special hypotheses and in base of these hypotheses, some of the marketing models were effective, ideal and un-executive, and they made it possible to explore the characteristics to create the portfolio of exchanges. (Mammedov&Nazari, 2010a)The development level of the total principles of creating portfolio exchange in the different countries, which depend on their characteristics and in deferent figures, will be studied. (Padinovski&Nagin, 1982) On the other hand, the development, which happened on the contemporary economy row, are going to be globalized, the developments like period critics, the rising political and economic competition strict either among the different companies or among the area and different countries of world and also the natural events which damage the country's economy, and it is along with other unsuitable and unpleasant development. Because of these developments, happening these unsuitable conditions is inevitable in the economic activities filled which in these situations, the economic decisions will be inevitable. (Markowitz, 1959)The financial risks are known as the best risk through the economic risks because most of the risks are faced with financial dangers which are counted as the final results of risks. Since the financial risks depend on the perilous quality of exchanges existed in the financial portfolio; therefore, exploring the issues related to the management and controlling the portfolio risks are the important parts of the mentioned issues. (Markowitz, 1952) Variety with distributing the capital in different fields cause to prevent the part of risk. Variety is counted as the reasonable method for reducing the investment risk. Therefore, the main attention should be focused on the risks where the variety has not been done.

When it comes to speak about investment, increasing the existent final investment and other financial necessities of the applications for keeping the properties are mentioned if that is not possible. (Sharp, 1964)

Forming the portfolio includes the selecting the invested exchanges and assumption the decision about volume and period of investment on these exchange. The main ingredient of process includes:

- Determining the investment policy
- Analyzing the exchanges markets
- Determining the portfolio of exchanges
- Determining the structure of the exchanges' portfolio

By attention to this fact that the exchanges in turnover in markets have different characteristics from quality's point of view; therefore, selecting the exchanges for investing will be the important problem in front of the investors (and or financial managers). Attention to the below problems are so important in forming the portfolio:

- A) Supplying the investment security (that is, investment robustness in front of financial markets' fluctuations)
- B) Access the proved income
- C) Supplying the liquidity and ability of the fast investments' substantiation without important differences in price and decreasing it

None of the exchanges existent in markets can have all these qualities in once. As the principal, the exchanges which have high investing security have low profitability and the exchanges which have low security and high risk have the most profitability. Therefore, the main goal of the portfolio is to create the balanced optimal among the profitability levels and portfolio risk levels. Investing with low possible risk and most possible profitability will lead to such balance. On the other hand, the optimal portfolio will be possible by

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investing on the exchanges which have low risk and most profitability. For managing the portfolio, it is necessary that the investor or financial manager obey the principals which are applied universally.

1- Investment successfully is related to correct distribution of capital among the different exchanges. In base of done researches, 94% of this dependency is related to financial tools (the share of great companies, long-time borrowings, options and etc., its 40% is related to exchanges and 2% is related to evaluating the time of buy and sell of the exchange.

This principal is applied in base of total compound of exchange in turning in financial markets of different countries, for example, in the financial markets of the U.S.A., the exchanges are divided in 2 groups in the base of their area:

A) Domestic exchanges

B) The exchanges published from foreign countries (international exchanges)

The above mentioned groups which are called model groups are divided to subsidiary groups:

Domestic model groups

- Exchanges with 3 to 12-month refund and proved profitability
- The public exchanges with refund time more than one-year
- Mutual corporate bonds
- Companies' bounds with high volume of capital (more than 10 Billion Dollars)
- Companies' bounds with average volume of capital (from 1 Billion Dollars to 10 Billion Dollars)
- Companies' bounds with low high volume of capital (from 100 Million Dollars to 1 Billion Dollars)

The international subsidiary groups:

- Exchanges published by developed countries (West European countries, Scandinavia)
- Exchanges published by developing countries (East European countries, South of Asia, Middle East...)

This detail classification is considered as the total classification, while the subsidiary group which was called was divided to other subsidiary groups, for example, in mutual unites' frame, the economy fields, the public exchanges are mentioned in international bound framework, the group of bound can be mentioned with proved and different costs. All above groups will be different in related to priorities which the investor considers.

2- For knowing the characteristics (profitability, risk ...) the portfolio formed from model groups (model portfolio) use the indexes which show the experience of the used exchanges in the model through the period of time. By considering the indexes which show the mentioned experience can foresee the expected profitability of the exchanges and differences of the values of these exchanges. Moreover, by studying the part of indexes, it is possible to understand the common aspects of them.

By analyzing the dynamic degree of indexes through the long period of time, it is possible to consider about the characteristics of increasing income (Cow) of the exchanges entered in model group and its decreasing risk(Bear)about fluctuations or its power.

It is necessary to mention that attempt which continues universally to foresee the future differences of the costs of the financial tools by using these indexes has been done for several years. These attempts are done by three groups as below:

- Fundamentalists are looking for explore and study the financial marketing process in total conditions of economy. From this group's point of view, the reasonable behavior of the markets' activists (investors) has been known as the important factor (agent) and in drawing the future, the information issue is attended more.
- Experts are trying to explain the conditions of markets in base of local processes. According to them, the method of the markets' activists is counted as the important factor in determining the markets' conditions.
- "Quantity analysts" don't analyze the events of marketing from the investors' reasonable results' point of view, but they explain it from feeling conditions' point of view. Therefore, profitability as the important indexes of the portfolio of the exchanges can be evaluated in base of indexes suitable for exchange groups forming the portfolio.

As it was mentioned above, one of the important concepts of financial analyses is to analyzethe risks resulted from unsuitable conditions of the markets in financial structures and totally in economy field.

The unsuitable conditions includes the lack of existence of accurate image about future value of different economy parameters in base of different reasons; on the other hand, the unsuitable conditions are the situations which are possible that the damage and losses would be created because of unwilling events through the executing and reaching to goals. These conditions are described with risk characteristics. (Mammedov&Nazari, 2010b) The risk word is as the bluff in ancient Greek and in most languages is as danger. In economy field, the

risk includes the existent of loose possibility in financial and economical activities. (Mammedov&Nazari, 2010c)

Scientists present the different attitudes about unsuitable conditions; therefore, in the existent works through the world, we see the different definitions about this concept.

- Risk includes the possibility of non-optimal event in relation to capital value at the end of investing activity
- Risk includes the possible losses which happens in random events
- Risk includes the losses because of natural events and social changes
- Risk includes the concept because of below factors:
  - A) The possibility of lack of achievement in going to determined goal
  - B) The unsuitable unexpected result
  - C) The mental evaluating about expected result

It is possible to add other definition to these definitions. Through the definitions which were counted, and also through the other definitions of risk, the risk issue and the unsuitable conditions are the same, and from other aspects, their different concepts will be described. The lack of similarity about concept of risk and undetermined conditions first time were mentioned by A. Night. We will look at the risk which is resulted from the uncertain conditions.

One of the best aspects of the portfolio investing is that it supplies the wide facilities for solving the investment problems, and for this work, a collection of portfolio is created among the risk and profitability, and the type of portfolio is determined according to existent balance between risk and profitability, and in base of this the exchanges are selected as the place for making money. If the formed portfolio has the acceptable balance for investing, in this position the effective portfolio will be counted. Profitability and portfolio risk will be different on its structure. For explaining and analyzing these differences, there are different mathematical models and software which can make the different portfolio with different profitability and risk (in future, we will be familiar with some these models).

Investing in base of portfolio classical theory, which was explained above, will be possible in case of existence of factors like exchange marketing, activities of markets through the determined period, the existent of comprehensive statistic and etc.

If the issue of decreasing the attitudes of models of Markowitz and Tobin is considered, so the value of profitability will be counted in base of below order:

$$(1) \quad G(X) = \sum_{i=1}^n m_i x_i$$

Here  $m_i$  is the expected income from exchanges type  $i$  and  $x_i$  is the specialized share for exchanges  $i$ . the risk portfolio is counted as the below order:

$$(2) \quad \text{Risk} = R(x_1, \dots, x_n) = \sum_{i=1}^n \sum_{j=1}^n \text{cov}_{ij} x_i x_j$$

$$X = (x_1, x_2, \dots, x_n)', \quad M = (m_1, m_2, \dots, m_n), \quad C = \|\text{Cov}_{ij}\| \quad i, j = \overline{1, n}$$

By using the vectors and matrixes, the relationships (1) and (2) can be written as below:

$$\text{Risk} = R(X) = X'CX, \quad G(X) = MX$$

The tendency of investor to risk is less and the income is high, it can be mentioned as the mat as the 2-criteria optimal problem as below:

- (3)  $R(X) \rightarrow \min$
- (4)  $G(X) \rightarrow \max$
- (5)  $IX = I$
- (6)  $X \geq 0$

Here  $I=(1,1,\dots,1)$  and the condition (5) includes the equality condition of the total stocks specialized for portfolio with unite capital. In this odel, in the frequency case, the solutions determined by (5) and (6) by

reflexive and transitive “ $\geq$ ”, the concepts like Pareto – optimal and frequency (affective–weak) will be mentioned in its classical meaning. If the studying issue of (3)-(6) includes the solution, these solutions will be selected from Pareto – optimal type. Therefore, the Pareto–optimal condition will be mentioned when every possible solution can do the (5)-(6) condition. This condition is supplied by the below proved theorem through the optimizing multi-criterion theory:

Theorem 1-2: the necessary and enough condition for sharing each possible solution for  $X_0$  of the tow-criterion issue (3)-(6) in frequency of pareto-optimal solutions is to solve the below mono-criterion optimizing issue:

$$(7) R(X) \rightarrow \min$$

$$(8) G(X) \geq g_p$$

$$(9) IX = I$$

$$(10) X \geq 0$$

Here:

$g_p \in [a, b]$  and  $b = \max G(X)$

$$a = \begin{cases} \max\{G(X) \mid X \in Q(X)\} & \text{if } Q(X) \neq \emptyset \\ \min G(X), & \text{while} \\ Q(X) = \{X \mid R(X) = b_1\}, b_1 = \max R(x) \end{cases}$$

Also, it can be shown that the needed condition for that the solving the  $X_0$  in the theorem to be as the pareto-optimal solutions, solving the below issue is  $X_0$

$$(11) G(X) \rightarrow \max$$

$$(12) R(X) \leq \gamma_p$$

$$(13) IX = I$$

$$(14) X \geq 0$$

Here:

$\gamma_p \in [d', b']$  and  $d', b'$  are determined like the above method.

In mono-criterion issues of (7)-(10) and (11)-(14), the parameters  $g_p$  and  $r_p$  can be selected optional in relation to participants  $[a, b]$  and  $[d', b']$ . This selection is done by attention to behavior of investor with risk issue. In portfolio classical model of Markowitz, the conditions (10) and (14) would be solved by equal changed conditions by Lagrangian method, and clear orders are resulted for solving the  $X_1^*, X_2^*$ . Moreover, we can attend to optimal model which has gathered these issues especially in one place instead of (7)-(10) and (11)-(14) issues.

This model has been shown below:

$$(15) V_1 G(X) - V_2 R(X) \rightarrow \max$$

$$(16) IX = K$$

$$(17) X \geq 0$$

Here,  $V_1$  and  $V_2$  are the coefficient of the expected efficiency and risk for investing and the quantities which the investor selects in base of his or her characteristics. In some cases, in the normal conditions, the  $V_1 + V_2 = 1$ ,  $V_1, V_2 \geq 0$  will be selected. Also, in this issue, without considering the condition (17), the issues (15)-(16) would be solved optimally.

$$(18) X^* = \frac{V_2}{2V_1} \left[ \frac{K \frac{2V_1}{V_2} - IC^T M}{IC^{-1} I} C^{-1} I + C^T M \right]$$

If each component of the portfolio structure of  $X^*$  is negative, short sale application of the exchanges will be done. If the number of unsuitable components is more, the investor can follow the other investments by avoiding the portfolio  $X^*$ .

So that, it is resulted from the optimal solution (18) and the below relationship (19) which shows the profitability either the components of  $X^*$  or expected issue  $G^*$  are dependent on the value of capital K.

$$(19) G^* = MX^* = \frac{V_2}{2V_1} \left[ \frac{K \frac{2V_1}{V_2} - IC^T M}{IC^{-1} I} MC^{-1} I + MC^{-1} M \right]$$

The investment risk is calculated from below order:

$$(20) R(X^*) = X^* G^* X^* = \left( \frac{V_2}{2V_1} \right)^2 \left[ \frac{\left( \frac{2V_1}{V_2} \right)^2}{IC^{-1} I} K^2 - \frac{(IC^{-1} M)^2}{IC^{-1} I} + MCM \right]$$

The square dependency of risk to the value of specialized capital can be seen.

On the other hand, as it can be seen through the equalities both portfolio profitability and its risk will depend on these characteristics proportionally. Comparing the classical solution model of Markowitz is shown with quality (18); that is, if there is  $V_1=V_2$ , so the optimal solution of (18) will be the answer of the optimal issue

$$X^* CX \rightarrow \min$$

$$MX = G^*$$

$$IX = K$$

Here,  $G^*$  is the determined expected coefficient efficiency from equality (19) and  $R(X^*)$  is the risk degree which is determined by equality (20). This reality shows that the issue (15)-(17) helps to create a special agreement between issues of Markowitz from efficiency-risk point of view. Moreover, the solution of the optimal issue

$$V_2 XCX - V_1 MX \rightarrow \min$$

$$IX = K$$

Has been shown by issue (20) and for issues (15)-(17), the similar results have been accessed.

In both issues, quantities  $G(X^*)$  and  $R(X^*)$  can be known as the expected coefficient efficiency and risk which investor has accepted.

### Conclusion

Investors should attend to two parameters which are profitability and investment risk through the investing and forming the portfolio. The main goal of the forming the portfolios should be in a situation that the parameters, which determine the risk, should have optimum quality. The main issue here is to determine the optimum value of the investment which is specified for exchanges without any risk.

This value will be available by solving the mono-parameter issue of the optimization.

Forming the portfolios, whose structure is in base of discipline, will cause to create the equality through the random profitability of these portfolios.

Through the presented model, in the frequency of the determined solutions by  $IX=1$  and  $X \geq 0$  by the reflective and transitive relationship, the concepts like effective – weak will be mentioned.

Therefore, the effective - weak condition of each possible solution which could do the above conditions has been mentioned.

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