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Risk of the Collective Investment and Investment Portfolio

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Abstract

Currently, the investing method of the available funds in the form of collective investing is going to be more popular. This method that is based on the common interest of a greater number of individual investors as efficiently as possible to evaluate their available funds. The basic starting point for collective investment is to minimize the risk of investors, through the diversification of the portfolio. The benefits of collective investment is more efficient diversification of risk, professional management of savings, availability and expansion of investment opportunities for small investors. There are also large selection of funds, high liquidity, lower transaction costs, and insufficient information and tax advantages compared to bank deposits. And these are what is attracted for more and more investors to invest their funds right this way. In the case of investment funds, however, is to get the cash in form of subscription of shares, which investors buy, thereby increasing the risk that investors will run regardless of the amount of the income. Along with the theme of collective investment came also to the fore the portfolio theory and its application of this theory as well as in the field of collective investment. The principle of portfolio theory is diversification which is used to achieve the objective of investment enterprises and their funds, mutual funds and pension funds, and the creation and management of the portfolio that provides to the clients the highest effect. The present paper deals with the analysis and optimization of the investment portfolio. There is also mentioned the founder of the portfolio, M. H. Markowitz and his selective model. This paper is also dedicated to the measurement of risk and return of portfolio and their calculation – correlation and covariance.

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1. Collective investment

Collective investment may be conducted only through mutual funds under the conditions laid down in this Act (n.593/2003) and in accordance with the rules of risk spreading.

The main advantages of collective investment through investing and mutual funds are recorded in the following facts: *(i) leads to savings from economies of scale, (ii) there is a saving of professional management, (iii) collective investment in all countries subject to State supervision and control, (iv) the funds invest money into a large number of different securities and that diversification can significantly reduce the risk of the investor*.

Particular advantage of the collective investment is that offers quite a wide divergence of investment strategies. Subsequently, each investor can choose the type of fund that suits its approach to risk, mainly of time and investment preferences.

Disadvantageous aspect of the collective investment for investors are (according to the Valach, 2010), *(i) the entry fees to be paid by the investor, (ii) the administrative fees for fund management, (iii) the volatility of share prices and units of funds fluctuations affecting profitability, and (iv) the lack of insurance.*

2. Risk of the collective investment

Like any investment, including collective investment faces to risks that are classified to the specific risks and market risks.

Specified risks associated with the insolvency of the issuer to perform its obligations divided into the following risks:

(i) *Management risk* – the quality of management is involved in the development of the enterprises, its loss or prosperity. It depends on the age of the enterprises, its experience, human errors or possible fraud,
(ii) *Operating risk* – this risk occurs in the absence of sales covering fixed costs. It is therefore necessary to know the volatility of turnover and operational lever and a suitable combination to avoid losses,
(iii) *Financial risk* – the risk scores in the ratio of debt and equity. The higher this ratio is, than the higher risk is, due to scales that are not able to override the fixed interest charges and loan repayments,
(iv) *Backup or security risk* – this risk arises from the fact that in case of bankruptcy and liquidation of all investors have equal rights,
(v) *The risk of early repayment* – occurs if there is a redemption of securities before maturity because of unfavourable market conditions for issuer,
(vi) *The risk of conversion* – the fund may also suffer losses by the conversion, for example the change in long-term securities for securities with shorter maturities.

In term of global-economic, political and social impact, there are market risks which consist of the following types of risk:

(i) *Interest rate risk* – a change of interest rate affects the prices of securities, i.e. an increase in interest rate leads to decrease in securities prices and a decrease of interest rate leads to increase lead to increase in securities price. Both of these cases, there is an impact to issuer of securities and also to investor to securities. With increasing securities prices, the issuer must bear the loss and the investor the gain, vice versa.
(ii) *Reinvestment risk* – as well as the interest rate risk, the reinvestment risk is associated with the change of market interest rates. However, if there is a decreasing in interest rate, both issuer and investor bear the loss because of reinvestments at the low interest rates.
(iii) *Inflation risk* – inflation bring the devaluation of money, which resulting the higher interest rate for investor which take into account a given inflation.
(iv) *Foreign exchange risk* – this risk occurs when the investor entrances to the international markets and threatened with unexpected changes in exchange risk.
(v) *Market liquidity risk* – the risk associated with type of security, the administrative and legislative law and the functioning of financial markets.

(vi) *Political and legal risk* – these risks either encourage or discourage an investor from the investment. This risk arises from government economic policy and legislative changes.

Each investor should consider the risk by collective investment. To specific and market risks we include even the following risks:

(i) *Business risk* – this risk mainly refers to funds which invest to small enterprises, start-ups or financial derivatives. As an example, there can be mentioned hedge funds and aggressive growth funds,
(ii) *Transaction risk* – this risk are emphasizes to the failure of transactions and asset of enterprises.
(iii) *Territory risk* – this risk reflects the political, natural and social situation in the country where the investments are realised.
(iv) *Legislative risk* – despite of legislative modification, there is often the fraud which have an impact on investors.

The theory of portfolio came to the fore in the end of the 20th century, and with it also the application of the theory of collective investment. The principle is the diversification, which is used to achieve the objective of investment enterprises and their funds, mutual funds and pension funds, to the creation and management of portfolio that provides the highest effect to the clients.

3. The theory of investment and Markowitz selective model

Modern portfolio theory was processed by Mr. Markowitz, who also get the Nobel prices for his selective model. Mr. Markowitz described the optimal allocation of resources and capital, which aim to be the maximum return on investment funds. Most important, however, was the determination of portfolio diversification which reduces the risk.

The concept of portfolio diversification was the basis of the entire portfolio theory, also known as a selective model. Markowitz selective model is based on the following information:

- All investors are investing for equally long time,
- The same aversion to risk,
- The expected return and expected risk are the part of the investment decisions which investors looking for the standard deviation,
- The expected effect is always the basis for investment decisions,
- The existence of perfect capital markets is consistent with the theory of efficient markets.

These assumptions can be said to be abstract and in some ideal statues to which practice should go across. Consequently, the investor may quantify the risk and expected returns of their investment.

Markowitz also showed that the risk associated with investing to any asset is not depending on other assets, but it is important to pay attention to new investment in so far as it contributes to a change in the yield and risk of the entire portfolio. The degree of correlation of movement return on individual assets in the portfolio reflects the impact of the risk of each asset to the riskiness of the entire portfolio. Markowitz, based on this knowledge, distinguishes the following types of assets:

1. Assets with perfectly positively correlated returns, which returns are moves as well. By investing to these assets is not reduce the risk of the portfolio. The effect is the same as if he invested his available funds to a single assets.
2. Assets with perfectly negatively correlated returns are characterized by inverse movements of income and they are therefore suitable for the preparation of the portfolio. Suitably covering portfolio is made up of a mix of instruments, for which the rule is “if the one is the possibility of high investment income, then this option may not be achieved with a high probability for an investment”.
3. The assets of uncorrelated returns, which yield have no connection. The correlation coefficient yields of these assets approximates to zero.

The background of the Markowitz Selective model can be summarized as follows: if investor wants to reduce overall portfolio risk, he must combine those assets which are perfectly positively correlated (Revenda, 2012).

3.1. Measurement of the portfolio yield

Calculation and consideration of yield, risk and liquidity of investment instruments are not considered complex matter. In reality, however, the investor does not hold only one investment instrument, but he usually invests his available funds into several different instruments – in the portfolio.

For the investor who owns or creates a portfolio is the most important information on yield, risk and liquidity which play an important role in share of the instruments on the total market of the portfolio.

To measure the rate of yield of the portfolio is necessary to distinguish between the input data, as well as measuring the rate of individual instruments yield. The expected value or the average rate of return can be calculated easily using geometric or arithmetic average return over the same periods. If the all returns are with likely probability than all outputs (return) are divided by the number of their quantity (simple arithmetic average).

$$R_1 = \sum_{j=1}^{N} \frac{R_{ij}}{N} \tag{3.1}$$

If the all returns are not with likely probability then each return must be assigned a probability Pij, i.e. probability of j- return at the i- asset (Bajus, 2011).

$$R_1 = \sum_{j=1}^{N} P_{ij} R_{ij} \tag{3.2}$$

Bajus identifies the following characteristics of the expected value of return E (Ri):

- The expected value of the sum of the two returns (yields) is equal to the sum of the expected values of each yields, thus

$$E\left(R_{1j} + R_{2j} \right) = R_1 + R_2 \tag{3.3}$$

- The expected value of the constant C multiplied by the rate of return is constant

$$E\left[C.(R_{1j})\right] = C.R_1 \tag{3.4}$$

3.2. The risk of the portfolio and its rate

The risk is associated with an uncertainty of the outcome of the investment, and that the actual rate of return will be different than the predicted return. This is a variation of the standard deviation around the yield which financial analysts expressed in %. By risk quantification, the analysts therefore are not only based on their attitudes and beliefs, but also based on the statistical calculations. To measurement of risk is used two calculations:

- Ex post calculation of the risk – variance and standard deviation are calculated as:

$$\delta^2 = \frac{\sum_{t=1}^{T} (v - v_t)}{T} \tag{3.5}$$

- Ex ante calculation of the risk rate differs from the ex-post calculation with data as expected (predicted) values. This calculation counts estimate probability that occurs:

$$\delta^2 ante = \frac{1}{T-1} \sum_{t=1}^{T} [E\ (v) - E(v1)]^2 \tag{3.6}$$

3.3. Covariance and correlation

The correlation between the rates of return of individual instruments in the portfolio can be measured by covariance. It is a statistical measure that informs the linear relationship between the rate of return instruments and direction of their movement. A positive value of covariance talking about the positive relationship between the movements of the yield rate of the two instruments. The opposite is negative covariance, when the yield rate move in opposite directions. A value of zero covariance tells that between the two investigated instruments there is no relationship.

If we have no data on the historical average rate of return and information about different historical rates of two instruments for the period, the historical ex post covariance is computed as:

$$cov_{A,B} = \frac{1}{T}\sum_{t=1}^{T}(r_{At} - r_{AA})x\,(r_{BT} - r_{BA}) \tag{3.7}$$

Where:

CovA,B:	historical covariance associated with the movement of historical interest rate instrument A and B
rAA:	the average historical rate of return of the instrument A
rBA:	the average historical rate of return of the instrument B
rAi:	individual historical yield rate of the instrument A during the reporting period
rBi:	individual historical yield rate of the instrument B during the reporting period
T:	number of years within the study period

If the total expected yield rate of instruments are used by calculation, the expected rate of yield for each individual yield is quantified and their associated ratio of probability is the covariance calculated as follow:

$$E\left(cov_{A,B}\right) = \sum_{i=1}^{I} P_i\,[E(r_{Ai}) - E(r_A)]x\,[E(r_{Bi}) - E(r_B)] \tag{3.8}$$

Where:

E(covA,B):	the expected covariance between the movement of the expected yield rate of instrument A, B
E(rA):	the overall expected yield rate of the instrument A
E(rB):	the overall expected yield rate of the instrument B
E(rAi):	each expected yield rates of the instrument A corresponding to invidual earing capacities
E(rBi):	each expected yield rates of the instrument B corresponding to invidual earing capacities
Pi:	ratio of probability corresponding to each expected yield rate on the instrument A and B
I:	number of yield options

The correlation coefficient is used by investor when he needs information about the degree, the strength of the relationship between scheduled adjustments. The correlation coefficient is a statistical measure o the linear relationship between two variables to be provided. Compared to the covariance is a measure of the correlation coefficient, which is able to provide information about the strength and degree. The calculation of the correlation coefficient follows the calculation of covariance. It is a division of covariance standard deviation of yield rates observed variables. These two coefficients differ only in their interpretation and the ability of expressive result. The correlation coefficient is calculated as:

$$\rho_{A,B} = \frac{cov_{A,B}}{\sigma_A \sigma_B} \tag{3.9}$$

Where:

ρA,B	the correlation coefficient between the movements of the yield rate of the instruments A and B, ex post or ex ante
covA,B	covariance between the movements of the yield rate of the instruments A and B, ex post or ex ante
σA	standard ex post or ex ante deviation, the overall risk rate of the instrument A
σB	standard ex post or ex ante deviation, the overall risk rate of the instrument B

4. Conclusion

According to the recommendations of H. Markowit, principle of the appropriate portfolio is the diversification of risk and it is necessary to choose that instruments to the portfolio which yield rates are positively correlated, moved is synchrony and yield rate which have moved the rate yield for the portfolio as a whole. It would be in a synchronized way situation, when the yield rate of the portfolio has decreased, the yield rate their instruments has also decreased (Markowitz, 1959, p.77).

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