UDC 336.763:336.781.2(497.7)
Original scientific paper

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RISK OF SHARES ON THE MACEDONIAN CAPITAL MARKET MEASERED BY THE BETA COEFFICIENT

Abstract

Risk is one of the key variables in making appropriate investment decision. In literature there are more variables to assess the risk of an investment. When analyzing the finances, especially when considering share as a dominant financial asset on the capital market, the most commonly used measure is the beta coefficient. Based on this variable is determined the risk of a given share in achieving the expected yield of this share. In theory, but in the practice also, there is a positive correlation between yield and risk.

The paper subject is the determination of the beta of the Macedonian capital market. To simplify the calculation of this coefficient does not take all the shares on the Macedonian Stock Exchange, but only shares entered in the market index MBI 10. Also, the paper analyzes the relation between the rate of return and the risk involved in MBI 10. Based on this research, it proves the existence negative correlation between yield and risk so it contrary to findings from the literature and the usual world practice, which causes a need for analysis of the reasons for this state of the capital market in the country.

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Keywords: risk, beta coefficient, rate of return, Macedonian capital market, MBI-10

JEL classification: G11, G12

Introduction

When analyzing the efficiency of equity investments despite the rate of yield, the risk is the key variable, too. In theory there are several measures for the riskiness of the shares.

A beta as a measure of risk is taking in the paper, that is key variable in the CAPM (Capital assets pricing model).

Determining the riskiness of shares is made on the example of the Macedonian Stock Exchange (MSE), but it is not taken into account the market portfolio, but only the shares entering in the market index (MBI 10). The purpose of the paper is to perceive the risk of equity for a given period of capital market in the Republic of Macedonia based on the risk of shares only to companies entering in the market index MBI 10. It allows to see the relation between yield and risk of shares of the Macedonian capital market, from one hand, but on the other hand provides the basis to compare the rate of return and risk between different alternatives of investing on the capital market (shares, bonds, deposits, loans, etc.), that is relevant to making appropriate decision by investors.

1. CONCEPT AND SIGNIFICANCE OF BETA COEFFICIENT

In the financial literature, there are several measures of risk exposure of financial assets. The widespread measure for determining the riskiness of financial assets, especially when it comes to stocks is beta (beta coefficient).

It is a measure of the systemic risk, representing the relevant risk in a diversified portfolio. Therefore, its value implies the risk of a specific asset in relation to its market portfolio as well. Namely, this coefficient measures the variability of the rate of return of individual securities in relation to the

variability of the average rate of return of the overall market portfolio. The value of the beta coefficient is positive and can be above or below + 1. The value of the beta coefficient greater than +1 implies greater variability in the required rate of return of the relevant securities (shares) in relation to the variability of the average of the total market portfolio. Therefore, such securities will be risky, but also carry higher yields. Most shares have a beta-coefficient that ranges from 0.5 to 1.50. When the value of the coefficient is equal to 1, the risk of the relevant security equals the risk of the market portfolio or, in other words, the required rate of return for the particular security will equal with the average rate of return of the market portfolio. If the value of the beta coefficient is less than 1, for example 0.5, the risk of a particular share will be half then the market portfolio, and when its value is +1.5, the risk of a share is about 1.5 times the risk of the market portfolio. In terms of the rate of return, it would be reflected in such a way that in the first case with a change in the average rate of return on the market portfolio by 1%, the rate of return of the particular share would change up to 0.5% and for the second case up to 1.5 %. Theoretically, the beta coefficient could have a negative sign, but in practice this is not confirmed.

There is a linear dependence between the required and the expected rate of return and risk (systemic risk ß), because of which a higher risk would condition a higher required rate of return.

When there is an equilibrium in the capital market, a case when all investors have all available information, all the assets or portfolios should have a value at which their estimated rate of return is consistent with the level of systemic risk and there is an equivalence between the estimated expected and required rate of return. In the opposite case, when the market is not perfect, the assets could have an overestimated or underestimated value. Specifically, if the estimated expected rate is above the required rate of return, the value of the asset will be underestimated and vice-versa, overestimated when the expected rate is below the required rate of return. The type of decision that will be made depends on the relationship between these two rates. That is, if an asset has been undervalued than it would be best to make a decision to buy, and if the value has been overestimated, a decision to sell should be made.

2. THE DETERMINATION OF BETA COEFFICIENT

The beta coefficient is calculated according to the equation:
where:

$$\beta = \frac{Cov_{i,m}}{\sigma_m^2} = \frac{(Ri-\overline{Ri})(Rm-\overline{Rm})}{(Rm-\overline{Rm})^2} \quad (1)$$

- $Cov_{i,}m$ is a covariance of the yield of certain share and yield of market portfolio (or market index)
- Ri – monthly yield of share i;
- $\overline{Ri}$ – average yield of share i;
- Rm – monthly yield of MBI 10;
- $\overline{Rm}$ – average yield of MBI 10;
- $\sigma^2{}_m$ – variance of yield of the market portfolio (market index).

The Beta coefficient of individual securities (shares), besides mathematically, can also be determined by using a graphical method.

The graphical method primarily allows for visual representation of the beta coefficient. The slope of the curve, which shows the dependence between the rate of return of the specific share and the portfolio, actually represents the beta coefficient. The greater slope indicates a greater value of the coefficient, and therefore greater risk, and vice versa. The slope of the curve, i.e. the beta coefficient in this method is determined as the ratio between the change of the rate of return for the concrete share and the market portfolio.

$$\beta = \frac{\Delta Y}{\Delta X} \quad (2)$$

- ΔY – change of the rate of return of share i;
- ΔX - change of the rate of return of market portfolio;

Based on the previous formula, it can be concluded that the size of the coefficient will be determined, first of all, by the level (coefficient) of the correlation between the share and the portfolio, and secondly, by the

relationship between the variability of the rate of return of the specific share and portfolio (σi/σm).

Because diversification reduces the non-market risk, for analysis purposes, only the market risk remains relevant, and as we mentioned it is measured through the beta coefficient. With this in mind, the question is how long should diversification be performed by increasing the number of assets in the portfolio. The impact of diversification on non-market risk depends on several factors:[3]

- The relative share of individual securities in the total value of the portfolio;
- The size of the non-market risk for certain types of securities;
- Whether diversification is performed within one industry or with invests in more branches, etc.

The first two factors are covered by the formula:

$$D = \frac{1}{\sum_{i=1}^{n} w_i^2 r_i^2} \qquad (3)$$

where:

- D- deversifiaction of the portfolio;
- wi – relative share of the share in the total value of the portfolio;
- ri – relative non-market risk of share i, while: $\dot{r} = \sigma_{\dot{c}} / \sigma_{c^*}$;
- $\sigma_{\dot{c}}^{2}$ - non market risk of share;
- σc – non market risk of the typical (average) share

When the portfolio is comprised of typical shares (shares whose relative non-market risk is one), with equal participation in the total value of portfolio, diversification D will be equal to n, the number of shares included in the portfolio.

In terms of the relationship between the risk (standard deviation) and the number of securities, practice has confirmed that maximum benefit from diversification is achieved by increasing the number of assets in the portfolio of 12 to 18 securities. But if the cost of transaction is to be included, the number of securities increases to 30 for investors who lend, and to 40 for

[3] Boskovska Diana, Shares-instruments of portfolio management, Institute of economics, Skopje, 2014, p. 46.

those who borrow. But there are authors, who based on their many years of work and experience in analysis of securities, represent the opinion of not such a broad portfolio diversification. One of the proponents of this group of authors is author William J. O'Neil, who states that "there is no need to own twenty or more shares. Simply, you cannot know everything that you need for as many shares and to achieve great success." His recommendations are that for an amount of $ 5,000 not more than two types of shares should be bought, and for the amount of $ 100,000 five or six different types of shares.[4]

3. THE DETERMINATION OF BETA ON THE MACEDONIAN CAPITAL MARKET

The MBI 10 Index is used to determine the beta coefficient of the Macedonian capital market. The MBI Index consists of common shares up to 10 listed companies, selected according to the criteria from the methodology for calculation of the MBI 10.[5] The Macedonian Share Exchange Index is a price index weighted by market capitalization, which is located on the free market (free float), adjusted for dividend payments, with limit that on the day of revision the stake of each share-part of the index is not over 20%.

According to a revision of the Macedonian Share Exchange Index conducted on 27.12.2013, the following companies are included in the composition of this index:[6]

- Alkaloid AD
- Replek AD
- Granit AD
- Komercijalna Bank
- Makpetrol AD
- Stopanska Banka AD Bitola
- Macedonski Telekom AD Skopje
- Makedonija turist AD
- Toplifikacija AD

Monthly data on yields of individual shares included in the MBI 10, as well monthly yield of the index MBI 10 for the period 31.01.2005 to 31.03.2014, are used to calculate the variance and covariance, which

[4] O'Neil J. W.: 24 basic lessons for successful investment" translated into Macedonian, Commission of securities of Republic of Macedonia, Skopje, 2002, p.123.
[5] http://www.mse.mk/mk/content/13/3/2010/structure-of-index-mbi10
[6] http://www.mse.mk/mk/content/13/3/2010/structure-of-index-mbi10, accessed on 5.5.2014.

are determined according to the equation for calculating the yield (rate of return) given previously (equation 1). Monthly data on yields of individual shares included in the MBI 10, as well monthly yield of the index MBI 10 are obtained by the following equation:

$$Rate\ of\ return = \frac{\text{Sale price} - \text{Bay price} + \text{dividend}}{\text{Bay price}} \quad (4)$$

The data calculated for the average yield of individual stocks a for the period analyzed, are given in Table 1.[7] Also in this table is calculated the value of the covariance of individual stocks.

Table 1. Average yield, covariance and beta of the individual stocks included in MBI 10

Company/MBI 10	Average rate of return % $\overline{Ri}$	Covariance $(Ri-\overline{Ri})(Rm-\overline{Rm})$	Beta coefficient $(Ri-\overline{Ri})(Rm-\overline{Rm})$ $(Rm—\overline{Rm})^2$
Granit AD Skopje	2,81	2,1809	1,3356335
Alkaloid AD Skopje	1,50	1,5738	0,9638008
Komercijalna banka AD Skopje	0,18	0,8877	0,5436135
Replek AD Skopje	2,4	0,6917	0,423584
Makpetrol AD Skopje	1,77	1,6341	1,000734
Stopanska banka AD Bitola	0,01	0,9531	0,583666
Makedonski telekom AD Skopje	0,17	0,3988	0,345089
Makedonijaturist AD Skopje	1,42	0,9245	0,566162
Toplifikacija AD Skopje	0,94	1,7676	1,082503

Source: Own calculation based on data obtained from www.mse.org.mk

But to determine the beta is necessary to determine the average return of the market index MBI-10 for the same period (based on calculations is 1.1794%) and the variance (with value 1.1556).[8]

So, the value of the beta coefficient for the individual shares of MBI 10 determined on the basis of the previously given equation 1 is presented in Table 1. Based on this table, it can be seen that beta is the greatest for the Granit AD Skopje company, with the values of 1.33, and for the Macedonian Telecom is 0.345,that is the smallest from all others. Based on these data, it

[7] In the calculation dividends are excluded.
[8] Own calculation based on the data from www.mse.org.mk.

can be seen that the share of the Granit AD Skopje company has the biggest risk, while the least risky share is the share of Macedonian Telecom. It actually means that when changing beta for 1 percent, the rate of return of the company Granit AD Skopje will change for 1.33%, while for the company Macedonian Telecom AD for 0.34%.

4. ANALYSIS OF THE RELATIONSHIP BETWEEN THE BETA AND THE EXPECTED RETURN OF SHARES

As previously stated, there is a positive correlation between yield and risk. For this purpose the paper examines the relationship between yield and risk of the shares in MBI-10. CAPM mode is used for calculating the yield of shares. Based on this model the yield is determined according to the following equation:

$$E(Ri) = Rfr + \beta i(Rm - Rfr) \quad (5)$$

Based on the above equation, it can be seen that there are three elements in building the model for assessment of the rate of return of assets:

1. The rate of return of free risk investments (Rfr). Here, it should be noted that the yields of government securities is most often used as the rate of risk-free investments.
2. The coefficient of variability of yields of company shares in relation to the average variability of returns of all shares in the capital market. This ratio is called the beta (β) coefficient and represents a measure for the risk of holding shares of a particular company in relation to the shares of all companies listed on the capital market.
3. Market risk premium, as an additional risk of holding shares as a riskier asset in relation to the government securities, (Rm- Rfr).

According to the previously state, for the shares included in the MBI 10 to calculate the rate of return under the CAPM model, after determining the beta and average market yield, remains to be determined the risk-free rate of return. The interest rate of the treasury bills of the National Bank of the Republic of Macedonia[9] is used for the risk-free rate of return Rfr in the

[9] Treasury bill is a short-term securities issued by the National Bank of the Republic of Macedonia, which is sold at a discounted value, and on the day of maturity the issuer pays it's nominal value.

model, which in 2014 was 3.35%,[10]

By getting all the necessary variables and with using the CAPM model the expected rate of return of shares in the MBI-10 is determined (Table 2).

Table 2. Expected rate of return of the common shares included in MBI 10

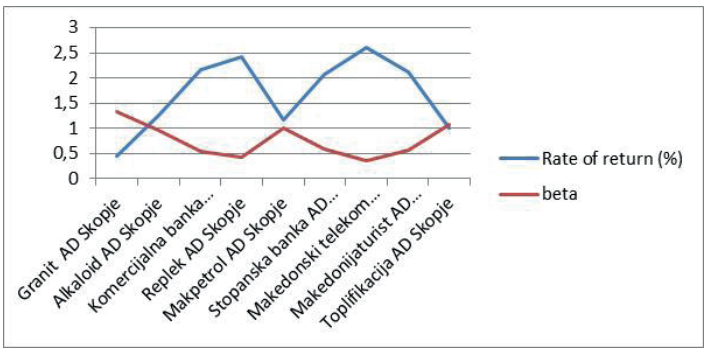
Company	Rate of return (%)
Granit AD Skopje	0,451675
Alkaloid AD Skopje	1,258552
Komercijalna banka AD Skopje	2,170359
Replek AD Skopje	2,430823
Makpetrol AD Skopje	1,178407
Stopanska banka AD Bitola	2,083445
Makedonski telekom AD Skopje	2,601157
Makedonijaturist AD Skopje	2,121428
Toplifikacija AD Skopje	1,000968

Source: Own calculation

So by determining the rate of return on individual stocks on one side, and beta, on the other side, it would be possible to see what is the relationship between these two variables (see Graph 1).

Graph 1. Relation between expected rate of return and beta

Based on the Graph 1 we can perceive that the Macedonian capital



market is not being confirmed by the positive correlation between yield and risk. Namely, those companies that have a higher risk have a lower yield and vice versa. The reason for this is primarily due to the low market rate of return, which is below the risk free rate in Macedonia.

10. www.nbrm.mk

Conclusion

In investment theory and practice the relationship between yield and risk is crucial to making an appropriate decision. The risk of financial assets, primarily of the shares is in the focus of this paper. Beta as a measure of the riskiness of assets is a subject of research of the this article. Moreover, unlike the standard deviation which is a measure of overall risk of the assets, systemic risk is only relevant fore beta (risk which can not be avoided by diversifying the portfolio)**.**

Specifically, the riskness of the Macedonian capital market are determined in the paper, based on the calculation of the beta for the common shares included in market index MBI-10. Given that, the beta is a key variable in the CAPM model, the values obtained for beta allow to calculate the rate of return with the CAPM model, which enables analysis of the relation yield –risk, too. Unlike the usual positive correlation between yield and risk, the Macedonian capital market notes the existence of a reverse relation between yield and risk. Namely, the company, or the share that has the highest beta risk at the same time has the lowest yield. This state of macedonia capital market is due to the lower rate of market returns to risk free rate. This in turn leads to reduced incentive for investment in shares, but imply on investment in other types of securities, such as government securities, treasury bills and other less risky securities, which of course doesn't lead to successful development of the capital market seen in the long term.

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