Specifications of the cost of capital on the capital market in the Republic of Macedonia

Prof. Diana Boskovska
Institute of economics, Ss. Cyril and Methodius, Skopje, Republic of Macedonia

Abstract
In investment theory and practice, the cost of capital is one of the crucial issues. This paper studies the cost of capital of common shares in Republic of Macedonia. The CAPM model is used to calculate the cost of capital of common shares, which does not apply to the whole market portfolio, but rather to the market index of common shares of the Macedonian Stock Exchange (MBI 10).

When analyzing the cost of capital, the variables that are incorporated in the CAPM model are calculated for a period of about 10 years, for the purpose of obtaining a more realistic value of beta, as a key element in this model. In the period of analysis, what is characteristic is that the rate of return of the Macedonian market of securities is low, below the risk free rate in the country that determines a reverse relationship between the rate of return and risk.

Key words: CAPM model, beta, rate of return, risk, Macedonian Stock Exchange.
JEL classification: G11, G12

1. INTRODUCTION
The cost of capital is one of the key variables in making investment decisions. The model for determining the cost of capital depends on the types of sources of capital. The subject of research in this paper is the cost of capital of common shares. There are several models for determining the cost of this type of capital, such as the CAPM model, Gordon method, build-up method, arbitration model of valuation assets and others. In this paper, the cost of capital is determined based on the CAPM model in the Republic of Macedonia.

In determining the cost of capital based on this model, the market portfolio is not taken into account, but rather the calculation is made based on the market index of the common shares, so called MBI 10. Hence, the subject of research of this paper is the cost of equity (shares) of companies entering in the market index MBI 10. The purpose of this paper is to perceive the price of capital for a certain period of market securities in the country (Macedonian Stock Exchange). It allows one to see the relationship between the return and risk of the stocks on the Macedonian capital market. Furthermore, it provides the basis for comparing the rate of return between different alternatives of investments on the capital market and the adoption of appropriate decisions by investors.

2. THE PROCEDURE OF DETERMINING THE COST OF CAPITAL ACCORDING TO CAPM MODEL
CAPM (Capital Asset Pricing Model) is one of the most applied and exploited models for valuation of assets in theory and practice.

The expected or required rate of return of a risky asset is determined through this model, which later appears as the discount rate in the models for valuation of assets, or property. The required rate of return obtained by this model is then compared with the estimated rate of return of the investor, and based on this, the value of the asset or portfolio is estimated whether it is real, overestimated or underestimated, and consequently a decision is made on whether to buy, sell or possibly maintain an adequate security or portfolio of assets.

Mathematically, the model has the following form:

\[ E(R_i) = R_{fr} + \frac{Cov_{i,m}}{\sigma_m^2} (R_m - R_{fr}) \]
and if the expression \( \frac{Covi,m}{\sigma^2_m} \) is replaced by a new variable \( \beta \) (beta), where the covariance \( Covi,m \) is determined as \( Ri-Rm \), the equation takes the following form:

\[
E(Ri) = Rfr + \beta(Rm - Rfr)
\]

Based on the above equation, it can be seen that there are three elements in building the model for assessment 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 stocks in the stock market. This ratio is called the beta (\( \beta \)) ratio and represents a measure for quantifying the risk of holding shares of a particular company in relation to the shares of all companies listed on the stock market.

3. Market risk premium, as an additional risk of holding shares as a riskier asset in relation to the government securities. (Rm- Rfr)

The beta coefficient has a central role in the CAPM model. It is a measure of the systemic risk, as the only 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 (stocks) 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 stocks 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 stock will be half then the market portfolio, and when its value is +1.5, the risk of a stock is about 1.5 times the risk of the market portfolio. In terms of the value of the beta coefficient, it would reflect 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 stock 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.

The equation above shows that there is a linear dependence between the required rate of return and risk (systemic risk \( \beta \)), 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.

The Beta coefficient of individual securities (stocks), 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 stock 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 stock and the market portfolio (Graph 1)

\[ \beta = \frac{\Delta Y}{\Delta X} \]

- \( \Delta Y \) – change of the rate of return of stock \( i \);
- \( \Delta X \) - 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 stock and the portfolio, and secondly, by the relationship between the variability of the rate of return of the specific stock and portfolio (\( \sigma_i/\sigma_m \)).

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 (Boskovska, 2014)

- 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:

\[ D = \frac{1}{\sum_{i=1}^{n} w_i^2 r_i^2} \]

where:
- \( w_i \) – relative share of the stock in the total value of the portfolio;
- \( r_i \) – relative non-market risk of stock \( i \), while: \( r_i = \sigma_i/\sigma_c \);
- \( \sigma^2 \) - non market risk of stock;
- \( \sigma_c \) – non market risk of the typical (average) stock.
When the portfolio is comprised of typical stocks (stocks 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 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 stocks 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. (O’Neil J. W, 2002)

3. DETERMINING THE COST OF CAPITAL OF COMPANIES FROM MBI 10 BY THE CAPM MODEL

The MBI 10 Index is used to determine the cost of capital of the Macedonian capital market. The MBI Index consists of common shares of up to 10 listed companies, selected according to the criteria from the methodology for calculation of the MBI 10 (http://www.mse.mk/mk/content/13/3/2010/structure-of-index-mbi10). The Macedonian Stock 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 Stock Exchange Index conducted on 27.12.2013, the following companies are included in the composition of this index:

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

The CAPM model, explained previously, is used in calculating the cost of equity. The interest rate of the treasury bills of the National Bank of the Republic of Macedonia, which in 2014 was 3.35% ((www.nbrm.mk) is used for the risk-free rate of return $R_{fr}$ in the model. The average rate of return on the Macedonian market $R_m$ (represented by MBI 10) is calculated as the average of the monthly returns $R_m$ of MBI 10 obtained by the following equation:

$$Rate\ of\ return = \frac{Sale\ price - Buy\ price + dividend}{Buy\ price}$$

The monthly returns of shares in MBI 10 are calculated for the period 31.01.2005 to 03.31.2014, and based on this, the average market yield (average yield of the shares in the MBI 10) for this period has been determined to be 1,1794 % (in the calculation dividends are excluded).

To calculate the cost of capital of stocks included in MBI 10, the beta coefficient also needs to be calculated, as a key variable in this model, which at the same time is a measure of the risk of a stock. This ratio indicates the percent of change in the rate of return of a share when beta changes for 1%.
The beta coefficient is calculated according to the equation:

$$
\beta = \frac{\text{Cov}_{i,m}}{\sigma_m^2} = \frac{(R_i - \overline{R}_i)(R_m - \overline{R}_m)}{(R_m - \overline{R}_m)}
$$

where:
- Cov$_{i,m}$ is a covariance of the yield of certain share and yield of market portfolio (or market index)
- $R_i$ – monthly yield of share $i$;
- $\overline{R}_i$ – average yield of share $i$;
- $R_m$ – monthly yield of MBI 10;
- $\overline{R}_m$ – average yield of MBI 10;
- $\sigma_m^2$ – variance of yield of the market portfolio (market index).

Monthly data on yields of individual stocks 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 are determined according to the equation for calculating the yield (rate of return) given previously.

The value of the beta coefficient for the individual shares of MBI 10 determined on the basis of the previously given equation is presented in Table 1.

<table>
<thead>
<tr>
<th>Company</th>
<th>Beta coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granit AD Skopje</td>
<td>1.3356335</td>
</tr>
<tr>
<td>Alkaloid AD Skopje</td>
<td>0.9638008</td>
</tr>
<tr>
<td>Komercijalna banka AD Skopje</td>
<td>0.5436135</td>
</tr>
<tr>
<td>Replek AD Skopje</td>
<td>0.423584</td>
</tr>
<tr>
<td>Makpetrol AD Skopje</td>
<td>1.000734</td>
</tr>
<tr>
<td>Stopanska banka AD Bitola</td>
<td>0.583666</td>
</tr>
<tr>
<td>Makedonski telekom AD Skopje</td>
<td>0.345089</td>
</tr>
<tr>
<td>Makedonijaturist AD Skopje</td>
<td>0.566162</td>
</tr>
<tr>
<td>Toplifikacija AD Skopje</td>
<td>1.082503</td>
</tr>
</tbody>
</table>

Source: Calculation are based on data obtained from www.mse.org.mk

Based on the data in Table 1 and Graph 2, it can be seen that beta is greatest for the Granit AD Skopje company, with the values of 1.33, and for the Macedonian Telecom its value is the smallest and is...
Based on these data, it 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%.

By determining all the necessary elements, the application of the CAPM is enabled, which was presented above, based on which the cost of capital for companies involved in MBI 10 is determined. The estimated value of the cost of capital for the shares or the companies involved in the MBI-10 is given in Table 2.

Table 2. Cost of capital of the companies in MBI 10

<table>
<thead>
<tr>
<th>Company</th>
<th>Cost of the capital (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granit AD Skopje</td>
<td>0.451675</td>
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<tr>
<td>Alkaloid AD Skopje</td>
<td>1.258552</td>
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<tr>
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<td>Replek AD Skopje</td>
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<td>Makpetrol AD Skopje</td>
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<tr>
<td>Stopanska banka AD Bitola</td>
<td>2.083445</td>
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<tr>
<td>Makedonski telekom AD Skopje</td>
<td>2.601157</td>
</tr>
<tr>
<td>Makedonijaturist AD Skopje</td>
<td>2.121428</td>
</tr>
<tr>
<td>Toplifikacija AD Skopje</td>
<td>1.009968</td>
</tr>
</tbody>
</table>

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

Graph 3. Beta coefficient and cost of the capital for the companies in MBI 10

Based on the data given in Table 2, it can be noted that the cost of capital is highest for the company Macedonian Telecom AD, which is 2.6%, while the lowest is for the company Granit AD Skopje of 0.45%. According to these data, it is seen that there is a reverse relationship between beta and the cost of capital, i.e. that the company that has the riskiest stock has the lowest cost of capital, and vice versa (see Graph 3), which is in contrast to the economic logic of investing, which involves higher risk to brings higher yields. This situation is a result of the lower average yield realized by shares in MBI 10, which is 1.1794 % of the risk-free yield, i.e. of the yield that can be achieved by buying treasury bills of 3.35%, which as less risky securities generally should have a lower yield than the shares as a more risky investment.
CONCLUSION

The analysis on the cost of capital of the Macedonian stock exchange for a given period (period of one year), concludes that an unusual situation occurs on the Macedonian market of securities. It refers to the fact that among the analyzed companies there is no positive correlation between yield and risk, which means shares that bring a higher yield can be risky and vice versa. This situation results from the fact that the risk free rate of return is higher than the market average rate of return.

In addition, the calculations confirm that investments on the capital market in the Republic of Macedonia, i.e. the Macedonian Stock Exchange are not attractive. Namely, the purchase of government securities and deposit money in banks allow investors higher rates of return from investments in shares on the Macedonian Stock Exchange. Also, the relatively low rate of required return, i.e. cost of capital to the owners of capital, points to the fact of the underestimation of the value of shares of the Macedonian Stock Exchange, which is a reason more to buy shares in the expectation of future earnings from the re-growth of their share price. But despite this fact, as of the boom of the Macedonian Stock Exchange in 2007, the equity investments remain insufficient and not sufficiently attractive investments, mainly resulting from the lack of sufficient knowledge for this type of investment in the country, but it is an undeniable fact that there are alternatives of investments that are less risky, yet ones that enable a higher yield than from buying shares.

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