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## The opportunity cost of equity capital

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### Abstract

This paper is focused on the calculation of cost of equity with using the CAPM model and Build-up model. The main aim of this calculation was to discover whether traditional measurements of business performance are better than selected modern measurements or not. For the calculation we used a sample of 31 engineering companies situated in the Slovak market. Based on the research results we propose a methodology that could be suitable for the more efficient calculation of costs for examined industry.

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### 1. Introduction

The growing competition among companies at the market and the strong connectivity among individual economies can be considered as most significant effects of globalization. The negative consequences of these effects are showed especially with arrival of the financial and economic crisis in 2008, which caused deeper financial or existential problems in some companies. According to these problems, there arise up an increasing pressure on examination of business performance. So, we can ask the question how we could evaluate companies and their performance as efficiently as possible under these conditions.

There are several traditional (e.g. indicators of liquidity, activity, profitability, etc.) or modern (e.g. EVA, MVA, NPV, CFROI, etc.) indicators of business performance, which bring a more dynamic and realistic image about company but not only about its performance but also about competitive position on the market. Thanks to the simplicity of calculation, not only Slovak companies tend to use traditional indicators for measure of business

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performance. The main deficiency of traditional indicators may be considered disregard of risk, the impact of inflation as well as the time value of money which leads to the question about accuracy of the calculations and their explanatory value of business performance.

Due to above facts, we decided to explore the possibility of using selected modern indicators for measure of business performance. In business practice, the most widely used model for measuring a business performance is model EVA (Economic Value Added). The problem within EVA may be the calculation of opportunity cost of capital, which is one of the most examined components of business costs. Therefore, within our research we focused just on the indicator opportunity cost of capital and we examine the main differences between the calculation with CAPM model and Build-up model.

The first part of this paper is focused on the theoretical definition of selected models with emphasis on their computational feature that can we discover significant differences between these two models. In the next part, we introduce the examined sample as well as the criteria that we set within selection process. Due to the large volume of data, we present in section Research sample and results the example of calculation of opportunity cost of capital with using CAPM model and Buil-up model (the calculation was performed on randomly selected company from our sample). In the final part, we present our obtained concludes.

## 2. Evaluation of business performance

Company and its transformation processes are influenced by a number of macroeconomics and microeconomics factors, which impacts reflected in the results of business. This raises the question, how we could evaluate the company which is undertaking these factors as well as how we could measure its performance. The concept of business performance is perceived by different views as the ability of company to achieve the desired effects or outcomes in measurable units (Lesáková, 2004) or as the rate of achievement by individuals, groups, organizations or processes (European Foundation for Quality management). When we examine a business performance it is necessary to monitor not only the financial components, but also non-financial components of companies such as the work efficiency of employees, their motivation, etc.<sup>†</sup>

In terms of comparison the company with competitors or interest of investor, it is important not only to monitor business performance, but also its measurement. Based on the measurement we are able to evaluate company in terms of its performance. We can use a several indicators of business evaluation e.g. qualitative or quantitative indicators, traditional or modern indicators, etc.

In our research, which is focused on the evaluation of business performance within the engineering industry in Slovakia, we decided to use a most used model of calculation of business performance – EVA. However, when we used this model we discovered a problem with variable approach how to calculate the opportunity cost of equity capital. In the next part of this section, we introduce a two models that we used for calculation.

### 2.1. Economic value added (EVA)

In 1991, the Stern Stewart & Co. introduced a model Economic value added – EVA. This model represents economic (extraordinary) profit that the company created after the payment of all costs including cost of capital (Wagner, 2009). The basic concept of calculating of EVA is specified by the general form of the calculation of economic profit. Its value is the difference between the net profit from the main performed activity and the cost of capital, which are expressed as the product of the assets in the main performed activity and the weighted average cost (Wagner, 2009).

There exist a lot of formulas of EVA calculation, but based on the fact that our research is focused on the data from accounting we use in this paper next formula of EVA:

$$EVA = (ROE - r_e) * E \quad (1)$$

Where:

ROE – Return on equity,

<sup>†</sup> In this paper, we examine a business performance in terms of financial components. Our next research is focused on examination of non-financial components. We bring the results from this research in our next paper.

$r_e$  – opportunity cost of equity capital,  
 $E$  – Equity.

The new added value is created when  $EVA > 0$ . So, it means that effectiveness of the invested capital is equal to the cost of its acquisition. On the other hand, if  $EVA < 0$  it means that investor is loss-making. The results are obvious but how could companies calculate the value of opportunity cost of equity capital? The opportunity cost of equity capital is one of the most important parameters that affect the final total value of company. There exist several models how we could calculate it e.g. model INFA, Gordon Growth model, model APT, etc. In our research, we decided to use CAPM model and Build-up model, because these models are most used in conditions of European Union countries. But are these two models usable in conditions of the Slovak market?

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## 2.2. Capital asset pricing model (CAPM)

This model was developed by W. Sharpe and J. Lintner around 1965 building on the earlier work of H. Markowitz which was focused on diversification and modern portfolio theory. The CAPM model is considered as a basic model for determination the relationship between market risk and return of financial investments (Vlachynský et. al., 2006). According to some studies, this model has general application on the market. It means that the market portfolio should include all financial investments. But there could be a problem with its using in practice because there exist companies which don't have financial investments on the stock market.

In this paper, we are focused on the calculation of opportunity cost of equity capital. Because of that, we used for calculation following mathematical formula:

$$r_e = r_f + \beta * (r_m - r_f) \quad (2)$$

Where:

$r_f$  – risk-free rate of interest,

$r_m - r_f$  – market risk premium,

$\beta$  – Market risk or sensitivity of the expected excess asset returns to the expected excess market returns.

In our research, we used two different methods of calculation of market risk (beta coefficient) – the analogy method and analysis of operating factors. When we were setting the risk-free rate of interest, we faced with a problem, which type of bonds should be use in term of maturity and also in term of their issuer. Based on the available literature, we discovered that the best type of bonds is government bonds. There is a assumption of the government bonds, that government is able to pay its debt at least in nominal value. Because of that, the best choice could be American 30-years bonds. However, there arose the question whether it makes sense to use this type of bonds in calculation for other non-American countries.

## 2.3. Build-up model

The second model, which we use in our calculation of the opportunity cost of equity capital, is the Build-up model. This model is known as WACC model which was developed by Inka and Ivan Neumaier. It was originally based on the assumption of independence WACC of capital structure and financing of company only with using equity capital (Neumaier, Neumaier, 2002). The Build-up model is considered as an indicator of non-market valuation of the company (Kotulič et al., 2010). There exists a relationship in terms of the Build-up model:

$$r_e = \frac{WACC * \frac{UZ}{A} - (1-d) * \frac{U}{BU+O} * (\frac{UZ}{A} - \frac{VK}{A})}{\frac{VK}{A}} \quad (3)$$

Where:

UZ – repayable funds (bank loans, bonds, equity)

WACC – Weighted Average Cost of Capital

A – Assets

d – Tax rate

U – Cost interests

BU + O – bank loans + obligations

VK – equity capital

This mathematical equation is very simply for calculation however, this basic formula includes only external risks. As we known, the impact of external risks on the equity is strong but there is also an internal risks caused by changes within company. Because of that, we decided to use follow type formula which includes both – external and internal risks:

$$r_e = \text{rate of risk - free asset} + r_{company} + r_{finstr} + r_{finstab} + r_{LA} \quad (4)$$

Where:

$r_{company}$  – additional charge for the amount of business risk,

$r_{finstr}$  – additional charge for the risk from the capital structure,

$r_{finstab}$  – additional charge for the risk, that the company will not be able to pay its debts,

$r_{LA}$  – additional charge for the lack of liquidity of the shares.

### 3. Research sample and results

In our research, we focused on companies operating on the Slovak market. Based on the data availability, we decided to use a sample of companies from public sector. In our calculations we used data from the available financial statements of each company from our sample. Lovaš (2001) in his publication sets the following steps that should be observed when we want to set a research sample within the public sector:

1. Formulation of research problem
2. Determination of the theoretical population
3. Identification of the available population
4. Determination of the type of research
5. Determination of the sample size
6. Determination of the methodology

For our research, expect of above general criteria, we set following additional criteria which helps us to specify the sample:

1. Affiliation of company within industry (according to classification of economic activities – SK NACE)
2. Legal form of selected companies (limited company, company limited by shares, limited partnership)
3. The size of company by number of employees (more than 20 employees)

Based on the all mentioned criteria, we set a research sample from engineering industry which represents Table 1. It is generally known that the Slovak Republic belongs to the countries with the largest production of motor vehicles in the European Union. Due to this fact, we decided to examine the sample of motor vehicles which represent SK NACE 29. According to the Lovaš (2001), for generally conclusions a sufficient sample from public sector should consist of minimum 30 companies. At the beginning of our research, we decided to contact 50 companies for obtain a sufficient information and data for our survey. However, only 31 companies were willing to cooperate and provide their data for survey. Based on the fact, that our sample is sufficient condition of Lovaš, we worked in our research with sample of 31 companies from engineering industry.

Table 1. Number of companies in engineering industry according to SK NACE

SK NACE	Number of companies
25	3 361
28	845
29	230
30	59
SUM	4 495

Source: own processing

Where:

SK NACE 25 – Manufacture of metal products except of machinery and equipment

SK NACE 28 – Manufacture of machinery and equipment

SK NACE 29 – Manufacture of motor vehicles, trailers and semi-trailers

SK NACE 30 – Manufacturer of other transport equipment

#### 4. Results

As we mentioned before, the main aim of this paper is to show the calculation of the opportunity cost of equity capital with using two different models on the one selected company. Based on the requirement of companies, we had to marked all companies by number not by their real name. To obtain the objectivity of selected company, we used the Excel function RANDBETWEEN for randomly selection. After this process, the system selected one company which we used as a sample for our calculation. In our research, we marked this company as XY.

The next step was the calculation. We calculate the opportunity cost of equity capital of company XY in the period 2012-2008. As first, we used the CAPM model and as second the Build-up model. In next part, we present only results of calculation (all readers who are interested in process of calculation and methodology, don't hesitate to contact us for deeper discussion).

Table 2. Calculation of opportunity cost of equity capital by CAPM model

	2012	2011	2010	2009	2008
$r_f$	2,9217	3,9108	4,2507	4,0767	4,2775
$\beta_1$	1,302	1,67	2,309	2,207	2,05
$\beta_2$	2,07	2,20	3,71	2,13	1,68
MRP	7,28	6,28	5,83	7,1	5,84
$r_{e1}$	12,4002	14,3984	17,7122	19,7464	16,2495
$r_{e2}$	17,9909	17,7558	25,9055	19,2293	14,1040

Source: own processing

Where:

 $r_f$  – risk-free rate of interest $\beta_1$  – Market risk $\beta_2$  – Market risk

MRP – Market risk premium

 $r_{e1}$  – opportunity cost of equity capital (analysis of operating factors) $r_{e2}$  – opportunity cost of equity capital (analogy method)

In the first calculation of opportunity of cost equity capital we used the CAPM model. Table 2. presents achieved results. In the method of analysis of operating factors ( $r_{e1}$ ) we can see a decrease of the cost of equity capital, while in 2009 the increase is caused by higher financial risk. In the method of analogy ( $r_{e2}$ ) is a visible the increase (2008-2010) and subsequent decline, which holds almost at the same level. The significant increase is caused by increased

average of market risk non-debt companies, which was used in the calculation.

Based on the knowledge of Mařík et. al (2011) and our achieved results, we confirmed that the CAPM model is a world-renowned method of business evaluation. However, it is a small usability and reliability of data from the domestic capital market, so in next calculation we had to use data from United States bonds regard with the current country risk.

Table 3. Calculation of opportunity cost of equity capital by Build-up model

	2012	2011	2010	2009	2008
US bonds – $r_f$	2,9217	3,9108	4,2507	4,0767	4,2775
$r_{LA1}$	0,00	0,00	0,00	0,00	0,00
$r_{LA2}$	-28,58	-21,46	-18,32	-16,36	-15,17
$r_{company1}$	0	0	0	unspecified	0
$r_{company2}$	40,4152	23,6429	14,2953	5,0087	210391790,2
$r_{FinStab1}$	unspecified	unspecified	unspecified	unspecified	unspecified
$r_{FinStab2}$	6,5071	7,4998	7,6975	9,1649	8,8355
$r_{FinStr}$	0,0000	0,0000	0,0047	10,0000	10,0000
$r_{e1}$	9,4288	11,4106	11,9529	28,2503	23,1130
$r_{e2}$	21,2659	13,5899	7,9253	11,8916	210391798,19

Source: own processing

Where:

US bonds –  $r_f$  – US bonds risk-free rate of interest

$r_{company}$  – additional charge for the amount of business risk,

$r_{finstr}$  – additional charge for the risk from the capital structure,

$r_{finstab}$  – additional charge for the risk, that the company will not be able to pay its debts,

$r_{LA}$  – additional charge for the lack of liquidity of the shares.

$r_{e1}$  – opportunity cost of equity capital (analysis of operating factors)

$r_{e2}$  – opportunity cost of equity capital (analogy method)

In the second calculation, we used the Build-up model. In first step, we calculated additional charge. For each charge we used two types of calculation: 1. Estimation according to above set criteria, 2. On the basis of our calculation. In some cases, we didn't have accessible data, so we could not estimate values and the calculation on the same time. In this specific case, we didn't estimate an additional charge. Table 3 presents our achieved results.

We can see that estimates according to the criteria are more appropriate to calculate the cost. In 2009, the cost of equity capital had a significant increase to the value 28,250 and since 2010 the cost decreased to 9,429.

## 5. Conclusion

Based on our research we can conclude that the best way how to calculate the opportunity cost of equity capital is calculation by Build-up model. This method reflected not only external risks but also internal risks of companies which is very important factor. However, the big disadvantage of this model is that quantification is based on the subjective assessment of the analyst as well as the fact that risk additional charges are often estimated only according to the financial statements. Foreign studies confirmed that this model is not applicable for all businesses and for each sector or industry. If the company decided to use the CAPM model, it must consider very carefully what type of bonds should be used for determining the risk-free rate of return. The most ideal way would be to set bonds at the beginning and the end of the examined year or average of these two issues. However, in some countries, as well as in Slovakia, it is very difficult because not all countries have developed capital market. In the concept of CAPM model we recommended to use for calculation the 30-years US bonds.

We realized, that utilization of US bonds within calculation in Slovak market is not the best way how to expressed the opportunity cost of equity capital as well as how to evaluate the business performance. However, we think that modern indicators are the better way how to calculate cost of equity than traditional indicators which are not as flexible and efficient as modern indicators. We are convinced that the best option how to express the business performance is the combination of financial and non-financial factors. Because of that, we continue with our research and we examine the non-financial factors within the engineering industry on the Slovak market.

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