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DETERMINING THE DISCOUNT RATE: THE CASE OF OIL INDUSTRY IN SERBIA

Određivanje diskontne stope – slučaj naftne industrije u Srbiji*

Abstract

The paper presents theoretical and methodological aspects of determining the discount rate on the example of NIS, as the largest energy company in Serbia and one of the largest in Southeast Europe. The total cost of capital which represents the weighted average of equity and long-term debt costs is used as discount rate. The cost of equity capital is calculated using the CAPM which, despite all its limitations, is still theoretically the most correct and frequently used model in practice. The average cost of long-term debt capital to the company NIS is equal to 14.773%, the cost of equity capital is 12.453% and the total cost of capital, WACC, is 12.505%. The main component of the cost of equity capital is the risk premium of investing in Serbia. The results show that macroeconomic stability strengthening and adequate management of borrowed funds can contribute to reduction of the total cost of capital in the Serbian oil industry.

Keywords: *discount rate, WACC, cost of equity, CAPM, country risk premium*

Sažetak

U radu su prikazani teorijsko-metodološki aspekti utvrđivanja diskontne stope na primeru preduzeća NIS a.d. kao najveće energetske kompanije u Srbiji i jedne od najvećih u jugoistočnoj Evropi. Kao diskontna stopa korišćen je ukupni trošak kapitala koji predstavlja ponderisani prosek troškova sopstvenog i dugoročnog pozajmljenog kapitala. Trošak sopstvenog kapitala je izračunat primenom CAPM modela koji je, i pored svih svojih ograničenja, i dalje teorijski najispravniji i često korišćen model u praksi. Prosečni trošak dugoročnog pozajmljenog kapitala za preduzeće NIS a.d. iznosi 14,773%, trošak sopstvenog kapitala je 12,453% i ukupni trošak kapitala, WACC, je 12,505%. Glavna komponenta troška sopstvenog kapitala je premija za rizik ulaganja u Srbiju. Dobijeni rezultati pokazuju da jačanje makroekonomske stabilnosti i adekvatno upravljanje pozajmljenim izvorima sredstava mogu doprineti smanjenju ukupnog troška kapitala u naftnoj industriji Srbije.

Ključne reči: *diskontna stopa, WACC, trošak sopstvenog kapitala, CAPM, premija za rizik zemlje*

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Introduction

The subject of this paper is the analysis of theoretical and methodological aspects of determining the discount rate on the example of the oil industry in Serbia. The determination of adequate discount rate represents the critical step in the investment analysis process and it is the subject of ongoing controversy in financial theory and practice. The application of too high a discount rate leads to underestimation of the present value of expected future cash flows, while too low a discount rate leads to their overestimation. Both situations result in inadequate investment decisions with long-term negative consequences. When choosing a discount rate, it is necessary to take into account pure interest, risk and inflation [21, p. 273]. The assessment of discount rate is especially problematic in developing countries, such as Serbia, in which, due to the underdevelopment of financial market, the mechanisms, i.e. factors for its determination do not exist.

Watson & Head [30], as well as Damodaran [7], point out that the total, i.e. weighted average cost of capital (WACC) should be used as a discount rate if dynamic methods, such as net present value or internal rate of return, are used for investment appraisal. The total cost of capital represents the weighted average of all components of long-term financial sources, including equity, as well as long-term debt finance. The goal of this paper is to determine the total cost of equity to the company NIS, as one of the largest vertically integrated energy companies in Southeast Europe. A special importance of this paper for theory and practice is the use of CAPM, which is considered to be the most appropriate model for estimating the cost of equity. In this paper, we hypothesize that the largest component of the cost of equity in the Serbian oil industry is the country risk premium, while the volatility of NIS's stock returns is lower than the volatility of market returns. Consequently, the opportunities for lowering the total cost of equity should be searched for in adequate management of debt financing.

Capital asset pricing model (CAPM), developed by Sharpe [27], assumes linear relationship between risk and return and enables determining of the cost of equity using the risk-free rate, which is increased by equity risk premium (ERP). ERP includes the systematic risk of investing in a company, as well as the excess of market return above the risk-free rate.

Different from CAPM, which is a one-factor model, the arbitrage pricing theory (APT), developed by Ross [25], assumes that, instead of one beta, the whole set of betas exists – one for each factor. According to that theory, the expected return depends on how a stock reacts to the whole set of individual macroeconomic factors and on the risk premium of each of those factors. Although more sophisticated than the CAPM, the arbitrage pricing theory is difficult to apply in practice.

The estimation of the total cost of equity in natural monopolies, such as companies in the energy sector, is an important starting point for further expert analyses in the process of their regulation. Real discount rate is a necessary assumption for not only making optimal investment decisions, but also for determining adequate fuel prices. In addition, comparison of the profits earned with corresponding cost of capital is the basis for estimating the profitability of this sector. Under conditions of low oil prices, lowering the cost of capital represents an imperative for companies in oil industry.

Kavussanos & Marcoulis [18] examined the impact of market returns and factors, which are suggested by Fama & French [15], on the profitability of American oil companies. The authors conclude that the market return (S&P 500) has the highest impact on the oil companies' stock prices, while the impact of the company's size, measured by market capitalization, and of the ratio of book to market value is very low. This fact justifies the use of CAPM for determining the cost of equity in oil industry.

While estimating the expected returns on oil and gas industry stocks in Canada, Sadorsky [26] proved that this sector is less risky than the market. This result is contrary to that of Ferson & Harvey [16], who argue that real interest rates and market return represent key determinants of the oil companies' stock returns in the U.S. In their research, which covered 34 countries, Ramos & Veiga [24] proved that oil and gas sector in developed countries responds more strongly to changes in oil price than in developing countries. The analysis of the cost of equity in the UK energy market shows that vertically integrated energy firms have lower WACC in comparison with stand-alone generators [5].

Družić et al. [12] conducted research on WACC calculation on the example of power and natural gas sector in Croatia. The authors prove that WACC is relatively lower if the proportion of debt in capital structure is higher, and in case of monopolistic activities (e.g. gas transmission). In performing an empirical test of the application of the value-based enterprise risk management (VBERM) in the Serbian power sector, Vuksanović [29] also used WACC as discount rate. Research results show that the cost of equity is almost twice the debt cost in the case of the public enterprise Electric Power Industry of Serbia. Momčilović et al. [23] calculated the cost of equity for eight largest companies in the Serbian food industry using the CAPM and Downside CAPM. According to their results, a relatively high cost of equity in food industry arises from the country risk premium. However, the results of the similar research on the example of oil industry in Serbia have not been published so far.

Research methodology

In this section, we explain the model for calculating the total cost of equity with all its elements. The total cost of capital represents the weighted average cost of all long-term sources of finance. Since, besides equity, NIS has long-term debt, the total cost of capital of this company is calculated using the following formula [30]:

$$WACC = \frac{K_e + E}{D + E} + \frac{K_d \text{ x } (1 - C_t) \text{ x } D}{D + E} \tag{1}$$

where $WACC$ represents the total, i.e. the weighted average cost of capital, K_e represents the cost of equity, K_d is the cost of long-term debt, E is the value of equity, D is the value of long-term debt and C_t is corporate tax rate, which amounts to 15% in Serbia.

It is important to note that instead of the book value, the market value of equity is used. The reason for this is because the nominal value of a share is almost always lower than its market value, which further leads to underestimation of the cost of equity. Since the cost of equity is, by rule, higher than the cost of debt, the use of book value of equity would lead to underestimation of the total cost of capital and thus the discount rate, which could further lead to accepting unprofitable investment projects.

On the other side, some sources of finance, such as bank loans, do not have market values. Theoretically, there is no reason why market values and book values of different sources of finance cannot be used together. It is recommended that market values of long-term sources of finance be used, if they exist. If that is not the case, book values can be used as well [4, p. 366]. For that reason, due to the lack of data on market value of NIS's long-term debt, in this research, the book values are used instead. The cost of long-term debt capital of this company is calculated using the data from the latest balance sheet and income statement according to the following formula:

$$K_d = \frac{Net\ finance\ expanses}{Long\text{ - }term\ debt} \tag{2}$$

The cost of equity of NIS is calculated using the CAPM according to the following formula [9, p. 72]:

$$K_e = R_f + \beta\ x\ RP + CRP \tag{3}$$

where R_f represents the risk-free rate, β represents the beta of NIS, RP is the mature market risk premium and CRP is the country risk premium.

Risk-free rate

An investment can be considered as risk free if its actual return is always equal to its expected return. According to Damodaran [8, p. 6], that is possible if there is no default risk and no reinvestment risk. Default risk assumes possible financial losses for an investor due to the inability and/or unwillingness of a debtor, an issuer of financial instruments which are kept in his investment portfolio, to settle his obligations [17, p. 24]. Only government securities of some countries do not have default risk. Securities which are issued by companies, even those considered the safest, have default risk and for that reason they cannot be risk free.

Reinvestment risk represents the possibility that the return from reinvesting received cash flows will be lower than the return from initial investment in conditions of falling interest rates. This risk exists if, for example, a six-month treasury bill is used for estimating the expected return for the period of five years [8, p. 6]. Even though this security guarantees receiving of the expected return after six months, there is still a risk that, until the reinvestment of received cash flows in a new six-month treasury bill, the interest rate could change and the return could be different from the one in the first six months. Treasury bonds with coupons and maturity longer than one year also carry reinvestment risk, since coupons need to be reinvested during the period of maturity at interest rates that are unknown at a given moment.

From the abovementioned, only long-term zero-coupon government bonds issued by developed countries, such as the U.S., are considered risk free. The next question relates to the length of the period of maturity of those bonds. Theoretically, the most correct approach is to use as a risk-free rate the return of those bonds whose period of maturity is equal to the length of cash flows of an investment project. Thus, for example, as a risk-free rate for determining the discount rate for discounting cash flows in the first year of an investment project, the return of one-year government bond should be used. As a risk-free rate for determining the discount rate for discounting cash flows in the second year of the same project, the return of a two-year government bond needs to be used, etc.

Since the application of this approach is complicated, in practice, only one risk-free rate is often used for determining the discount rate, which is used for discounting cash flows from all periods of an investment project. In accordance with that, we also used only one risk-free rate for determining the NIS's cost of equity and that is the rate of return of a ten-year U.S. government bond.

Beta

The beta of a company measures the sensitivity of stock returns to the change of systematic factors which affect all companies whose shares are traded on the stock market. Thus, for example, a company's beta of 1.2 means that, if the average return of the stock market increases by 10%, the return of the share of that company will increase by 12%. Conversely, if the average return of the stock market decreases by 10%, the return of the share will decrease by 12%. From the abovementioned, it can be concluded that the shares of a company whose beta is greater than 1, offer higher return and higher risk than the shares of a company whose beta is lower than 1.

Beta coefficient for any company is calculated using the linear regression, where dependent variable represents the return on shares of a company, and independent variable represents the market return, i.e. the return on the stock market index, which includes shares of as many companies as possible:

$$r_{i,t} = \alpha_i + \beta_i r_{m,t} + \varepsilon_t, \quad t = 1,2,...,T, \qquad (4)$$

where $r_{i,t}$ represents the return on shares of a company *i* in the period *t*, $r_{m,t}$ represents the return on the stock market index in the period *t*, α_i is the intercept on the vertical axis for a company *i*, β_i is the regression coefficient or beta coefficient for a company *i*, ε_t is residual, and *t* is the number of time periods for which the return is calculated.

During the calculation of beta coefficient, three questions are raised: which stock market index should be used, how long the time period for which beta is calculated should be and how long the return interval should be [7].

A rule is to use the index which includes the shares of as many companies as possible, where these shares are weighted with companies' market capitalization. For that reason, for calculating beta coefficient for American companies, for example, the S&P 500 is usually used. Since the NIS's shares are traded on the Belgrade Stock Exchange (BSE), for calculating the beta coefficient of that company, it is necessary to choose one of the BSE indexes, such as Belex 15 or Belex Line. The advantage of Belex Line over Belex 15 is the larger number of shares in the index. Belex 15 includes the shares of 15 companies, whereas Belex Line includes the shares of 34 companies. Besides that, the maximum weight of market capitalization of one company in stock market index is 20% for Belex 15 [3, p. 3], whereas for Belex Line it is 10% [2, p. 3]. This is also the advantage of Belex Line over Belex 15. For all these reasons, we decided to use the Belex Line index.

The next problem is the length of the time period for which beta is calculated. Credit rating agencies in the U.S. often calculate beta coefficients for periods from two to five years [6, p. 26]. Generally speaking, the longer the time period for which beta is calculated, the greater the number of observations in the regression model is and the results are more reliable. On the other side, if a too long period is chosen, there is a risk that company's business or capital structure has changed during that period. For that reason, a shorter period should be chosen if a company was recently restructured or involved in merger and acquisition activities. Since NIS went public on 9/1/2010 and given that since then its business remained quite stable, we decided to calculate beta for the period of 5 years.

The last problem related to calculation of beta is how long the return interval should be when calculating the return on shares of a company and the return on stock market index. Returns can be calculated on a daily, weekly, monthly, quarterly and yearly basis according to the following formula:

$$Return\ on\ share_t = \frac{Price_t - Price_{t-1}}{Price_{t-1}} \quad (5)$$

$$Return\ on\ index_t = \frac{Index_t - Index_{t-1}}{Index_{t-1}} \quad (6)$$

where $Price_t$ represents the share price of a company at the end of a period, $Price_{t-1}$ represents the share price at the beginning of a period, $Index_t$ is the value of a stock market index at the end of a period and $Index_{t-1}$ is the value of a stock market index at the beginning of a period.

Again, the shorter the return interval, the greater the number of observations in the regression model is and the results are more reliable. However, if return intervals are too short, there is a possibility that during some intervals shares have not been traded. If that is the case, the correlation between the return on shares and the return on stock market index will be lower, which will negatively affect the estimation of beta coefficient. In order to avoid such possibility, instead of daily or weekly returns, we decided to use the monthly returns.

Mature market risk premium

The mature market risk premium is the difference between the average return on shares traded on a mature market and the average return on risk-free securities over a specified period of time. As an approximation of the average return on shares traded on a mature market, we use the average return on the S&P 500 index, while the rate of return on the U.S. government bonds with a maturity of 10 years is used as the risk-free rate.

The risk premium thus defined requires answers to the following two questions: how long should a period of time that will be used for calculating the average returns be and by which method should the average returns be calculated, that is whether to use the arithmetic or the geometric mean?

The advantage of using a shorter time period for determining the average returns is that there is less of a chance that during this period the average investor's attitude to risk has changed. On the other hand, reducing the time leads to an increase of the standard error when calculating the risk premium. For example, the standard errors in case of 5 or 10-year periods can be almost equal to the estimated amount of the risk premium [10, p. 25]. For that reason and in accordance with [9], we have chosen the period from 1928 to 2014.

The average returns can be arithmetic or geometric. The arithmetic mean is appropriate if there is no correlation between annual returns over time. However, Fama & French [14] proved that there is a negative serial correlation between stock returns over the years, leading to overestimation of the arithmetic average returns. Therefore, in this research, we opted to use the geometric mean. Accordingly, the average return is calculated as follows [10, p. 27]:

$$Geometric\ average\ return = \left(\frac{value_N}{value_0}\right)^{\frac{1}{N}} - 1, \quad (7)$$

where $value_N$ represents the value of market index or the price of risk-free security at the end of the last year, $value_0$ represents the value of market index or the price of risk-free security at the beginning of the first year and N is the number of years, i.e. the length of time for which the average return is calculated.

Country risk premium

The country risk premium reflects the specific economic, political and social conditions, as risk factors, in the country where the investment project is being realized, i.e. in which the considered company operates [22, p. 309]. According to Damodaran [9, p. 63], the country risk premium is calculated in the following way:

$$CRP = CDS \text{ x } \frac{\sigma_E}{\sigma_B} \quad (8)$$

where *CRP* represents the country risk premium, *CDS* is the country default spread, σ_E is the standard deviation of the average return on shares of all companies in the country (the standard deviation of stock market index return) and σ_B is the standard deviation of return on government bonds of a given country.

In our case, *CDS* represents the difference between the interest rate on government bonds of the Republic of Serbia and the interest rate on government bonds of that country, whose government bonds are considered risk-free. It is important to note that the two countries' government bonds must have the same maturity and must be denominated in the same currency, in order to exclude the inflation effect on their return. As the government bonds of the Republic of Serbia are denominated either in euros or in dinars, *CDS* is the difference between the interest rate on German government bonds and the interest rate on Serbian government bonds, denominated in euros and with the same maturity.

Belex Line index is used as an approximation of the average return on the shares of all companies in Serbia, so that σ_E in fact represents the standard deviation of Belex Line returns during a certain period. Weekly returns on the index over a period of the last two years are most commonly used for calculating the standard deviation [9, p. 62]. Weekly returns during the last two years are also used for calculating the standard deviation of return on government bonds of the Republic of Serbia, σ_B. For this purpose, ten-year government bonds denominated in euros are taken.

Data

Data on market capitalization, financial expenditures and long-term liabilities for the company NIS as at 12/31/2015 are taken from the website of the Belgrade Stock Exchange. These data are necessary for calculating the average cost of long-term debt capital, as well as for the weights to be applied to the amounts of costs of equity and long-term debt when calculating the total cost of capital. The data are presented in Table 1.

The rate of return on the U.S. government bonds with a maturity of 10 years as at 7/1/2016 amounted to 1.46% (see Table 2). This rate is used as a risk-free rate in our model.

The monthly returns on NIS's shares and Belex Line index are calculated using the data on the share prices and the index values during the period from 7/1/2011 to 7/1/2016. These data are also taken from the website of the Belgrade Stock Exchange [1]. Table 3 shows the descriptive statistical indicators for NIS's shares and Belex Line index.

As can be seen from Table 3, the average return on NIS's shares during the period of five years is almost zero (-0.01%). The same is with Belex Line index. However, the price of this company's shares has fluctuated significantly, which led to very low and very high returns during particular months. The highest return was recorded in February 2012 (27.12%), while the lowest return was achieved in September 2011 (-0.03%).

Damodaran [10] calculated risk premium in the United States as the difference between the average return on S&P 500 stock index and the average return on Treasury

Table 1: Relevant data for NIS

Data on 12/31/2015	Value
1. Number of ordinary shares	163,060,400
2. Share price (RSD)	600
3. Market capitalization (RSD) (1x2)	97,836,240,000
4. Net finance expenses (RSD)	14,671,061,000
5. Long-term debt (RSD)	99,309,246,000
6. The weight of the cost of equity in WACC (3/(3+5))	49.63%
7. The weight of the cost of long-term debt in WACC (5/(3+5))	50.37%

Source: [1].

Table 2: U.S. Treasury yield curve rates (%)

Date	1 Mo	3 Mo	6 Mo	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr
7/1/2016	0.24	0.28	0.37	0.45	0.5	0.71	1.00	1.27	1.46	1.81	2.24

Source: [28].

Table 3: Descriptive statistics for NIS's shares and stock market index Belex Line for the period 7/1/2011-7/1/2016

Statistic	NIS Share Price	Belex Line Value	NIS Monthly Return	Belex Line Monthly Return
Mean	740	1,158	-0.01%	0.01%
Median	713	1,131.5	-0.46%	0.37%
Standard deviation	127	176	7.05%	4.14%
Minimum	539	858.04	-20.03%	-11.94%
Maximum	938	1,445.37	27.12%	9.74%
Range	399	587.33	47.14%	21.68%

Source: Authors' calculation on the basis of [1].

Table 4: Mature market risk premium (U.S. market)

Period	Arithmetic Mean		Geometric Mean	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks – T. Bills	Stocks – T. Bonds
1928-2014	8.00%	6.25%	6.11%	4.60%
1965-2014	6.19%	4.12%	4.84%	3.14%
2005-2014	7.94%	4.06%	6.18%	2.73%

Source: [10, p. 30].

bonds (bills) for different time periods by using geometric and arithmetic means (see Table 4). In our model, the mature market risk premium, as the difference between the geometric average S&P 500 return and the geometric average return on 10-year government bonds for the period from 1928 to 2014, is equal to 4.60%.

According to Damodaran [11], the premium for the risk of investing in Serbia (country risk premium) equals to 6.95%.

Results and discussion

In this section, we present and discuss the results of the research. All calculations were performed in Microsoft Excel 2007 and Stata/IC 12 programs. Average cost of long-term debt capital, K_d, is calculated on the basis of available data, by applying Formula 2, in the amount of 14.773%.

$$K_d = \frac{14{,}671{,}061{,}000\ RSD}{99{,}309{,}246{,}000\ RSD} \text{ x } 100 = 14.773\% \quad (9)$$

The results of the regression analysis are shown in tables 5 and 6. Estimated value of the beta coefficient for NIS company equals 0.879.

Table 5: Results of the regression analysis

Results	Value
Number of observations	60
F (1.58)	21.00
Prob > F	0.0000
R-squared	0.2658
Adj. R-squared	0.2532
Root MSE	0.06094

Source: Authors' calculation on the basis of [1].

P-value of the beta coefficient is equal to zero, which means that we can reject the null hypothesis which states that $\beta = 0$. This is corroborated by the F test, since the value of F statistic is relatively high (21.00).

The standard error of the beta coefficient is 0.192, meaning that with a probability of error of 5% we can conclude that the actual beta coefficient for the entire population (period since NIS went public until today) is in the range from 0.495 to 1.263. Unfortunately, that is a fairly wide interval. Since we are not interested in beta coefficient for the entire population, but for the more recent period within which we are confident that the business of the company has not significantly changed, a high level of standard error is not a problem.

However, what adversely affects the ability of beta to predict the change in returns on company`s shares on the basis of changes in the stock market index return is

Table 6: Beta coefficient for NIS

NIS Monthly Return	Coefficient	Standard Error	t	P > |t|	95% Confidence Interval	
Belex Line monthly return	0.8789155	0.1917963	4.58	0.000	0.4949935	1.262838
Cons	-0.0001515	0.0078673	-0.02	0.985	-0.0158996	0.015596

Source: Authors' calculation on the basis of [1].

a relatively low coefficient of determination of 0.266, or 0.253 in terms of the adjusted coefficient of determination. This coefficient measures how well a variation of monthly returns on Belex Line stock exchange index explains the variation of monthly returns on NIS's shares. The higher the value of this coefficient, the closer the monthly stock returns are to the regression line. Figure 1 illustrates the dispersion of NIS's monthly stock returns in relation to the regression line.

Although it would be ideal if the coefficient of determination was somewhat higher, a positive correlation between the stock return and the index return is evident in Figure 1. For the purpose of determining the cost of capital and the discount rate, the resulting coefficient of determination can be considered sufficiently high.

Beta coefficient of 0.879 indicates that the shares of the company NIS can be considered defensive. Such shares are attractive to investors in periods when stock prices are falling on average [30]. The reason for this is the fact that, if the average return on shares of all companies in Serbia, measured by Belex Line index, declined by 10%, NIS's stock return would be reduced by a smaller percentage, that is, by 8.79%.

However, this conclusion should be taken with some reservation. Firstly, although the most comprehensive stock index in Serbia, Belex Line does not include the shares of all companies, but only of 34 of them. Secondly, the market capitalization of NIS participates in Belex Line index in the amount of 10%, which is an extremely high percentage. The reason is undeveloped financial market in Serbia with a small number of companies whose shares are traded on the stock exchange. Finally, even though NIS's shares are traded each day, their trading volume is very small. Unfortunately, the same is true for the shares of other companies, whereby the shares of some companies are traded even less frequently than once a week.

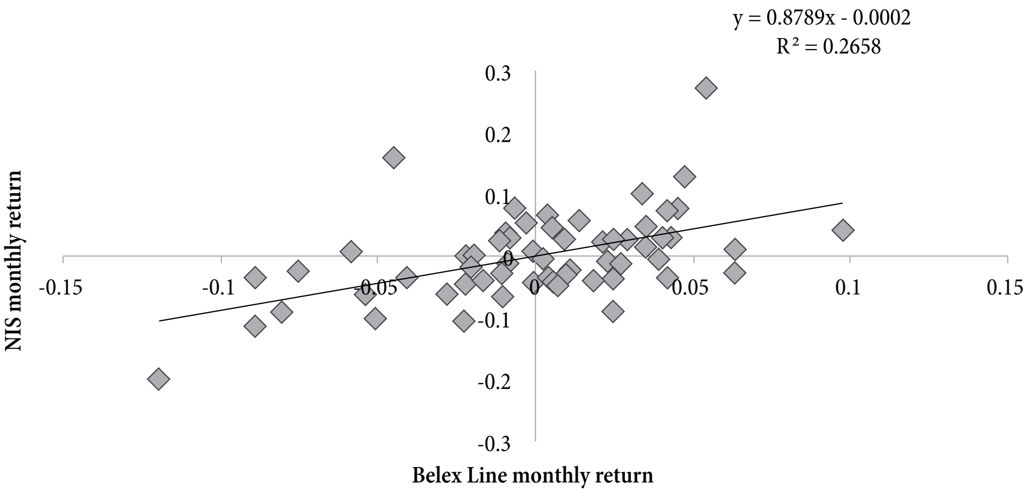
The cost of equity, K_e, is calculated by applying Formula 3, in the amount of 12.453%:

$$K_e = 1.46\% + 0.879 \times 4.60\% + 6.95\% = 12.453\% \quad (10)$$

As can be seen, the main component of the cost of equity capital is the premium for risk of investing in Serbia, which is very high at 6.95%, thus confirming the research hypothesis. Such a result supports the findings of [23]. By comparison, the country risk premium for Montenegro amounts to 5.56%, Croatia 3.86%, Hungary 3.86% and Slovenia 3.40%. The only country in the region with a risk premium higher than the one for Serbia is Bosnia and Herzegovina (10.05%) [11].

It can also be noticed that the cost of equity in the case of NIS is slightly lower than the average cost of long-term debt capital. Such a situation is not common, and on theoretical grounds, it should be the other way round, that is, the cost of own capital should be higher than the average cost of long-term debt capital. The reason is that shareholders bear a greater risk in terms of their investment returns in relation to creditors. Shareholders' return in the form of dividends and capital gains depends on the results achieved, while the return earned by creditors is

Figure 1: Dispersion diagram of NIS's monthly stock returns



Source: Authors' calculations on the basis of [1].

fixed and equal to the amount of contracted interest rate on borrowed funds. Finally, in the event of liquidation, creditors have priority in the settlement of their claims in relation to shareholders. From the above, we can conclude that such a situation may indicate poor management of borrowed funds of the company.

The total cost of capital, *WACC*, calculated on the basis of Formula 1, equals 12.505%:

$$WACC = (12.453\% \text{ x } 0.4963) + (14.773\% \text{x} 0.5037 \text{x} 0.85) = 12.505\% \quad (11)$$

The total cost of capital thus determined can be used as a discount rate if the dynamic methods, such as net present value and internal rate of return, are applied in investment projects evaluation. In that case, interest expense on borrowed funds, as well as other finance expenses, should be excluded from the net cash flows of the investment project, given that they are already implicitly included in the discount rate [20].

Conclusion

The paper presents theoretical and methodological aspects of determining the discount rate on the example of NIS, as the largest energy company in Serbia and one of the largest in Southeast Europe. The total cost of capital, as the weighted average of costs of capital from all long-term sources of finance, including both owned and borrowed funds, is used as a discount rate. The cost of equity is calculated by applying CAPM which, despite all its limitations presented in this paper, is still theoretically the most correct and frequently used model in practice. In accordance with that, we used the rate of return on the U.S. government bonds with a maturity of 10 years as a discount rate. Beta coefficient is estimated on the basis of the linear regression where dependent variable represents the return on company's shares, and independent variable represents the market return, i.e. the return on Belex Line stock market index. Returns are calculated on a monthly basis for a period of five years.

The mature market risk premium is approximated with the difference between the average return on the S&P 500 index and the average return on 10-year U.S. government bonds. We used geometric mean for the period from 1928 to 2014. The country risk premium is the country default spread (the difference between the interest rate on risk-free (German) government bonds and the interest rate on government bonds of the Republic of Serbia, denominated in euros and with the same maturity), corrected with the ratio of the volatility of weekly returns on Belex Line and the volatility of weekly returns on government bonds, observed over the last two years.

The conducted analysis shows that the average cost of long-term debt capital to the company NIS is equal to 14.773%, the cost of equity capital is 12.453% and the total cost of capital, WACC, is 12.505%. The main component of the cost of equity capital is the premium for the risk of investing in Serbia, which is extremely high, reaching 6.95%. For instance, all countries in the region, with the exception of Bosnia and Herzegovina, have a lower risk premium compared to Serbia. At the same time, the cost of equity capital is lower than the average cost of long-term debt capital, which is not logical from a theoretical point of view and may indicate poor management of borrowed funds of the company.

The obtained results indicate possible directions for lowering the total cost of capital in the Serbian oil industry. On the one hand, a prerequisite for lowering the cost of equity capital is the improvement of the macroeconomic environment, through the establishment of economic, monetary and political stability, development of financial market, eradication of corruption, attraction of foreign direct investments, legal protection of property rights and strengthening the rule of law. Minimization of the total capital costs, on the other hand, requires adequate management of borrowed funds at the level of the oil industry in Serbia. This will lead to an increase in the present value of future cash flows that will, in case of an efficient capital market, have positive impact on the share price and market capitalization of the company.

Finally, we conclude with suggestions for future research. Instead of one discount rate, it is possible to develop a theoretical risk-free spot rate curve applying bootstrapping technique in the context of arbitrage-free valuation approach [19]. By incorporating that curve in the explained model, the maturity structure of the cost of equity capital and then of the total cost of capital could be derived. Following that, each individual cash flow from the investment project could be discounted by a discount rate that corresponds to its maturity, which would enhance the precision of research results. In terms of undeveloped financial market, betas and stock returns have a relatively low correlation and, therefore, the modifications of classical CAPM are proposed for developing countries [13]. Hence, another important direction of future research relates to the comparison between the obtained results and the results which the application of Downside CAPM, capturing the downside risk that investors just want to avoid, would give in the same example.

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