“Quality of business valuation methods in Slovakian mining industry”

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Quality of business valuation methods in Slovakian mining industry

Abstract

The purpose of this article is to investigate the efficiency and quality of business evaluation methods in the Slovakian mining industry and design process of company's valuation. The three commonly used business valuation methods (DCF, EVA and iterative method) were selected and compared with the share price of mining company to explore which valuation methods were better for evaluating business performance in the Slovakian mining industry.

Keywords: valuation methods, DCF, EVA, mining company.
JEL Classification: C15, C25, G32.

Introduction

There are many different valuation approaches that can be applied to determine the value of a business. However all of those valuation methods can be categorized into 4 types of approaches based on the sources of input and valuation processes: income approaches, market approaches, asset-based approaches and option pricing approaches [1]. Different valuation methods have their own characteristics. Different valuation methods are shown in Figure 1.

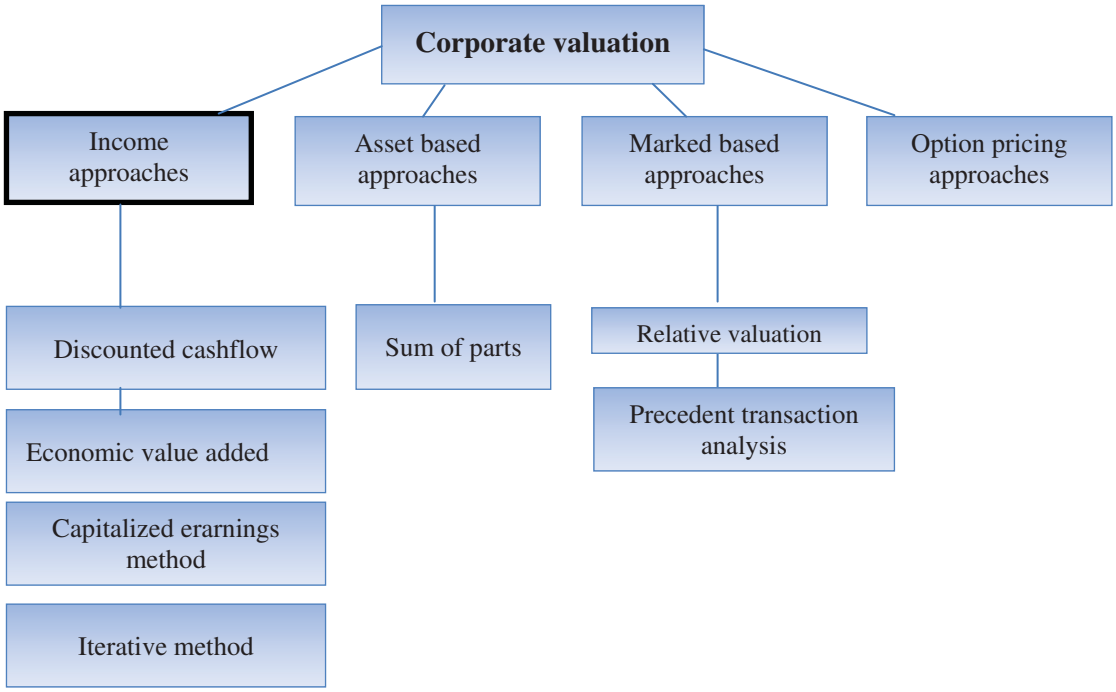

Fig. 1. Valuation approaches and models

In this paper the income approaches are selected and compared. The income approaches determine the fair market value of targeted company by multiplying cash flows brought by the subject and then multiplied by a discounted factor or rate. The discount rate helps to discount the cash flows value to be the present value.

The income valuation approach is based on the premise that the value of business depends on its future economic benefits. Its goal is to determine what the value of a projected income stream would be worth today by taking into account the risk associated with a company's income generating capacity. [2] In order to use this method, estimation on future earnings or cash flows must be made, and then discounted to the present, based on a discount rate. Common valuation methods used under this approach include the capitalization of earnings or cash flows and the discount of future earnings or cash flows.

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The value of any asset is a function of the cash flows generated by that asset, the life of the asset, the expected growth in the cash flows and the riskiness associated with the cash flows (as discount rate). However to value a firm it is needed to measure not just the cash flows from investments already made, but also estimate the expected value from future growth. In every DCF valuation there are two critical assumptions we need to make on stable growth. The first relates to when the valuated firm will become a stable growth firm, if it is not one already. The second relates to what the characteristics of the firm will be in stable growth, in terms of return on capital and cost of capital [3].

$$V_{(0)} = \sum_{t=1}^{t=N} \frac{E(CF)}{(1+WACC)^t}, \quad (1)$$

where, $E(CF)$ is estimated future cash flow, r is weighted average cost of capital, N is estimated useful life of assets.

After having estimated cash flows, the next step is to determine the value of the discount factor per year. The discount factor is *WACC* which is applied to the projected financial and operating performance of the business in the period of 5-10 years. Discount rate relates to risk of future cash flows. The below formula shows how to calculate the discounted factor.

$$WACC = r_d (1-t)\frac{D}{C} + r_e \frac{E}{C}, \quad (2)$$

where, E is market value of equity, D is market value of Dept, C is market value of capital, r_e is cost of equity, r_e is cost of Dept.

Discounted Cash Flow methodology assumes that the present range of values of the company as of the valuation date is equal to the present value of future cash flows to the company shareholders. Due to the limitation of the period of the financial projections the value of the company is a sum of two factors:

- the present value of cash flows (sum of the present value of dividends that the company may afford to pay out to shareholders and/or additional capital injections made by the shareholders);
- residual value of the company, which is the discounted value of the company resulting from cash flows generated by the company after the projections period. The cash flows are derived from financial projections compiled in accordance with assumptions. Depending on whether Free Cash Flow to Firm (FCFF) or Free Cash Flow to Equity (FCFE) calculation is used in DCF valuation the cost of capital or the cost of equity of a valued company, shall be used as discount rate [4].

When determining the discount rate, the DCF methods lean on the models of theory of capital market and the CAPM (Capital Asset Pricing Model). As a result of enterprise assessment, the market value of the overall capital, or the market value of the own capital, named as "Shareholder Value" are determined [5].

Capitalized Earnings Method is a method of determining the value of a company by calculating the present value of expected future profits of the remaining years (or months) on the hypothesis of constant operating.

Economic value added (EVA) is trade marked by Stern Stewart & Company. Stern & Stewart (1991) state, that EVA is residual income that remains after operating profits cover the cost of capital. Stern explains that for debt and equity investors to earn an adequate rate of return, the return must be large enough to compensate them for risk. If the residual income is zero, a firm's operating return is just equal to the return that investors require for the risk they are taking. Thus, EVA is defined by Stewart (1991) and Ehrbar (1998) as:

$$EVA = NOPAT - WACC \times (TC), \quad (3)$$

where, *NOPAT* is net operating profits after taxes, *WACC* is cost of capital, *TC* is total capital employed.

While calculation of *NOPAT*, the non-operating items like dividend/interest on securities invested outside the business, non-operating expenses etc. will not be considered. The total capital employed is the sum of shareholders funds as well as loan funds. But this does not include investments outside the business. In determining the *WACC*, cost of debt is taken as after tax cost and cost of equity is measured on the basis of capital asset pricing method.

When applying iterative method it is working with the cost of equity, which is determined according to the current capital structure. Cost of equity is converted into zero debt according to the formula:

$$c_e = \frac{c_e(d) + c_d \cdot (1-r_{it}) \cdot D/E}{1 + (1-r_{it}) \cdot D/E},$$

where, c_e – cost of equity (debt-free), $c_e(d)$ – cost of equity (by Dept d), c_d – cost of borrowed capital (cost of debt), r_{it} – income tax rate, D – market value of debt, E – market value of equity.

The iterative method progresses from the end of panning period and then continues from year to year during planning period up to the date of valuation.

2. Methodology

Estimation of future development of variables consists of following steps:

1. Creation of benchmarking group of companies

Companies should compare in the benchmark group of enterprises with a company whose value is determined. Comparable companies are those operating in the same economic sector and they have comparable certain parameters, such as the size of the undertaking and the scope of the region, etc.

2. Data collection

After creation of benchmark group of undertakings evaluator should try to get as much information of companies as possible. Information about the property, sources of capital, incomes and expenses and cash flow are most often obtained from published financial statements (balance sheet, income statement, cash flow statement). Another source of information is the annual report of individual companies. In case of available information financial plan is also helpful.

3. Analysis of data and evaluation of development in the frame of benchmark group

The data collected should be properly sorted and further analyzed. In the frame of analysis there are determined probability distributions of indicators and possibilities of further development of the sector on the basis of the historical development of individual indexes. Based on the conducted analysis of the data, the evaluator should adopt conclusions and calculated parameters and then to apply them to the analyzed company. This method is suitable for the evaluators, who are trying to predict the further development of the business and do not anticipate extraordinary events, such as the economic crisis, high specific risk of evaluated company, etc.

4. Financial plan

According determining of the probability development of the individual components of company, its result and cash flow, and during ignorance of the financial plan, the evaluator can create probable financial plan. At creation of a financial plan a certain degree of risk and uncertainty is still arising. Therefore, investor or other valuation entity can not say with certainty that the profit, total value of assets and other components of the company would be in certain volume. Due to the mentioned it is appropriate to use probability distribution at the different items. In the final step, we draw each firm's cost of capital from a distribution and calculate the value of this firm.

As an example, one of the mining companies in Slovakia is illustrated. Input data for the evaluation of the company have been gathered from financial statements from period 2009 to 2014.

Individual variables were evaluated through Crystal Ball from Oracle. With use of this statistical software we acquired statistical probability distributions of individual indicators development that were later used in the evaluation of the development of the company's value in mentioned program Evalent4.0. Thus simulated values were inducted in plan items of the company by methods that require knowledge of the company's plan. As for the methods that can be performed without knowledge of the plan, they were thus referred to as not known items according the historical development of all analyzed companies. It was subsequently performed a simulation by using Monte Carlo methods.

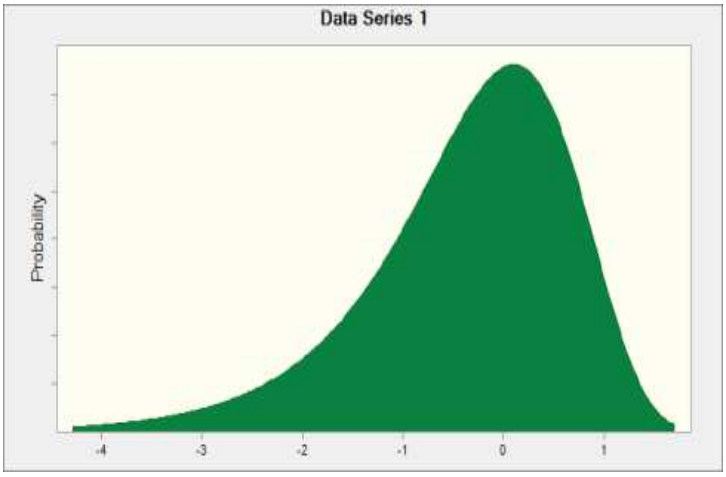
2.1. Monte Carlo. Monte Carlo simulations are a well-established scientific approach, and have been applied to address a range of questions in accounting and finance, where important aspects of the underlying environment are unobservable so that tests of theories with real-world data are impossible. In simulations we observe these otherwise unknown variable. The simulation model combines an econometric forecasting model, a business planning model, and a DCF-based valuation model.

As common in financial modeling and corporate valuation, sales growth and profitability are used (EBITDA-margin) as our main value drivers ("percentage-of-sales model"). Sales growth rates and EBITDA-margins are then the random variables in Monte Carlo simulation from which all other accounting and cash flow items in the projected financial statements are calculated, mostly as percentages of sales.

3. Results

Probability distributions for the main variables influencing the growth of companies are shown in the next four figures. Distribution in Figure 2 shows probability changes of operating profit. Based on changes of the operating profit of 22 Slovakian mining companies, it can be concluded that most likely is about 0.1% increase of this variable. The average value of the distribution is at -0.38%, median -0.2.

Percentage change of operating profit/loss



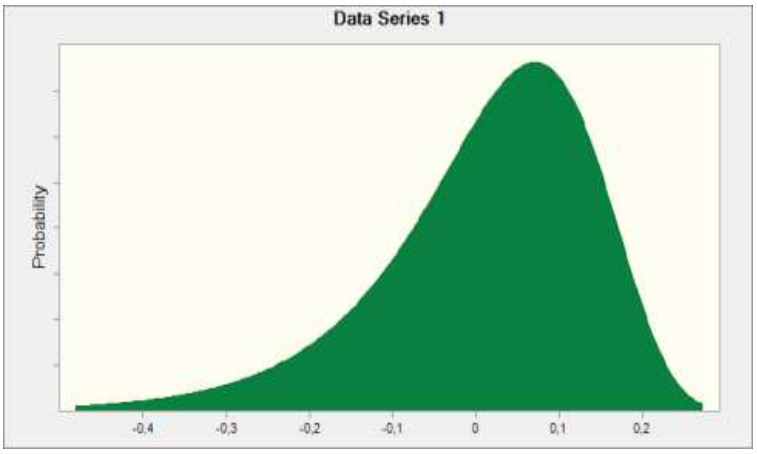
Parameters

Type of distribution	Minimum extreme distribution
Likeliest	0.1
Scale	0.83
Mean	-0.38
Median	-0.2
Std. dev.	1.06

Fig. 2. Percentage change of operating profit/loss

Figure 3 provides a probability distribution of changes in total sales. It can be noted that the average sales growth of mining companies in Slovakia was positive. Distribution parameters are shown in the table. It can be concluded that most likely is about 0.07% increase of sales variable. The average value of the distribution is at 0.01, median 0.03.

Percentage change of sales



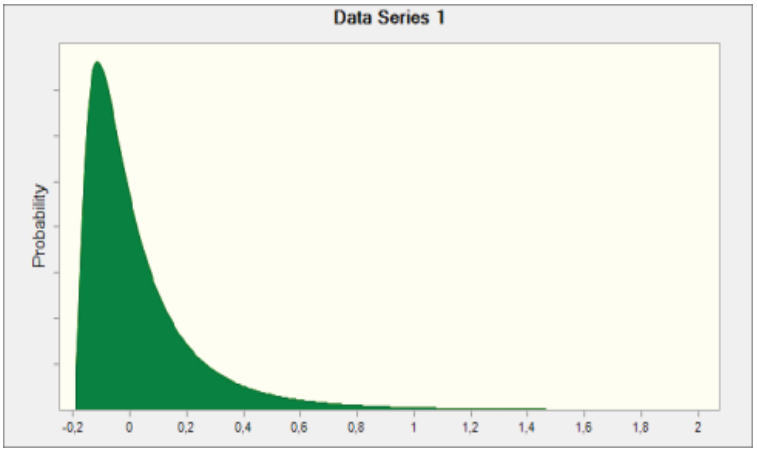
Parameters

Type of distribution	Minimum extreme distribution
Likeliest	0.07
Scale	0.1
Mean	0.01
Median	0.03
Std. dev.	0.13

Fig. 3. Percentage change of sales

The average value of amortization changes is 0.04%. Half of 22 Slovakian mining companies had more than 0.03% decrease of amortization in last 6 years. Other parameters are presented in Figure 4.

Percentage change of amortization

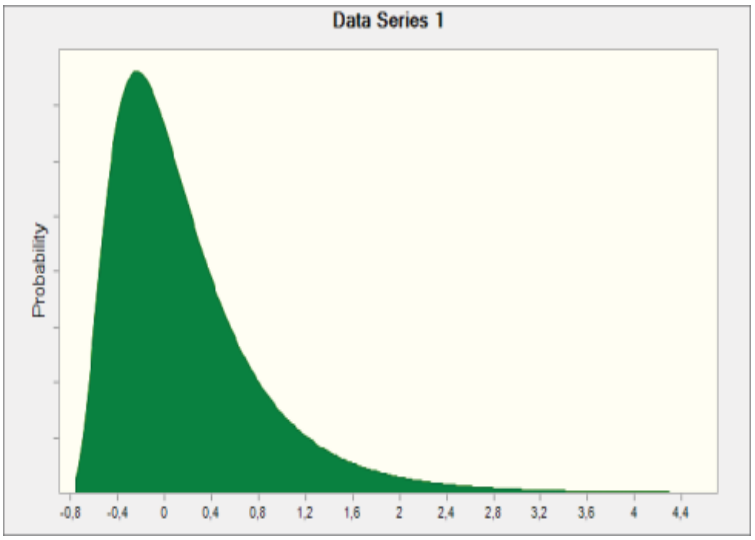


Parameters

Type of distribution	Minimum extreme distribution
Location	-0.21
Mean	0.04
Median	-0.03
Std. dev.	0.24

Fig. 4. Percentage change of amortization

Company's growh rate



Parameters

Type of distribution	Minimum extreme distribution
Location	-0.9
Mean	0.19
Median	-0.03
Std. dev.	0.24

Fig. 5. Company's growh rate

Probability distribution of company's growth rate is presented in Figure 5. Based on its parameters it can be stated that more than half of mining companies in Slovakia recorded negative change of total assets.

Based on probability distributions of main variables, it was predicted their future development to generate finacial plan of selected company. Apart of data in the income statements it has been given additional data (EURIBOR, risk-free interest rate, beta coefficient, risk premium, income tax rate) required to calculate the value of the company.

Risk-free interest rate presents the yield of the 10 year government bond. In this case it is on the level of 1.615%. Beta coefficient was determined by Domodoran, which examined the dependence of individual sectors on the market development. For Europe and Russia a value according this research presents 1.55. According to Standard & Poors agency total risk premium of Slovakia is 6.28%. Beta coefficient for European mining industry is 1.07. The income tax rate was at 19% in 2012, in 2013 a tax rate of corporation tax was 23% and in 2014 it dropped to 22%. Development of interest rate EURIBOR during analyzed period is illustrated in Table 1.

Table 1. Development of Euro interbank offered rate

Year	2009	2010	2011	2012	2013	2014
EURIBOR	1.42	1.38	1.89	1.18	0.54	0.48

Simulations were made in software Crystal Ball. The results are illustrated in Table 2. There were 2000 trials made. Highest value was reached by iterative method. It must be noted that standard deviation of iterative method is the highest (44632 EUR). Based on this fact it can be stated that the other two methods are more accurate.

Table 2. Comparison of selected methods – result of simulations

Forecast: Company's value EUR	DCF	EVA	Iterative method
Statistic	Forecast values		
Trials	2 000	2 000	2 000
Mean	662 472	670 820	693 898
Median	663 559	669 456	682 137
Mode	-	-	-
Standard deviation	5 853	4 654	42 632
Variance	34 257 968	21 657 702	1 817 526 085
Skewness	-1.24	2.51	2.78
Kurtosis	5.71	13.82	15.91
Coeff. of variability	0.0088	0.0069	0.0614
Minimum	625 705	665 214	644 130
Maximum	674 673	713 796	1 054 426
Mean std. error	131	104	953

Conclusion

In the paper valuation methods of selected mining companies were compared. The aim of the article was to design process of mining company's valuation and compare selected approaches. The process was presented on selected mining company. Based on performed simulations using the statistical software, it is concluded that the highest mean of company's value was using the iterative method, the lowest by using method of DCF. Methods based on discounted cash flow and economic value added are more accurate.

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