

# Key input factors for discounted cash flow valuations

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*Abstract:* - Business valuation becomes requisite not only because of the recent trend of mergers and acquisitions but of course regarding to identification of economic value creation sources. This paper examines weighted average cost of capital and terminal growth rate as the key input factors that is needed for discounted cash flow valuation and can alter the valuation results considerably. A practical example of this implication is given using sensitivity analysis. A special emphasize is being put on the overview of methods that are used by appraiser's in nowadays Czech practice to calculate the equity cost. The following part of analysis is focused on investigation of the inherence of the fundamental assumptions that led appraisers to determination of terminal growth rate, the rate that influence the business value considerably.

*Key-Words:* - business valuation, cost of capital, discounted cash flow, sensitivity analysis, terminal growth rate, equity

## 1 Introduction

Globalization and development of capital markets lead to intensification of capital investments which have resulted in mergers and sales of businesses. These processes asked for market company valuation. Business valuation becomes more extensive discipline address expert institutions, investment banks, consulting companies and of course owners of small and medium-size companies and universities themselves. The valuation is mainly based on experiences. Exact practices play only a small role in this procedure. To someone this may seem like an easy discipline and fairly simple. However, the opposite is true. It is a sophisticated discipline in which it is necessary to combine knowledge from different disciplines. The business valuation process may be connected with a number of problems whose solution often requires extensive theoretical knowledge, practical experience and intuition. At the beginning of valuation it is always necessary to know the purpose and objectives of value determination which then influence the choice of the methods and procedures and any decision to be taken in. Business valuation is an important area that keeps growing in importance in the context of expanding markets, mergers, acquisitions, or a transformation of property relations. This is an area that is constantly moving forward. Assumption of the correct valuation is precise data processing

which leads to correct estimate of the final valuation result.

This research discusses weight average cost of capital and terminal growth rate as the key input factors of discounted cash flow valuation model. Sensitivity analysis explains how varying weight average cost of capital and terminal growth rate will lead to different results when the value of company is determined. The next part of analysis aims to bring an overview of the mostly used valuation methods for equity cost in nowadays valuation practice in Czech Republic. The following part investigates the inherence of growth expectations that led appraiser to estimation of terminal growth rate. This fact is considerable because terminal value generate major part of determined business value and this reason can tend to manipulation or at least to disproportional creativity that lead in overestimated and incorrect value.

The paper is organized as follows. In second section the research purpose and objectives of the article are described. Section III introduces theoretical findings of the method of company valuation using discounted cash flows as well as its key input parameters that have impact on the valuation results. In the fourth section gained data and methodology are described. In the fifth section, empirical results are presented. Finally, last section concludes with a summary of the major results of this paper.

## 2 Problem Formulation

The paper presents that discounted cash flow method is subject to many assumptions and even slight changes of certain inputs can have appreciable impact on valuation results. The purpose of this study is to examine consequences that changes in the cost of capital and terminal growth rate have on the company value. The results are interspersed by current overview of the method for determining the equity cost in today's business practice. The analysis also investigate if the terminal growth rate as the main input for calculating terminal value is based on fundamental assumption that are mentioned in examined reports.

### 2.1 Research question

The paper tries to answer the questions concerned business valuation and changes of its inputs and today's appraiser valuation practice in the Czech Republic.

- 1) How big effects have the changes of the key inputs on the valuation results?
- 2) What valuation methods do appraisers use for calculating equity cost?
- 3) Do appraisers always explain which fundamental assumptions lead them to estimation of terminal growth rate?

## 3 Frameworks for valuation

Business valuation of a company is subjective by nature and depends on the assumptions considered to perform the valuation. Whether the goal of valuation will be accomplished rely on choice of the correct method. It is related with what purpose the valuation is done and who does it. Good valuation has to be technically correct, based on faithful assumptions that carry over the reality of the company and has to take into consideration the different activities of the company being evaluated. The aim of valuation is usually to find the objective value which is usually in practice a combination of valuation techniques with different theoretical bases as pointed by Dluhosova [15].

In generally, business valuation process includes five phases: business valuation, accounting valuation, financial analyses, forecasting and calculation of value.

### 3.1 Discounted cash flow method

For companies that are almost never public, a model of income based valuation is inevitable to assess

their fair value [14]. Discounted Cash Flow models measure the intrinsic value of a company and are based on the principle that the current value of an asset is equal to the present value of all expected future cash flows [15].

The sense of the discounted cash flow is based on the belief that every asset has an intrinsic value and it is possible to estimate it by looking at asset's fundamentals. It would be perfect if it could exist analyst with access to all information available right now and perfect valuation model. However, it is not true. But we can still aspire to be close as we can. The problem lies in the fact that none of us ever gets to see what the correct intrinsic value of an asset is and if the calculating value is closed to mark or not as pointed by Damodaran [9].

In general, the DCF method is perceived to be the best method for company valuations, however only if the company is profitable [24].

The limitations of the DCF method include its large dependency on weighted average cost of capital and terminal value assumptions. Only small changes have considerable impact on the final company value. For this reason, the DCF method can be easily manipulated by the analyst in order to achieve a given result. Additionally, it requires a lot of information to determine a company's future cash flows, growth rates and discount rates. Similar to any other analytical tools, the DCF have been used with caution. The results from any model depend on the model's inputs [10].

There are two variations of discounted cash flow method in nowadays practice. The first is to value the entire business and is often termed as discounted cash flow to entity. This approach is based on free cash flow to firm, it means free cash flow for owners and creditors and discounted rate that reflects all sources of financing company's operation. The second way is to determine the equity stake in business. Equity that is determined only on the basis of free cash flow for owners is discounted only by the cost of equity [11]. It should be noticed that it is possible always get from the "firm value" to the "equity value" by netting out the value of all non-equity claims from firm value [9].

The challenge of using a discounting cash flow methodology for companies is determining what constitutes cash flow, what the company is worth beyond the forecast period, and what discount rate to use to determine the present value as pointed by Allman [1].

To the key components of DCF belong free cash flow (cash generated by the assets of the business available for distribution to all providers of capital), terminal value and discounted rate. Value of the

companies that are not listed in the capital markets is the present value of all future free cash flow discounted at rate known as cost of capital. In mathematical terms this simple model is able to express as following:

$$V = \sum_{t=1}^T \frac{FCF_t}{(1+r)^t} \quad (1)$$

where:

$FCF$  = free cash flows

$r$  = cost of capital

$t$  = years

$T$  = number of period [25].

Valuing a business by discounted cash flow method includes three general steps:

- A) Prediction of business cash flow
- B) Calculation of discounted rate
- C) Estimation of business terminal value [8].

The fundamentals of the DCF model are to determine the present value of so-called free cash flows (FCF) that company is expected to earn in the future. Relevant cash flow calculation can be confusing because there are many sources and uses of funds. It means that cash available for a debt holder is most likely different from that of an equity holder. The number of periods of cash flow we count in a forecast is also of major concern as emphasis Allman [1].

Forecasting company's cash flows into the expectable future is a challenging task, and for this reason analysts typically divide the future into two parts: planning period with temporary number of the years and all years thereafter. Discounted cash flow model can be expressed as sum of present value of set of cash flows spanning a temporary number of years and present value of the estimated terminal value (TV) of the company at the end of the planning period. The formula for using a two-step approach to estimate enterprise value is following [25]:

$$V = \sum_{t=1}^T \frac{FCF_t}{(1+r)^t} + TV \quad (2)$$

where:

$V$  = Enterprise value

$FCF$  = free cash flows

$r$  = cost of capital

$t$  = years

$T$  = number of period

$TV$  = terminal value

Terminal value represents the present value of all the cash flows that are expected to be received beyond the end of the planning period.

### 3.2 Prediction of business Free Cash Flow

When it is discussed the business valuation, it is used the term free cash flow to firm. This term is able to easy express as the amount of cash flow (produced by firm) that is available for distribution to the various claimants (debt and equity) after paying all the firm's expenses and investing in new projects. The free cash flow to firm can be compute using the following procedure:

Table 1 Free Cash Flow to Firm. Source: [25].

<b>Earnings Before Interest and Taxes (EBIT)</b>	
<b>less</b>	Taxes
<b>equals</b>	Net operating profit after taxes (NOPAT)
<b>plus</b>	Depreciation expense
<b>less</b>	Capital expenditures (CAPEX)
<b>less</b>	Increases in net working capital (NWC)
<b>Free cash flow firm (FCFF)</b>	

To make all the items clear it is better to go through the terminology. The calculation starts with earnings before interest and taxes because interest payments are value to debt holders. Depreciation expense is actually an addition to free cash flow. The reason is simply because it reflex the fact that although tax deductible, it does not represent a cash outflow [25].

Capital expenditures are deducted because they represent clearly a real cash outflow. Generally, is necessary to make investments in new long-lived assets periodically to sustain a company's productive capacity and provide for growth in future cash flows [25].

Finally, the cash flow is deducted by the value of working capital that is critical to a business because the current assets and liabilities keep operations running on a day-to-day basis. Therefore, there should be enough funding from current liabilities to cover the assets that are created [1].

Free cash flow is independent of financing and therefore not affected by capital structure even though capital structure may affect a company's discount rate, the weighted average cost of capital (WACC) and therefore its intrinsic value [7].

In addition, it is also define equity free cash flow that refers to the amount of cash flow that is available for distribution to the firm's equity holders. To calculate equity free cash flow (FCFE),

the firm free cash flow has to be lessening by creditor cash flows as follows:

Table 2 Free Cash Flow to Equity. Source: [25].

Free cash flow to firm (FCFF)	
less	Interest expense
less	Interest Tax Savings
plus	Principal payments
less	New debt issue proceeds
Free cash flow to equity (FCFE)	

### 3.3 Calculation of the Weighted Average Cost of Capital

Generally, cash flow that is riskier should be assessed lower value than more stable cash flow. The question could be how to measure the risk and reflect it in value. To capture the value of risk in business is employed cost of capital.

Weighted average cost of capital (WACC) is a discounted rate used in company valuations that rely on entity based discounted cash flow methods [8, 16]. In its basic definition, WACC is the weighted average express the cost of capital to company thus the cost of capital coming from both the equity and the debt. The firm's invested capital is capital raise through the issuance of interest-bearing debt and equity as defined by Titman [25]. In a single discount rate is incorporated all financing consideration. For this reason, WACC express how much interest the company has to pay for every crown it finances [18].

There are many factors that affect the weighted average cost of capital whereas some of them may the company influence and some not. Among the important factors that cannot be affected by the company itself belong the level of interest rates, risk premium and tax rates. The others that the company can control include access to capital structure, dividend and investment policy [4].

The basic formula is seen in following equation:

$$WACC = \frac{E}{V} * r_e + \frac{D}{V} * r_d * (1 - T_c) \quad (3)$$

where:

$r_e$  = cost of equity

$r_d$  = cost of debt

$E$  = market value of the company's equity

$D$  = market value of the company's debt

$V$  = the sum of market value of the company's equity and market value of the company's debt

$T_c$  = corporate tax rate [10].

As mentioned above weighted average cost of capital is weighting by proportion of the individual cost of capital components, equity and debt, and any specific rule is demand in its calculation. However, practical applications of the weighted average cost of capital appear to be almost standardized and consequently hardly questioned as pointed out by Gruninger [13]. He notes some facts. First, the WACC is the most often calculated with an adjusted cost of debt that accounts for the tax deductibility of interest-rate costs. On this account it is often referred to as the after-tax WACC. Second, the cost of equity calculation mostly relies on the capital asset pricing model (CAPM). The CAPM model is well defined and generally accepted despite the fact that its parameters is subject to some degrees of freedom. Third, one of the inputs of CAPM, is the equity beta that is usually computed by (re-) leveraging the asset beta derived from comparable listed companies. The advantage of using comparable companies is reducing the standard error of beta and making the beta estimation more accurate. Finally, the cost of debt need to be estimated when calculates the weighted average cost of capital [13].

An easy way to understand fundamentals of weighted cost of capital is to think as to what is the expectation of each investor (debt holder and equity holder). The debt holder expects to receive in period  $t$  the interest on the value of his/her debt at period  $t-1$ ,  $D$  at the cost of debt,  $r_d$ . It is able to express according to following formula:

$$\text{Interest at period } t = r_d * D \quad (4)$$

From the other point of view, the equity holder expects to receive a return based on the market value of equity at period  $t-1$ . That is:

$$\text{Interest at period } t = r_e * E \quad (5)$$

By calculating weighted cost of capital the tax shields have to be considered. Tax shield is kind of subsidy that the government pays to those who incur deductible expenses like the interest payment. For this reason, the net expected payment for the company is the total cost of the company expects to pay to the capital owners (debt and equity) minus the tax shields.

The formula for the total adjusted cost to be paid by the company is [22]:

$$\text{Total adjusted cost} = E * r_e + D * r_d * (1 - T_c) \quad (6)$$

where:

$r_e$  = cost of equity

$r_d$  = cost of debt

$E$  = market value of the company's equity

$D$  = market value of the company's debt

$T_c$  = corporate tax rate

In the formula, market values of equity and debt are taken instead of their book values. The market value of the company's equity can be obtained from stock price quotes. The market value of debt capital can be estimated by considering cash flow accruing to debt holders and the market interest rate [19].

### 3.3.1 Cost of debt

The cost of debt is the rate that a company pays to borrow money [10]. Generally, authors and experts in field of finance agree that estimation of cost of debt is not problematic because they are mostly explicit and observable as compared with cost of equity estimation [11, 23]. A lot of publications presents that cost of debt are derived from current interest rates or in the case of more loans the cost of debt are calculated as their weighted average [11, 15, 23].

Another way how to determine the cost of debt needs for calculation three factors: the risk free rate, the default spread and the tax rate. The formula for the after tax cost of debt is follows [10]:

$$\text{After tax cost of debt} = (\text{Risk free rate} + \text{Default spread}) (1 - \text{marginal tax rate}) \quad (7)$$

The default spread can be determined in three ways whose choice depends on the company to be evaluated:

- company with outstanding bonds - the cost of debt can be calculated by applying the current market interest rate on the company's long-term bonds,
- company with bond ratings from rating agencies (Moody's or Standard and Poor) - the default spread can be determined based on the ratings,
- company without rating - an artificial rating can be made based on the firm's interest coverage ratio (EBIT/ Interest expense) [8].

The last part for determining the cost of debt is the tax rate. Interest payments on debt are subtracted

from income before tax is determined, thus taking on debt can act as a tax shield [20].

### 3.3.1 Cost of equity

The cost of equity capital is the most difficult estimate that is required in evaluating a firm's cost of capital [25]. The cost of equity can be formulated as an opportunity cost equivalent to a return on alternative investments with similar level of risk as pointed by Pratt [23]. Finance theory introduces several approaches to cost of equity estimation. There exist few classes of models for expected return of equity [9]:

- The most attractive seems to be *Capital Asset Pricing Model (CAPM)* that derives the cost of equity directly from the market by econometric analysis. Based on the CAPM model, a stock's expected return is determined by the time value of money and the risk premium. The time value of money is represented by the risk free rate,  $r_f$ . Risk premium can be defined as the extra return that investors demand for taking on risk [16]. The risk is captured in beta that should assign business. The number of beta should carry the burden of measuring exposure to all components of market risk. The calculation of expected return is based on three variables – the risk free rate, the beta and equity risk premium. The expected return on any security can be written as follows:

$$E(R_i) = r_f + \beta * [E(R_m) - r_f] \quad (8)$$

where:

$E(R_i)$  = expected return of security  $i$

$r_f$  = risk-free rate

$B_i$  = stock's sensitivity to the market

$E(R_m)$  = expected return of the market

In the calculation of CAPM, the risk-free rate and market premium, difference between  $E(R_m)$ , and  $r_f$  are common to all companies. Only one input factor that differs across companies is beta. Beta can be defined as stock's incremental risk to a diversified investor, where risk represents the extent to which the stock covaries with the aggregate stock market. [25].

- The second class represent *arbitrate pricing and multi-factor models*. The models allow for multiple sources of market risk and

estimate betas against each one. The formula for calculation of expected return of an investment is a function of multiple betas and risk premium for that factor.

- The final category is *proxy models*. The essential of this model is to measure risk directly instead of look at historical data for clues on what types of investment have earned high returns in the past. The expected return for company is able to estimate on its market capitalization and price to book ratio [25].
- To cost of equity pricing models belong of course *Build-up model* that determine the cost of equity as a sum of risk-free rate and individually estimated risk premiums. There are several variants of this model which are different in definition of the main risk factors. The main aim is to capture as much partial risks which should be reflected in the discounted rate as possible. One of the easiest build up model is to determine the risk premium only on the basis of the business and financial risk. The following formula for determining the equity cost is used for statistical purposes by the Ministry of Industry and Trade in the Czech Republic:

$$r_e = r_f + r_{LA} + r_{firm} + r_{fin} \quad (9)$$

where :

$r_f$  = the return on risk-free assets,

$r_{LA}$  = risk premium for lower liquidity of the shares in the market,

$r_{firm}$  = risk premium for the business risk

$r_{fin}$  = risk premium for financial risk [21].

The inputs of CAPM and multi-factor models are straightforward. It is necessary to estimate risk-free rate and equity risk premium (or premium in multi-factor models) to use all across investments. The risk-free rate is expected return on an investment with guaranteed returns. It is connected with no default risk and the time horizon is mattered. For this reason the government securities are used. The other issue is equity risk premium that expressed the how much investor demand for investing in risky equities. It expresses the risk aversion that investors bring to market [24].

### 3.4 Estimation of the business terminal value

When evaluating a company using the discounted cash flow method, terminal value frequently becomes a key factor in estimating the company's intrinsic economic value [6]. Since discounted cash flow analysis is based on a limited forecast period, terminal value have to be used to estimate the company's value at the end of the period. Terminal value is the NPV of all future cash flows that accrue after the time period. [8]. In this case, to analyze the reasonableness of the terminal value used it is necessary to make a reasonable estimate of the main economic value generators including growth rate, period of time, base of free cash flows from which the extrapolation will be made as noted by Lopez [18].

Due to the fact that it is very difficult to estimate the value that should show if company develops over a long period of time, the terminal value is based on average growth expectations that are easier to predict. Terminal value can be calculated a couple of ways. One way is based on the assumption that the company will be cease to operate at point in the time in the future and sell the assets it has accumulated. Such a methodology is appropriate in industries in which competition is expected to eliminate excess returns, thus driving assets returns to the cost of capital. The estimate that emerges is called a *liquidation value*. This method is call Exit or Terminal Multiple Approach. On the other hand, the perpetuity growth model is based on the idea that company will continue its historic business and the cash flows of the company will growth at a constant rate forever. In the stable growth model we are assuming that company can reinvest some of their cash flows back into new assets and extend their lives [8].

If the company is being valued as going concern, the economic value may be determined from market data, *extrinsic value*, or based on company fundamentals, *intrinsic value*, Lopez [18]. The Fig. 1 illustrates the various alternatives.

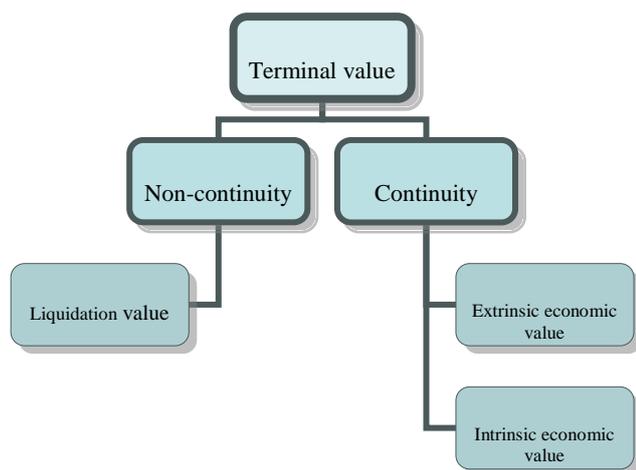


Fig. 1 Terminal value. Source: [18].

The question could be how to determine the rate of sustainable future growth that is often used in the formula of perpetual growth model? The perpetual growth rate has to be established in a way that is consistent with the assumptions used in the valuation. Therefore, if the method used to estimate the economic value of the business up until year  $n$  is discounted cash flow method, it would be logical to determine the terminal value using the same method or on the other hand to have a good reason to do it otherwise. In other words, if a scenario of real GDP growth of three per cent is assumed, a reasonable and well founded explanation needs to be given for using higher value of terminal growth rate, and in any event, it has to be refer to a specific period. It does not seem reasonable to use terminal values with real growth rates higher then GDP for unlimited periods as remarked by Lopez [18].

As pointed by Beranek and Howe [2] the constant perpetual growth rate ( $g$ ) together with the WACC as the discount rate ( $r$ ) allows for the use of a perpetual growth model to determine the terminal value.

The formula for a growing perpetuity is as follows [10]:

$$TV = \frac{FCF_{n+1}}{r - g} \quad (10)$$

where:

$TV$  = Terminal value

$FCF$  = free cash flows

$n$  = final year of the projection period

$r$  = cost of capital

$g$  = is the nominal growth rate expected into perpetuity.

Since all these cash flows are discounted to a date in the future, the terminal value has to be discounted again to give us the net present value of all free cash flows. The value of the cash flows and discounted rate depends upon whether the company or equity value is determined [10].

### 3.1.4 Sensitivity analysis

Sensitivity analysis tests the impact of changing the parameters of the model to the company's value as mentioned by Bessis [3]. It helps to build the confidence in the model by studying the uncertainties that are often associated with parameters in model. It thereby supports management in determining the most crucial variables for the value of a project.

Koller exemplifies that the advantage of sensitivity analysis can be found from the investor's perspective with support by further investigation and more closely monitoring of chosen inputs and with bounding the valuation range when there is uncertainty about the inputs [16]. However, the sensitivity analysis is missing in business valuation despite of the fact that it should be an important part of the valuation process and be used for results analyzing with respect to input data reliability and precision as mentioned by Dluhosova [12].

## 4 Methodology

The focus of this paper is to investigate the impact of the selected variables to company's value. On this account were used input data from case study where author try to estimate equity value of the company from telecommunication sector by using real options techniques and discounted cash flow method. These data represent suitable base for sensitivity analysis. The sensitivity of equity value estimated under the discounted cash flow method was further investigated.

The second part of the paper is employed into analysis of identification of the mostly frequent theoretical models that are being used to calculate equity cost in nowadays appraiser practice. The primary input data were gained from the expert's reports that were stored into the Commercial Register. The commercial register should involve all the expert's valuation reports of nonmonetary investment for the establishment of the limited company or joint stock company or for increasing their stock, appraiser valuation reports of the valuation of business assets for transformation of trading company and cooperatives.

For data collection were used provisions of Commercial code in Czech Republic which requires to store selected valuation reports of the company into Commercial Register and make public this transaction. The Commercial Register is able to find on the Ministry of Justice website and the access is free for all. However, there is no list of expert's valuation reports in the Commercial Register. This complication can be solved via Commercial Bulletin. This website involved information that competent company stored expert's valuation report into Commercial Register. According to the list of companies that stored expert's valuation report into Commercial Register in 2012 were downloading all relevant documents into the database. The reports where an equity is valued under income approach were further analyzed to find out frequency of methods chosen to estimate discounted rate.

However, the research is connected with some potential limitations. If there is another reason then mentioned above the company is not obligatory to store the reports into the Commercial Register. The second limitation is connected with poor disclosure discipline of the Czech companies. A lot of them do not store the required documents to Commercial Register although they can be sanctioned.

#### 4 Results

To determine equity value is necessary to established free cash flows and discounted them with appropriate rate. After that the terminal value is calculated and added to the sum of all free cash flows. The free cash flow calculating is based on forecasting of different component. It is supposed that the past is a reasonable predictor of the future. The strategic financial plan was determined for five years.

Table 3 Free cash flow to firm. Source: [17].

in mil. CZK	2011	2012	2013	2014	2015
FCFF	11393	11267	11544	11605	11777

$$r_d = 4,35\%$$

$$r_e = 0,427 + 0,491 * 6,28 = 7,36\%$$

$$WACC = 7,35\%$$

$$V = \frac{11393}{(1+0,0735)^1} + \frac{11267}{(1+0,0735)^2} + \frac{11544}{(1+0,0735)^3}$$

$$+ \frac{11605}{(1+0,0735)^4} + \frac{11707}{(1+0,0735)^5} = 46726$$

$$TV = \frac{46726}{7,35 - 1,1} = 95512$$

$$V_{Brutto} = 46726 + 95512 = 142238$$

$$V_{equity} = 142238 - 104 = 142134 \quad (11)$$

Free cash flows were discounted by weighted average cost of capital of 7,35 %. The sum of all these values represents the value of the first phase. The gross value of the company (the value of first phase plus value of second phase) is necessary to reduce by the value of debt to get equity value.

To analyze the sensitivity of equity value determined by discounted cash flow method, the study of Telecommunication Company was used. The weight average cost of capital and perpetual growth rate as two main input factors that have large effect on the final value were applied.

Table 4 Sensitivity analysis: WACC and perpetual growth rate (in %). Source: [own].

WACC (in %)	Terminal growth rate (in %)								
	5,1	4,1	3,1	2,1	1,1	0,1	-0,9	-1,9	-2,9
11,35	-11	-14	-17	-20	-22	-25	-26	-28	-30
10,35	-4	-8	-12	-15	-18	-20	-23	-25	-26
9,35	5	-1	-5	-9	-13	-16	-18	-21	-23
8,35	14	8	2	-3	-7	-10	-13	-16	-18
7,35	27	18	11	5	0	-4	-8	-11	-14
6,35	42	31	22	14	8	3	-1	-5	-9
5,35	62	47	35	25	18	11	6	1	-3
4,35	90	68	51	39	29	21	14	9	4
3,35	130	96	73	56	43	33	25	18	12

The Table 4 above shows the results of sensitivity analysis of two mentioned input factors. The base assumption of weighted cost of capital of 7, 35% and perpetual growth rate of 1, 1% are highlighted by the darkest color. These values were considered as the base scenario. The input perpetual growth rate and weighted average cost of capital were changed by the same proportion, concretely by 100bp. The results shows that even small changes in the perpetual growth rate or weighted average cost of capital have large effect on the determined equity value as compared with the base scenario. Generally, the change of perpetual growth rate and cost of capital have opposite impact on the determined value exactly. Increasing weighted average cost of capital decrease the equity value and by contrast increasing perpetual growth rate raises the value of equity. For example increasing perpetual growth rate by 100bp and simultaneously decreasing the weighted average cost of capital by 150bp will heighten the value by 51%. Considering it is not easy to estimate both inputs with a correctness of just a few base points, the established company value can only be seen as guidance nor the utterly exact value.

The sensitivity analysis summarized that discounted cash flow method is very vulnerable to changes in the input factors. This foundation lead author to further analyses how these two inputs are estimated in nowadays valuation practice.

The first part gives an overview of the method for determining the equity cost. The cost of debt is almost known. This assumption leads the attention only to cost of equity.

Special attention has been given to estimation of perpetual growth rate due to the fact that terminal value creates more than half of the total company value. Determination of perpetual growth rate is based on specific assumptions. From this point of view was examined if the perpetual growth rate was support by referred assumptions or analyst just only present some rate without explanation how it was achieved.

The research was based on the analysis of the appraiser's valuation reports created during the year 2012. The analysis has been completed on the basis of a sample of 482 transactions with subject "company" that were stored into the Commercial Register. Reports where not have been used income method at all were excluded from the analysis. The income approaches were applied in 42 % of cases, however not always they have been chosen as final result.

Table 5 Terminal growth rate. Source: [own].

Terminal growth rate	Number	Shares
Without explanation	124	62%
Fundamental assumptions	77	38%
<b>Total</b>	<b>201</b>	<b>100%</b>

The fact that precise estimation of figures for long term prediction of company's development is very difficult to estimate, the terminal value is based on average growth expectations that can be easier to predict. However, from the whole investigated sample is evident that presentation of fundamental assumptions that led appraiser to determination of terminal growth rate does not appertain to the standard part of business valuation process. The findings indicate that terminal value was based on fundamental assumptions in less than 40% of cases. However, the correct substantiation of its estimating is necessary because of its influence of the company's value. Terminal value can be a factor that readily lends itself to manipulation or at least to an excess of creativity, so as to arrive at a previously decided, not necessarily reasonable, economic value as pointed by Lopez [18].

Table 6 Cost of equity methods. Source: own.

Equity valuation method	Number	Share
CAPM	144	72%
Others	24	11%
Build-up model	20	10%
Unlisted	14	7%
<b>Total</b>	<b>201</b>	<b>100%</b>

For the result of the most frequently used equity costs methods see Table 6. Recent trend in estimating cost of equity confirms that most attractive valuation method presents Capital Asset Pricing Model (CAPM). Valuation experts chose CAPM for cost of equity estimation in more than 70% of cases. The other popular method is Build-up model that was applied in 10% of total sample. In more detailed, the simpler version of build-up model determined equity cost in 18 of valuation reports. Remaining two valuation reports exercised complex build-up model. This version is based on assumption of more detailed analytical classification of partial

risks which should be reflected in the discounted rate. In twenty one cases were applied different valuation methods that mentioned above. This category included for example equity cost estimated by PRIBOR or risk free rate or in few cases the value of equity cost was established on the basis of combination of CAPM and build-up method

#### 4 Conclusion

Business valuation becomes essential requisite of anyone involved in field of corporate finance. The reason is not only an increase number of mergers and acquisitions but of course identifying the sources of economic value creation.

The results of the analyses demonstrated that both perpetual growth rate and weighted average cost of capital are very important inputs of the company valuation. It was evident that only small changes in the rates had big impact on the company value in total.

The following part of the paper provided an insight into the different company valuation models that are used in nowadays practice. This was done in an attempt to answer the main research questions of this paper. The article provides evidence that most attractive valuation method in estimating cost of equity presented Capital Asset Pricing Model. This model was chosen in more than 70% of researched cases. The analysis also investigated if the terminal growth rate as the main input for calculating terminal value is based on fundamental assumption that give reason for its estimation. However, results confirmed that clarification of fundamental assumptions that led appraiser to determination of terminal growth rate did not appertain to the standard part of business valuation process. In most then 60 % of cases there were any explanation despite the fact that it influence of the company's value considerably. Estimation perpetual growth rate should be paid considerable attention due to the large proportion of the terminal value on the company value. Reasonable range for perpetual growth rate is the nominal GDP growth rate of the country.

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#### References

- [1] K. A. Allman, *Corporate valuation modeling: A step by step guide*, New Jersey: John Wiley & Sons, 2010, pp. 185-187.
- [2] W. Beranek, and K. M. Howe, The regulated firm and the DCF model: Some lessons from financial theory. *Journal of regulatory economics*, Vol. 2, No. 2, 1990, pp. 191-200.
- [3] J. Bessis, *Risk Management in Banking*, New York: John Wiley and Sons Inc., 2002, pp. 79.
- [4] E. F. Brigham, and M. C. Ehrhardt, *Financial management theory and practice*. Ohio: Thomson, 2005, pp. 323.
- [5] R. A. Brealey, and S.C. Myers, *Principle of corporate finance*. Irwin: McGraw-Hill, 2000, pp.88-89, 318-320.
- [6] B. Cornell, *Corporate Valuation: Tools for Effective Appraisal and Decision making*, New York: Business One Irwin Inc., 1993.
- [7] T. Copeland, T. Koller and J. Murrin, *Valuation and managing the value of companies*, New York: John Wiley&Sons, Inc., 2000, pp.102-167.
- [8] A. Damodaran, *Investment valuation: tools and techniques for determining the value of any assets*, New York: Wiley, 2002, pp. 233-453.
- [9] A. Damodaran, *The dark side of valuation: Valuing old tech, new tech and new economy companies*, Upper Saddle River: Prentice Hall, 2001.
- [10] A. Damodaran, *Valuation approaches and metrics: A survey of the theory and evidence*, Hanover: Publishers Inc, 2005, pp. 693-784.
- [11] D. Dluhosova, Application Possibilities of Real Option Methodology to Company Valuation, *ECON'05*, Vol.12, No.1, 2005, pp.51-59.
- [12] D. Dluhosova, Sensitivity approaches in company valuation, *In proceedings of International Conference on Finance, Accounting and Auditing*, Zlín, 2012, pp.116-121.
- [13] M. C. Güninger, WACC calculation in practice: Incorrect results due to inconsistent assumption – Status quo and improvements, *Accounting and finance research*, Vol. 2, No. 2, 2013, pp. 36-44.
- [14] B. Knapová, T. Krabec and J. Roubíčková, EBIT criterion: Financial analysis issues, *International Journal of Mathematical Models and Methods in Applied Sciences*, Vol. 5, No. 3, 2011, pp. 499-507.
- [15] P. Kogler, T. Krabec, Firms as a bundle of core competencies: A valuation approach using the Dresdner reference model, *In proceedings of 6th WSEAS International Conference on*

*Business administration*, Cambridge, 2012, pp. 124-129.

- [16] T. Koller, M. Goedhart, and D. Wessels, *Valuation: Measuring and managing the value of companies*, New Jersey: John Wiley&Sons, Inc, 2010, pp. 290-291.
- [17] E. Kramna, Flexibility consideration in equity valuation, *International Journal of Mathematical Models and Methods in Applied Sciences*, Vol. 6, No. 8, 2012, pp. 934-942.
- [18] F. J. Lopez, Valuation of small business: An alternative point of view, *Journal of Business valuation and Economic loss analysis*, Vol. 3, No. 1, 2008, pp. 1–6.
- [19] S. C. Meyers, Financial theory and financial strategy, *Strategic management*, Vol. 14, No. 1, 1984, pp. 126–137.
- [20] S. K. Mitra, Revisiting WACC, *Global Journal of Management and Business Research*, Vol. 11, No.11, 2011, pp. 88-96.
- [21] I. Neumaier, I. Neumaierova, *Business Performance and Market value*, Prague: Grada, 2002.
- [22] I. Pareja-Velez, Back to basics: Cost of capital depends on free cash flow,” Vol. 16, No. 1, 2010, pp. 28-39.
- [23] S. Pratt, *Cost of capital, estimation and applications*, New York: John Wiley and Sons Inc.,2002.
- [24] J. P. Russell, Valuation of Imaging Centers: Alternative Methods and Detailed Description of the Discounted Cash Flow Approach, *Journal of the American College of Radiology*, vol. 4, no. 1, 2007, pp. 53-64.
- [25] S. Titman, J.D. Martin, *Valuation: The art and science of corporate investment decisions*, Boston: Pearson Education, 2011.