**COMENIUS UNIVERSITY IN BRATISLAVA**

**Faculty of Mathematics, Physics and Informatics**

# Valuation of private companies in M&A process using iterative method

Bratislava, 2011

Bc. Marek Vízy

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## Faculty of Mathematics, Physics and Informatics


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# VALUATION OF PRIVATE COMPANIES IN M&A PROCESS USING ITERATIVE METHOD

**Master Thesis**

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| Study field: | 9.1.9 Applied Mathematics |
| Study programme: | Economic and Financial Mathematics |
| Supervisor: | doc. Dr. Ing. Menbere Workie Tiruneh, PhD. |

**Bratislava, 2011**

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# UNIVERZITA KOMENSKÉHO V BRATISLAVE

## Fakulta matematiky, fyziky a informatiky


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# OCEŇOVANIE SÚKROMNÝCH SPOLOČNOSTÍ V PROCESE M&A VYUŽITÍM ITERAČNEJ METÓDY

**Diplomová práca**

| | |
|---|---|
| Štúdijný odbor: | 9.1.9 Applied Mathematics |
| Štúdijný program: | Economic and Financial Mathematics |
| Školiteľ: | doc. Dr. Ing. Menbere Workie Tiruneh, PhD. |

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**Názov :** Valuation of private companies in M&A process using iterative method

**Cieľ :** Analysis and valuation of companies involved in merger and acquisition process using iterative method to find market value of equity.

**Vedúci :** doc. Dr. Menbere Workie Tiruneh, PhD.

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## DECLARATION ON WORD OF HONOUR

I declare, this thesis was written on my own, with the only help provided by my supervisor and referred-to literature.

……

Marek Vízy

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# Abstract

VÍZY, Marek: Valuation of private companies in M&A process using iterative method

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The aim of this master thesis is the valuation of private company using the iterative method to determine the market value of equity, WACC and enterprise value of the valued company. We described the main terms connected with M&A process and the whole valuation process with the main focus on DCF model. Consequently, we applied this procedure for purposes of the valuation of Czech privately-held company Beta a.s.. We analyzed the financial health of this company firstly. Then we computed all the variables entering DCF model. Finally, we calculated WACC and enterprise value using the iterative method. Our results showed us the approximate value of the company Beta a.s. and confirmed that the iterative method is suitable for situation where necessary market values are not available.



**Keywords:** valuation, WACC, DCF, merger & acquisition, synergy effect

# Abstrakt

VÍZY, Marek: Valuácia súkromných spoločností v procese M&A využitím iteračnej metódy

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Cieľ tejto diplomovej práce je valuácia súkromnej spoločnosti využitím iteračnej metódy pre určenie trhovej hodnoty vlastného imania, WACC a celkovej hodnoty spoločnosti. V práci sme definovali hlavné termíny používane v procese M&A a taktiež celý proces valuácie so zameraním na DCF model. Následne sme aplikovali daný proces na účely ohodnotenia českej súkromnej spoločnosti Beta a.s. Najprv sme analyzovali jej finančnú situáciu. Potom sme vypočítali všetky premenné vstupujúce do DCF modelu. Nakoniec sme využitím iteračnej metódy vypočítali WACC a hodnotu spoločnosti. Naše výsledky nám ukázali približnú hodnotu spoločnosti Beta a.s. a potvrdili, že iteračná metóda je vhodná v situáciách ked nie sú k dispozící potrebné trhové hodnoty.



**Klúčové slová:** oceňovanie, WACC, DCF, fúzia a akvizícia, synergický efekt

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# 1. Introduction

A big market competition, liberalization and globalization of markets worldwide cause that production and services are still more and more gathered to less number of big companies. This process can be called concentration. Concentration expresses the ratio of production of big companies to total production, number of employees to total number of employees in an economy or the amount of total turnover. Closely associated with this process is centralization of capital and an effort for its best appreciation. The most common tools for executing concentration are Merger & Acquisition (M&A).

The amount of M&A increased in previous century few times. This trend has expanded from USA to the whole world and nowadays represents huge and complex topic containing preliminary assessment and business valuation, phase of proposal, exit plan and stage of integration.

One of the most important and complex issues in world of M&A is synergy effect. Synergy effect is easily explained by the equation 1+1=3. This means that the value of individual companies should be lower than the value of joint company. This effect is one of the main reasons why the amount of M&A is still rising. But why does this effect arise? Why one company is more valuable after a merger or acquisition than before it? And does synergy effect appear every time?

Another important step in determining if any synergy effect in M&A process actually comes is valuation of the whole process and its parts. This should include valuation of the companies involved before M&A separately and consequently valuation of the established joint company.

The valuation of quoted public companies in countries with well developed stock markets is in general relatively easy. The market value of equity of these companies can be quite easily calculated, as a market value of a single share times number of issued shares. Definitely, there are at least few facts influencing the terminal value of the company, but this simple calculation can serve as a good benchmark at the beginning.

Absolutely different situation is on the emerging markets with stock exchanges where only few companies are quoted. Very good example are countries in central European region.

Stock market in these countries is still developing with only few tenths of quoted companies. And here comes the problem regarding M&A. Majority of the companies involved in M&A process are either not quoted or the financial information about them are difficult to gain. Even if there are some information available, the valuation becomes quite complex. There are two main reasons. Unavailability of market values, in particular concerning market equity values and lack of peer comparable companies or M&A.

And so, finding the real value of a company in these conditions becomes usually very difficult and complex. The calculated values of the same company can differ from one valuer to another in thousands or even millions.

# 2. The purpose of the work

The work is divided into two main parts. In first one (theoretical part) we try to describe the whole valuation process of companies. Firstly, we shortly describe main terminologies connected with M&A as types of M&A or types of synergy effects. Consequently we focus on description of complex valuation process. The whole process is described in detail, step by step, starting from determining the main valuation method, its description, finishing with description of additional valuation method. All the inputs used in the second part are also theoretically described here.

In the second part, which is a practical part, we try to employ all the theoretical knowledge from the first part in valuation of a real company involved in M&A. Firstly we shortly described involved companies in M&A and analyze the financial health of target company, development of its financial ratios and possible biases in these ratios. We also add their short descriptions and explanations. The whole process will be applied on the M&A of private companies from central European region. Unavailability of data, in particular of market data in CEE, makes the valuation of private companies very complex. Especially, determining of WACC – discount rate, in DCF valuation method is difficult, as the use of market values is necessary here. Due to the fact we are going to value private entity using iterative method of calculating WACC that helps us also to determine the market value of equity. Our aim is to prove, if the method is usable and can yield a reasonable enterprise value of target company.

Due to the scope of this work, we focus on valuing and analyzing of only one company. We choose the target company and take a look at the whole process from the buyer's side perspective.

# 3. Mergers and acquisitions

One plus one makes three. This equation is the special alchemy of the M&A. The key principle behind buying a company is to create shareholder value over and above that of the sum of the two companies. Two companies together are more valuable than two separate companies - at least, that's the reasoning behind M&A. We can express it by a simple equation:

*Equation 1.1:* $$VI = V_{ab} - (V_a + V_b)$$

where:

$VI$ – value increase

$V_{ab}$ – value of companies A and B combined

$V_a$ – value of company A

$V_b$ – value of company B

The synergy effect is registered if the $VI > 0$.

Now, let's take a closer look at definitions of mergers and acquisitions. Acquisition can be defined as „a corporate action in which a company buys most, if not all, of the target (seller) company's ownership stakes in order to gain the control of the target firm.

Acquisitions are often made as part of a company's growth strategy whereby it is more beneficial to take over an existing firm's operations and niche compared to expanding on its own. Acquisitions are often paid in cash, the acquiring company's stock or a combination of both. “ [1]

The main difference between merger and acquisition lies in the way of joining a company. As far as in acquisition one company takes over another and clearly establishes itself as the new owner, by mergers the process is slightly distinct.

„A merger happens when two firms agree to go forward as a single new company rather than remain separately owned and operated. This kind of action is more precisely referred to as a "merger of equals". The firms are often of about the same size. “ [2]

[1] http://www.investopedia.com/terms/a/acquisition.asp
[2] http://en.wikipedia.org/wiki/Mergers_and_acquisitions

In fact, „mergers of equals" are quite rare. Usually one company will buy another and, as part of the deal's terms, allows the acquired firm to proclaim that the action is a merger of equals, even if it is technically an acquisition.

Generally, the distinction between merger and acquisition doesn't matter very much. After all, as a result, all the companies are operating now under the same roof. The joint of the companies is always any financial, strategic or operating objective for involved companies.

Even though the M&A are getting still more and more popular, the process of joining two (or more) companies is quite complex. Every M&A starts with initiating phase of buyer or seller, continuing through deep due diligence and structuring the deal. The most important part follows consequently. That's phase of valuation and pricing the seller's company and way of financing of acquisition. However, also after closing a deal, M&A require a lot of attention. In particular in phase of transition there may occur still some problems. But this is not the goal of this thesis.

## 3.1. Different types of M&A

### Conglomerate merger

This type of M&A occurs when the two merging companies belong to two different industrial sectors. E.g. producer of microchips buys software provider.

### Vertical merger

A vertical merger joins companies at different levels of production chain. E.g. bakery buys flourmill which has supplied him so far. The objective of this kind of M&A is usually cost saving and speeding up the work flow.

### Horizontal merger

Horizontal merger takes place when two merging companies manufacture similar goods and belong to the same industry. Usually they have also some common customers and suppliers. This type of M&A may cause economies of scale. Companies can also cover a bigger market this way and get competitive advantage. Because of that, these types of M&A are usually under the control of anti-trust office.

### Congeneric merger

Congeneric merger is very similar to the aforementioned horizontal merger. The merging companies are also from the same industry, but they don't have any common supplier, customer or buyer.

### Other types of mergers

- Reverse merger – an acquisition of a public company by private entity
- Dilutive merger - an acquisition that will decrease the acquiring company's earnings per share EPS [3]
- Accretive merger - an acquisition that will increase the acquiring company's EPS [4]

### Acquisition and its kinds

In general, we can divide acquisitions in friendly and hostile. Friedly acquisitions rise after cooperation of involved companies. On the other hand, hostile acquisitions are usually executed the way the company to be bought has no information about it.

We can divide acquisitions also from another point of view. In one case, the buying company may buy all the shares of the smaller company. The other option is buying the assets of the smaller companies.

## 3.2. Synergy effect

Let's repeat the one simple (in)equation valid in world of M&A. 1+1=3. That's the main reason why companies buy another companies either from their own industry sector or another. They try to get any additional advantage from the merger. Otherwise joining of two (or more) companies wouldn't make any sense. But where they can get this surplus?

### Operating synergy

Operating synergy is often the biggest temptation for entrepreneurs to think about buying or selling another or their own business. Why? This kind of synergy allows companies to increase income, revenue or economic growth.

There are few channels how to gain those significant surpluses:

[3] http://www.investopedia.com/terms/d/dilutiveacquisition.asp
[4] http://www.investopedia.com/terms/a/accretiveacquisition.asp

- Economies of scale – joint of companies can lead to higher cost-efficiency and profitability
- Greater pricing power – reducing the market competition and increasing market share could lead to a higher margins and operating income
- Combination of different functional strenghts – combination of firms where one has e.g. a strong marketing skills and another one good product line
- Higher grow in new or existing markets – buying a company operating in emerging market by a company with a worldwide goodwill can lead to a higher demand

After all we can count into operating synergies all the activities of the companies connected with increasing of operating income (increase in export/import, effectivity of sale, reducing of costs of services...).

## Financial synergy

Financial synergy usually yields higher cash flows and/or lower cost of capital. This includes:

- Increasing of debt capacity – higher equity, more stable and predictable cash flows can allow to borrow the money at lower interest rates and higher volumes
- Tax benefits – the company with a possitive EBIT (earnings before interest and tax) acquiring a company with a pre-tax loss may use its operating losses to reduce its own tax burden

## Other synergies

There are plenty of other synergies starting from management of companies (e.g. replacing of ineffective management) going trough R&D (sharing of R&D expenses and experiences) and ending with work force and work process. Most of them are closely connected to abovementioned financial or operating synergies.

Another factor influencing the type and amount of synergy is the industry sector. There are other synergies expected by combining companies form IT sector than in beverage for example (R&D vs. market).

# 4. Valuation

Definitely, the valuation is one of the most important and complex parts when buying or selling a company. And so it's also an inseparable step when acquiring any firm in the M&A process. Let's take a closer look at a valuation framework.

## 4.1. Steps of Valuation process

The valuation itself consists of two main parts.

The analytical part, where the financial model of a company has to be developed is divided into next two parts. In the first one, we focus on historical performance of the company. This includes mainly adjustment of financial statements (as there are several accounting standards are used worldwide), preparing them for the purposes of the valuation and calculating main liquidity and leverage ratios. Second part is focused on forecasting of existing financial indicators to the future.

The next phase is predominantly computational. But firstly we need to choose the most appropriate method of valuation. In our case we'll choose DCF method as the main one. Consequently, all the necessary parameters have to be calculated (FCF, discount rates…). Generally, there are used at least two methods in order to compare the outcomes and their plausibility.

### Developing the Financial model

a. Analyzing historical performance
    i. Reorganizing the accounting statements to gain greater analytical insights and to calculate financial indicators
    ii. Project cash flows
    iii. Analyzing credit health and liquidity
b. Forecasting future performance
    i. Identification of future value drivers
    ii. Forecasting Profit & Loss statement, Balance sheet and mainly Cash flow statement

## Valuation procedure

a. Selecting the main method and auxiliary method to confirm plausibility of valuation
b. Calculating Free Cash Flow
c. Determination of Discount and Growth rate
d. Calculating Weighted Average Cost of Capital (WACC) Model
    iii. Estimate Cost of Equity
    iv. Estimate Cost of Debt
    v. Determination of market debt to equity ratio
e. Calculating Discounted Free Cash Flows (DFCF)
f. Estimating Value Discounts & Premiums (Illiquidity discount and control premium)
g. Determination of the company value

## 4.2. Selecting the appropriate methodology

The key criterion in selecting a methodology is that it should be appropriate in light of the nature, facts and circumstances of the investment and its materiality in the context of the total investment portfolio. We'll look at this from buyer's side perspective.

In assessing whether a methodology is appropriate, the valuation should be biased towards those methodologies that drawn heavily on market-based measures of risk and return. The value estimates based entirely on observable market data will be of greater reliability than those based on assumptions.

Methods utilizing discounted cash flows and industry benchmarks should be rarely used in isolation of the marked-based measures and then only with extreme caution. These methodologies may be useful as a cross-check of values estimated using the market-based methodologies.

In spite of those facts, we'll focus here right on the DCF method, where the strongest mathematical and statistical approach is used. So, for us now, the market-based measures will serve as the cross-check only.

## Valuation Approaches

- **Income approach** - income based valuation methods determine business worth based on the business earning power. (Discounted cash flow)
- **Market approach** - market based valuation methods focus on estimating business value by examining the business sale transaction data available from the actual market place. It compares the value of similar business and transaction (Method of multiples)
- **Asset-based (cost) approach** – asset-based valuation methods are based on the premise that the value of a business can be best determined by adding the value of all assets of company and subtracting the liabilities, leaving a net asset valuation. (Net asset value or liquidation value). Another sub-approach use estimation of all costs needed to build similar firm with equal products, market share and operation margins. (Reproduction costs).

## Income approach

Income based valuation methods determine business worth based on the business earning power, where this power usually represents just the power to create cash (cash flow). While there are quite a few acceptable methods under the rubric of the income approach, most of these methods fall into these two categories: direct capitalization and discounted cash. The latter one can be divided into two approaches.

- Discounted cash flow of Investment (usually used in private equity)
- Discounted cash flow of Underlying Business

For purposes of valuing firms in M&A process, we will work with DFC of Underlying business only.

## Discounted Cash Flow of Underlying Business

This methodology involves deriving the value of a business by calculating the present value of expected future cash flows.

The Discounted Cash Flows (DCF) technique is flexible in the sense that it can be applied to any stream of cash flows (or earnings). This flexibility enables the methodology to be applied in situations where other methodologies may be incapable of addressing

(businesses going through a period of great change, such as a rescue refinancing, strategic repositioning, loss making or in start-up phase)

The disadvantages of the DCF methodology centre on its requirement for detailed cash flow forecasts and the need to estimate the Terminal value and an appropriate risk-adjusted discount rate. All of these inputs require substantial subjective judgments to be made, and the derived present value amount is often sensitive to small changes in these inputs.

## 4.3. Discounted cash flow

We will use the non-constant growth valuation model. This two stage model allows varying cash flow growth rates over finite time from year to year (terminal year is n) and then assuming that cash flow growth is constant from the end of finite time frame forward.

*Equation 1.2:* $$EV = \sum_{t=1}^{n} \frac{FCF_t}{(1+WACC)^t} + CV$$

*Equation 1.3:* $$CV = \frac{FCF_{n+1}}{WACC-g} \times \frac{1}{(1+WACC)^n}$$

Where:

*EV* – enterprise value

*FCF* – free cash flow

*CV* – continuing value

*WACC* – weighted average cost of capital

*n* – number of years in transitional phase (after this phase, the constant growth of *g* is expected)

*g* – growth in perpetuity

Plausible range for g (growth in perpetuity)

The long-term growth in firm cash flows should not be expected to grow significantly faster than the long-term growth potential of Czech economy. If this was assumed, it would imply that the firm would represent an increasing share of the total economy over time, and at some point in the future the firm would be equal in size to the total economy. Therefore the value of g should not be higher than 4 – 5 % in nominal terms.

### Calculating Free Cash Flows

There are few approaches how to calculate FCF. One of the most common is the model, where the free cash flow is equal to the after-tax operating earnings of the company, plus non-cash charges as depreciation and amortization, less investments in operating working capital (change of WC), property, plant and equipment, and other assets (Capital expenditures). It does not incorporate any financing-related cash flows such as interest expense or dividends.

***Free Cash Flow** = Operating Cash Flow + Cash Flow from investment - Tax Shield*

This measure of financial performance expresses the net amount of cash that is generated for all capital providers; consisting of operating revenues and expenses, taxes, tax shields, changes in net working capital and investments.

***Operating Cash Flow*** = EBITDA – cash relevant portion of income tax + Changes in Working Capital + Financial Income (excl. FX gains) – Financial Expenses + Profit/loss form extraordinary operations

***Cash flow from investment*** = Capex

Capex = calculated as difference between book value of (tangible fixed assets + intangible fixed assets + financial fixed assets) in year N – their book value in year N-1

***Tax shield*** - A tax shield is the reduction in income taxes that results from taking an allowable deduction from taxable income. For example, because interest on debt is a tax-deductible expense, taking on debt creates a tax shield. Since a tax shield is a way to save cash flows, it increases the value of the business, and it is an important aspect of business valuation.

It is calculated as: Interest expenses x Tax rate

## 4.4. Cost of Capital

For consistency with the cash flow definition, the discount rate applied to the free cash flow should reflect the opportunity cost to all the capital providers weighted by their relative contribution to the company's total capital. This is called the weighted average cost of capital (WACC). The opportunity cost to a class of investors equals the rate of return the investors could expect to earn on other investments of equivalent risk. The cost to the company equals the investors' costs less any tax benefits.

**WACC - Weighted Average Cost of Capital**

WACC is calculated by multiplying the cost of each capital component by its proportional market weight:

*Equation 1.4:* $$WACC = \frac{E}{V}C_e + \frac{D}{V}C_d(1-T)$$

Where:

E - market value of the firm's equity

D - market value of the firm's debt

V = E + D

$C_e$ - cost of equity

$C_d$ - cost of debt

T - corporate tax rate

## Steps involved in developing discount rate, or WACC

- ***Market D/E ratio*** - Developing market value weights for the capital structure.
- ***Cost of debt*** - Estimating the opportunity cost of non-equity financing.
- **Cost of equity** - Estimating the opportunity cost of equity financing.

## Book value vs. market value

As the formula above demonstrates, to calculate the *WACC*, it is necessary to estimate the market values of all equity and debt components in the valued company. The main reason is that book values usually don't reflect the real market values. As for market value of equity, this should not be a problem concerning publicly traded companies, where this value is usually available ("Market value of equity is calculated by multiplying the company's current stock price by its number of outstanding shares. ")[5]. However, if it's concerning privately held companies, there a problem pops-up. This value is quite difficult to estimate or even calculate, because is not publicly available. This requirement leads to the following iterative procedure for estimating WACC:

## Calculating WACC by iteration

1. Estimate the market value of all debt such as the *seller's note* and bank loan.

[5] http://www.investopedia.com/terms/m/market-value-of-equity.asp

2. Project future business free cash flow (FCF), e.g. for 3-10 years.
3. Estimate the average annual growth rate in the *FCF*.
4. Use the *WACC* formula and the book value of business equity to calculate the initial estimate of *WACC*.
5. Estimate the market value of equity using the *WACC* initial estimate, first year *FCF* projection and the average *FCF* growth rate from above.
6. Re-calculate the *WACC* using the new equity value estimate while keeping the debt values constant.
7. Iteratively adjust the initial *WACC* input until it approximates the calculated *WACC* result.

We will use the constant growth capitalization model to estimate the market value of business equity when calculating the *WACC*:

*Equation 1.5:* $$E_m = \frac{FCF_1}{WACC - c} - debt$$

Where $E_m$ is the market value of business equity, $FCF_1$ is the *free cash flow* projection in the first year following your business valuation, *WACC* is the discount rate you are estimating with this iterative procedure (weighted average cost of capital), and $c$ is the average annual growth rate in the projected business *net cash flow*.

## 4.5. Cost of Equity

Cost of Equity is equal to its expected return. It is the minimum rate of return that a firm must offer to shareholders to compensate for waiting for their returns, and for bearing risk. The cost of equity reflects the opportunity cost of investment for individual shareholders. It will vary from company to company because of the differences in the business risk and financial or gearing risk of different companies.

We will use additive CAPM formula to estimated cost of equity:

*Equation 1.6:* $$CoE = R_f + \beta \times ERP + RiskA + RiskB$$

Where:

$CoE$ = Cost of Equity

$\beta$ = beta

$R_f$ = Risk free rate

*RiskA* = Firm specific risk

*RiskB* = Small size premium

*EPR* = Equity risk premium

## Risk free rate

The risk free rate chosen in computing the premium has to be consistent with the risk-free rate used to compute expected returns.

- For the most part, in corporate finance and valuation, the risk-free rate will be a long term default-free (government) bond rate and not a treasury bill rate. Thus, the risk premium used should be the premium earned by stocks over treasury bonds.
- The risk free rate used to come up with expected returns should be measured consistently with the cash flows are measured. Thus, if cash flows are estimated in nominal EUR terms, the risk free rate should be the EUR Treasury bonds rate.

## Beta coefficient

Beta is a measure of systematic risk. In CAPM it describes how the expected return of a stock or portfolio is correlated to the return of the financial market as a whole. An asset with a beta of 0 means that its price is not at all correlated with the market; that asset is independent. A positive beta means that the asset generally follows the market. A negative beta shows that the asset inversely follows the market; the asset generally decreases in value if the market goes up. Beta of value 1 means, that the stock or portfolio is in perfect correlation with the market.

Correlations are evident between companies within the same industry, or even within the same asset class (such as equities). This correlated risk, measured by Beta, creates almost all of the risk in a diversified portfolio.

Beta measures the part of the asset's statistical variance that cannot be mitigated by the diversification provided by the portfolio of many risky assets, because it is correlated with the return of the other assets that are in the portfolio.

## Steps in determining Beta coefficient

Firstly, we should find industry unlevered beta as median of sample of publicly traded companies in a single appropriate branch of economy. This can be quite difficult as we don't have an access to official charged databases like Ibbotson.

Consequently an adjustment of beta for capital structure is needed. In corporate finance, Hamada's Equation is used to separate the financial risk of a levered firm from its business risk. The equation combines the Modigliani-Miller theorem with the Capital Asset Pricing Model. It is used to determine the levered beta.

Hamada's Equation[6] relates the beta of a levered firm to that of its unlevered counterpart. It has proved useful in several areas of finance, including capital structuring, portfolio management and risk management, to name just a few.

The equation is:

*Equation 1.7:* $\beta_L = \beta_U[1 + (1 - T)\varphi]$[7]

Where:

$\beta_L$=leveraged beta,

$\beta_U$= unleveraged beta,

$T$= the corporate tax rate,

$\varphi$= the leverage, **defined as the market ratio of debt to equity of the firm**.

The importance of Hamada's Equation is that it separates the risk of the business, reflected here by the beta of an unlevered firm, $\beta_U$, from that of its levered counterpart, $\beta_L$, which contains the financial risk of leverage. Apart from the effect of the tax rate, the discrepancy between the two betas can be attributed solely to how the business is financed.

Certain academic studies showed that historic beta is not a best estimate for prospective beta and in the long run beta converges to 1.0 as a company matures and stabilizes. Then Betas are adjusted by Bloomberg formula.

*Equation 1.8:* $\beta = ⅓ + ⅔ \times \beta.$

This pushes betas towards 1, particularly in matured firms.

[6] http://www.investopedia.com/terms/h/hamadaequation.asp

[7] Mergers and Acquisition, The McGraw-Hill Executive MBA Series, J. Fred Weston, Samuel C. Weaver, 2001 (Bibliography no. 2)

## Equity risk premium

Equity risk premium is the excess return that an individual stock or the overall stock market provides over a risk-free rate. This excess return compensates investors for taking on the relatively higher risk of the equity market. Idea of calculating equity risk premium we use is fully based on prof. Damodaran approach:

$$\textit{Equity Risk Premium} = \textit{Base Premium for Mature Equity Market} + \textit{Country Premium}$$

- *Mature market base equity premium* – The US equity market is a mature market, and that there are sufficient historical data in the United States to make a reasonable estimate of the risk premium. Based on Ibbotson's database of historical equity premiums, we use the geometric average premium earned by stocks over treasury bonds of 4.53% between 1928 and 2002[8]. We chose the long time period to reduce standard error, the Treasury bond to be consistent with our choice of a risk-free rate and geometric averages to reflect our desire for a risk premium that we can use for longer term expected returns. No other adjustments were made in sense of reflecting prospective yields.

- *Country risk premium* - Country risk refers to the likelihood that changes in the business environment adversely affect operating profits or the value of assets in a specific country. We use as base for estimation of country risk premium long-term country rating granted by Moody's. Then estimate the default spread for that rating (based upon traded country bonds) over a default free government bond rate. This becomes a measure of the country risk premium for Czech Republic. By rating A1 the country risk premium in the year 2009 is estimated as **1,05%.**

## Small size premium

Small size companies usually bear higher risks than bigger companies and therefore in compensation for higher risks, small company investors require additional return. Increased risk relating to size of a company is for valuation purposes usually accounted for by a parameter "premia for small market capitalization", which is add-on to the CAPM formula – RiskA. In case of a small firm (sales less than 700 000 € = 18 534 600

[8] http://www.performancetrading.it/Documents/AdMeasuring/AdM_Estimating.htm

CZK with the exchange rate 26,478 CZK/EUR from 5th June 2009) then we should add a small firm premium, which is estimated to be around 2 % (based on US observations).

Firm specific premium

In the standard finance theory, the equity cost of capital does not reflect firm specific risk, because it is assumed that the risk unique to firm can be diversified away. Thus, if the investor does not have to bear the risk, then the financial markets will not reward the investor for taking it. In estimating the costs of capital for a private firm, it is generally assumed that the owners cannot diversify away from unique risk that the firm represents, and thus anybody desiring to purchase the firm would incorporate a premium to reflect this fact.

## 4.6. Cost of Debt

We determine Cost of Debt as follows:

- For newly issued debt at par, the Cost of Debt is simply determined as the coupon rate. As for bank debt it is particular kind of prime rate plus margin.
- Estimating the Cost of Debt becomes more difficult, when we need to calculate the current cost of previously issued debt. In this case we should use Altman's Z score model[9].

Steps in determining the cost of private's firm debt using Altman's model:

- Estimating the firm's Z score using Altman's model
- Converting the Z score to a debt rating
- Determining the Cost of debt for a given maturity plus the expected yield spread of equivalent debt relative to the rate on the Treasury security
- Adding an additional risk premium to reflect firm size

The Z score model for private firm:

*Equation 1.9:*

$$Z = 0{,}717 \times X_1 + 0{,}847 \times X_2 + 3{,}107 \times X_3 + 0{,}42 \times X_4 + 0{,}998 \times X_5$$

[9] Principles of private firm valuation

Where:

*Equation 1.10:* $$X_1 = \frac{Current\_assets - Current\_Liabilities}{Total\_assets}$$

*Equation 1.11:* $$X_2 = \frac{\text{Re}tained\_earnings}{Total\_assets}$$

*Equation 1.12* : $$X_3 = \frac{Earnings\_before\_inerest\_and\_taxes}{Total\_assets}$$

*Equation 1.13:* $$X_4 = \frac{Book\_value\_of\_equity}{Total\_liabilities}$$

*Equation 1.14:* $$X_5 = \frac{Sales}{Total\_assets}$$

Finally, the Cost of Debt should be calculated as follows:

*Equation 1.15:* $$CoD_i = Rate\_of\_appropriate\_Treasury\_note + \frac{Basic\_points\_of\_Altman's\_model}{100}$$

where:

CoDi = Ineffective Cost of Debt

Basic points of Altman's model are gained from Altman's table attached in Appendix. The maturity of appropriate Treasury note should be determined as the weighted average maturity of firm's debt (in %). We should be aware of the fact that this percentage represents the rate that would be charged based solely on an analysis of its credit risk. The effective rate is likely to be larger.

Effective Cost of Debt:

*Equation 1.16:* $$Cod = CoD_i + Size\ risk\ premium$$

According to SBA (Small business Administration), the size premium for small companies (where less than 1 000 000 € is refinanced) might be somewhere between 2,75 and 4,75%.

## 4.7. Market Approach - Earnings Multiple

This methodology involves the comparison of an earnings multiple of comparable companies to the earnings of the business being valued in order to derive a value for the business. This methodology is likely to be appropriate for an established business with an identifiable stream of continuing earnings that can be considered to be maintainable. It may be applicable to companies with negative earnings, if the losses are considered to be temporary and one can identify a level of "normalized" maintainable earnings. Very important note is that this approach is quite useful in countries with developed stock markets with high volume of M&A, where the data about comparable companies and M&A are quite easy to acquire.

It has to be said, that this approach won't be used in our consequent valuation, due to the scope of this thesis and lack of data.

### Appropriate Multiple

A number of earnings multiples are commonly used, including price/earnings (P/E), Enterprise Value/earnings before interest and tax (EV/EBIT) and depreciation and amortization (EV/EBITDA). The particular multiple used should be appropriate for the business being valued.

In general, because of the key role of financial structuring, multiples should be used to derive an Enterprise Value for the Underlying Business. Therefore, where a P/E multiple is used, it should generally be applied to a taxed EBIT figure (after deducting finance costs relating to working capital or to assets acquired or leased using asset finance) rather than to actual after-tax profits, since the latter figure will generally have been significantly reduced by finance costs.

By definition, earnings multiples have as their numerator a value and as their denominator an earnings figure. The denominator can be the earnings figure for any specified period of time and multiples are often defined as "historical", "current" or

"forecast" to indicate the earnings used. It is important that the multiple used correlates to the period and concept of earnings of the company being valued.

We would usually derive a multiple by reference to market-based multiples, reflected in the market valuations of quoted companies or the price at which companies have changed ownership. This market-based approach presumes that the comparing companies are correctly valued by the market.

Whilst there is an argument that the market capitalization of a quoted company reflects not the value of the company but merely the price at which "small parcels" of shares are exchanged, the presumption is that market based multiples do correctly reflect the value of the company as a whole. Where market-based multiples are used, the aim is to identify companies that are similar, in terms of risk attributes and earnings growth prospects, to the company being valued. This is more likely to be the case where the companies are similar in terms of business activities, markets served, size, geography and applicable tax rate.

In using P/E multiples, we should note that the P/E ratios of comparable companies will be affected by the level of financial gearing and applicable tax rate of those companies. In using EV/EBITDA multiples, we should note that such multiples, by definition, remove the impact on value of depreciation of fixed assets and amortization of goodwill and other intangible assets. If such multiples are used without sufficient care, we may fail to recognize that business decisions to spend heavily on fixed assets or to grow by acquisition rather than organically do have real costs associated with them which should be reflected in the value attributed to the business in question.

It is important that the earnings multiple of each comparator is adjusted for points of difference between the comparator and the company being valued. These points of difference should be considered and assessed by reference to the two key variables of risk and earnings growth prospects which underpin the earnings multiple. In assessing the risk profile of the company being valued, we should recognize that risk arises from a range of aspects, including the nature of the company's operations, the markets in which it operates and its competitive position in those markets, the quality of its management and employees and its capital. For example, the value of the company may be reduced if it:

- is smaller and less diverse than the comparator(s) and, therefore, less able generally to withstand adverse economic conditions;
- is reliant on a small number of key employees;
- is dependent on one product or one customer;
- has high gearing[10]; or
- for any other reason has poor quality earnings.

Recent transactions involving the sale of similar companies are sometimes used as a frame of reference in seeking to derive a reasonable multiple. It is sometimes argued, since such transactions involve the transfer of whole companies whereas quoted multiples relate to the price for "small parcels" of shares, that they provide a more relevant source of multiples. However, their appropriateness in this respect is often undermined by the following:

- The lack of forward-looking financial data and other information to allow points of difference to be identified and adjusted for;
- The generally lower reliability and transparency of reported earnings figures of private companies; and
- The lack of reliable pricing information for the transaction itself.

It is a matter of judgment for us as to whether, in deriving a reasonable multiple, we refer to a single comparator company or a number of companies or the earnings multiple of a quoted stock market sector or sub-sector. It may be acceptable, in particular circumstances, for us to conclude that the use of quoted sector or sub-sector multiples or an average of multiples from a "basket" of comparator companies may be used without adjusting for points of difference between the comparator(s) and the company being valued.

## Maintainable Earnings

In applying a multiple to maintainable earnings, it is important that we are satisfied that the earnings figure can be relied upon. Whilst this might tend to favor the use of audited historical figures rather than unaudited or forecast figures, it should be recognized that

[10] Financial gearing refers to the relationship between a company's debt and the equity it has from its shareholders. Expressed as a percentage, you can easily calculate the financial gearing if you have those two figures because it is obtained by dividing the debt by the shareholders' equity.

value is by definition a forward-looking concept, and quoted markets more often think of value in terms of “current” and “forecast” multiples, rather than “historical” ones.

In addition, there is the argument that the valuation should, in a dynamic environment, reflect the most recent available information. There is therefore a trade-off between the reliability and relevance of the earnings figures available. On balance, whilst it remains a matter of judgment, we should be predisposed towards using historical (though not necessarily audited) earnings figures or, if we believe them to be reliable, forecast earnings figures for the current year. Whichever period’s earnings are used, we should satisfy ourselves that they represent a reasonable estimate of maintainable earnings, which implies the need to adjust for exceptional or non-recurring items, the impact of discontinued activities and acquisitions and forecast downturns in profits.

# 5. Valuation of a real company

Now, let's take a look at more practical issues. We will try to apply the above-mentioned process described in Chapter 4.1: Steps in valuation process. Due to the scope of this thesis, we will focus on some parts more and on some parts less or even we will drop them. The whole process of valuation will be applied on acquisition of companies Best a.s. and Beta Olomouc a.s., where company Best a.s. bought Beta Olomouc a.s.

## 5.1. Description of involved companies

### Best a.s.

The company Best a.s. (Inc.) is the biggest manufacturer of concrete structural elements for rural and garden architecture in Czech republic. The company was established in 1990, immediately after the fall of communism and nowadays services the major part of the market in its particular industrial sector. The company also exports to neighbouring countries like Germany, Austria Poland and Slovakia. We have to notice, that except other estates, company owns three gravel-sand quarries which are quite important considering the focus of firm's business. The market share of the company in Czech Republic is over 35% at stand-alone basis.

The company Best a.s. focuses particularly on the manufacture of different types of pavements, curbs, palisades, stairs, fences, terraces walls and other complements of garden architecture.

The company owns total assets in the amount about 2,2 billion CZK. Consolidated revenues in the year 2010 was 1,3 billion CZK. Best a.s. employs approximately 500 own employees and other 500 persons permanently work for the company in the service.

The company runs the business with positive profit, which is always reinvested back to firm, from the beginning. From the establishment of the business, the company paid off the tax in total amount of more than 3 billions CZK.

The founder of the company, 100% owner and CEO is Mr. Tomas Brezina. He is considered a very smart and intuitive businessman. He founded his own industry in Czech Republic, and is also a president of Union of concreters in this country. He was elected as a

Businessman of the year 2007 and represented Czech Republic on a world final of this competition in Monte Carlo.

### Beta Olomouc a.s.

The company Beta Olomouc a.s was established 30.4.1992 in Olomouc in Czech Republic. It is also an important producer of complements in garden and rural architecture. With manufacture of pavements, elements of garden architecture and sewer lines and pipes is its business focus very similar to business of company Best a.s. We cannot gain the information about market share of the company, but for our purposes it's not key information.

The company Best a.s. became 22.9.2008 a 50% owner of the company Beta Olomouc a.s. with the perspective of 100% acquisition of Beta in the future. In September 2009 the company got an approval from Czech anti-trust office for the acquisition of Beta Olomouc and consequently 7.10.2009 became its the 100% owner. As a consequence, in December 2009, the company Beta Olomouc a.s. definitely vanished and was renamed to Best-Beta a.s.

## 5.2. Description of acquisition of Best a.s. and Beta Olomouc a.s.

Both companies were founded in a range of two years. The focus of their business was very similar from the beginning. The main difference was the region they operate. The company Best operated mainly in a west and central region of Czech Republic, while Beta Olomouc operated in the east part of Czech Republic and Morava. We can integrate them both somewhere between the industry of building products and distributors, as the companies manufacture and also sale the products.

The next big difference between the companies was the development of their revenues and profit. As we can see in Graph 1, 2 and 3, Beta Olomouc reached higher revenues, gross profit and net profit in the year 1995. But as we can see, in next years, the company Best started to achieve much better results and in the year 1997 was its financial results compared to results of Beta Olomouc better in all levels.

Let's make a simple hypothesis. Suppose that Beta accumulate all the earnings – net profit. From the available data, we can estimate, that the value of accumulated earning in period of years 1995 -2007 would be about 927 517 ths. CZK. According to the last survey[11], the average Enterprise value/sales (in our case, we can consider revenues as sales) in industries: building materials, retail building supply and homebuilding, is 0,9x.. That means, that approximate value of the company Beta according its revenues is around 500 - 530 ths. CZK. That results to the outcome, that if the company Best didn't pay off big dividends from the earnings, it should be able to acquire the company Beta without borrowing additional money.

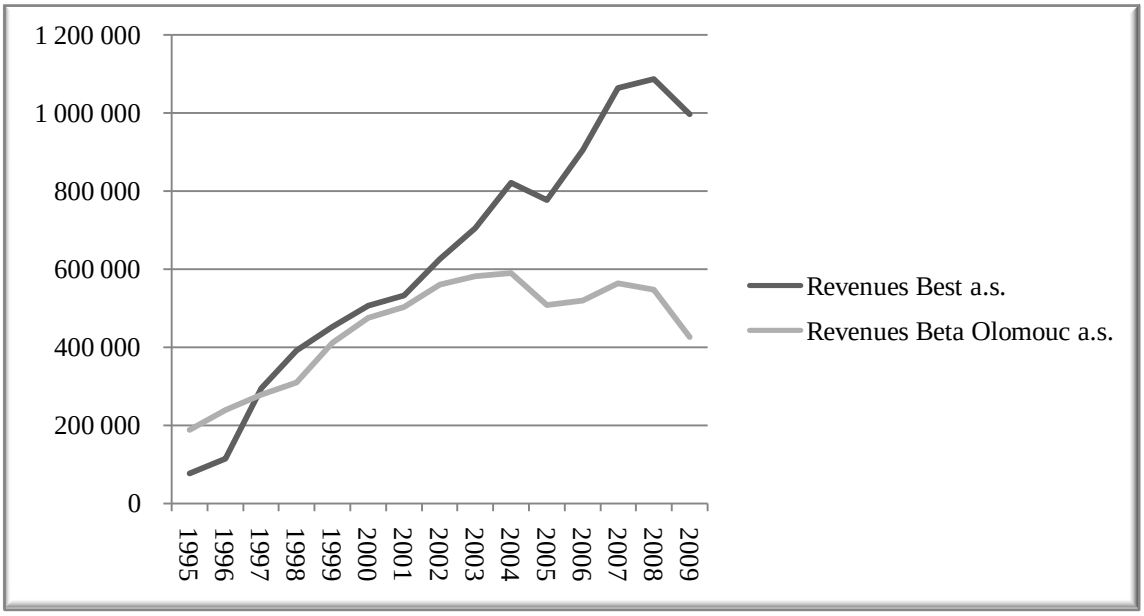
We have to take into account, the aforementioned "calculation" is very rough and can't be taken very seriously. It was done only to find out, if particular acquisition makes any sense and could be done, even though we know how it is in reality.

Our hypothesis was confirmed in the year 2008, when Best a.s. bought 50% share in Beta Olomouc. The acquisition was completed in the year 2009, when Best a.s. became 100% owner of Beta Olomouc.

We will focus on valuation of company Beta Olomouc. All the processes will be taken from the investor side that is from company's Best perspective. That means all the risk from the investment in on the buyer's side. Therefore we have to take into account the liquidity, marketability and rentability of the whole transaction.

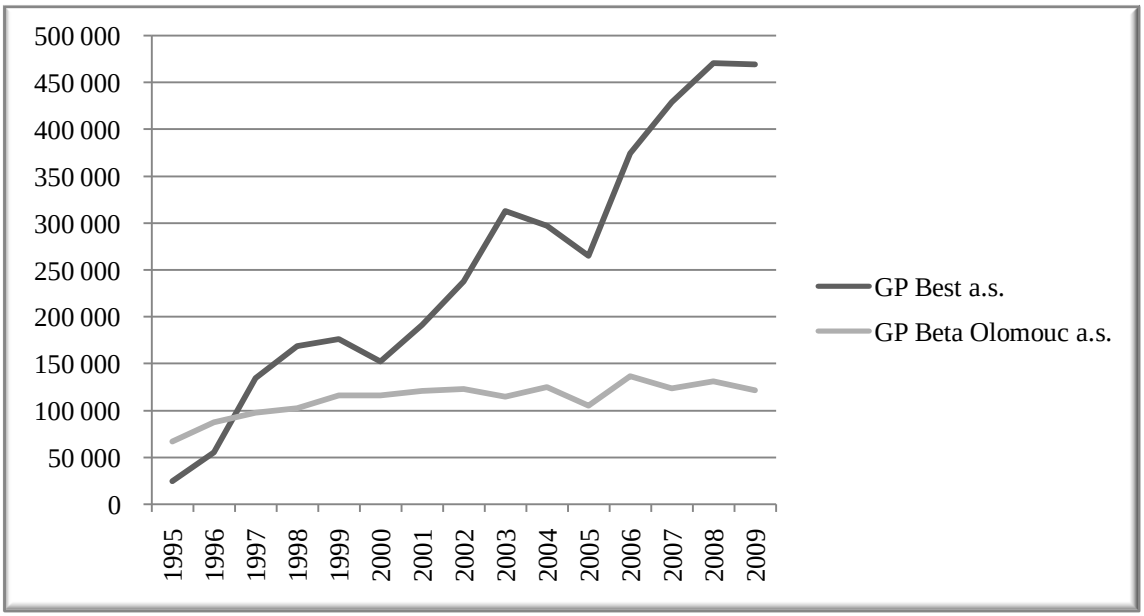
[11] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/psdata.html (Bibliography no.13)

*Graph 5.1 (Revenues in ths. CZK)*



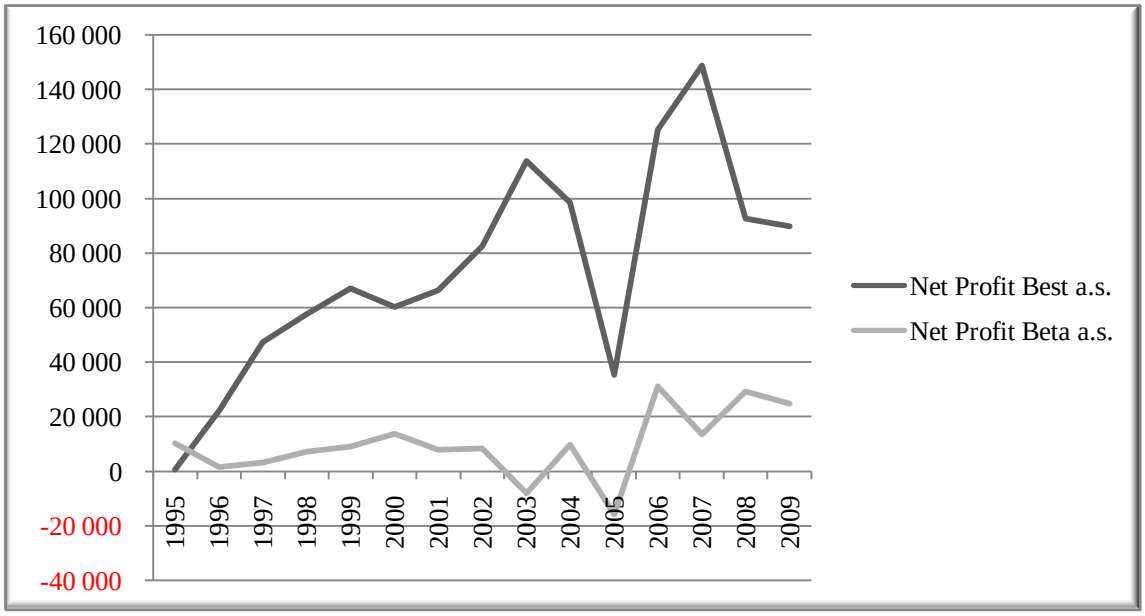

Source: http://www.justice.cz/or/

*Graph 5.2 (Gross profit in ths. CZK)*




Source: http://www.justice.cz/or/

*Graph 5.3 (Net profit in ths. CZK)*




Source: http://www.justice.cz/or/

As we can see from the graphs above, company Best run much better form the year 1997 afterwards. It's hard to find why, as we don't have sufficient information about both companies. We can only guess, if it was caused by better managment, more flavourable business environment or anything else.

We can notice also another fact from the graphs above. There is quite a big corellation in developement of profitability of both companies. This fact is the most obvious from the graph of net income (*Graph 5.3*), where particularly noticable is the drop in the year 2005. When we take a look at a graph of developement on Prague stock exchange (Graph 5.4), there is no such a drop, which probably would be there if also quoted companies would record any dramatic fall in revenues. Due to the lack of information, we can only deduce that this deterioration of profitability was concerning only the sector of the industry, where both companies are operating. But it is not the aim of this thesis to find out all facts. Let us go to take a closer look at the more importatnt parts of analysis.

To conclude, in our case, it's the horizontal acquisition of two private companies from Czech Republic. Both companies have a solid business track record and run business in manufacture and sale of similar products. So the synergy effect for Best a.s. from this deal should be in particular gained from broading customer base, acquiring competition and higher cost efficiency.

*Graph 5.4 (PX - Prague stock exchange index)*[12]


## 5.3. Adjusting financial statements for the purposes of valuation

One of the most important part of the whole valuation process is understanding the financial statemnents of particular company. That means understanding particular items in balance sheet and income statement and ability to calculate at least basic cash flow entering DCF model.

We will work with financials in period of years 2005 – 2008 mostly. All the statements are done in accordance with IAS (International Accounting Standards). All information about the companies are gathered from internet sources. Original financial statements are available on website of Czech business register[13]. All accounting items used for purposes of valuation are in netto value. That means, they are adjusted by adjusting entry. Netto value of accounting items should give us more realistic image of the financial situation in the companies.

Due to the lack of information, we will not be able to adjust or explain all of the issues. We will focus on items entering valuation model. Many of the adjustments of inputs will be quite subjective and another valuer would have different opinion on their value. Our

[12] http://www.pse.cz/Statistika/Burzovni-Indexy/Detail.aspx?bi=1
[13] http://www.justice.cz/or/

purpose will be to proove if we can get any realistic output with the use of iterative method in DCF model.

In the next phase we will focus on basic adjusting of finacial statements. We will not present all the calcuations, only the most important and most complex.

## Balance sheet

The financial statement balance sheet is divided into two equal categories. Assets and liablities. Those two should be balanced in the end of every accounting period.

Assets are in general divided into two main subcategories. Long-term asstes and short-term assets. Both of them are influencing free cash flow quite considerably. LT assets are have the biggest impact on Cash flow from investing activities. ST assets infuence Changes in working capital.

To get the value of Changes in working capital is quite complex. Calculation of this is shown in *Table 5.1*. The cash out operation will be marked as (-) and cash in as (+).

*Table 5.1*

| | |
|---|---|
| +/- | Changes in LT and ST Trade Receivables |
| +/- | Changes in Inventory |
| +/- | Changes in Other ST Receivables |
| +/- | Changes in ST Accounts Payable |
| +/- | Changes in ST Advances from Customers |
| +/- | Changes in Other ST Liabilities |
| +/- | Re-/Devaluation of Current Assets |
| = | **Total Changes in Working Capital** |

Year to year rise of trade receivables means for the company cash out (-), because company provided any services or goods to its customer (-), but haven't got paid for this service (+). The same is valid cocerning inventory and other reveivables.

Situation by account payable is vice-versa. The year to year rise of A/P means for the company cash in (+). Company as a customer already received goods or service (+), but haven't paid the particular amount of money to the provider yet (-).

So, year to year rise of items shown in the table 1. above the dotted line means cash out and contrarivise. Year to year rise of items below the dotted line means cash in and vice-versa.

And here we got to liabilities. They are also divided into two subcategories. Equity and liabilities to other subjects. As we already mentioned above, liabilities have also quite a significant impact on cash flow via changes in working capital.

The liability side of balance sheet shows us, how the assets are financed. We can find out here the capitalization (indebtedness) of the company or analyze the liquidity.

In analyzing assets, we should take closer look in particular at receivables. It's good to have a structure of trade receivables where we can see their maturity or days in past due (after maturity). Consequently we should judge which are really short-term, which are long-term and which even will not be paid (e.g. receivables against customers with financial problems, in default or in trial). As a next step we could also find out if other assets (buildings, inventory…) are priced correctly and their account values are not higher than their real market values.

On the liabilities side of balance sheet we can find out the capitalization of the firm. We should analyze if the company is able to pay all its obligations. We could calculate the current portion of long term debt (CPLTD). This includes all the ST loans and leasing, portion of LT debt that has to be paid in one year period and expected interest expenses during the year. Consequently the DSCR ratio can be calculated as follows:

*Equation 2.1:* $$DSCR = \frac{(EBITDA - Tax)}{CPLTD}$$

DSCR (debt service coverage ratio) can show us, whether the company is able to pay all its obligation in period of one year. To do so, DSCR has to be greater than 1,0x. Tax should be deducted from EBITDA (Earnings before interest, tax, depreciation and amortization), as this item is a cash out to be paid with higher priority compared to other debt.

## Income statement

The financial statement with crucial impact on cash flow. This statement determines the value of EBITDA, depreciation and amortization, interest expense or other items entering DCF model.

There is hardly anything to adjust in items like amortization and depreciation, taxes or interest expenses. Much more important is the correct determination of value of EBITDA. The best demonstration, why EBITDA is so crucial is shown in *Table 5.2* below:

*Table 5.2*

| |
|---|
| + Total Revenues |
| - Total Cost of materials and services |
| = Gross Profit |
| - Personal Expenses |
| = EBITDA (Earnings before interest, tax, depreciation and amortization) |
| - Depreciation and Amortization |
| = EBIT (Earnings before interest and taxes) |
| +/- Financial Income/Loss |
| = Ordinary Income |
| +/- Profit/Loss from Extraordinary activities |
| = Pre-tax Profit/Loss |
| +/- Tax |
| = Net Profit/Loss |

We can see what counts and what doesn't count into EBITDA. The very essential thing is the accurate determination of item Profit/Loss from Extraordinary activities. There should be included all the revenues not directly connected with the business of the company or revenues that company doesn't produce on regular basis (e.g. sale of real estate of a manufacturer of milk is his extraordinary income, even though we cannot forget that this operation influences his cash flow).

## 5.4. Calculating and projecting Cash Flows

For the purposes of our valuation, we need to calculate free cash flow (FCF). The general calculation is shown in the Chapter 4.3. (Calculating free cash flows). We will calculate FCF as follows:

*Table 5.3*

| | |
|---|---|
| | **EBITDA** |
| - | Cash Relevant Portion of Income Taxes |
| +/- | Changes in ST and LT Provisions |
| +/- | Changes in Trade Receivables |
| +/- | Changes in Inventory |
| +/- | Changes in Other ST Receivables |
| +/- | Changes in ST Accounts Payable |
| +/- | Changes in ST Advances from Customers |
| +/- | Changes in Other ST Liabilities |
| +/- | Offset Re-/Devaluation of Current Assets |
| = | **Total Changes in Working Capital** |
| = | **Operating Cash Flow** |
| + | Financial Income excl. FX Gains |
| - | Financial Expenses |
| +/- | Extraordinary Result |
| = | **Net Operating Cash Flow** |
| +/- | Total CAPEX (Cash flow from Investment) |
| + | Tax Shield |
| = | **Free Cash Flow** |

Free Cash Flows of company Beta Olomouc a.s. in years 2004 – 2008:

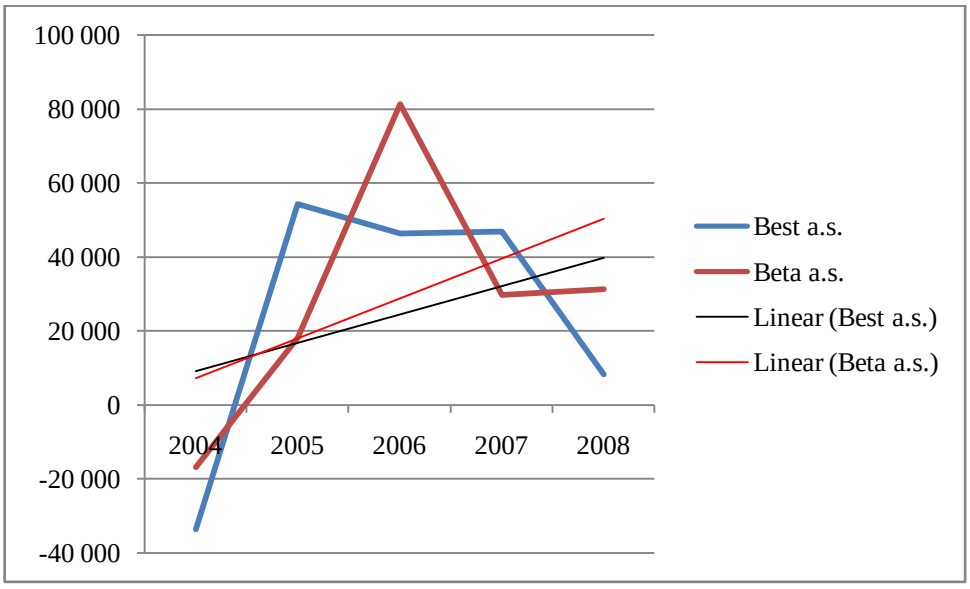
*Table 5.4*

| Beta a.s<br>In ths.<br>CZK | 2004 | 2005 | 2006 | 2007 | 2008 | Avg. |
|---|---|---|---|---|---|---|
| NOCF | 11 779 | 27 161 | 86 103 | 41 880 | 24 960 | |
| Capex | -29 569 | -9 988 | -5 680 | -12 854 | 5 986 | |
| Tax Shield | 1 023 | 1 028 | 869 | 695 | 410 | |
| **FCF** | **- 16 767** | **18 201** | **81 292** | **29 721** | **31 356** | **28 761** |

Calculated according to data on: http://www.justice.cz/or/

The corporate income tax in Czech Republic is 19%.

*Graph 5.5*




As the calculation of FCF is quite complex and its values are very volatile, as we can see from the Graph 5.5, it is very difficult to forecast any future cash flows. Therefore, as projected future cash flows, we will use the arithmetical average of CF during the years 2004 – 2008, with grow rate 5% in growth period and consequent growth rate on the level of growth of Czech economy. And here comes another problem. The whole economy in Czech Republic and also in whole world was in the year 2009 in the deep recession due to world financial crisis. Therefore, we decided to set the grow rate as an average growth of Czech economy[14] between the years 1999 – 2009 at 3,2%.

*Table 5.5*

| FCF | | | | | | | Projected period | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2004 | 2005 | 2006 | 2007 | 2008 | avg. | 2009 | 2010 | 2011 | 2012 | 2013 |
| Beta a.s. | -16 767 | 18 201 | 81 292 | 29 721 | 31 356 | 28 761 | 30198 | 31708 | 33293 | 34958 | 36077 |
| Growth | | 208,55% | 346,63% | -63,44% | 5,50% | 124,31% | 5% | 5% | 5% | 5% | 3,2% |

## 5.5. Analyzing of credit health and liquidity

This part will be focused on analyzing liquidity, indebtedness and efficiency of target company, Beta Olomouc in our case. We will use different ratios, which are easy to understand, interpret and calculate.

[14] http://www.czso.cz/csu/2010edicniplan.nsf/p/1409-10

## Liquidity ratios

Common liquidity analysis leans on three main indicators. Current ratio, quick ratio and working capital.

Current ratio is most used of them. It is the ratio of current assets to current liabilities. It shows us how the company is able to cover its short-term liabilities by short – term assets. For satisfactory output, the ratio should be greater than 1,0x. However, it seems to be quite easy to understand, the interpretation can be quite misleading.

*Equation 2.2:* $$Current\ ratio = \frac{Current\ assets}{Current\ liabilities}$$

First misleading fact is, that current ratio works with current assets. These include short-term receivables, inventory, cash and bank deposits. Even though all of them dispose with good liquidity, it is not always easy to transform them into the cash. There is no doubt about liquidity of cash and most of the bank deposits. Cash from those sources should be available almost immediately. But how about inventory and receivables? We have to be more careful in judging their liquidity. Although they are the most liquid assets after cash and bank deposits, convert them into the cash is not always easy. Then a detailed look at their structure is needed. But it is not our intention to go into details.

Second misleading fact is the turnover of receivables and inventory on asset side and payables on liability side. E.g. if the companies receivables and inventory period is 180 days and payables period is 60 days, then even current ratio 2,5x doesn't mean enough liquidity.

Both facts mean that we have to take a look at this ratio from broader perspective. And this is valid also by other ratios.

Quick ratio is very similar to current ratio. The main difference is in his numerator, where current assets don't include their less liquid component – inventory.

*Equation 2.3:* $$Quick\ ratio = \frac{Current\ assets - inventory}{Current\ liabilities}$$

The last indicator, working capital, is basically the same as Current ratio. It deducts volume of current liabilities from current assets, so we get the amount of free sources available after all ST liabilities are paid off.

In general, liquidity ratios with the help of efficiency ratios can show us the operational efficiency of particular company. How much company's money are tied up in inventory or receivables and cannot be used to pay off its obligations.

## Efficiency ratios

There are lots ratios measuring the efficiency of the company from different angles. We will try to define shortly only the most important and used of them.

**Inventory turnover**

*Equation 2.4:* $$Inventory\ turnover = \frac{Total\ cost\ of\ sales}{Average\ Inventory}$$

**Receivables turnover period**

*Equation 2.5:* $$Receivables\ turnover = \frac{365}{\frac{Sales}{Average\ Receivables}}$$

**Payables turnover period**

*Equation 2.6:* $$Payables\ turover = \frac{365}{\frac{Sales}{Average\ Payables}}$$

**Total Assets turnover**

*Equation 2.7:* $$Total\ Assets\ turnover = \frac{Sales}{Average\ Total\ Assets}$$

All the aforementioned efficiency ratios show us how the company manages particular part of its assets/liabilities. There is no right value determined for those ratios. Their value varies from industry to industry.

Analysis of efficiency and liquidity of company Beta Olomouc

*Table 5.6*

| **Liquidity ratios** | y2005 | y2006 | y2007 | y2008 |
|---|---|---|---|---|
| Current Ratio | **1,0 x** | **0,9 x** | **0,9 x** | **1,2 x** |
| Quick Ratio | **0,5 x** | **0,5 x** | **0,4 x** | **0,5 x** |

*Table 5.7*

| **Efficiency ratios** | y2005 | y2006 | y2007 | y2008 |
|---|---|---|---|---|
| Asset Turnover | **1,3 x** | **1,5 x** | **1,7 x** | **1,7 x** |
| Receivables Period | **21 days** | **28 days** | **35 days** | **30 days** |
| Inventory Period | **55 days** | **52 days** | **44 days** | **51 days** |
| Payables Period | **24 days** | **34 days** | **44 days** | **45 days** |

When we look at the liquidity ratios separately, the situation doesn't seem to be very sound. Current ratio is in each year around 1,0x, what indicates possible problems in case company would pay all current obligations. But in connection with efficiency ratios, the situation slightly improves. We can see, that receivables period is shorter than payables period in all years. That means, company collects money from its customers quicker than it pays to its suppliers. While company holds this situation, it shouldn't get to the problems.

Next positive fact when looking at efficiency and liquidity ratios is their stability in observed period. There are no big rises and falls, what indicates that company probably runs its business smoothly.

## Leverage ratios

A company's leverage relates to how much debt it has on its balance sheet, and it is another measure of financial health. Generally, the more debt a company has, the more revenues has to produce to satisfy its lenders. To find the answer to question, if the company produces or owns enough sources to cover all ist debt, how much EBITDA does it have to produce or how long should it take to pay off all the debt, will help us next ratios.

**Debt/Equity ratio**

The most common and used ratio. Serves as a indicator of company's leverage. It indicates what proportion of equity and debt the company is using to finance its assets.

*Equation 2.8:* $$Debt/Equity\ ratio = \frac{Total\ liabilities}{Equity}$$

**Equity ratio**

Quite simmilar to Debt/Equity ratio. Indicates what portion of total assets is financed by own capital. Equity ratio shows the proportion of assets financed by shareholder and owners of the company.

*Equation 2.9:* $$Equity\ ratio = \frac{Equity}{Total\ assets}$$

**Interest cover ratio**

If a company borrows money in the form of debt, it most likely incurs interest charges on it. The interest coverage ratio measures a company's ability to meet its interest obligations with income earned from the firm's primary source of business. Higher interest coverage ratios are usually better, and interest coverage close to or less than one means the company has some serious difficulty paying its interest.[15]

*Equation 2.10:* $$Interest\ coverage = \frac{EBIT}{Interest\ expenses}$$

**Debt amortization period (DAP)**

Not very used ratio, that shows us how many years does it take to the company to pay off all its debt from the cash currently producing.

*Equation 2.11:* $$DAP = \frac{Total\ Interest\ bearing\ Debt - Cash\ \&\ Equivalents}{Ordinary\ income + Depreciation\ \&\ Amortization}$$

**Net Senior debt/EBITDA ratio**

Again very simmilar ratio. In this case EBITDA should serve as a proxy to operating cas flow. It is important because it should show us how company's operating cash flow might be able to service its debt load.

*Equation 2.12:* $$Net\ Senior\ debt/EBITDA = \frac{Total\ Interest\ bearing\ Debt}{EBITDA}$$

*Table 5.8*

| **Leverage ratios** | y2005 | y2006 | y2007 | y2008 |
|---|---|---|---|---|
| Debt/Equity ratio | **1,50x** | **0,97x** | **0,93x** | **0,53x** |
| Equity Ratio | **40,0%** | **50,8%** | **51,7%** | **65,2%** |
| Interest coverage | **3,2 x** | **13,9 x** | **11,7 x** | **18,8 x** |
| Net Sen. Debt / EBITDA | **8,71 x** | **1,28 x** | **1,50 x** | **0,61 x** |
| DAP | **11,6y** | **1,4y** | **1,7y** | **0,7y** |

[15] http://news.morningstar.com/classroom2/course.asp?docId=145093&page=5&CN=COM

*Table 5.9*

| **Equity** | | y2005 | | y2006 | | y2007 | | y2008 |
|---|---|---|---|---|---|---|---|---|
| Basic capital | 88 790 | 26,4% | 88 790 | 29,3% | 88 790 | 29,5% | 88 790 | 30,8% |
| Taxed Reserves | 13 260 | 3,9% | 13 260 | 4,4% | 14 820 | 4,9% | 14 820 | 5,1% |
| Accumu. Ret. Earnings | 48 301 | 14,3% | 20 921 | 6,9% | 38 473 | 12,8% | 54 865 | 19,1% |
| Current Year's Result | -15 737 | -4,7% | 31 198 | 10,3% | 13 671 | 4,5% | 29 210 | 10,1% |
| **Equity** | **134 614** | **40,0%** | **154 169** | **50,8%** | **155 754** | **51,7%** | **187 685** | **65,2%** |
| | | | | | | | | |
| ST Bank Loans | 82 000 | 24,3% | 46 000 | 15,2% | 44 587 | 14,8% | 40 549 | 14,1% |
| LT Bank Loans | 79 000 | 23,5% | 36 000 | 11,9% | 19 000 | 6,3% | 0 | 0,0% |
| **Total Bank Debt** | **161 000** | **47,8%** | **82 000** | **27,1%** | **63 587** | **21,1%** | **40 549** | **14,1%** |
| | | | | | | | | |
| Other debt | 41 150 | 12,2% | 67 226 | 22,1% | 81 883 | 27,2% | 59 726 | 20,7% |

We can see, the company seems to be quite healthy from the financial perspective. The ratios Debt/Equity and Equity ratio indicates the company goes well. The fact the ratio of equity to debt is still rising means either reduction of firm's debt or increase in basic capital by shareholders or accumulating retained earnings from prior periods.

As we can see from the table above, the reason of rising Equity is mainly the accumulation of retained earnings. The company produces enough sources to pay off the debts, as their amount is considerably decreasing. All these facts are quite favourable from the investor's perspective.

## 5.5. Weighted average cost of capital calculation

In this part, we will try to calculate WACC. Due to the lots of subjective estimations of inputs, we could also say, the value of WACC will be rather estimated than calculated. Anyway, we will try to set the value of inputs as objective as possible.

### Cost of equity

First, we try to set the risk free rate ($R_f$). The benchmark for us will be the Czech government bond rate with 10 year maturity. As the transaction was realized in the year 2009, we will set $R_f$ parameter at any value of bond rate during this year. Most of the year the rate was moving between 4,5% and 5%, so we can set the value at 4,80%[16].

[16] http://www.finance.cz/zpravy/finance/277874/ (Bibliography no. 17)

Now, let's set the value of parameter Beta ($\beta$). There are few ways how to calculate this parameter. The most precise is probably calculation of leveraged $\beta$ from unlevered $\beta$. This can be used when we know the market ratio of debt and equity. We drop this method, as we don't know the market value of equity (we only approximate this value using iterative method). The next possibility is determining the $\beta$ value as an average $\beta$ of companies in the industry company belongs to. We already mentioned above, that the companies don't have an accurate industry belonging. We have integrated them somewhere between the building products industry and distributors. We know the Betas of these industries from the internet source[17].

Building Products $\beta$ = 0,64

Distributors $\beta$ = 0,75

Regarding the business of the companies is focused mainly to manufacture, we put the weight of these Betas to 70% to 30% = Building Products $\beta$ to Distributors $\beta$. The final$\beta_f$ is then 0,67.

As we mentioned, Betas converge in long-term horizon to 1. This is caused by the fact, the companies tend to stabilize after some time and adapt to the market. Therefore we adjust our $\beta_f$ by Bloomberg formula *(Equation 1.8)* to get the terminal $\beta_t$.

$$\beta_t = 0{,}79$$

As the Equity risk premium, we set the value of mature market base equity premium plus $country\ risk\ premium$.

$$Mature\ market\ base\ equity\ premium = 4{,}53\%$$

$$Country\ risk\ premium = 1{,}05\%$$

The final $ERP_f$ is then 5,58%.

Small size premium (*RiskA*) will not be applied in our case, whereas the company is not considered as small size firm. The sales of the company during the whole observed period

[17] http://api.ning.com/files/2*x2qDRMz3mco0q1KJ5SGrJcNUOvi3GKgrPD-uJHQLhDyPc2aYTGJ4GppSE8abvKdjD-eYHwxbb357bDufurhIhp*85UB-QK/emergmktscostofcapdata.xls

were much higher than maximal sales of companies being considered small yet. Therefore *RiskA = 0%* .

Last of the parameters entering into the CAPM formula of calculating Cost of equity is Firm specific risk (*RiskB*). Setting this parameter is the least accurate, as we don't know the company's business very well. The whole calculation is done in Excel solver and will not be performed here. Regarding the scope and focus of thesis we do not consider it necessary. The final value of *RiskB* is 1,7%.

Now let's go to final calculation of *CoE*. According to *Equation 1.6*

$$CoE = 0{,}048 + 0{,}79 \times 0{,}0558 + 0{,}0 + 0{,}017$$

$$CoE = 0{,}109$$

All the inputs result to the **final Cost of Equity 10,9%.** This percentage may seem a little low maybe. It is caused by low $\beta_t$ parameter in particular, as the industry where company operates is less volatile than market and therefore the expectations on return of investors are also lower.

## Cost of Debt

Steps of calculation of Altman's Z score are described in the first part of this work. Here we try to focus on determining of appropriate treasury note rate and size risk premium of the company Beta.

We get the score 2,889 from the Altman score matrix from *Equations 1.9 – 1.15.*

The rate of treasury note used to determine effective *CoD*, should be used from the rate of treasury notes in 2009 with maturity equals to average maturity of firm's debt. Regarding the fact there is no list of bank loans, leasing and other debt available, we can only estimate the maturity of the debt very roughly. When we look at firm's financials in last years, we can see descent trend of debt in company. That could indicate that also the average maturity of this debt is declining. Another fact playing a key role is, that most of the debt is allocated as a short-term debt (up to one year). Due to the fact, that data about yield of short-term treasury notes in Czech republic in year 2009 are not available, we will set this value at 4,0%. This value is derived from the treasury notes rate with 10 years maturity in 2009.

As the total bank debt of the company is higher than 1 mio. EUR, the small size premium should be applied as very low or even shouldn't be applied. In our case due to the rule of carefulness, we will apply the small size premium of 0,5%.

All these inputs will yield the **value of *CoD* = 17,8%.**

## 5.6. Calculation of WACC and market value of equity using iterative method

Now, when we have all necessary inputs entering WACC formula and Constant growth capitalization formula, we can finally calculate the WACC and consequently the terminal value of company.

We adjusted *Equations 1.4* and *1.5* for the purposes of iteration.

*Equation 2.13:* $$f(WACC)_n = \frac{E_{n-1}}{V} C_e + \frac{D}{V} C_d (1 - T)$$

*Equation 2.14:* $$E_n = \frac{NCF_1}{f(WACC)_n - c} - D$$

Where:

$E_n$ - market value of the firm's equity in *n-th* iteration

D - market value of the firm's debt

V = E + D

$C_e$ - cost of equity

$C_d$ - cost of debt

T - corporate tax rate

n = 1,2,3...

We iterated until this condition was met: $|f(WACC)_n - f(WACC)_{n+1}| < \varepsilon$, where $\varepsilon <$ 0,01. The whole iteration was done in Excel solver.

The walue of WACC was then 11,23%. Market value of Equity increased after iteration to 366,1 mio. CZK. This significnat rise of equity compared to book value of equity (187 mio. CZK) is quite reasonable. As the company's performance in last years was quite good, it has reflected on its value.

This theory is confirmed in terminal calculation of final enterprise value of the company. Using the DCF formula (1.2) and value of projected FCF (*Table 5.5.)* we calculated the growht period value and contiuing value of the company. Here are the values:

Growth period value = 99,8 mio. EUR

Continuing period value =462,9 mio. CZK

Terminal EV value =562,7 mio. CZK

In calculating the terminal EV value no marketability discound was involved, as the company was bought for the purpose of acquisition and not sale in next years.

# 6. Conclusion and discussion

We have determined the final value of the target company Beta a.s. on 562,7 mio. CZK. Even thought our hypothesis put at the beggining of the second part was not confirmed, and the value of the company doesn't lie in the range of 500 – 530 mio. CZK, the difference in these values is not very big. The bias over 30 mio. EUR is not as big as it seems. Considering the available data, economy environment, valuation method and and complexicity of this topic, we could consider these two values as quite similar and their difference as acceptable.

We have to confess, that determining of many parameters entering the valuation model is based on personal judgement and experiences. The whole model is very sensitive on only a little change in parameters. Due to the lack of information and data, few parameters were estimated very roughly and could cause no small differences in final value. In spite of these facts we tried to set the values of variables in the model as precise as possible. If we have more sources of information, the final outcome could have been more punctual and relieble.

All in all, our work prooved possible employment of iterative method in calculating WACC and market value of equity by private entities. The exactness and reliability of valuation model should rise along with quality and quantity of data and information and experiences and skills of valuer.

# 7. Resumé

V súčasnom svete rastúcej konkurencie a globalizácie sa tále viac a viac stretávame s pojmami ako akvizícia a fúzia (M&A). Na to aby spoločnosti zvýšili svoj trhový podiel, konkurencieschopnsť či kvalitu výrobkov musia byť efektívne, promptné a taktiež dostatočné veľké a silné. Jedným z nástrojov na dosiahnutie týchto požadovaných efektov je aj ich zlučovanie a koncentrácia do väčších, silnejších celkov. Tie môžu vznikať dobrovoľne, zlúčením, vzájomnou dohodou o spolupráci alebo nedobrovoľne, ich odkúpením či prevzatím.

Poznáme viacero druhov M&A:

- Konglomerátná fúzia
- Vertikálna fúzia
- Horizontálna fúzia
- „Obrátená“ fúzia
- Nepriateľská akvizícia
- Priateľská akvizícia

Dané M&A vznikajú vždy za účelom zisku či pridanej hodnoty pre jednu, druhú či obe zainteresované strany. Daný pozitívny efekt vznikajúci počas resp. po M&A nazývame synergický efekt. Synergické efekty vieme rozdeliť taktiež na viacero kategórií:

- Prevádzková synergia (zahŕňa napr. úspory z rozsahu, cenová politika, rozšírenie trhu...)
- Finančná synergia (redukcia nákladov, väčšie možnosti dlhového financovania...)
- Iné synergie (delenie nákladov na výskum, zdielanie know-how...)

Najdôležitejšou časťou pri zlučovaní či kúpe spoločností je ich ohodnotenie. Táto časť je zvyčajne aj najzložetejšia. Ak sa spoločnosť rozhodne kúpiť inú spoločnosť, potrebuje najprv poznať jej cenu a potenciál. Samotné ocenenie spoločnosti by sme mohli rozdeliť na dve základné časti: analytickú a výpočtovú časť. Ocenenie spoločnosti sa skladá zo základných nasledujúcich krokov:

1. Vypracovanie finančného plánu
    a. Analýza historického vývoja spoločnosti

b. Prispôsobenie finančných výkazov pre potreby valuácie a výpočet finančných ukazovateľov
c. Projekcia budúcich finančných tokov (Cash flow)
d. Analýza finančnej situácie a likvidity spoločnosti
e. Projekcia budúcich finančných výkazov

2. Oceňovanie
    a. Vybranie vhodnej metódy oceňovania
    b. Výpočet Free Cash Flow (FCF)
    c. Určenie diskontných faktorov a miery rastu FCF
    d. Výpočet diskontovaných FCF
    e. Výpočet váženej priemernej ceny kapitálu (WACC)
        1. Výpočeť ceny vlastného kapitálu (CoE)
        2. Výpočet ceny dlhu (CoD)
    f. Určenie ďalších potrebných diskontov a premií
    g. Výpočet hodnoty spoločnosti (EV)

Hlavné kroky vyššieuvedeného postupu budeme v ďalšej časti aplikovať na ocenenie českej súkromnej spoločnosti Beta a.s.. Pomocou iteračnej metódy sa pokúsime čo najpresnejšie určit hodnotu firmy a overiť či je daná iteračná metóda použiteľná pri valuácií súkromných spoločností.

Spoločnosť Beta a.s. sa stala v roku 2009 súčasťou akvizície, keď sa jej 100% vlastníkom stala iná česka spoločnost Best a.s.. Obe spoločnosti podnikali v oblasti výroby betónových doplnkov a dlažieb pre záhradnú architektúru, čiže v danom prípade išlo o horizontálnu akvizíciu, ktorej hlavnými synergiami by pre spoločnosť Best a.s. boli strata konkurencie, rozšírenie trhového podielu a produktového portfólia.

Pred samotnou valuáciou spoločnosti Beta a.s. sme si urobili malý odhad jej hodnoty. Na základe ukazovateľa Cena spoločnosti/ tržby, ktorého hodnota sa pre sektor v ktorom spoločnosť podniká rovná 0,9x a hodnoty tržieb spoločnosti v roku 2008, stanovili približnú cenu Beta a.s. na 500 – 530 mil. CZK.

Pozreli sme sa bližšie na súvahu a výkaz ziskov a strát spoločnosti Beta a.s., z ktorých sme získali potrebné informácie ohľadom finančného zdravia spoločnosti. Pomocou súvahy za roky 2005 – 2008 sme vypočítali zmenu stavu pracovného kapitálu. Z výkazu ziskov a strát sme zistili hodnotu EBITDA, príjmu z finančných aktivít či daňového štítu. Dané

hodnoty nám potom slúžili na výpočet FCF. Vzhľadom na veľkú volatilitu vypočítaneho FCF, sme sa rozhodli predikovať budúci FCF nasledovne. Ako priemer FCF v sledovaných rokov s nasledujúcim rastom uvedeným v tabuľke. Pričom od roku 2013 sme rátali s konštantným rastom 3,2%, ktorý sa rovná priemernému rastu českej ekonomiky v rokoch 1999 až 2009.

| FCF | | | | | | | Predikovaný CF | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rok | 2004 | 2005 | 2006 | 2007 | 2008 | avg. | 2009 | 2010 | 2011 | 2012 | 2013 |
| Beta a.s. | -16 767 | 18 201 | 81 292 | 29 721 | 31 356 | 28 761 | 30198 | 31708 | 33293 | 34958 | 36077 |
| Rast | | 208,55% | 346,63% | -63,44% | 5,50% | 124,31% | 5% | 5% | 5% | 5% | 3,2% |

Následne sme previedli analýzu finančných ukazovateľov ohodnocovanej spoločnosti v perióde rokov 2005 až 2008. Ukazovateľe ako ,

- Current ratio,
- Doba obratu pohľadávok/záväzkov/zásob,
- Pomer dlhu a vlastného imania,
- Pomer celkového dlhu spoločnosti k EBITDA,

a ďalšie, nám ukázali, že spoločnosť je stabilizovaná, s primeranou zadĺženosťou a operačným cykom. Žiadne extrémne hodnoty a výkyvy, ktoré by mohli signalizovať možné problémy neboli nájdené.

V poslednej časti sme presli k samotnému výpočtu EV pomocou DCF. K čo najpresnejšiemu výpočtu sme najpr museli vypočítať nasledujúce hodnoty pomocou ďalších pomocných premenných (v pododrážkach)

- Cena vlastného kapitálu = 10,9%
    - Beta koeficient (upravený pomocou Bloombergovej rovnice) = 0,79
    - Equity risk prémia = 5,58%
    - Small size prémia = 0%
    - Špeciálne riziko spoločnosti = 1,7%
- Cena dlhu = 17,8% (vypočítaná pomocou Altmanovho Z skóre)

Následne pomocou iteračných rovníc *2.13* a *2.14* sme vypočítali WACC a trhovú hodnotu vlastného kapitálu.

WACC = 11,23%

$E_m$ = 366,1 mil. CZK

Napokon sme pomocou všetkých vypočítaných premenných a DCF modelu vyčíslili konečnú hodnotu spoločnosti Beta a.s. na 562,7 mil. CZK. Daná hodnota nám zhruba korešpondovala s hodonotou vypočítanou ako pomer ceny spoločnosti k jej tržbám.

Daný výpočet nám potvrdil možné použitie iteračnej metódy pri oceňovaní súkromných spoločností. Pomocou danej metódy sme dostali prijatelný výsledok. I keď jeho presnosť a spolahlivosť nie je vzhľadom na použité dáta a informácie najväčšia. Mnoho parametrov vstupujúcich do DCF modelu, priamo či nepriamo, bolo odhadnutých veľmi subjektívne. Pri väčšej dostupnosti informácií by mala konečná hodnota firmy pravdepodobne väčšiu presnosť a výpovedaciu hodnotu.

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# Appendix 1: Firm Specific Matrix

| Firm Specific Risk Matrix | | | | |
|---|---|---|---|---|
| Risk Concept | Measurement | Assessment | Factor Weight | Weighted Assessment |
| **Business stability** | How long the company been profitable?<br>1-3 years = High risk: 5<br>4-6 years = Moderate risk: 3<br>More than 6 years = Low risk: 1 | 3 | 10,00% | 0,3 |
| **Business transparency** | Does the firm produce an audited financial statement at least once a year?<br>Yes = Low risk: 1<br>No = High risk: 5 | 1 | 10,00% | 0,1 |
| **Customer concentration** | Does the firm recieve more than 30% of its revenue from less than 5 customers?<br>Yes = Hign risk: 5<br>No = Low risk: 1 | 1 | 25,00% | 0,25 |
| **Supplier reliance** | Can the firm change suppliers without sacrificing product/service quality or increasing costs?<br>Yes = Low risk: 1<br>No = High risk: 5 | 1 | 10,00% | 0,1 |
| **Reliance on key people** | Are there any personnel critical to the success of the business that cannot be replaced in a timely way at the current market wage?<br>Yes = Hign risk: 5<br>No = Low risk: 1 | 1 | 20,00% | 0,2 |
| **Intensity of competition** | What is the intensity of the firm competition?<br>Very intense = High risk: 5<br>Modestly intense = Moderate risk: 3<br>Not very intense = Low risk: 1 | 3 | 25,00% | 0,75 |
| Sum | | | 100,00% | **1,7** |

# Appendix 2: Valuation sheet