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BUSINESS VALUATION BY MEANS OF THE FREE CASH FLOW METHOD

The paper presents one of the methods of business valuation, namely the free cash flow method (FCFM). This method belongs to the income methods group that are based on the company's ability to generate future income (earnings, cash flow, dividends), discounted at the interest rate that takes into account the relevant risk. In practice, it is one of the methods most widely used to estimate the value of the company and make the investment decisions. The article presents such theoretical issues as: types and methods of determining free cash flow, company valuation procedure using free cash flow, methods of forecasting free cash flow and the possibilities and limitations of the method. In the last part of the article, the author estimates the value of a selected company (Pozbud S.A.) quoted on the Warsaw Stock Exchange

Key words: *cash flow, business valuation*

Introduction. In today's economy, the company is not only one of the entities involved in the exchange of goods and services on the market but not infrequently also the object of such exchange. The globalization of financial markets and liberalization of rules on capital movements means that the purchase of a company or a part thereof, e.g. through the acquisition of a particular block of shares, has become a relatively common form of investment. This is best evidenced by the large number of mergers and acquisitions in recent years. Hence, more and more of the present and prospective business owners are faced with the need to estimate the company's value. This information is also of interest to the board of directors, the supervisory board, controlling department, employees, oversight bodies, etc. However, there is no single value of the company – its value differs depending on the adopted standards of value, and above all – on the valuation method. One of the most popular methods, both in pertinent literature and in business practice, is the free cash flow method of valuation. Unfortunately, despite its long-standing popularity, its application continues to pose a number of problems.

The purpose of this paper is to present procedures involved in the valuation of companies by means of the free cash flow method, the difficulties associated with it and to estimate the value of a selected company – Pozbud S.A.

Types and Methods of Determining Free Cash Flow. DCFM (Discounted Cash Flow Methods) methods are some of the most popular methods used in making investment decisions, such as a decision to buy or sell a company. The theoretical foundations of these methods were laid by I. Fischer, who in the book titled "The Theory of Interest" (1930) stated that of all the options, one should chose the option that has the maximum present value calculated at the market rate of discount. This approach was disseminated in the 1950 s when the Net Present Value (NPV) came into wide use in evaluating investment projects [Dudycz T., 2005, p. 37].

According to studies conducted in the USA, the market value of companies listed on US stock exchanges is determined primarily on the basis of cash flows, rather than by other measures of performance, such as net income. The statement "It's all about cash" is not just a slogan, it is a theoretical concept proven by numerous studies [Cornell B., 1999, pp. 92-93]. In addition, cash flow is the best measure to indicate – in cash terms –

effective management by corporate executives of the company's resources and equity. It is a reflection of any decision made by managers on how to finance the company, directions of use of funds and results of operating and investing activities [Gołębiowski G., Szczepankowski P., 2007, p 133]. Another important feature of cash flow is that it determines in money terms the direct financial benefit which the owner will be able to get in the future, without prejudice to the activities carried out by the company, or in simple terms – how much money (cash) can be withdrawn from the project without affecting the continuity of its future operation [Malinowska U., 2001, p. 64].

One of the methods of discounted cash flows (DCFM) is the Free Cash Flow Method (FCFM). Pertinent literature recognises four basic types of cash flows[1]:

1) Free Cash Flow to Firm (FCFF) or Firm Cash Flow (FCF) – money for all the providers of capital viewed from the company's point of view;

2) Free Cash Flow to Equity (FCFE) or Equity Cash Flow (ECF) reflecting cash flows which will be available to owners/shareholders;

3) Free Cash Flow to Capital (FCFC) or Capital Cash Flow (CCF) – cash flows earmarked for all the providers of capital which are equivalent to the cash they can obtain;

4) Adjusted Present Value (APV) – in this approach it is assumed that the total value of an indebted company's equity and debt is equal to the equity of the unindebted company, plus the present value of cash flows arising from the tax shield.

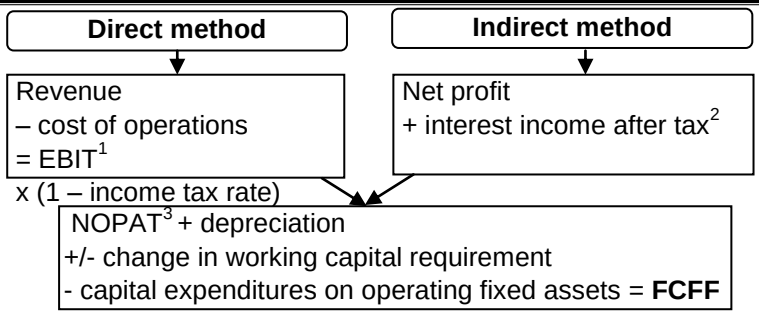
In addition to the above, pertinent literature contains some other types of cash flows. Fernandez identified a total of 10 varieties of cash flows (including the above mentioned), but making the same assumptions and properly using these flows in the valuation process one obtains in effect the same result, i.e. the same value of the company [Fernandez P., 2007, pp. 854-861].

In the valuation of the company by means of the DCFM, use is most often made of only two of the above cash flows, namely free cash flows to firm (FCFF) and free cash flows to equity (FCFE). Free cash flow (FCF) refers to surplus cash generated by the company and owing to the relevant parties financing its activity (owners and creditors or owners alone) [Gołębiowski G., Szczepankowski P., 2007, p. 134].

Free cash flow to firm (FCFF) is the cash actually available for distribution among all investors (both owners and creditors), after the company has undertaken all the necessary investments in fixed assets, new products and working capital in order to maintain its existing business base [Brigham E., Houston J., 2005, p. 82]. Thus, FCFF is the cash flow that the company gains from operations, net of taxes, but before expenses incurred to pay off external sources of capital funding, before covering interest expenses on loans and advances, and distributions to providers of equity (dividends for owners) [Gołębiowski G., Szczepankowski P., 2007, p. 142]. However, FCFF must not be confused with cash flow from operating activities as defined by accounting principles, as it only takes into account the cash flow associated with operations (mainly sales) and expenses (supplies and services, net payroll, social security, etc.) but does not include revenues and expenses associated with the disposal or acquisition of fixed assets as it relates to cash flows from investing activities according to the principles used in accounting [Micherda B., 2005, pp. 251-252].

Free cash flow to equity can be determined by means of a direct or indirect method. Both methods are shown in the following figure 1.

[1] The paper will focus on the first two methods.

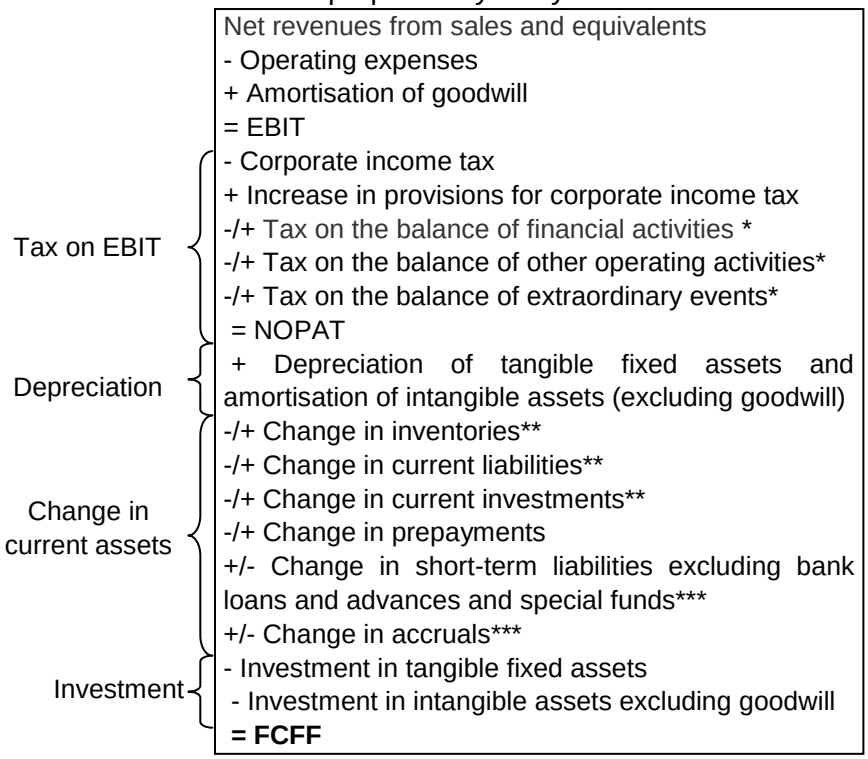


Key:
[1] EBIT – Earnings Before Interest and Taxes;
[2] after-tax interest expense = interest expense x (1 – income tax rate);
[3] NOPAT – Net Operating Profit After Tax.
Source: own study based on: [Nita B., 2007, pp. 68-79].

Fig. 1. *FCFF calculation by means of direct and indirect methods*

The above methods are derived from the basic concept of free cash flows to firm. The schemes rely on general concepts, such as depreciation, working capital, interest expense, etc. whose definitions and components vary from country to country and depend on the prevailing accounting standards in use. In each case therefore the procedure for calculating FCFF must be adapted to the country's legal environment [Estridge J., Lougee B., pp. 60-61, 70].

The figure 2 below presents the calculation of free cash flows to firm on the basis of the Polish financial statements as proposed by Dudycz.

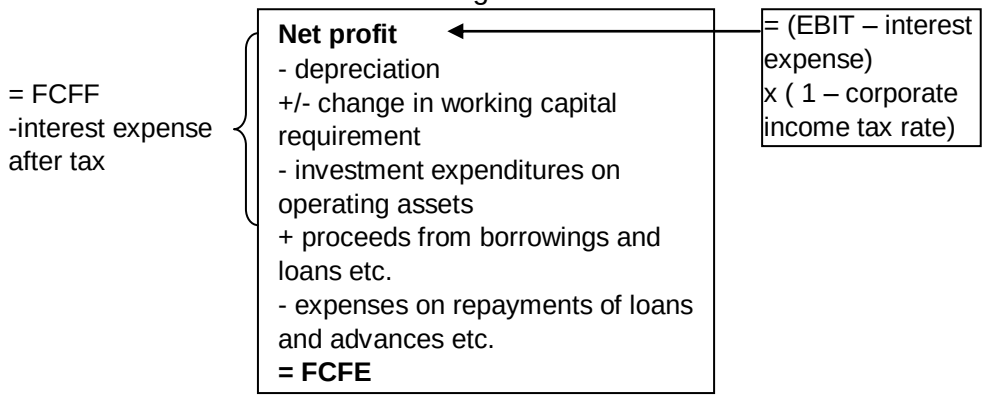


Key:
* Minus, if the balance is positive; plus, if the balance is negative
** Minus, if there is an increase; plus, if there is a decrease
*** Plus, if there is an increase; minus, if there is a decrease
Source: own study based on: Dudycz T., 2005, p. 63.

Fig. 2. *FCFF calculation based on Polish financial statements*

Another important type of cash flow is free cash flow to equity (FCFE). FCFE is the cash flow generated by the company that remains after debt has been paid, i.e. the costs related to the company's debt and the coverage of planned and necessary reinvestment needs. Therefore, it includes current operating income and capital inflows from creditors, as well as expenses related to the financial costs arising from interest on loans and debt securities, income tax, payments of financial obligations by instalments and spendings on investments in capital assets and net working capital serving the needs of achieving planned development and projected growth of the company [Szczepankowski P., 2007, p. 66].

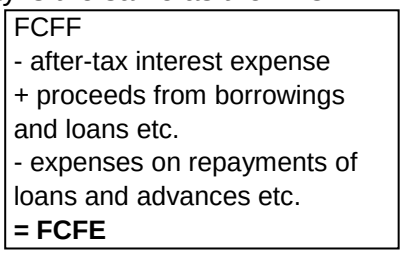
Free cash flow to equity is usually calculated by starting from the net profit. The FCFE calculation method is shown in the figure 3 below.



Source: own study based on: Panfil M., 2009, s. 19; Szablewski A., Tuzimek R., 2004, p. 150.

Fig. 3. *FCFE calculation*

The above figure shows that it is possible to calculate FCFE directly from FCFF. There is no need, therefore, to show a detailed procedure for determining FCFE, including on the basis of the financial statements prepared in accordance with Polish regulations as it suffices to simply adjust FCFF suitably. These adjustments are shown in the figure 4 below. In addition, it can be seen that the FCFF of companies financing operations only through equity is the same as their FCFE.



Source: own study based on pertinent literature.

Fig. 4. *Calculation of FCFE on the basis of FCFF*

Free cash flow to equity is currently the most popular measure of corporate efficiency among investors as it is less prone to various forms of management manipulation than net profit [Estridge J., Lougee B., 2007, p. 70]. Research indicates there is no clear correlation between the net profit and the current share price of listed companies.

FCFE is also of interest to the company's competition, in particular to companies looking forward to gain additional benefits form a takeover. As shown by studies conducted in the U.S., the likelihood of a hostile takeover of the company is directly proportional to the rate of earned and undistributed FCFE to its market value. In this context, it needs to be noted that company managers tend not to accumulate excessive surplus cash to avoid becoming the target of a hostile takeover [Lehn K., Poulsen A., 1989, p. 783].

Business Valuation Procedure by Means of the Free Cash Flow Method (FCFM). Overall, the FCF valuation method involves estimating future free cash flows, and then bringing those cash flows to their present value by means of an appropriate discount rate.

The basic formula for the valuation of companies using free cash flows takes the following form:

$$EV_{FCF} = \sum_{i=1}^{T} \frac{FCF_i}{(1+k)^i} + \frac{RV}{(1+k)^T}, \quad (1)$$

where:

FCF_i – free cash flow,

k – appropriate cost of capital,

RV – residual value during the last accounting year,

i – subsequent accounting moment (year).

An approach to the valuation of the company that relies on free cash flow to firm is referred to as a gross approach as it takes into account the total value of capital (both equity and interest-bearing debt capital) [Maślankowski K., Winiarski R., 2009, p. 17]. Then, the Weighted Average Cost of Capital (WACC) should be used as the discount rate. Therefore, the formula for the valuation of the company by means of FCFF has the following form [Szablewski A., Tuzimek R., 2004, p. 153]:

$$EV_{FCFF} = E + D = \sum_{i=1}^{T} \frac{FCFF_i}{(1+WACC)^i} + \frac{RV}{(1+WACC)^T}, \quad (2)$$

where:

EV_{FCFF} – company's gross value estimated by means of FCFF,

E – equity,

$FCFF_i$ – free cash flow to firm during a given accounting year,

D – debt.

However, most recipients of FCFM valuation are mainly interested in the value of equity (its fundamental, internal value), and therefore to calculate the value for the company's owners, it is necessary to subtract the market value of debt from the estimated value of the company (gross) [Maślankowski K., Winiarski R., 2009, p. 17]. It can be computed as follows:

$$E = EV_{FCFF} - D, \quad (3)$$

From a theoretical point of view, if we use the same assumptions, we should obtain the same value by deploying free cash flow to equity (FCFE), i.e. using the so-called net approach (in practice, this equality is almost never witnessed) in the valuation [Maślankowski K., Winiarsk R., 2009, p. 20]. The resulting value is called the company's net value (without interest-bearing debt), the value of the company to shareholders (FCFE is used) or – and that seems to be the most factually correct – the internal (fundamental) value of equity called Equity Value. The cost of equity (k_e) should then be the discount rate. The Business valuation formula using FCFE is as follows:

$$EV_{FCFE} = E = \sum_{i=1}^{T} \frac{FCFE_i}{(1+k_e)^i} + \frac{RV}{(1+k_e)^T}, \quad (4)$$

where:

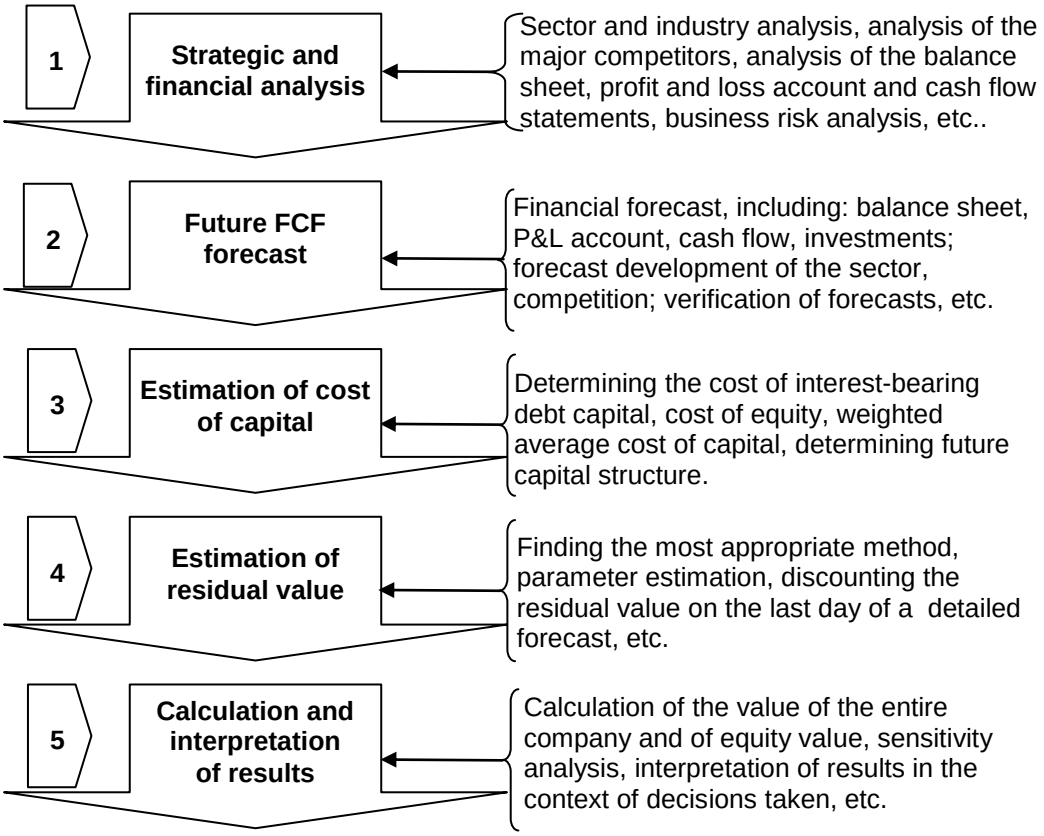
EV_{FCFF} – the net value of the company to shareholders estimated by means of FCFE,

$FCFE_i$ – free cash flow to equity during a given accounting year.

In some studies, authors complete the estimated company value by adding these assets whose disposal (or spending) will not affect future free cash flows. One can list

such examples as cash, the value of marketable securities (held for trading) and the value of other non-operating assets (e.g. minority interests in other companies) [Damodaran A., 2007, pp. 1167-1168].

In order to estimate the value of the company, one should follow the specific steps in the proceedings. Standard FCFM valuation procedure is presented by means of the following figure 5.



Source: own study on the basis of: Copeland T., Koller T., Murrin J., 1997, p. 143; Szablewski A., Tuzimek R., 2004, pp. 154-155.

Fig. 5. *Business valuation procedure by means of free cash flow*

Methods of Forecasting Future Free Cash Flows. After an overall assessment of past and current status of the company utilising strategic and financial analyses, free future cash flows should be predicted for the specific forecast period. These flows, discounted at the time of valuation, along with the discounted residual value will constitute the value of the company (before the appropriate adjustments.)

Pertinent literature contains three methods of future FCF calculation. These are:

1) Method using financial planning relying on the method of percentage of sales;

2) Simplified Damodaran method that uses aggregate reinvestment rate;

3) Growth models: the Gordon constant growth model, two phase model, three phase model.

The most popular method used in financial planning is the percentage of sales model. It is based on the assumption that most of the items in the profit and loss account and balance sheet change in proportion to changes in sales volume. Consequently, the first step involves preparation of sales forecasts, followed by projections of each component of the profit and loss account and the balance sheet as a percentage of

revenues [Sierpińska M., Jachna T., 2007, p. 573]. Due to its nature, this method is also called the re-sale method [Szczepankowski P., 2007, p. 208].

The procedure for creating the projected profit and loss account (P & L) and the balance sheet is as follows [Machała R., 2009, p. 331]:

1) Identification of these P & L account and balance sheet items the size of which depends on the size of sales revenue;

2) Identification of each item's dependence on the level of sales;

3) Forecast of revenues from sales for a certain number of future periods;

4) Calculation of the value of the profit and loss account and balance sheet depending on the level of sales using past dependences;

5) Forecast for P & L and balance sheet items which are not directly dependent on sales;

6) Aggregation of the results in the form of a projected profit and loss account and balance sheet.

With the projected profit and loss account and balance sheet in place, one can proceed to construct cash flow statement. It should be noted, however, that sales growth affects the majority of the company's assets (fixed and current assets, although in practice this interdependence is not necessarily exactly proportional), while on the liabilities and shareholders' equity side this interdependence applies only to selected items (e.g. goods and services payable). As a result, the accuracy of a prediction of a steady growth in revenues will result in a financing deficit on the liabilities and shareholders' equity side, which is defined as Additional Funds Needed (AFN) or External Funds Needed. These are resources that the company will need to raise externally (e.g. revolving credit) during the forecast period to finance the expected increase in revenues [Sierpińska M., Jachna T., 2007, p. 574].

The basic, yet most important, element of the percentage of sales method is therefore forecast sales revenues. Such an approach seems to be natural as sales revenues are derived from the demand for the company's goods or services, which demand is a prerequisite for the company's very existence [Copeland T., Koller T., Murrin J., 1997, p. 199]. Sales revenue bears witness to the existence of the company's economic activity and effectiveness of its management. The main sources of data for forecasting are historical data, industry analysis and fundamental data. In practice, analysts rarely rely on a single source of information and try to find a coherent justification for projections based on different data [Pomykalska B., Pomykalski P., 2007, p. 138].

Forecasting based on historical data involves extrapolation of previous periods data. Trend analysis is based primarily on extracting a systematic component of the time series which is specifically constituted by sales revenue, and a random component. A trend taking the shape of a linear function is considered a to be the primary trend, but in practice few variables are linked with each other in a proportionate manner (although, due to the simplicity of the determination and analysis of linear trends, it is the most commonly used). In the case of some of the data, use may also be made of the following trends: parabolic in the form of a polynomial of the third degree, exponential, power series, log, hyperbolic, etc. More advanced trend models also include various kinds of periodic fluctuations (harmonic, seasonal, etc.). From the statistical point of view, the trend that will have the lowest variability rate (maximum 10 %), the highest coefficient of determination (minimum 90%) and statistically significant main parameters of the model will be the best [Zeliaś A., Pawełek B., Wanat S., 2003, pp. 75-92]. The final choice of the type of regression depends on the analyst (the person conducting the forecast) and

on the way he perceives the current situation of the company. Moreover, from the point of statistics, the more past periods are introduced into the model, the more reliable are the results. However, in the case of revenue forecasting, this can lead to erroneous conclusions and one should only consider a few periods, because the volatility of the environment in which the company operates means one will have to be very careful when interpreting results based on many years of activity [Pomykalska B., Pomykalski P., 2007, p. 143]. It should be borne in mind that in forecasting any financial figures, special importance is played by professionalism and one's own professional experience.

With a final forecast of the profit and loss account, balance sheet and cash flow prepared on their basis, one should calculate free cash flow. One can also only forecast sales and these components (mainly based on projected sales) which form the FCF, but this approach restricts the analysis of the relationship between their components.

A more simplified forecast of free cash flow is proposed by Damodaran in his own model, using only an EBIT forecast, tax rate (t) and the rate of aggregate capital expenditures and depreciation (net capital expenditures) and the change in net working capital, i.e. a reinvestment rate. According to Damodaran the formula for a company's free cash flow has the following form [Damodaran A., 2007, pp. 1147, 1156]:

$$FCFF = EBIT \times (1-t) \times (1-\text{reinvestment rate}), \quad (5)$$

The reinvestment rate is computed as follows:

$$\text{The reinvestment rate} = \frac{\text{capital expenditure on fixed assets - depreciation} + \text{change in net working capital}}{\text{EBIT} \times (1\text{- t})}, \quad (6)$$

The forecast of free cash flows according to the Damodaran methodology should begin with a forecast of future EBIT. In order to predict the operating profit before interest and taxes one should determine the appropriate growth rate according to which it will change in the future (rather increase than decrease). The forecast may rely on one of two rates: the historical EBIT growth rate or the expected EBIT growth rate. The historical EBIT growth rate is calculated on the basis of corporate data, e.g. for the previous five years. This approach is, however, biased by past results and may happen to be of no use for future calculations [Damodaran A., 2007, pp. 1155-1156].

Therefore it is better to use the expected EBIT growth rate, which is a function of two variables: the reinvestment rate and investment quality measured in terms of return on invested capital. The rate is calculated as follows:

$$\text{The expected EBIT growth rate} = \text{reinvestment rate} \times \text{return on capital (ROC)}$$

where:

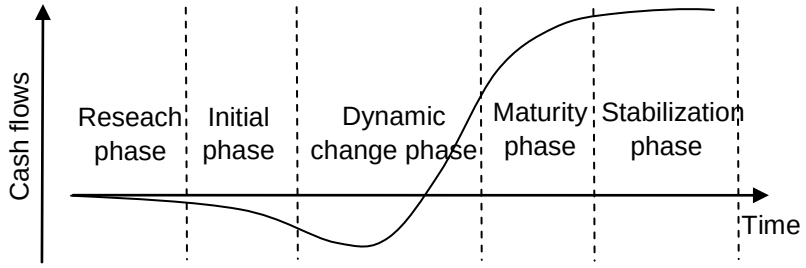
$$\text{The return on capital (ROC)} = \frac{\text{EBIT} \times (1\text{- t})}{\text{invested capital}}, \quad (7)$$

The starting point for forecasting the reinvestment rate is the average annual reinvestment rate in previous years. Of particular importance in the forecast is the company's current stage of development. The need for reinvestment may be greater or smaller depending on the stage. In addition to the individual characteristics of each company one should also consider the average reinvestment rate for the industry.

While forecasting the company's ROC one can rely on the return on existing investments where the invested capital is often calculated at book value. This approach makes sense only when the return on company's existing investment may apply to future investments. This condition may not be met because the book value based on the historical cost method and dependent upon the depreciation method used is not always

a good measure of the existing investment (the investment may be either under- or overvalued). In addition, EBIT is an accounting measure, hence it should be adjusted to reflect the actual cash flows. However, even after adjustments of EBIT and the book value of investments, the forecast ROC may be different from the return on capital which the company expects from new investments. When predicting ROC, the average annual return on the company's capital in previous years and the average ROC for the industry as a whole must also be taken into account, in very much the same manner as in the case of the reinvestment rate [Damodaran A., 2007, pp. 1155-1156].

The last method for calculating future free cash flow involves the so-called phase models. Phase models are based on the theory of distinctive phases of the company's development for which separate cash flows generated by the company are determined (cf. Fig. 6).



Source: Pomykalska B., Pomykalski P., 2007, p. 291.

Fig. 6. *Company's development cycle and cash flows*

From the point of view of the DCF method, and in particular the free cash flow method (FCFM), it is important to distinqyish between the phase of highly dynamic changes in the cash flows, the maturity phase and stabilization phase. In practice, they are used to distinguish between three business valuation models reflecting differences in the dynamics of these changes [Damodaran A., 2007, pp. 1155-1156]:

– Model of constant growth in cash flows, the so-called Gordon's model (stabilization phases);

– Two phase model (maturity and stabilization phases);

– Three phase model (dynamic change, maturity and stabilization phases).

This division does not reflect all the scenarios that company valuer may encounter in practice, but it offers an advantage in that it permits the use of various combinations of the discounted cash flow method, annuity method and perpetuity method.

The constant growth model usually assumes two situations in the infinite future period of the company's operations [Gołębiowski G., Szczepankowski P., 2007, p. 145]:

– Constant level of fee cash flows;

– Constant growth in free cash flows.

In the case of constant free cash flow to firm (FCFF) the value of the company is calculated from the following formula (perpetuity):

$$EV = \frac{FCFF_t}{WACC}, \tag{8}$$

where:

$FCFF_t$ – free cash flow to firm for the previous year; other symbols same as before.

In the FCFF model, the value of the company is calculated by means of the following formula:

$$EV = \frac{FCFF_{t+1}}{WACC - g} = \frac{FCFF_t \times (1+g)}{WACC - g}, \quad (9)$$

where:

$FCFF_{t+1}$ – projected future cash flow to firm;

g – constant increase in FCFF value (in percentage); other symbols same as before.

According to the Gordon's model, the value of the discount rate (weighted average cost of capital – WACC) must exceed the constant growth rate (g). In addition, it is worth noting that this formula incorporates the earlier formula, i.e. the formula of constant FCFF if the growth rate equals zero.

When we assume that the company has reached the maturity phase, which will subsequently be followed by the stabilization phase, a two phase model should be used. In this case, the value of the company is calculated by means of the following formula:

$$EV = FCFF_{t+1} \times \left(\frac{1 - \frac{(1+g)^n}{(1+WACC)^n}}{WACC - g} \right) + \frac{1}{(1+WACC)^n} \times \frac{FCFF_{t+1} \times (1+g)^n \times (1+g_n)}{(WACC - g_n)}, \quad (10)$$

where:

g – growth rate over the next n years of company's operations (duration of the maturity phase);

g_n – growth rate during a time period after n years of company's operations (beginning of the stabilization phase);

$g > g_n$ – other symbols same as before.

If the company is experiencing a period of dynamic changes resulting from its high growth potential or restructuring, we can use the three phase model i.e. a formula which allows splitting valuation into three phases: dynamic changes, maturity and stabilization. In this case, the value of the company is calculated by means of the following formula [Gołębiowski G., Szczepankowski P., 2007, p. 146; Pomykalska B., Pomykalski P., 2007, p. 296]:

$$EV = EV_{DFCFF} + DEV + DRV, \quad (11)$$

where:

EV_{DFCFF} – value of the company produced by the sum of discounted FCFF during the phase of dynamic changes;

DEV – value of the company arising from the sum of discounted FCFF during the maturity phase;

DRV – value of the company arising from discounted FCFF during the stabilization phase (discounted residual value); other symbols same as before.

To recapitulate, the main idea of phase models is to divide the company's future activities into specific phases within which free cash flow is directly predicted, assuming that they change from year to year by the assumed growth rate corresponding to the phase in question. Thus, for the purposes of valuation, the company's future activities can be divided into any number of periods (as many as the analyst deems necessary), assuming a decline in growth rates from period to period. These growth rates can be calculated from historical or fundamental data, analysts' reports or as a consensus rate calculated on the basis on these sources. However, the final choice of the forecasting method of future free cash flows depends on the person valuing the company and it is mainly determined by the purpose of the valuation.

Possibilities and Limitation of the Use of FCFM. The FCF valuation method is based on the expected future free cash flows and discount rates. This approach is therefore the most simple to use when these flows are positive, i.e. when revenues

outweigh expenditure; otherwise, i.e. if revenue were negative, prediction based on it would be rather unreliable. With permanently negative FCF, positive FCF forecasts for the future seem irrational, and the assumption of a negative FCF in the future will mean that the value of the company will be less than zero (i.e. also negative). Another important issue involves the choice of the appropriate discount rate. The main problem in this area involves the correct estimation of the risk factor, which is necessary in order to estimate the cost of equity [Damodaran A., 1996, p. 12]. It can therefore be concluded that two conditions must be met for the FCF method to be used, namely:

1) the free cash flow must be positive,

2) the risk rate (beta) can be reliably estimated.

The FCF method is the most popular valuation method with those involved in professional business valuations i.e. stock market analysts, investment advisors, securities brokers, experts involved in mergers and acquisitions, persons carrying out the privatization of state-owned companies, etc. Based on the results of research conducted in the 1990 s on the Brussels EURONEXT stock exchange, one can say that the FCF method is particularly popular with and thus most commonly used by consultants and analysts conducting business valuation for IPOs (Initial Public Offerings). The study also revealed that a company's value estimated by means of the FCFM was the least prone to errors, i.e. either overestimation or underestimation of its value [Deloof M., Maeseneire W. De, Inghelbrecht, 2009, pp. 156-157].

Yet, despite its popularity, the FCF method is by no means easy to use. The more the valued company deviates from the perfect (theoretical) model, the more difficult the valuation process becomes. As a "living" economic organism, the company goes through various stages (phases) of the life cycle, in very much the same manner as a human being does. These stages are called "scenarios of business development". Some of them cause the valuer to have difficulty in determining the correct value of the company and force him to make appropriate adjustments. The typical business development scenarios that cause problems in the valuation process include [Damodaran A., 1996, pp. 157-158]:

– Companies at risk of losing liquidity – companies which have permanently negative cash flows and show no signs of a future turnaround. In this case, there is a high probability of a loss of liquidity or even bankruptcy. As already mentioned, FCFM requires positive cash flows, and therefore it has a highly limited application in this case;

– Cyclical company – the company's financial performance and cash flows track economic cycles (they grow in times of economic growth and decline during a recession). The main difficulty in this case involves forecasting future FCF which would take account of economic cycles;

– Companies with assets that are not used in the operational process – unused assets do not generate cash flows and for that reason their value is not reflected in the FCF. They should be valued separately (e.g. by means of the comparative method) and their value added to the estimated value of the company;

– Companies holding patents or having optional manufacturing capacity – unused patents or licences held by the company which do not generate cash flows and that is why they should be valued separately (e.g. by means of the comparative method) and added to the value of the company, which would otherwise be underestimated;

– Companies in the process of restructuring – a change in the structure of assets, or changing capital structure, ownership structure, remuneration policies, etc., which cause difficulties in predicting future FCF and determining the appropriate business risk.

In this case, the FCFM can be used when the forecast incorporates these changes and new financial and operational risk;

– Companies in the process of acquisition – the valuation of the company for the purpose of acquisition demands that two aspects are taken into consideration:

1) will the alliance produce synergies and can these be estimated, quantified?

2) how will a possible change of management of the acquired company (e.g. as a result of a hostile takeover) affect the cash flows and risks? In this case, it is best to consider a number of possible scenarios and based on them to carry out valuations of the company, and then to compare the valuations and choose the most reliable one;

– Private companies – the gravest problem involves the proper calculation of the risk associated with a company, whose estimation in the standard model is based on historical share prices. In order to solve the problem, it is necessary to find companies (or to be accurate – public companies) with similar characteristics and to calculate the cost of the private company's equity on this basis, having first made appropriate adjustments.

The FCFM application potential is also limited where the company carries out various investment projects which are conditioned by one another. A failure to implement any of the projects may result in the projected FCF, including from this and other projects, not occurring, and thus the estimated value of the company going wrong. Moreover, it can be difficult to precisely identify those projects because the information is insufficient – complete knowledge will be possible to gain only after earlier projects have been completed [Rutkowski A., 2007, p. 26].

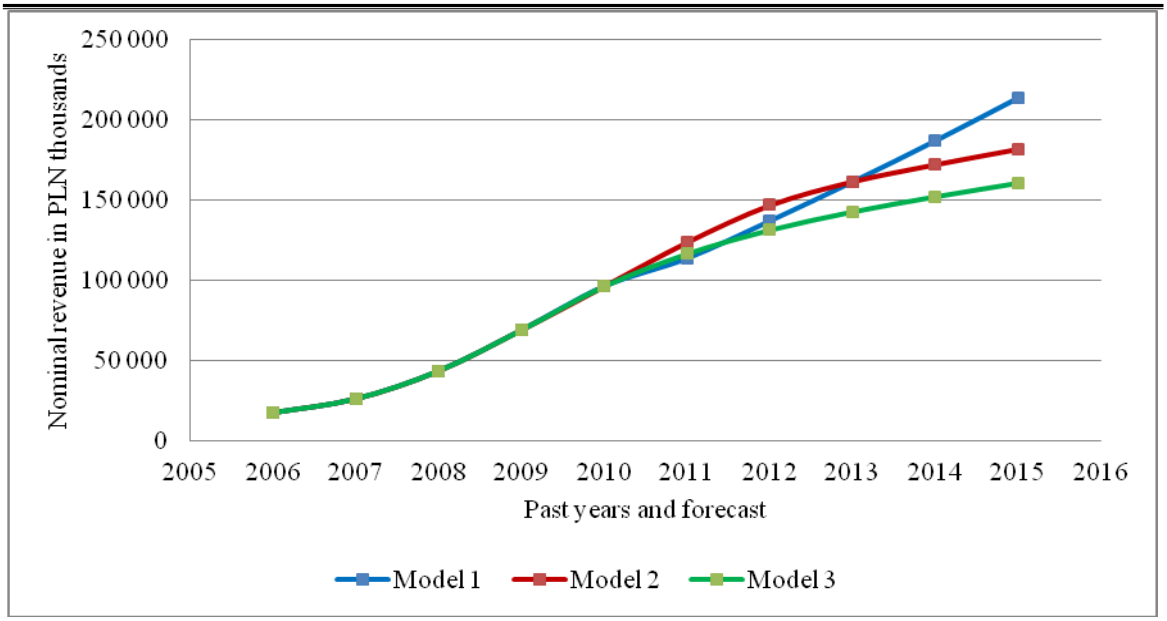
Valuation of Pozbud T&R S.A. Company by Means of FCFF. The author selected Pozbud T&D S.A. company (hereinafter Pozbud S.A.) for valuation. According to the PKD[2], Pozbud S.A. is a manufacturer of carpentry and joinery for the construction industry. The classification used by the Warsaw Stock Exchange puts the Company into the building materials industry and onto the 5 PLUS main market, due to its capitalization of under EUR 50 million.

Prior to making sales revenue forecasts, a trend analysis of historical data (based on 2006-2010 data) was carried out by means of a linear function, polynomial of the second, third and fourth degree and logarithmic and exponential functions. It should be noted that the fit of each of the functions (with the exception of the log function, $R^2 = 0.8430$) to empirical data measured by the coefficient of determination R^2 was very high and stood at between 0.9692 and 0.9999.

Next the author extrapolated historical data using accepted trend functions. After a thorough analysis and evaluation of the individual forecasts, the author initially selected three models for the final analysis, of which the least favourable solution was ultimately selected.

Nominal sales revenues resulting from the different models, including past (2006-2010) and forecast data (2011-2015) are presented in the following graph 7.

[2] Polish Classification of Activities



Source: author's own study.

Fig. 7. *Historical nominal revenues and forecasts by model*

The forecast free cash flow to firm was estimated on the basis of financial plans designed using the percentage of sales method. The following table 1 shows the forecast free cash flow during the detailed forecast for 2011-2015. The calculations were based on the income tax rate of 19 %.

Table 1. *Expected FCFF Pozbud S.A. in 2011-2015 (in PLN thousands)*

Item	*2011*	*2012*	*2013*	*2014*	*2015*
Profit from operations (EBIT)	14 883	17 087	18 773	20 171	21 430
Income tax	2 828	3 247	3 567	3 832	4 072
Profit from ordinary activities after tax (NOPAT)	12 055	13 840	15 206	16 338	17 358
Depreciation	2 542	3 268	3 951	4 546	5 028
Capital expenditure on fixed assets	18 690	18 439	17 172	15 255	12 884
Change in net working capital	-1 238	760	581	482	434
Free cash flow to firm (FCFF)	-2 855	-2 090	1 404	5 148	9 068

Source: author's own calculations.

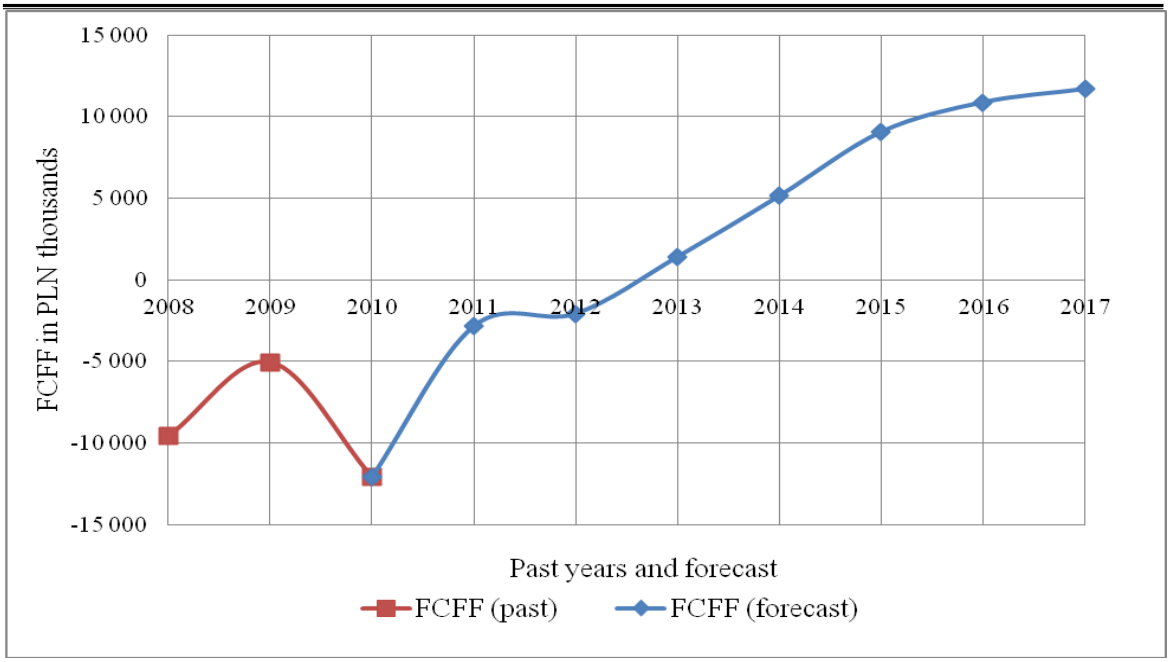
The above table 2 shows that in the first two years of the forecast, the company still maintains a negative FCFF due to its significant capital expenditure, followed by a positive FCFF (growth in NOPAT and decline in net investment) in the subsequent years. Later in the forecast (after 2015) a two-year phase two – maturity phase – was used and this revealed a stable growth in FCFF.

Table 2. *Expected FCFF in the second phase of Pozbud S.A.'s development in the years 2016-2017 (in PLN thousands)*

Item	*2016*	*2017*
Free cash flow to firm (FCFF) – phase two	10 882	11 689

Source: author's own calculation.

Pozbud S.A.'s ultimately forecast FCFF during a phase of dynamic changes in 2011-2015 based on the assumed revenue forecast model and maturity phase in 2016-2017 is as presented in the following graph 8.



Source: author's own study.

Fig. 8. *Pozdbud S.A.'s expected FCFF in 2011-2017*

In order to estimate the cost of capital (equity and debt), the average return on Polish Treasury bonds was assumed to constitute a risk-free rate of return. Of all the available bonds, the analysis was limited to five and ten year bonds. Finally, the yields on 10 year bonds, i.e. 5,52 % was used in the valuation.

In order to calculate the cost of debt, it is necessary to determine the premium for the risk of the company's insolvency. On 1 January 2011 the coverage ratio of Pozbud S.A.'s liabilities stood at 11.86, which according to the Damodaran methodology was equivalent to a premium of 0.75 %. To estimate the cost of debt after tax, the rate of 19 %, i.e. the rate for legal entities, including limited liability companies, was adopted.

During the final stage of the valuation use will be made of the weighted average cost of capital equal to 10 %. The final calculation of the WACC, broken down into individual components, is presented in the following equation:

$$\text{WACC} = (5{,}52\,\% + 1{,}05\% \times 4{,}8\,\%) \times 90{,}18\,\% + (5{,}52\,\% + 0{,}75\,\%) \times \times (1\text{-}19\,\%) \times 9{,}82\,\% \approx 10\,\%, \quad (12)$$

where:

– 5,52 % – 10-year bond yield (on 1 January 2011),
– 1,05 % – monthly β coefficient (on 1 January 2011),
– 4,8 % – premium for European markets, plus the country's risk premium,
– 90,18 % – share of equity in Pozbud S.A. (on 1 January 2011),
– 9,82 % – share of interest-bearing debt in Pozbud S.A. (on 1 January 2011),
– 0,75 % – insolvency risk premium (based on the Damodaran methodology),
– 19 % – income tax rate.

To estimate the residual value (RV), a growth rate of 3 % (corresponding to an increase in capital in the entire economy) was assumed. Based on this, the residual value used in the valuation will be:

$$RV = \frac{11\,689\,000 \times (1+3\%)}{10\% - 3\%)} = 171\,995\,286 \text{ PLN} \quad , \quad (13)$$

where:

– 11 689 000 PLN – estimated free cash flow to Pozbud S.A. in the last year of phase two (2017),

– 10 % – weighted average cost of capital (WACC).

The last stage of the valuation involves estimating the value of the company on the basis of the assumptions and a subsequent interpretation of the results. The following table 3 shows the calculation of the value of Pozbud S.A. as on 1 January 2011, determined on the basis of the sum of a discounted free cash flow (FCFF) forecast using the weighted average cost of capital (WACC), plus cash and cash equivalents.

Table 3. *Estimating the value of Pozbud S.A. as on 1 January 2011 (in thousands of PLN)*

Year of forecast	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
FCFF	-2 855	-2 090	1 404	5 148	9 068	10 882	11 688
RV							171 995
Discount rate	0.9091	0.8265	0.7514	0.6831	0.6210	0.5646	0.5133
Present value of FCFF and RV	106 280						
Cash and cash equivalents	32 444						
Equity value (EV)	138 724						

Source: author's own calculation.

Based on the assumptions, the estimated value of Pozbud S.A. as on 1 January 2011 amounted to 138 780 000 PLN (fundamental value). The estimated value of the company can be used to calculate the intrinsic value of a single share. For this purpose, the market value of debt should be subtracted from the company's estimated value (EV) and then the resulting value of the equity should be divided by the number of outstanding shares. These data, together with the estimated intrinsic value of a share are presented in the table 4 below.

Table 4. *Value of equity per Pozbud S.A.'s share on January 1, 2011 (in PLN)*

Equity of company	138 724 000
Market value of debt	14 998 921
Equity value	123 725 079
Number of outstanding shares	23 377 845
The value of equity per share (i.e. value of one share)	5.29 PLN

Source: author's own calculations.

The intrinsic value of a Pozbu S.A. share on 1 January 2011 based on the assumptions made was therefore 5.29 PLN. For comparison, on 3 January 2011, i.e. on the first day after the time for which the valuation was carried out, the stock market priced the share at 6.38 PLN, and hence the Company at about 164 million PLN. Expectations of stock market investors, as reflected in the current market rate, may therefore indicate anticipation of more income from the sale of the shares and a higher profit rate in the future.

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