

# **Enterprise valuation by discounted cash flows**

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## ***Abstract***

Valuation represents one of the most important subjects when discussing about corporate finance, due to its complexity and utility in discovering the value of an asset or enterprise. The appraiser must comprehend the means of computing the value in order to possess the correct information.

This paper focuses on the most commonly used methods of evaluation, bringing theoretical and practical support when it comes to appraising a company, especially on emerging markets.

**Keywords:** Valuation, DCF, CAPM, Emerging market.

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## **Introduction**

The aim of this thesis is to respond to four research questions:

*RQ1: Which are the main challenges in estimating future cash flows?*

In many cases, the attention of the appraiser is drawn to the computation of the weighted average cost of capital, which is also called the discount factor. But the importance of future cash flows is often diminished. This article presents some methods of estimating cash flows in reasonable terms.

*RQ2: Which are the advantages and limitations of CAPM model?*

Although the Capital Asset Pricing Model represents one of the most common used models of calculating the cost of equity, there are many authors that disagree with this method, due to its limitation in providing accurate information about the systematic risk or about the expected risk premium.

*RQ3: Which is the most appropriate method of valuation in emerging markets?*

Valuation on emerging markets represents a challenging issue concerning the work of an appraiser. Direct foreign investments and market globalization significantly impact the need for proper valuation of developing countries.

*RQ4: Is the DCF model suitable for responding to the current need of valuation, in reasonable terms, in Romania?*

The case study presents the discounted cash flow method of valuating a company in Romania, supported by the valuation with market multiples, to ensure that the results obtained through the first model are comparable with those from the second model.

## **Literature review**

The Discounted Cash Flows is one of the most used in evaluating companies, but also one of the most criticized. Computing the discount of future cash flows of a company with a discount rate, calculated or taken from the market, the DCF method assesses the company's market value at the time of evaluation.

Among the key elements of DCF, a proper importance is given to the discount rate, also called the cost of capital. One of the best-known model for calculating the cost of equity, the CAPM has been developed since the '70s by William Sharp (Sharp, 1964), John Lintner (Lintner, 1965), and a later contribution from Fischer Black (Black F., 1972), with a slightly modified version of the other two authors as regards the risk-free rate. The formula of Sharp – Lintner CAPM:

$$E(R_i) = R_f + \beta_i M^*(E(R_M) - R_f)$$

Other writers who make a significant contribution in developing the methodology for calculating the cost of capital (Damodaran, 2002), (Damodaran, 2009), (McKinsey & Company, Copeland, T., Koller, T., Murrin, J., 2000), (Palepu, Healy & Bernard, 2000), they present a comprehensive assessment of techniques and hypotheses in business valuation.

At the national level, clarifications and the way of determining the elements related forecasting and estimation of the discount are brought by authors such as (Dumitrescu, D., Dragotă, V., Ciobanu, A., 2002) or (Anghel, I. (eds.), Oancea Negescu, M.; Anica Popa, A.; Smith, AM, 2010).

Regarding the criticism of the model, notable work is identified within the studies (Fama & French, 2004), (Fernandez, 2015) in which it is covered the calculation of the CAPM, particularly in regard to the calculation beta (systematic risk) and risk premium estimated. The studies showed that in many cases, the computation of beta on long periods fail to predict an accurate systematic risk.

### *Empirical research*

Concerning the empirical research carried out by other authors, we can include some techniques regarding the determination of market risk premium. One of these techniques is represented by conducting a large-scale survey (Fernandez, Linares, & Acin, 2014), through which the authors received 8228 responses from 88 countries. The study is reflected in a summary table, which presents averages, medians, minimum and maximum values of risk premiums used in each country. We include averages for USA: 5.4%, China 8.1%, Spain 6.2% Germany: 5.4% United Kingdom: 5.1% France: 5.8% and Poland 6.3%, Greece 15%, Romania: 7.3% and Bulgaria: 7.9%. This survey started in 2010, with responses received from 22 countries, with noticeable improvement each year. This approach is motivated by the fact that an accurate estimate of the expected risk premium of investors is questioning the investors themselves.

In another article, using also the methodology of the survey, this time with e-mails sent only to the CFOs of companies in United States (Graham & Harvey, 2014) centralize responses of executives from companies, starting from 2000 and up to the current year, trying to find out the average risk premium used in the market.

An important contribution in explaining the systematic risk is made by the article "The Cross-Section of Expected Stock Returns" (Fama & French, 1992), where it is shown that the relationship between rates of return and beta is a weak one, in a regression calculated for longer historical time.

The manual application of corporate finance (Damodaran, 2004) the author studies the techniques applied in the market, presenting a wider angle of the area of corporate finance. The

author covers the main methods of assessing a company, as well as bringing interesting examples from some analyzed companies on the North American stock market.

Regarding the analysis and normalization of financial statements, a useful empirical study (Whited, 2010) on a small US company, explains the possible adjustments that may occur in the financial position and profit or loss, compared to what is happening in the market.

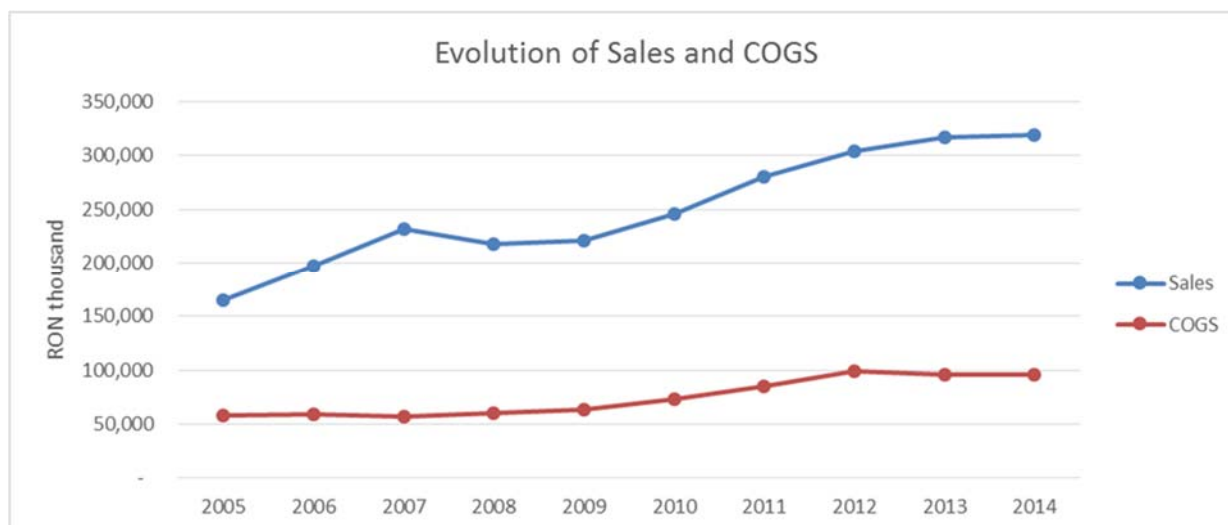
Another important work (Pereiro, 2002) proposes to address assessment of a company which is placed in an emerging market. The author explains the limitations, but also alternatives which may be employed to obtain reasonable results in difficult market conditions. Regarding the empirical study, it refers primarily to the evaluation of companies in Argentina. About the evaluation of emerging markets, we found some useful mentions in other studies (McKinsey & Company, Koller, T., Goedhart, M., Wessels, D., 2010), where the focus is reflected on the impact of certain factors (inflation, exchange rate) in estimating cash flows.

## Case Study

This case study focuses on the evaluation method of Discounted Cash Flows for a pharmaceutical Romanian company, Antibiotice Iasi SA, listed on the Bucharest Stock Exchange. The first step in estimating the free cash flows is to forecast the sales indicator. Based on the table presented below, we estimated that sales will grow in the future with the sustainable growth rate (5.8%), calculated as average for the last 5 years.

Financial indicators regarding growth rates											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
ROE		20.5%	14.5%	4.7%	6.4%	11.3%	6.3%	8.3%	9.3%	8.7%	<b>Average Last 5Y</b>
Dividend distribution (RON th)	6,743	-	13,918	7,577	2,276	9,035	8,629	-	15,459	15,747	
Dividend Distribution rate (%)	33.2%	0.0%	45.4%	65.1%	14.5%	29.0%	42.7%	0.0%	49.3%	50.6%	34.3%
Sustainable growth rate		20.5%	7.9%	1.6%	5.5%	8.0%	3.6%	8.3%	4.7%	4.3%	<b>5.8%</b>
Effective growth rate		19.9%	17.5%	-6.2%	1.6%	11.3%	13.9%	8.6%	4.4%	0.5%	7.7%

Source: Own calculations, based on data collected from Thompson-Reuters application



Source: Own calculation, based on data collected from Thompson-Reuters application

The next step requires the forecast of the balance sheet. Tangible assets were predicted based on the investments to be realized in the future company. We considered that the company will want to invest the remaining net profit after dividend distribution year. From the perspective of current assets and liabilities in the short term we decided weighting on turnover (sales revenue) or on the cost of goods sold (COGS called) (please see the table below).

#### Estimating hypothesis regarding balance sheet captions (short term)

	% in Sales	% in COGS
Stocks		52.9%
Clients	78.1%	
Advanced payments		1.2%
Suppliers		57.5%
Tax debts		6.0%
Provision debts		3.4%

Source: Own calculations, based on data collected from Thompson-Reuters application

Cash and cash equivalents in the period ahead will be restricted according to the average spot liquidity calculated in 2014, i.e. 0.15. This decision was made due to properly calibrate the liquidity of the firm, due to the fact that in the past few years, the company suffered because of a low liquidity.

Short-term loans, representing loans from local banks line the company will be sized according to general liquidity indicator (i.e. 2.15). We observed that the company has no actual long term financial debt, but they use credit lines (with annual reactivation) to fund their needs. Based on this fact, we considered that the company will tend to use the same strategy.

#### Restrictions regarding liquidity and debt ratio

	Anul 0	Perioada de previziune explicită						TV
	2014	2015	2016	2017	2018	2019	2020	2021
Lichiditate curentă	2.58	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Lichiditate la vedere	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Grad de îndatorare financiar	10.9%	16.9%	17.1%	17.4%	17.6%	17.9%	18.2%	18.3%

Source: Own calculations, based on data collected from Thompson-Reuters application

Concerning the income statement, we used the following hypothesis for the purpose of forecast. Cost of goods sold, the variable expense is estimated in the future in the proportion allocated in the past. Specifically, we used an average weights of COGS in Sales for the last 5 years. Projected salary costs are dimensioned as proportion in Sales, but the calculation will use the turnover of the previous year. As for other operating expenses, we assumed that 50% of them represent fixed expenses and 50% variable expenses.

Depreciation expense was calculated as follows: for the forecasted year, we computed the amortization of new investments, amount that will be added to the already known depreciation expense from the income statement a year earlier. Interest expenses were estimated based on the short-term loans in the balance sheet, by multiplying the interest rate with the amount of loans from the balance sheet (on market average, the interest rate is 5% for loans contracted by companies comparable with Antibiotice Iasi)

**Forecast of the statement of profit or loss**

	Year 0	Explicit forecast period						TV
	2014	2015	2016	2017	2018	2019	2020	2021
Sales	318,945	337,444	357,016	377,722	399,630	422,809	447,332	462,094
Other operating income	15,315	15,315	15,315	15,315	15,315	15,315	15,315	15,315
COGS	(96,039)	(103,523)	(109,527)	(115,880)	(122,601)	(129,712)	(137,235)	(141,764)
Wages and salaries	(71,439)	(75,047)	(79,400)	(84,005)	(88,877)	(94,032)	(99,486)	(105,256)
Other operating expenses	(99,446)	(98,722)	(101,786)	(105,027)	(108,456)	(112,084)	(115,922)	(118,232)
<b>EBITDA</b>	<b>67,336</b>	<b>75,466</b>	<b>81,618</b>	<b>88,126</b>	<b>95,011</b>	<b>102,296</b>	<b>110,004</b>	<b>112,156</b>
Amortization expenses	(17,058)	(18,341)	(20,242)	(22,325)	(24,597)	(27,065)	(29,739)	(32,626)
<b>EBIT</b>	<b>50,278</b>	<b>57,126</b>	<b>61,375</b>	<b>65,800</b>	<b>70,414</b>	<b>75,231</b>	<b>80,265</b>	<b>79,530</b>
Interest expenses, net	(2,118)	(4,534)	(4,797)	(5,075)	(5,370)	(5,681)	(6,011)	(6,209)
Other financial expenses	(10,797)	(10,797)	(10,797)	(10,797)	(10,797)	(10,797)	(10,797)	(10,797)
<b>Earnings before taxation</b>	<b>37,363</b>	<b>41,794</b>	<b>45,781</b>	<b>49,928</b>	<b>54,247</b>	<b>58,753</b>	<b>63,457</b>	<b>62,524</b>
Income tax	(6,224)	(6,687)	(7,325)	(7,988)	(8,680)	(9,400)	(10,153)	(10,004)
<b>Net income</b>	<b>31,139</b>	<b>35,107</b>	<b>38,456</b>	<b>41,939</b>	<b>45,568</b>	<b>49,352</b>	<b>53,304</b>	<b>52,520</b>
Dividend distribution ratio	50.6%	35%	35%	35%	35%	35%	35%	35%
Reinvested profit	15,392	22,820	24,997	27,261	29,619	32,079	34,648	34,138

Source: Own calculations, based on data collected from Thompson-Reuters application

Concerning the cost of capital, we adapted CAPM model so that it can be applied to a Romanian company. Systematic risk is taken from the European pharmaceutical sector ( $\beta = 1.17$ ) on the site Aswath Damodaran economist. The reason we chose this solution is that some authors (Pereiro, 2002) believe that the beta calculated in emerging markets is not stable over time.

Risk-free rate is taken as the coupon rate RO1425DBN029 state title (duration: 10 years) of 4.75%. Market risk premium related CAPM model adapted to local environment is taken from the study by Pablo Fernandez (Fernandez, Linares, & Acin, 2014) describing the expected risk premium for 88 countries through a survey that They've received 8228 responses.

### ***Estimation of CAPM***

<b>CAPM</b>	<b>13.3%</b>
Risk free rate	4.75%
Market premium risk	7.3%
Beta	1.17

Source: National Bank of Romania, Fernandez, Linares & Acin (2014), Damodaran website

### ***Estimation of WACC***

<b>WACC</b>	<b>11.6%</b>
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<b>CAPM</b>	<b>13.3%</b>
Equity / (Equity + Debt)	82%

<b>Interest ratio</b>	<b>5.0%</b>
Debt / (Equity + Debt)	18%
(1 - taxation rate)	84%

Source: Own calculation, based on CAPM estimation and interest rate from the market

The final step is to estimate the value of the company, by concentrating all the information above in this single table. In addition, some indicators (based on balance sheet) were calculated separately: CAPEX and variation of net working capital. As we can observe, two important aspects should be observed from the table below: first, the terminal value of the company dictates the value of the company, because of its increased value as compared with enterprise value. Second, the value of equity depends on the level of the discount factor.

### ***Enterprise value estimation***

	Year 0	Explicit forecast period						TV
	2014	2015	2016	2017	2018	2019	2020	2021
Net income	31,139	35,107	38,456	41,939	45,568	49,352	53,304	52,520
+ Amortization expenses		18,341	20,242	22,325	24,597	27,065	29,739	32,626
+ Dob*(1 - T)	5%	3,809	4,030	4,263	4,511	4,772	5,049	5,216
-- CAPEX		(15,392)	(22,820)	(24,997)	(27,261)	(29,619)	(32,079)	(34,648)
-- ΔNWC	-	(25,575)	(14,532)	(15,375)	(16,266)	(17,210)	(18,208)	(10,961)
<b>CFNI</b>		<b>16,290</b>	<b>25,377</b>	<b>28,157</b>	<b>31,149</b>	<b>34,361</b>	<b>37,805</b>	<b>44,754</b>
Terminal value								536,397
Discount factor	<b>11.6%</b>	1.1164	1.2464	1.3915	1.5536	1.7345	1.9364	1.9364
<b>CFNI discounted</b>		<b>14,591</b>	<b>20,360</b>	<b>20,234</b>	<b>20,050</b>	<b>19,811</b>	<b>19,523</b>	<b>277,006</b>
Enterprise value	391,574							
Financial debt	54,783							
<b>Equity value</b>	<b>336,791</b>	<b>Value of Equity using DCF</b>						
<b>Equity (m.cap.) 31-Dec-2014</b>	<b>392,733</b>	<b>Value of Equity as per market capitalization at 31-Dec-2014</b>						

The equity value computed using DCF brings an amount that is lower than the market capitalization of the company, which makes us believe that the company is overrated on the market.

Next, we will analyze the impact of the discount factor and of the perpetual growth rate (g), to understand the sensitivity of the enterprise value.

### ***Sensitivity analysis regarding the enterprise value***

<b>g</b>	<b>2.3%</b>	<b>3.3%</b>	<b>4.3%</b>
<b>WACC</b>			
<b>10.6%</b>	366,917	398,684	440,535
<b>11.6%</b>	314,355	336,791	365,338
<b>12.6%</b>	275,733	292,442	313,176

By changing the WACC with 1pp, plus or minus, the enterprise value significantly changes. The same process goes with the modification of the perpetual growth rate, but in a diminished impact as compared to the change of WACC.

To ascertain the result by DCF model, it is highly recommended to use an additional method of estimation. The market multiples method requires knowing the indicators from other comparable companies. Fernandez (2015c) found that for the pharmaceutical sector, PER and EV/EBITDA are the most used multiples.

We searched data at the European level and selected the multiples only for companies that come from countries similar to Romania concerning the macroeconomic indicators and history.

### ***Estimation of enterprise value through market multiples approach***

<b>Multiples</b>	<b>PER</b>	<b>EV/EBITDA</b>
Median	11.20	6.03
Standard Deviation	14.56	3.82
Standard Deviation coefficient	0.20	0.20
Minimum value	8.29	5.26
Maximum value	14.11	6.79

<b>2014</b>	
EBITDA (RON th)	67,336
EPS	0.0464
No. of shares (th)	671,338
Financial debt (RON th)	54,783

Minimum Equity value (RON th)	258,190	299,456
Normal Equity value (RON th)	348,881	350,916
Maximum Equity value (RON th)	439,572	402,377

*Source: Own calculation, based on data collected from Factiva Dow Jones*

Estimating the value of the company, we observe that using the median of PER, the range of EV is rated between RON 258,000 and 440,000 thousand, whereas by using the median of EV/EBITDA, the range is narrowed to RON 299,000 – 402,000 thousand.

## **Conclusion**



By making a comparison between the two valuation methods, DCF and multiples, we see that the results are similar equity securities. If the DCF obtain an average of RON 336,791 thousand, with market multiples (EV / EBITDA), we get an average of RON 350,916 thousand.

The DCF valuation method supported by multiple assessment may answer the need of valuation in a developing country such as Romania.

We see that changing WACC and perpetual growth rate, to increase or decrease their 1pp, resulting in a significant change in market value.

DCF model still remains one of the most used models in practice, both in developed countries and in emerging countries, despite weaknesses in the estimate of the cost of capital or arbitrary assumptions.

Proposals: For future research, we propose a model in which DCF is adapted to take account of the change in shareholder expectations over time. The model presented in this thesis consistently maintain the cost of capital, but in the real world it changes from one period to another.

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