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# **1FP571**

# **Special seminar – Advanced Corporate Finance**



EVROPSKÁ UNIE  
Evropské strukturální a investiční fondy  
Operační program Výzkum, vývoj a vzdělávání



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# Valuation Analysis II

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1. Overview
2. Comparable Company Analysis
3. Comparable Acquisitions Analysis
4. Discounted Cash Flow Analysis
5. Summary



# Valuation Analysis

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## 4. DCF Analysis

DCF analysis is a theoretical valuation technique which values a company as a sum of its:

**A. Unlevered free cash flows (FCF)** (different from operating CFs) before financial costs over some forecast period (usually 10 years), and

**B. Capitalized terminal value (TV)** at the end of the forecast period (i.e. Year\_10)

Terminal value may be calculated using

- CC multiples of the Year\_10 CF, operating income, net income, etc.
- CA multiples of the Year\_10 CF, operating income, net income, etc.
- Perpetual value of CFs after Year 10 (growth perpetuity)

Discount rates are generally based in the WACC of companies in similar business to reflect the relative riskiness (variability) of the projected CFs

Enterprise value = present value of (A) projected FCF in years 1–10 + (B) projected TV in Year\_10



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## 4. DCF Analysis: Definitions

**Free Cash Flow (FCF):** Unlevered after-tax net income + depreciation and amortization, deferred taxes and other non-cash charges less capital expenditures, increase in WC and other cash charges not included in income statement

**Working capital** (working investment) (**WC**): current assets less cash and marketable securities less current liabilities less current debt/notes. Increase in WC between years is subtracted from the respective FCF and vice versa.



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## 4. DCF Analysis: Definitions

### Present Value

The concept of present value assumes that a unit of currency today is worth more than the same unit of currency tomorrow. E.g. assuming the net interest rate of 7% p.a., \$1 today is worth \$1.07 one year from today. Similarly, \$1.07 next year is worth only \$1 today.

- $PV \text{ of a single flow} = \text{cash flow} / (1 + \text{discount rate})^n$   
where  $n$  is the number of years over which the flow is discounted
- $PV \text{ of a cash stream} = CF_1/(1+r)^1 + CF_2/(1+r)^2 + \dots + CF_{10}/(1+r)^{10}$   
where  $CF$  is the cash flow amount,  $r$  = discount rate

### Discount rate

Rate of return required by an investor for the level of risk associated with any investment. The rate at which the buyer of the business discounts its projected future cash flows.



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## 4. DCF Analysis: Definitions

### **Terminal Value**

TV is the projected value of the company at the end of the forecast period. TVs are most often derived by assuming the business is sold for some multiple of earnings or cash flow. Alternatively, TVs can be calculated based on the ongoing “perpetual” value of the company’s CFs beyond the forecast period, usually grown by some sensible growth rate (assuming nominal CFs i.e. inflation + growth of economy/sector)



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## 4. DCF Analysis: The Process

### **Step 1: Projections**

Project the operating results and FCFs of a business over the forecast period (e.g. 10 years).

### **Step 2: Terminal Value**

Estimate the exit multiples of the business at the end of the forecast period.

### **Step 3: Discount Rate**

Use the WACC to determine the appropriate DR range.

### **Step 4: Present Value**

Determine the range of values for the enterprise by discounting the projected FCFs and TV to the present.

### **Step 5: Adjustments**

Adjust for all assets and liabilities not accounted for in the CF projections.



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## 4. DCF Analysis: Step 1\_Projections

Preparation of financial model:

- Model = simplified representation (in accounting language) of the past and expected future financial performance of a business. Nothing but a tool.
- By their nature, models use a simplified picture of reality based on thousands of simplifications, both explicit and implicit. A poor choice of these may hamper its usability.
- The general purpose of a model is to project a company's future financial performance in order to
  - Value future CFs generated by a business
  - Analyze impact of mergers, acquisitions, divestitures and other transactions on a company performance (CFs, earnings, capital ratios)
  - Evaluate the impact of various pro forma operating/transaction scenarios against status quo projected performance (operating financial model, internal financial management).





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## 4. DCF Analysis: Projections

FCFs from a business can be projected using information about the sector or specific to the valued business.

DCF analysis looks at the company's pure operating results free of extraordinary items, discontinued operations, one-time charges, etc.

Make sense of how the past relates to the future.

In summary, DCF projections should be based on

- Historical performance
- Company projections
- Equity research analysis' projections
- Industry data
- Common sense



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## 4. DCF Analysis: Projections

Analyzing the collected numbers:

- How relevant are historical figures?
  - Major changes in business or industry
  - Management's discussion of results
- Purity of numbers
  - Extraordinary items
  - Acquisitions/divestitures
- Anything left excluded?
  - Comparable to CF statement



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## 4. DCF Analysis: Projections

Typical historical financials used in DCF Analysis:

- Sales
- Operating cash flow
- Depreciation and amortization
- Deferred taxes
- Capital expenditures (CAPEX)
- Working capital (receivables, inventories & prepaid expense – current payables & current operating liabilities)



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## 4. DCF Analysis: Step 1\_Projections

Make operating assumptions:

- Sales (realistic growth rate)
- Operating cash flow OCF (% sales)
- Operating income (OCF – depreciation)
- Taxes (realistic rate, statutory vs. effective rate)
- Deferred taxes (% taxes, or derived from depreciation matrix)
- Depreciation (% CAPEX, or derived from depreciation matrix)
- CAPEX (% sales)
- WC (% sales, receivable days, inventory days, payable days)



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## 4. DCF Analysis: Step 1\_Projections

For a model to reasonably project the target's future financial performance, meaningful links need to be established between individual income statement's items and common drivers, e.g.:

- |                              |   |
|------------------------------|---|
| ■ Revenue                    | y-o-y growth (% , unit volume x price)      |
| ■ COGS (before depreciation) | % Revenue                                   |
| ■ Depreciation               | calculated separately                       |
| ■ Amortization               | calculated separately for intangible assets |
| ■ Gross Profit               | Revenues – Costs                            |
| ■ Operating Expenses         | % Revenue                                   |
| ■ EBIT                       | Gross Profit – Operating Expenses           |
| ■ Pre-tax Income             | EBIT – Interest and Equity Income           |
| ■ Taxes                      | % taxable income                            |
| ■ Dividends                  | % net income, fixed periodic rate           |



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## 4. DCF Analysis: Step 1\_Projections

Free Cash Flow – components:

$\text{EBIT} \times (1 - \text{Tax Rate})$

+ Depreciation, Depletion and Amortization Expense

+ Changes in Working Capital

- Capital Expenditures (CAPEX)

+ Changes in Other Assets/Liabilities

**= Free Cash Flow**



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## 4. DCF Analysis: Step 2\_Terminal Value (TV)

The limited scope of forecast period necessitates the use of TV to capture the value of the enterprise beyond the forecast period's horizon. TV is added to the final year's projected CF and then discounted back to the present.

TVs may be derived based on "exit" multiples or perpetuity:

- CC multiples
  - Assumes the business is sold in the public securities market in Year<sub>10</sub>
  - TV calculated based on Year<sub>10</sub> net income, operating CF etc. multiplied by the relevant CC multiples
- CA multiples
  - Assumes the business is sold in the private market in Year<sub>10</sub>
  - TV calculated based on Year<sub>10</sub> OCF, operating income etc. multiplied by the relevant CA multiples
- Perpetual Value (growth perpetuity)
  - Assumes the business continues to operate as a going concern
  - TV calculated as the PV in Year<sub>10</sub> of the company's FCFs beyond Year<sub>10</sub>
  - $\text{Year}_{10} \text{ FCF} / (\text{discount rate} - \text{projected annual growth rate in cash flows after Year}_{10})$



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## 4. DCF Analysis: Step 3\_Discount Rate (DR)

- **Discount rate** is a function of the risk inherent in any business and industry (systematic, **market risk**), the degree of uncertainty regarding the projected cash flows (unsystematic, **specific risk**) and the assumed **capital structure** (share of own and borrowed capital). The greater the uncertainty, the higher the appropriate DR and the less the cash stream is worth.
- The most widely adopted measure of riskiness of the projected cash flows and the best way to determine the correct DRs is the weighted average cost of capital (**WACC**) of similar businesses.
- WACC assumes the capital market investors (both debt and equity) in any given industry require returns reflective of the perceived riskiness of their investments





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## 4. DCF Analysis: Step 3\_Discount Rate (DR)

$$\mathbf{WACC} = (D/E+D) \times r_d \times (1-t) + (E/E+D) \times r_e$$

where

Cost of Debt ( $r_d$ ) = borrowing cost to the company (before tax)

( $t$ ) = corporate tax rate, determining the tax shield of debt investment

Cost of Equity ( $r_e$ ) = risk-free rate + company's beta x market risk premium

Weights = Debt/(Equity+Debt), Equity/(Equity+Debt)



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## 4. DCF Analysis: Step 3\_Discount Rate (DR)

According to the Capital Asset Pricing Model (CAPM):

Cost of Equity ( $r_e$ ) = risk-free rate + **company's beta** x market risk premium

Beta: statistical measure, percentage of the variability of a company's stock price relative to the overall stock market, calculated by regressing the percentage change in a stock (or portfolio) against the percentage change in the market (usually index, e.g. S&P 500).

Mathematically, beta is a covariance between the company's and market's performance (return) divided by the variance of the market's return:  $\beta_i = \frac{COV_{im}}{\sigma_m^2}$



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## 4. DCF Analysis: Step 3\_Discount Rate (DR)

Beta = 1 applied to CAPM results in a premium over the risk-free rate equal to the average equity premium.

Most betas fall between 0.1 and 2.0, though higher or even negative betas are possible

(N.B. what implies a negative beta  $\beta < 0$ ? Think of it for a moment ...

$r_e = r_f + \beta \times \text{MRP} \rightarrow r_e < r_f !$       risk-free borrowing is more expensive than the company's cost of capital

Market risk premium (MRP) may be further split into two components, the risk premium inherent in the assets of the business and the risk associated with the leverage applied to those assets.



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## 4. DCF Analysis: Step 3\_Discount Rate (DR)

The business risk, the systematic risk of the cash flows ignoring how the business is financed, reflects, among other things, the operating leverage of the business (fixed vs. variable costs).

$$r_e = r_f + (\text{Business Risk Premium}) + (\text{Financial Risk Premium})$$

$\beta \times \text{Market Risk Premium}$

Therefore, an observed beta (which includes the effects of leverage) must be delevered to get an asset (**unlevered**) beta. This removes the effect of capital structure on a company.

This unlevered number may then be (re)**levered** to reflect an expected or target level of debt.



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## 4. DCF Analysis: Step 3\_Discount Rate (DR)

Borrowing creates financial leverage which pushes firm's common stock or equity beta above its asset beta:

$$\text{Beta}(\text{unlevered}) = \text{Beta}(\text{levered}) \times E/(E+D)$$

Unlevered beta may in turn be (re)levered to an optimal capital structure as defined by industry parameters or management expectations:

$$\text{Beta}(\text{relevered}) = \text{Beta}(\text{unlevered}) \times \text{target}[(E+D)/E]$$



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## 4. DCF Analysis: Step 3\_Definitions of DR

**Risk-free rate** = minimum return required by investors for a risk-free investment (typically 30-year US government bond rate)

**Company's beta** = statistical measure of volatility of the company's stock price relative to the stock market (historical)

**Market Risk Premium** = historical return premium required by equity investors above the risk-free rate



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## 4. DCF Analysis: Step 4\_PV Range

Value range of the business using DCF analysis:

- FCFs projected over the forecast period get discounted to PV at an appropriate range of discount rates (i.e. sensitivity);
- the range of terminal values is added in the last year of projections and discounted to PV.
- the resulting value range = total (enterprise) value of the business (debt + equity)
- the value of the company alone = subtract the company's net debt (enterprise value – net debt).



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## 4. DCF Analysis: Step 4\_PV Range

Enterprise value should be *adjusted* by

- adding other unusual assets
- subtracting liabilities to reflect the company's fair value (e.g. underfunded pension liabilities).

Sensitivity analysis

useful to vary key assumptions (e.g. sales growth rate, margins) to determine how sensitive are the value ranges to the key determinants





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## 5. Summary

All the 3 main valuations approaches – comparable company analysis, comparable acquisition analysis and discounted cash flow analysis – serve the same purpose of arriving at a fair value of the assessed enterprise.

Since the final value is seldom just a point estimate and rather a value range, there is a scope and even desirability for more than one take on the value estimate.

Moreover, DCF analysis itself adopts as one of its concepts of the terminal value exit relative multiples, these concepts complement each other.

Either way, both relative and intrinsic methods of valuation mutually provide a reality check of whether the final value range gives a basic economic sense.



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