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Concepts about Company Valuations

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Introduction

Valuation means to determine or estimate the value of something.

However, this value may depend on numerous aspects as, for example, the person who is making the valuation, his/her individual preferences, values, interests, personal goals, as well as the context in which the valuation is taking place.

One of the difficulties in measuring the value is, therefore, its subjective feature:

"Valuation is not an objective exercise, and any preconceptions and biases that an analyst brings to the process will find its way into the value"

Aswath Damodaran

Introduction

The valuators` role

The valuation’s quality is in direct proportion to the **data’s quality**, **information** and **time spent** in understanding the company to valuate.

The most important part must be on the **valuation process** rather than its end result.

Another important aspect to consider is that the **value obtained** by any method of valuation can be **modified** according to **new information** that appear in relation to the **company** and/or to the **market**.

As continually arise information, a company's valuation is not "endless" and needs to be updated to reflect the most current information.

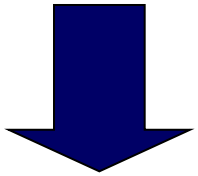
Introduction

Business Valuation Models

In order to estimate a business value, we can use several valuation methods. In fact:

"*the problem in valuation is not that there aren't enough models to valuate an investment, but rather that there are too much models!*" (...).

DAMODARAN



There are not perfect valuation models!

Introduction

Business Valuation Models

The suitable valuation model and parameters to use in a specific scenario will depend on a variety of asset characteristics or even on the company to be valuated (...).

The reality is that the reverse is often true.

Time and resources are spent trying to make the asset fit in a given pre-specified **valuation model**, because:

It is considered the best model

or because,

did not think enough about the model selection process

MISCONCEPTIONS ABOUT VALUATION

Myth 1: A valuation is an objective search for "true" value

• Truth 1.1: All valuations are biased. The only questions are how much and in which direction.

• **Myth 2: A good valuation provides a precise estimate of value**

• Truth 2.1: There are no precise valuations.

• **Myth 3: The more quantitative a model, the better the valuation**

• Truth 3.1: One's understanding of a valuation model is inversely proportional to the number of inputs required for the model.

• Truth 3.2: Simpler valuation models do much better than complex ones.

Aswath Damodaran

APPROACHES TO VALUATION

- Intrinsic valuation, relates the value of an asset to its intrinsic characteristics:

  its capacity to generate cash flows and the risk in the cash flows.

  In it's most common form, intrinsic value is computed with a discounted cash flow valuation, with the value of an asset being the present value of expected future cash flows on that asset.

- Relative valuation, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cash flows, book value or sales.

- Contingent claim valuation, uses option pricing models to measure the value of assets that share option characteristics.

Aswath Damodaran

DISCOUNTED CASH FLOW VALUATION

• What is it: In discounted cash flow valuation, the value of an asset is the present value of the expected cash flows on the asset.

• Philosophical Basis: Every asset has an **intrinsic value** that can be estimated, based upon its characteristics in terms of cash flows, growth and risk.

• Information Needed: To use discounted cash flow valuation, you need
• to estimate the life of the asset
• to estimate the cash flows during the life of the asset
• to estimate the discount rate to apply to these cash flows to get present value

• Market Inefficiency: Markets are assumed to make mistakes in pricing assets across time, and are assumed to correct themselves over time, as new information comes out about assets.

Introduction

RELATIVE VALUATION

• What is it?: The value of any asset can be estimated by looking at how the market prices "similar" or 'comparable" assets.

• Philosophical Basis: The intrinsic value of an asset is impossible (or close to impossible) to estimate. The value of an asset is whatever the market is willing to pay for it (based upon its characteristics)

• Information Needed: To do a relative valuation, you need:
- an identical asset, or a group of comparable or similar assets
- a standardized measure of value (in equity, this is obtained by dividing the price by a common variable, such as earnings or book value)
- and if the assets are not perfectly comparable, variables to control for the differences

• Market Inefficiency: Pricing errors made across similar or comparable assets are easier to spot, easier to exploit and are much more quickly corrected.

Aswath Damodaran

CONTINGENT CLAIM (OPTION) VALUATION

• What is it: In contingent claim valuation, you value an asset with cash flows contingent on an event happening as options.

• Philosophical Basis: When you buy an option-like asset, you change your risk tradeoff – you have limited downside risk and almost unlimited upside risk. Thus, risk becomes your ally.

• Information Needed: To use contingent claim valuation, you need:
- define the underlying asset on which you have the option
- a conventional value for your asset, using discounted cash flow valuation
- the contingency that will trigger the cash flow on the option

• Market Inefficiency: Investors who ignore the optionality in option-like assets will misprice them.

Business Valuation Models

Fundamental assumptions for each valuation

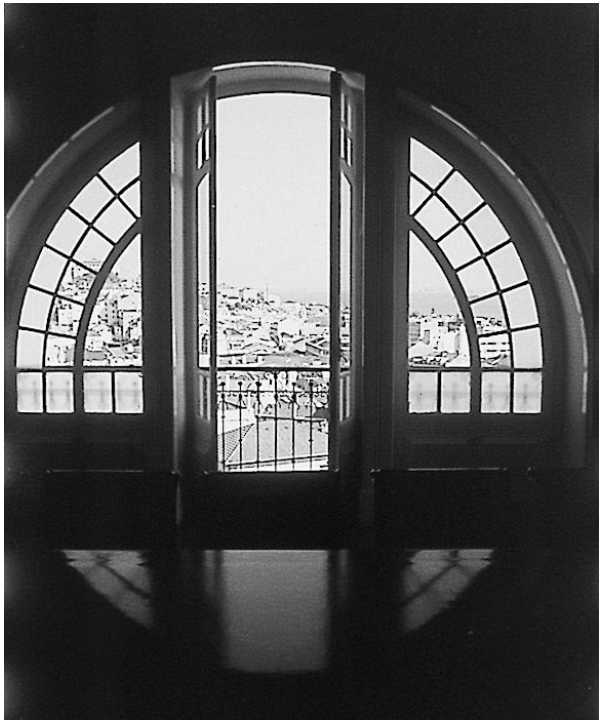
- Business Continuity
- Degree of Equity Control
- Degree of Liquidity
- Valuation's Purposes

A company's valuation can be made in different stages of its life:

- The Growth stage vs liquidation stage
- Old companies vs recent companies
- Loss-making companies vs profitable companies

In order to make a business valuation is necessary to have rigorous knowledge about

- The company's industry as well as its business
- The economic environment on which the company operates
- The company's organization and its internal functioning
- The company's ability to generate results



Different business valuation methods

Different business valuation methods

Besides the existence of different companies' valuation methods, there are also other different classifications where these methods fit.
Pablo Fernandez (2004, 2015) introduces six groups in which the valuation methods could be classified.

The four main groups comprising the most widely used company valuation methods:

Balance sheet-based methods,

Income statement-based methods,

Mixed methods, and

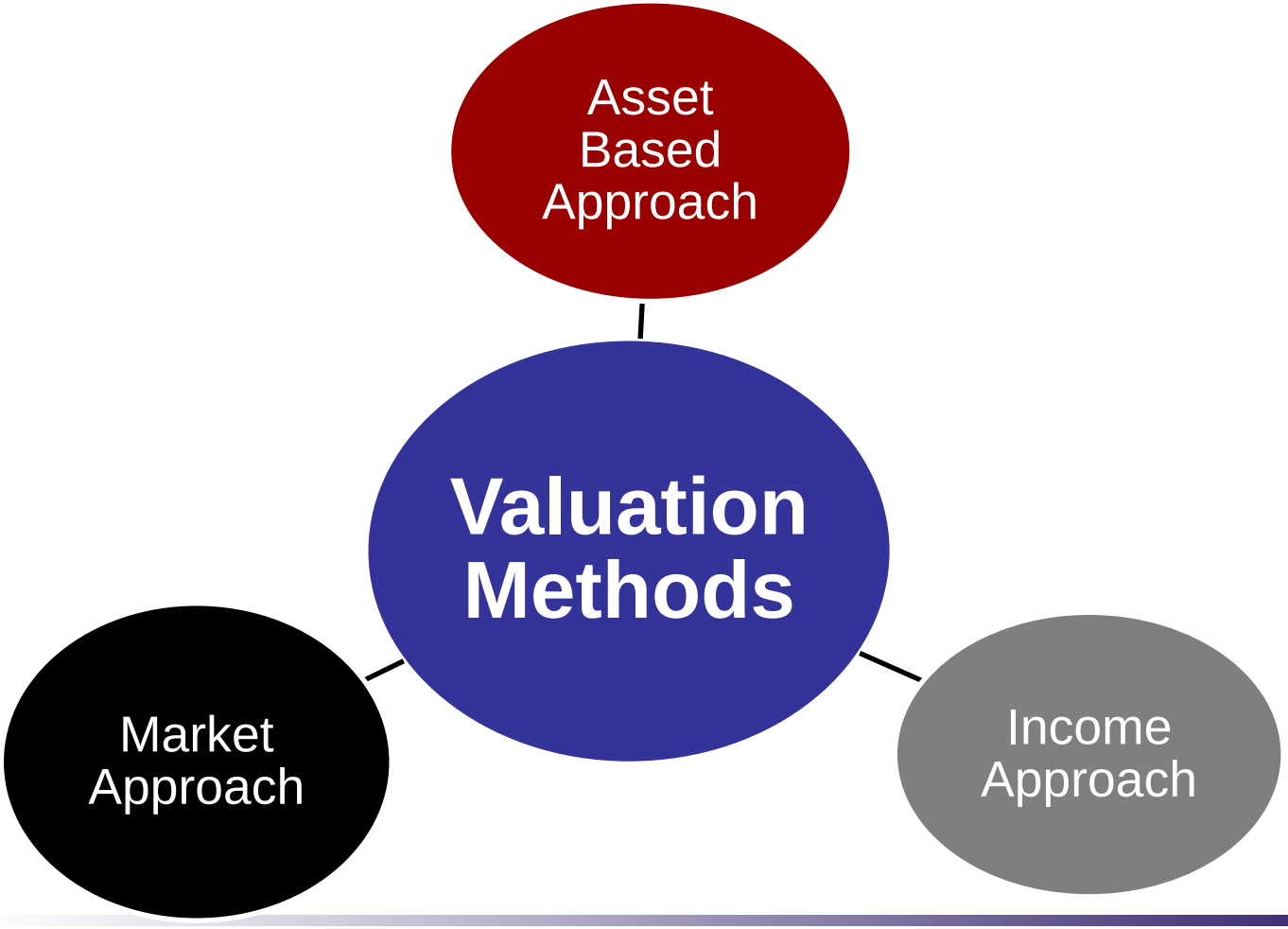
Cash flow discounting

Main Valuation Methods					
Balance Sheet	**Income Statement**	**Mixed (Goodwill)**	**Cash Flow Discounting**	**Value Creation**	**Options**
Book Value	Multiples	Classic	Equity cash flow (FCFE)	EVA	Black and Scholes
Adjusted Book Value	PER	Abbreviated income	Dividends	Economic profit	Investment option Expand the project Delay the investment Alternative uses
Liquidation Value	Sales	Others	**Free cash flow (FCFF)**	Cash value added	
Substancial Value	P/EBITDA		APV	CFROI	
	Other multiples				

Fernandez, P. (2015). Company Valuation Methods. IESE Business School, University of Navarra.

Classification of the valuation methods

There are, however, many other classifications of the business valuation methods. A quite common classification is as follows:



Classification of the valuation methods

1. Asset Based Approach

The Asset-Based Approach focuses on a company's net asset value, or the fair-market value of its total assets minus its total liabilities.

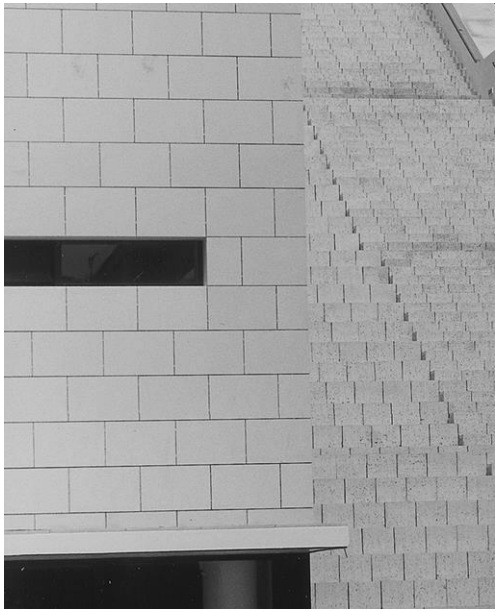
In asset-based valuation, you value a business by valuing its individual assets. These individual assets can be tangible or intangible.

Asset-Based Approach: This approach assesses the value of a company by considering its assets and liabilities. It is often used when a company's assets are the primary source of its value.
In this method, the value of the company is determined by subtracting its total liabilities from its total assets. The result is the company's net asset value or book value. This approach is more commonly used for companies with significant tangible assets, such as real estate or manufacturing companies.

Classification of the valuation methods

1. Asset Based Approach

The Asset-Based Approach focuses on a company's net asset value, or the fair-market value of its total assets minus its total liabilities.



In asset-based valuation, you value a business by valuing its individual assets. These individual assets can be tangible or intangible.

Within the asset-based approach we will highlight the following methods:

1.1. *Book value*

1.2. *Adjusted book value*

Classification of the valuation methods

1. Asset Based Approach

1.1. *Book Value Method*:

The book value method is a simplistic approach that, in general terms, defines the net amount of a company's assets and liabilities as its value.

Being so, subtracting liabilities from assets gives us the value of the stockholders which is the book value of the business.

The major limitation of the book value method is the fact that **not all assets** are properly **recognized and measured** in companies' financial statements for the purposes of financial reporting.

Classification of the valuation methods

1. Asset Based Approach

1.2. Adjusted Book Value Method

According to the Adjusted Book Value Method, the valuation is made by the market value, item by item from the balance sheet. The Adjusted Book Value Method consist, mainly, in the following criteria:

- Substitution Value
- Market Value
- Liquidation Value

Classification of the valuation methods

1. Asset Based Approach

1.2. Adjusted Book Value Method

It is based on the values stated in the balance sheet (Assets and Liabilities) but review those values (one by one) and, if necessary, adjust those in order to reflect realizable (or replacement) values.

The major adjustments can be:

- correction of “hidden reserves” and “hidden liabilities”

- correction of “latent reserves” and “latent liabilities”

Classification of the valuation methods

1. Asset Based Approach

1.2. Adjusted Book Value Method

Correction of "hidden reserves" and "hidden liabilities"

What are the "hidden reserves"?

Assets not listed on the balance sheet or listed bellow their market value. These are situations of undervalued assets or overvalued liabilities, 'voluntarily' disregarding or not generally accepted accounting principles - e.g., exaggerated provisions or for non-existent risks

Sometimes hidden reserves are deliberately (and illegally) created by undervaluing the assets or by overvaluing the liabilities to show a lower taxable income.

What are the "hidden liabilities"?

"Hidden liabilities": overvalued assets and/or undervalued liabilities - e.g., omission of provisions.

How to correct it?

Through the application of generally accepted accounting principles, carrying out a review/audit to the Financial Statements and proposing the appropriate adjustments.

Classification of the valuation methods

1. Asset Based Approach

1.2. Adjusted Book Value

Correction of "latent reserves" or "latent liabilities"

What are the "latent reserves"?

Situations on which there are undervalued assets, or overvalued liabilities, although respecting the generally accepted accounting principles – for example: land, buildings and equipment listed at historical cost.

What are the "latent liabilities"?

"latent liabilities": overvalued assets/undervalued liabilities - for example: installation costs or capitalized losses (ex. deferred tax assets*)

How to correct it?

Through the revaluation, at market value, of stocks and tangible and intangible fixed assets, the cancellation of intangible assets that cannot be sold separately and the valuation of liabilities at current value.

* A deferred tax asset is an item on a company's balance sheet that reduces its taxable income in the future.

Classification of the valuation methods

1. Asset Based Approach

LIQUIDATION VALUATION

- In liquidation valuation, you are trying to assess how much you would get from selling the assets of the business today, rather than the business as a going concern.

- Consequently, it makes more sense to price those assets (i.e., do relative valuation) than it is to value them (do intrinsic valuation). For assets that are separable and traded (example: real estate), pricing is easy to do. For assets that are not, you often see book value used either as a proxy for liquidation value or as a basis for estimating liquidation value.

- To the extent that the liquidation is urgent, you may attach a discount to the estimated value.

Classification of the valuation methods

1. Asset Based Approach

Criticisms pointed out to the Asset Based Approach

1. Difficulty in dealing with the effects of successive and widespread price variations, namely due to inflation, since the values are indexed to historical costs and, therefore, indices representative of the evolution of purchasing power are applied, which may not coincide with the real evolution of prices.

2. The Asset Based Approach does not consider, in a direct and explicit way, the human capital.

Classification of the valuation methods

1. Asset Based Approach

Criticisms pointed out to the Asset Based Approach

3. It does not reflect that the value of the company depends on the type of market in which it operates and its development perspectives.

4. It also does not reflect the distribution of power in the company, the motivations and the number and nature of interested parties in a possible transaction.

Therefore, it is currently considered that the valuation of companies from an Asset Based Approach perspective has some limitations, so it should be adopted in addition to other methods such as, for example, the Discounted Cash Flow (DCF) that will be discussed ahead.

Classification of the valuation methods

1. Asset Based Approach

When should we use the asset-based approach?

Classification of the valuation methods

1. Asset Based Approach

When should we use the asset-based approach?

1. When the **company is losing money at an operational level**.

   In these cases, it is not possible to use results on which to apply valuation models such as, for example, the Discounted Cash Flow (DCF) or multiples of results (e.g., EBITDA, Cash Flow or Net Income).

   The market value of **total assets less liabilities** may be an appropriate option for valuation purposes.

Classification of the valuation methods

1. Asset Based Approach

When should we use the asset-based approach?

2. In the case of **small companies** whose success in many situations is largely linked to the **personal relationships** of their **founder/ managing partner** with the company's main customers and suppliers.

   These relationships are often tenuous as they are usually not formalized and are not transferable. In these circumstances, it makes sense that the valuation of the company can be carried out based on an Asset Based Approach/Equity Approach, given that in a scenario of an eventual departure of the owner/manager (key person), the cash flows generated by the company could change dramatically.

Classification of the valuation methods

1. Asset Based Approach

When should we use the asset-based approach?

3. Another significant aspect in relation to the Asset Based Approach has to do with the fact that the **book value** method is sometimes used as a reference when the valuation method is the multiples of results.

In fact, some acquirers will increase or decrease the multiple, for example, of EBITDA for the purposes of the valuation based on the relationship between the book value and the possible transaction value.

The greater the book value relative to the possible transaction value, the greater the likelihood that a higher earnings multiple will be offered for the purposes of the transaction.

Classification of the valuation methods

Exercise 10

Based on public information search for examples (**one or two** examples) of companies that were valued using the **Asset Based Approach**.

Explain the rationale for the adoption of this method on the examples that you could find.

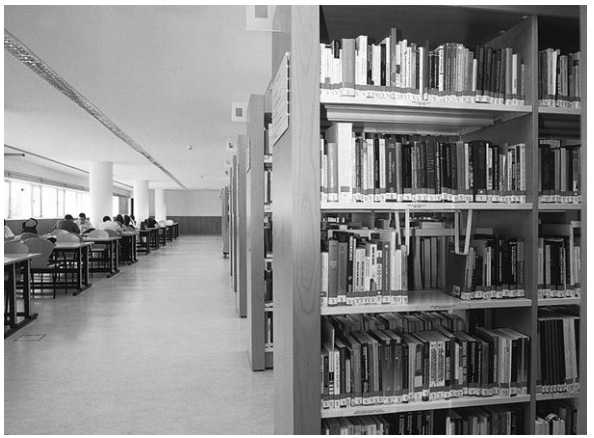
Classification of the valuation methods

2. Market Approach/Relative Valuation

The market approach is based on the premise that in a free market, the supply and demand will adjust in order to achieve the equilibrium price of a company stock.

It is more suitable for companies in the stock exchange. However, it could be also applied to other companies, by using indicators of **similar company** (ies) regarding to **risk, profitability** and **dimension** or using even the average indicators of the sector.

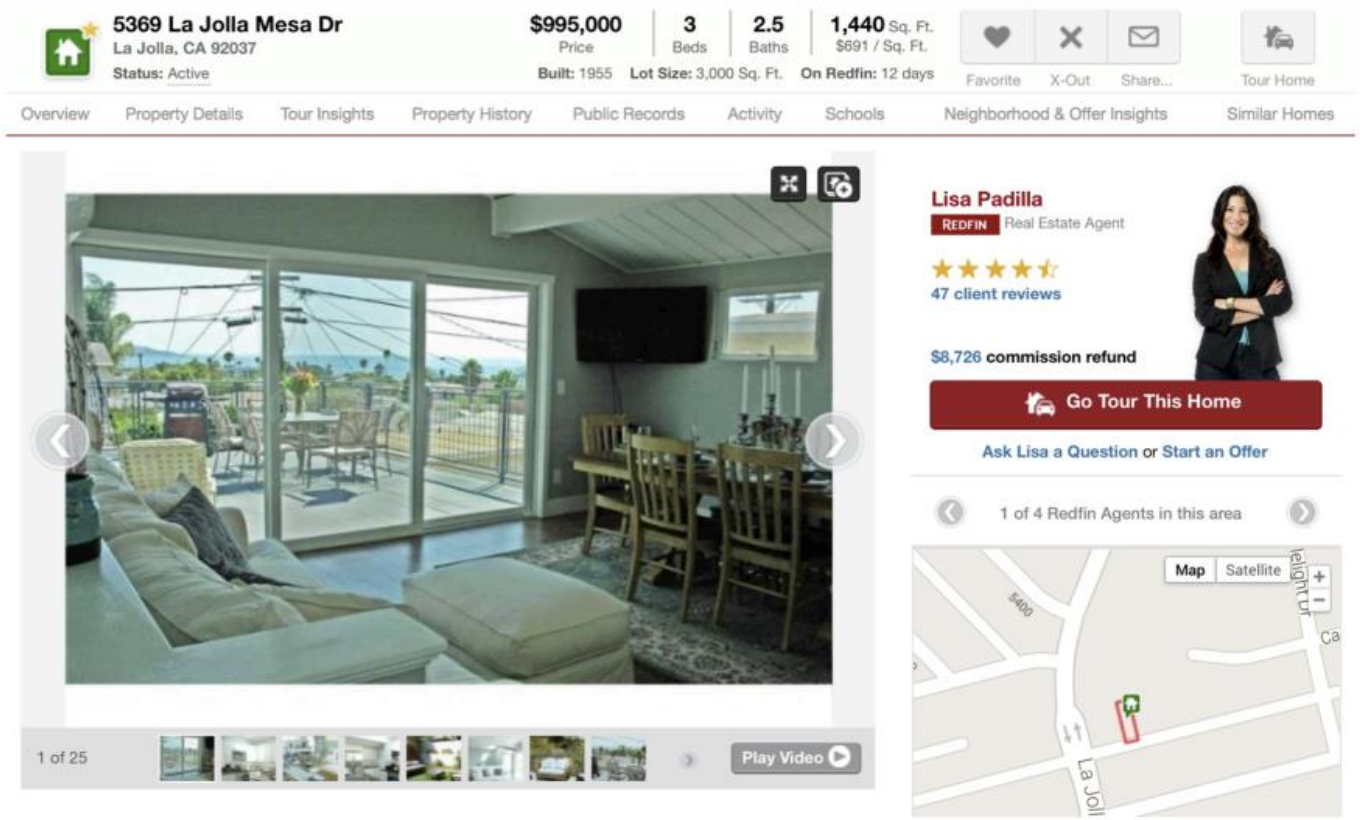
In this case, the company's value is calculated through the **comparisons** with the **transactions** already made in companies' market with similar characteristics.



Classification of the valuation methods

2. Market Approach/Relative Valuation

Question 1: ARE YOU PRICING OR VALUING?



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Classification of the valuation methods

2. Market Approach/Relative Valuation

Question 1: ARE YOU PRICING OR VALUING?

Rating
Buy

Europe
Switzerland

Biotechnology
Biotechnology

Company
BB BIOTECH

Reuters	Bloomberg	Exchange	Ticker
BION.S	BION SW	SWX	BION

Date
13 August 2013

Forecast Change

Price at 12 Aug 2013 (CHF)	124.00
Price Target (CHF)	164.50
52-week range (CHF)	128.40 - 84.90

Strong sector and stock-picking continue

Impressive performance

Over the past two years, BB Biotech shares have roughly tripled, which could tempt investors to take profits. However, this performance has been well backed by a deserved revival of the biotech industry, encouraging fundamental news, M&A, and increased money flow into health care stocks. In addition, BBB returned to index outperformance by modifying its stock-picking approach. Hence, despite excellent performance, the shares still trade at a 23% discount to the net asset value of the portfolio. Hence, the shares are an attractive value vehicle to capture growth opportunities in an attractive sector.

Biotech industry remains attractive

With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money and high liquidity. BB Biotech remains an attractive vehicle to capture the future potential of the biotech sector. In addition, investors benefit from a 23% discount to NAV and attractive cash distribution policy of 5% yield p.a. Hence, we reiterate our Buy on BB Biotech shares.

BB Biotech shares remain attractive

In the first 6M of 2013, BB Biotech increased its NAV by 36%, which marks good outperformance against the Nasdaq Biotech Index (NBI)'s 27%. This is a remarkable performance after 2012, when BBB's NAV increase of 45% also

Key changes

Target Price 106.50 to 164.50 ↑ 54.5%

Source: Deutsche Bank

Price/price relative

Performance (%)	1m	3m	12m
Absolute	-1.4	5.4	37.4
SPI Swiss Performance IX	0.5	-1.4	26.4

Source: Deutsche Bank

L15D

Classification of the valuation methods

2. Market Approach/Relative Valuation

THE ESSENCE OF RELATIVE VALUATION?

- In relative valuation, the value of an asset is compared to the values assessed by the market for similar or comparable assets.

- To do relative valuation then:

  • Identify comparable assets and obtain market values for these assets

  • convert these market values into standardized values (multiples).

  • compare the standardized value or multiple for the asset being analyzed to the standardized values for comparable asset, controlling for any differences between the firms.

L15D

Classification of the valuation methods

2. Market Approach/Relative Valuation

- Most asset valuations are relative.
- Most equity valuations on Wall Street are relative valuations.

• Almost 85% of equity research reports are based upon a multiple and comparables.

• More than 50% of all acquisition valuations are based upon multiples

• Rules of thumb based on multiples are not only common but are often the basis for final valuation judgments.

L15D

Classification of the valuation methods

2. Market Approach/Relative Valuation

THE FOUR STEPS TO DECONSTRUCTING MULTIPLES

- Define the multiple
    - Understand how the multiples have been estimated
- Describe the multiple
    - Use more of the data.
- Analyze the multiple
    - Identify the drivers of pricing
- Apply the multiple
    - Control and compare

L15D

Classification of the valuation methods

2. Market Approach/Relative Valuation

DEFINITIONAL TESTS

Is the multiple consistently defined?

• **Proposition 1:** Both the value (the numerator) and the standardizing variable (the denominator) should be to the same claimholders in the firm.

• Is the multiple uniformly estimated?

• The variables used in defining the multiple should be estimated uniformly across assets in the "comparable firm" list.

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Classification of the valuation methods

2. Market Approach/Relative Valuation

DESCRIPTIVE TESTS

• What is the average and standard deviation for this multiple, across the universe (market)?

• What is the median for this multiple?

• How large are the outliers to the distribution, and how do we deal with the outliers?

• Are there cases where the multiple cannot be estimated?
Will ignoring these cases lead to a biased estimate of the multiple?

• How has this multiple changed over time?

Classification of the valuation methods

2. Market Approach/Relative Valuation

ANALYTICAL TESTS

• What are the fundamentals that determine and drive these multiples?

• **Proposition 2:** Embedded in every multiple are all of the variables that drive every discounted cash flow valuation - growth, risk and cash flow patterns.

• How do changes in these fundamentals change the multiple?

• **Proposition 3:** It is impossible to properly compare firms on a multiple, if we do not know the nature of the relationship between fundamentals and the multiple.

Classification of the valuation methods

2. Market Approach/Relative Valuation

APPLICATION TESTS

• Given the firm that we are valuing, what is a “comparable” firm?

• **Proposition 4:** There is no reason why a firm cannot be compared with another firm in a very different business, if the two firms have the same risk, growth and cash flow characteristics.

• Given the comparable firms, how do we adjust for differences across firms on the fundamentals?

• **Proposition 5:** It is impossible to find an exactly identical firm to the one you are valuing.

Classification of the valuation methods

2. Market Approach/Relative Valuation

According to NEVES (2002a), in the Market Approach/Relative Valuation the financial analysts and the investors try to **analyze the value** of the **companies by comparison with its main competitors**.

For this end, they use several indicators, such as the ***Price Earnings Ratio* (PER)**, ***Price Book Value* (PBV)** and the ***Price Sales Ratio* (PSR)**.

PER has an important meaning within the market approach, and that is why we will detail its main concepts in the following slides.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

PER is a valuation ratio of a company's current share price compared to its per-share earnings.

In fact, it indicates **how much times** the **share is worth** compared to **profit**.

This technique is based on calculating the **Earning Per Share** (EPS), and the **Price Earnings Ratio** (PER), and takes into account possible adjustments coming from equity increases that have occurred in the period on which the analysis is being made.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Although it must be carefully analyzed, according to some authors, what we can see is:

- The companies with the highest growing trends, have usually a higher PER, between 20 and 50.

- If the company grows slightly over the inflation, then the company's PER will usually be between 10 and 20.

The formula to estimate the PER is:

PER = Share Price / EPS

With this formula is possible to determine the **company's value** through another one:

Value = estimated PER × expected EPS

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

PE = Market Price per Share / Earnings per Share

• There are a number of variants on the basic PE ratio in use. They are based upon how the price and the earnings are defined.

• Price: is usually the current price
is sometimes the average price for the year

• EPS:
earnings per share in most recent financial year
earnings per share in trailing 12 months (Trailing PE)
forecasted earnings per share next year (Forward PE)
forecasted earnings per share in future year

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Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Example of some statistics

WITH KEY STATISTICS

	Current PE	Trailing PE	Forward PE
Number of firms	7480	7480	7480
Number with PE	3,344.	3,223.	2,647.
Average	59.42	46.04	29.63
Median	18.53	18.29	16.98
Minimum	0.11	0.28	0.15
Maximum	32,269.00	6,900.00	2,748.00
Standard deviation	777.02	256.06	81.27
Standard error	13.44	4.51	1.58
Skewness	37.27	19.9	18.74
25th percentile	11.88	12.32	13.1
75th percentile	30.25	29.52	24.28

Source: Damodaran *US firms in January 2016*

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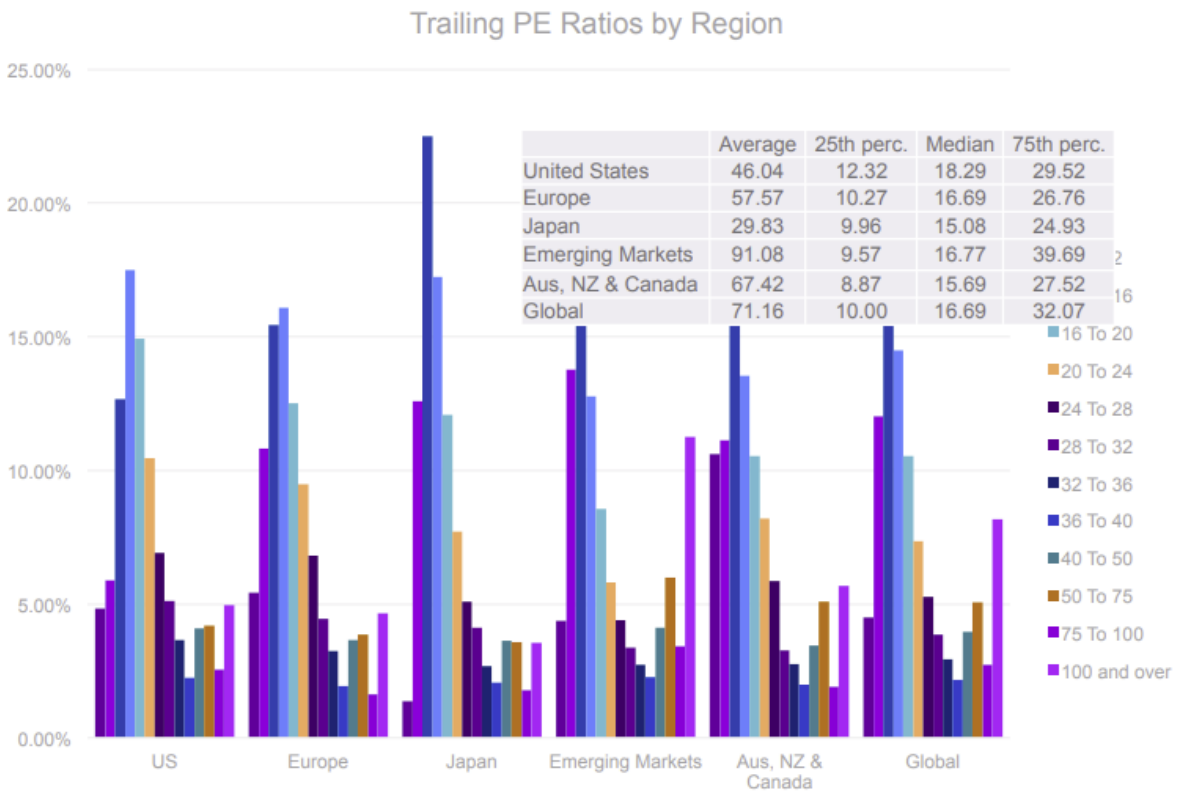
Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Example of some statistics



	Average	25th perc.	Median	75th perc.
United States	46.04	12.32	18.29	29.52
Europe	57.57	10.27	16.69	26.76
Japan	29.83	9.96	15.08	24.93
Emerging Markets	91.08	9.57	16.77	39.69
Aus, NZ & Canada	67.42	8.87	15.69	27.52
Global	71.16	10.00	16.69	32.07

L16D

Source: Damodaran

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

The Trailing P/E Ratio, also known as the Price-to-Earnings (P/E) Ratio based on trailing earnings, is a widely used financial metric in corporate finance and investment analysis. It measures the valuation of a company's stock by comparing its current market price per share to its earnings per share (EPS) over the trailing 12 months. Here's the formula:

Trailing P/E Ratio = Market Price per Share / Earnings per Share in Trailing 12 Months

In this formula:

- "Market Price per Share" is the current market price of one share of the company's stock.
- "Earnings per Share in Trailing 12 Months" represents the company's total earnings over the past 12 months divided by the total number of outstanding shares.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

PE RATIO: THE ANALYTICS

- To understand the fundamentals, start with a basic equity discounted cash flow model.
- With the dividend discount model,

$$P_0 = \frac{DPS_1}{r - g_n}$$

- Dividing both sides by the current earnings per share,

$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- If this had been a FCFE Model,

$$P_0 = \frac{FCFE_1}{r - g_n}$$

$$\frac{P_0}{EPS_0} = PE = \frac{(FCFE/Earnings) * (1 + g_n)}{r - g_n}$$

L16D

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

AND EXAMPLE: COMPARING PE RATIOS ACROSS A SECTOR

Company Name	PE	Growth
PT Indosat ADR	7.8	0.06
Telebras ADR	8.9	0.075
Telecom Corporation of New Zealand ADR	11.2	0.11
Telecom Argentina Stet - France Telecom SA ADR B	12.5	0.08
Hellenic Telecommunication Organization SA ADR	12.8	0.12
Telecomunicaciones de Chile ADR	16.6	0.08
Swisscom AG ADR	18.3	0.11
Asia Satellite Telecom Holdings ADR	19.6	0.16
Portugal Telecom SA ADR	20.8	0.13
Telefonos de Mexico ADR L	21.1	0.14
Matav RT ADR	21.5	0.22
Telstra ADR	21.7	0.12
Gilat Communications	22.7	0.31
Deutsche Telekom AG ADR	24.6	0.11
British Telecommunications PLC ADR	25.7	0.07
Tele Danmark AS ADR	27	0.09
Telekomunikasi Indonesia ADR	28.4	0.32
Cable & Wireless PLC ADR	29.8	0.14
APT Satellite Holdings ADR	31	0.33
Telefonica SA ADR	32.5	0.18
Royal KPN NV ADR	35.7	0.13
Telecom Italia SPA ADR	42.2	0.14
Nippon Telegraph & Telephone ADR	44.3	0.2
France Telecom SA ADR	45.2	0.19
Korea Telecom ADR	71.3	0.44

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Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

PE, GROWTH AND RISK

- Dependent variable is: PE
- R squared = 66.2% R squared (adjusted) = 63.1%

Variable	*Coefficient*	*SE*	*t-ratio*	*prob*
Constant	13.1151	3.471	3.78	0.0010
Growth rate	121.223	19.27	6.29	≤ 0.0001
Emerging Market	-13.8531	3.606	-3.84	0.0009

Emerging Market is a dummy: 1 if emerging market
0 if not

L16D

Source: Damodaran

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

IS TELEBRAS UNDER VALUED?

- Predicted PE = 13.12 + 121.22 (.075) - 13.85 (1) = 8.35
- At an actual price to earnings ratio of 8.9, Telebras is slightly overvalued.

L16D

Source: Damodaran

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

- DEPENDENT VARIABLE IS: **PE**
- DUMMY VARIABLE: **1** IF EMERGING MARKET, **0** IF NOT

Telebras ADR	*8.9*	*0.075*

- R SQUARED = **66.2%**
- R SQUARED (ADJ) = **63.1%**

PREDICTED PE = 13.12 + 121.22 (EXPECTED GROWTH) - 13.85 (MKT DUMMY)

PREDICTED PE = 13.12 + 121.22 (EXPECTED GROWTH) - 13.85 (MKT DUMMY)

PREDICTED PE = 13.12 + 121.22 (0.075) - 13.85 (1) = 8.35

TELEBRAS IS SLIGHTLY OVERVALUED AT 8.9

Statistics/econometrics can be a usefull tool in controling for differences.

L16D

Source: Damodaran

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

PE RATIO REGRESSIONS ACROSS MARKETS – JANUARY 2016

Region	Regression – January 2016	R^2
US	PE = 8.76 + 75.24 g_{EPS} + 19.73 Payout – 4.08 Beta	40.5%
Europe	PE = 13.43 + 54.46 g_{EPS} + 17.63 Payout - 4.16 Beta	24.7%
Japan	PE = 20.10+ 26.46 g_{EPS} + 24.87 Payout – 7.60 Beta	28.4%
Emerging Markets	PE = 15.13 + 40.99 g_{EPS} + 9.03 Payout - 2.14 Beta	11.5%
Australia, NZ, Canada	PE = 7.31 + 73.42 g_{EPS} + 13.94 Payout – 3.73 Beta	26.8%
Global	PE = 12.51 + 87.48 g_{EPS} + 11.48 Payout - 3.96 Beta	27.5%

g_{EPS}=Expected Growth: Expected growth in EPS or Net Income: Next 5 years
Beta: Regression or Bottom up Beta
Payout ratio: Dividends/ Net income from most recent year. Set to zero, if net income < 0

L16D

Source: Damodaran

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Exercise 11

Based on public information search the PER of 4 or 5 companies in different market segments in Europe and in the USA for the **year 2022**.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Exercise 12

Take a company
Obtain its growth rate
Obtain its Beta
Obtain its payout ratio

Plug it into the regression for the region of the world from where the company comes from

Question: See what the predicted PE Ratio is and compare with its current PE Ratio.

Source: Damodaran

L16D

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

In order to calculate **EPS,** we need to divide the **expected result**, after taxes, by the **number of shares** that represent the total company's equity.

When the net profit is adjusted, it must be taken into account its continuity, excluding the nonrecurring items that occurred during the year in question.

It is relatively common the **comparison** between the **EPS and the PER of the company** with the **EPS and the PER of the industry average** on which the company works.

Often a **company** is **valuated** by comparison with another company through its **PER**.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

When we choose to compare two or more companies, we must take into account that those companies must follow the same accounting criteria, for example, about:

- Capitalization of Costs
- Depreciations, amortizations and provisions of the exercise
- Capital gains and losses(*)

When **PER ratio** is **multiplied** by the **number of shares** and by the **net profit** of the company, we obtain the **market value** of the **equity** or **market capitalization *("market cap")***.

(*) Mais-valias e menos-valias

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Limitations

Despite of being an indicator quite used, it presents some **limitations**, that are based on a **stable relation** between the **company's value** and its **results**.

Another limitation is related to the inability to overcome the difficulty posed by **companies** that **do not generate positive results**, as happens with some companies that operate in information technologies or biotechnology, in the **beginning** of their **activity**.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Advantages and Disadvantages

Some **advantages** of using this method are the following:

- It is easy to use
- It incorporates the perceptions/insights of the market
- It allows with relative ease to measure the value of all the companies of a determined sector and to compare it with the industry average.
- It reflects the profitability, growth and risk of the company. It is assumed that companies in the sector are comparable, that the market is efficient in terms of quotations and that the assumptions about risk, growth and profitability are already implicit in the comparisons carried out.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Advantages and Disadvantages (cont)

Some **disadvantages** of using this method are the following:

- Companies with **different accounting criteria** are not easily comparable, since the PER is influenced by these criteria.
- It is relatively **difficult** to **find two companies** that can be considered **comparable** as it is very rare for two or more competing companies to present the same level of **risk**, **profitability** and identical forecasts of **future growth**.
- It is based on the assumption of a **stable relationship** between the **company's value** and its **results**.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Advantages and Disadvantages (cont)

- When a company has **losses**, the **PER cannot** be **used** as it has no meaning - this situation is relatively frequent, for example, in some companies operating in the information technology and biotechnology sector, in the beginning of their activity

- The **PER** value can be influenced, so it could become **volatile**.

Classification of the valuation methods

2. Market Approach/Relative Valuation

2.1. PER

Exercise 13

Based on public information search the PER of 2 companies for a period of 10 years (from 2013 to 2022.

What can you conclude about PER evolution during the mentioned time horizon?

Classification of the valuation methods

2. Market Approach/Relative Valuation

The use of other multiples for company valuation purposes

It is common to use other multiples for the purpose of evaluating companies, such as Sales multiples, EBIT or EBITDA multiples.

Sales multiples

Sales multiples are one of the most widely used benchmarks of company valuation methods.

The information required is annual sales and a sector multiple, which in most sectors will be between 0.25 and 1, although in some sectors it may be lower and in others higher.

Ex. Travel agencies - 0.1

Technology companies - 1,5

Classification of the valuation methods

2. Market Approach/Relative Valuation

The use of other multiples for company valuation purposes

Advantages

The main advantage of this method is its ease of calculation as well as the fact that it is quite intuitive.

Disadvantages

A disadvantage of this method is that it assumes the existence of **recent transactions** in a given sector of activity, which is not always the case.

Another disadvantage resides in the fact that companies within the same sector of activity can have significantly **different cost structures** and, as such, companies that, although they may have similar sales, present very different levels of profitability.

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

The EBIT (or EBITDA) method, as a variant of the PER, has some advantages over the latter.

In the case of EBIT, the problems of differences in indebtedness (debt level/leverage) and in the tax situation compared to comparable companies are avoided.

In EBITDA, as in EBIT, the need to adjust indebtedness (debt level/leverage) and taxation is avoided, and additionally, the problem of accounting criteria for **depreciation** and **amortization** is eliminated, as these are not deducted.

Both methods ignore **changes in fixed assets** and in **working capital**, which can be misleading.

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

$$\text{EV/EBITDA} = \frac{\text{(MARKET VALUE OF EQUITY + DEBT - CASH)}}{\text{EBITDA}}$$

$$Market\ Value\ of\ Equity = EV - Debt + Cash$$

$$EV_0 = \frac{FCFF}{WACC - g}$$

$$EV = \frac{EBITDA\ (1-t) + Depr\ (t) - Cex - \Delta\ Working\ Capital}{WACC - G}$$

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

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L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

The Determinants of Value/EBITDA Multiples: Linkage to DCF Valuation

- The value of the operating assets of a firm can be written as:

$$EV_0 = \frac{FCFF_1}{WACC - g}$$

- The numerator can be written as follows:

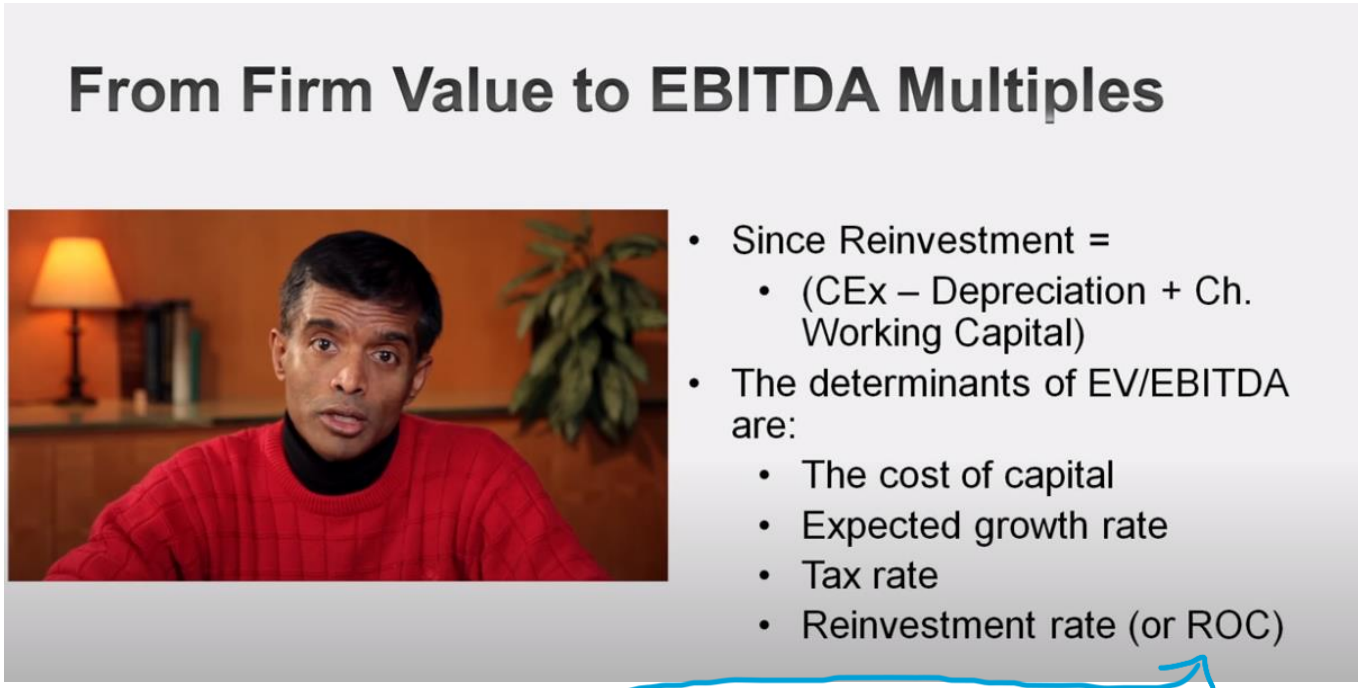
FCFF = EBIT (1-t) - (CEx - Depr) - Ch. in Working Capital
= (EBITDA - Depr) (1-t) - (CEx - Depr) - Ch. in Working Capital
= EBITDA (1-t) + Depr (t) - CEx - Ch. Working in Capital

More detailed explanation on the video: https://www.youtube.com/watch?v=xI-KTlxfNDU

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)



https://www.youtube.com/watch?v=xI-KTlxfNDU

ROC – Return on Capital

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

FCFF = EBIT (1-t) – (CEx – Depr) – Ch. In Working Capital

= (EBITDA – Depr) (1-t) – (CEx – Depr) - Ch. In Working Capital =

= (EBITDA) x (1-t) – (Depr) (1-t) – (CEx – Depr) - Ch. In Working Capital =

= (EBITDA) x (1-t) – Depr (1) + Depr (t) – (CEx – Depr) - Ch. In Working Capital =

= (EBITDA) x (1-t) – Depr (1) + Depr (t) – (CEx) + (Depr) - Ch. In Working Capital =

= (EBITDA) x (1-t) + Depr (t) – (CEx) + - Ch. In Working Capital

FCFF = EBIT (1-t) – (CEx – Depr) – Ch. In Working Capital

FCFF = (EBITDA) x (1-t) + Depr (t) – (CEx) – Ch. In Working Capital

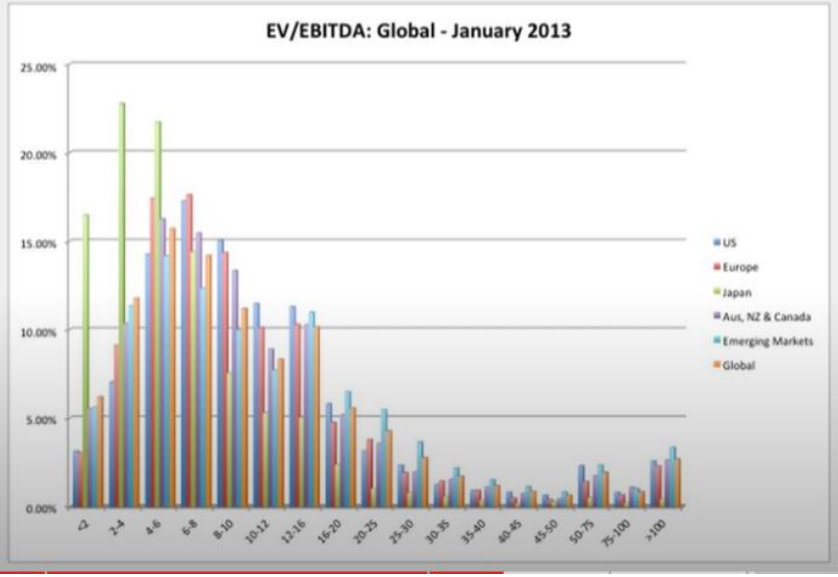
Atention: this is a **multiplication** by **t** (income tax rate)

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or **EBITDA** (Earnings Before Interest, Taxes, Depreciation and Amortization)

Enterprise Value/EBITDA: Global Data
6 times EBITDA seems like a good rule of thumb…



	25th percentile	Median	75th percentile
US	6.08	9.11	14.17
Europe	5.49	8.36	13
Japan	2.79	4.91	7.94
Aus, NZ & Canada	5.05	8.31	13.67
Emerging Markets	5.16	9.23	17.58
Global	4.91	8.33	14.78

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

A SIMPLE EXAMPLE

- Consider a firm with the following characteristics:
  - Tax Rate = 36%
  - Capital Expenditures/EBITDA = 30%
  - Depreciation/EBITDA = 20%
  - Cost of Capital = 10%
  - The firm has no working capital requirements
  - The firm is in stable growth and is expected to grow 5% a year forever.
- In this case, the Value/EBITDA multiple for this firm can be estimated as follows:

$$\frac{\text{Value}}{\text{EBITDA}} = \frac{(1-.36)}{.10-.05} + \frac{(0.2)(.36)}{.10-.05} - \frac{0.3}{.10-.05} - \frac{0}{.10-.05} = 8.24$$

L17D

The intrinsic EBITDA for this company is 8,24

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

CONSIDER A FIRM WITH THE FOLLOWING CHARACTERISTICS:

TAX RATE	36%
CAP EX/EBITDA	30%
DEPR/EBITDA	20%
COST OF CAPITAL	10%

- NO WORKING CAPITAL REQUIREMENTS
- STABLE GROWTH/ EXPECTED TO GROW AT 5% A YEAR FOREVER

$$\frac{EV}{EBITDA} = \frac{(1-t)}{WACC-g} + \frac{Depr(t)/EBITDA}{WACC-g} - \frac{Cex/EBITDA}{WACC-g} - \frac{\triangle Working\ Capital}{WACC-g}$$

$$\frac{VALUE}{EBITDA} = \frac{(1-.36)}{.10-.05} + \frac{(0.2)(.36)}{.10-.05} - \frac{0.3}{.10-.05} - \frac{0}{.10-.05}$$

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

CONSIDER A FIRM WITH THE FOLLOWING CHARACTERISTICS:

TAX RATE	36%
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- NO WORKING CAPITAL REQUIREMENTS
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$$\frac{EV}{EBITDA} = \frac{(1-t)}{WACC-g} + \frac{Depr(t)/EBITDA}{WACC-g} - \frac{Cex/EBITDA}{WACC-g} - \frac{\triangle Working\ Capital}{WACC-g}$$

$$\frac{VALUE}{EBITDA} = \frac{(1-.36)}{.10-.05} + \frac{(0.2)(.36)}{.10-.05} - \frac{0.3}{.10-.05} - \frac{0}{.10-.05} = 8.24$$

In an intrinsic value world this company should trade at 8,24 times EBITDA

L17D

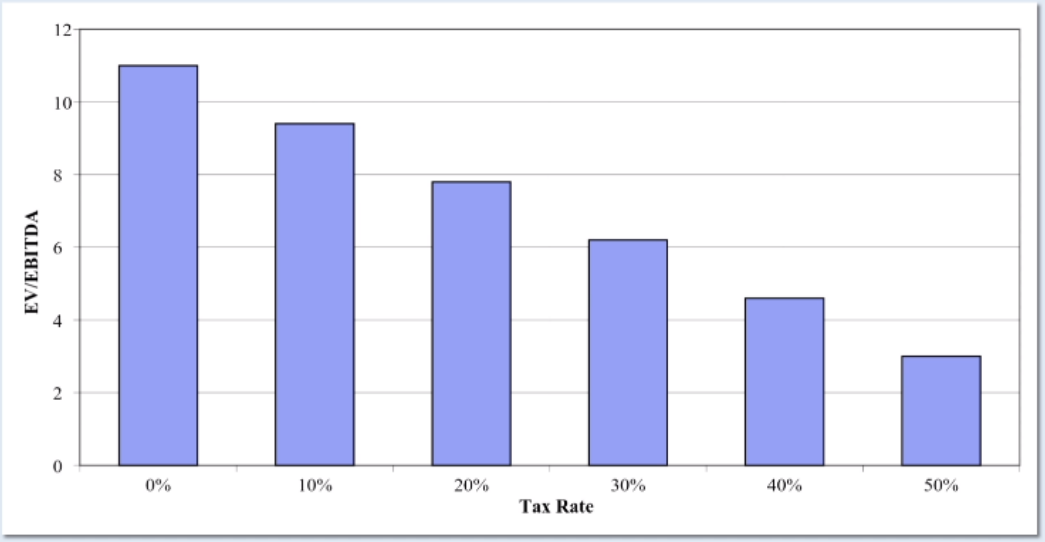
Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

How does this number changes as we change the variables?

If we change each variable at each time:



As tax rate increase the Enterprise Value to EBITDA decreases

=>cash flows go down

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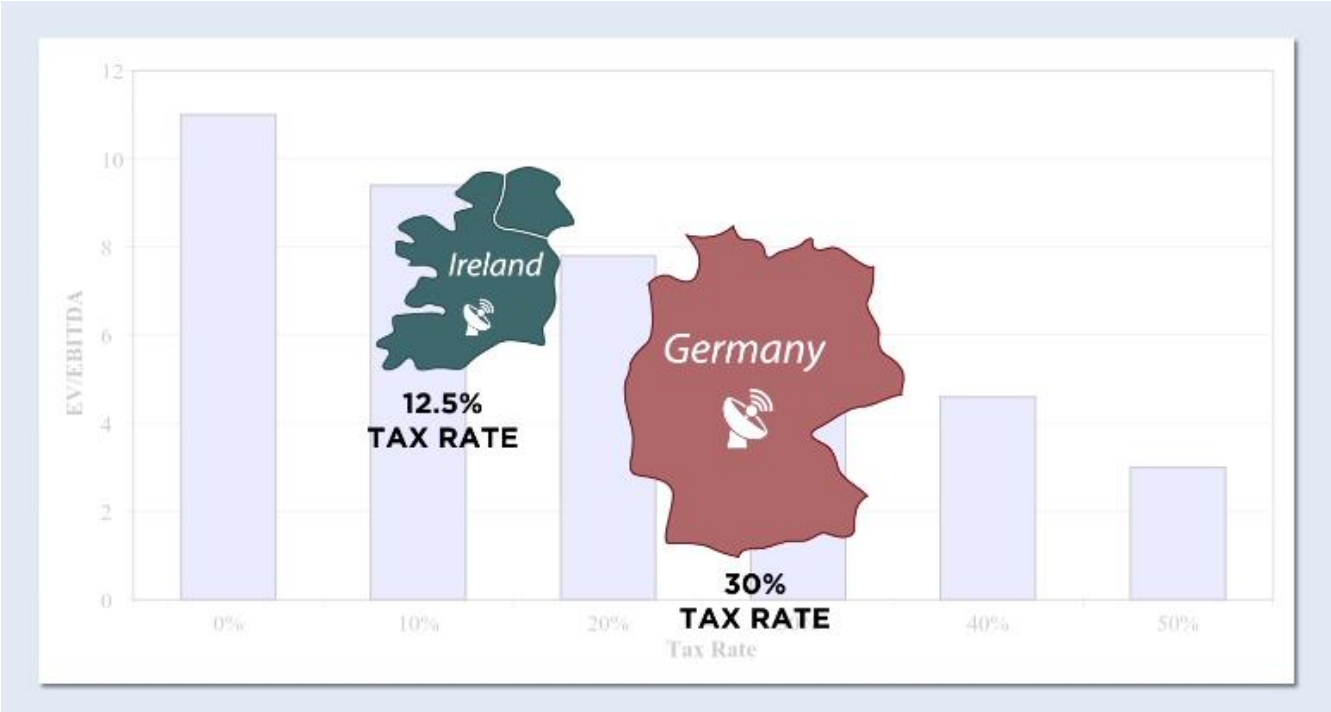
Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)



Deutsche Telekom may look cheaper, because of a highter tax rate

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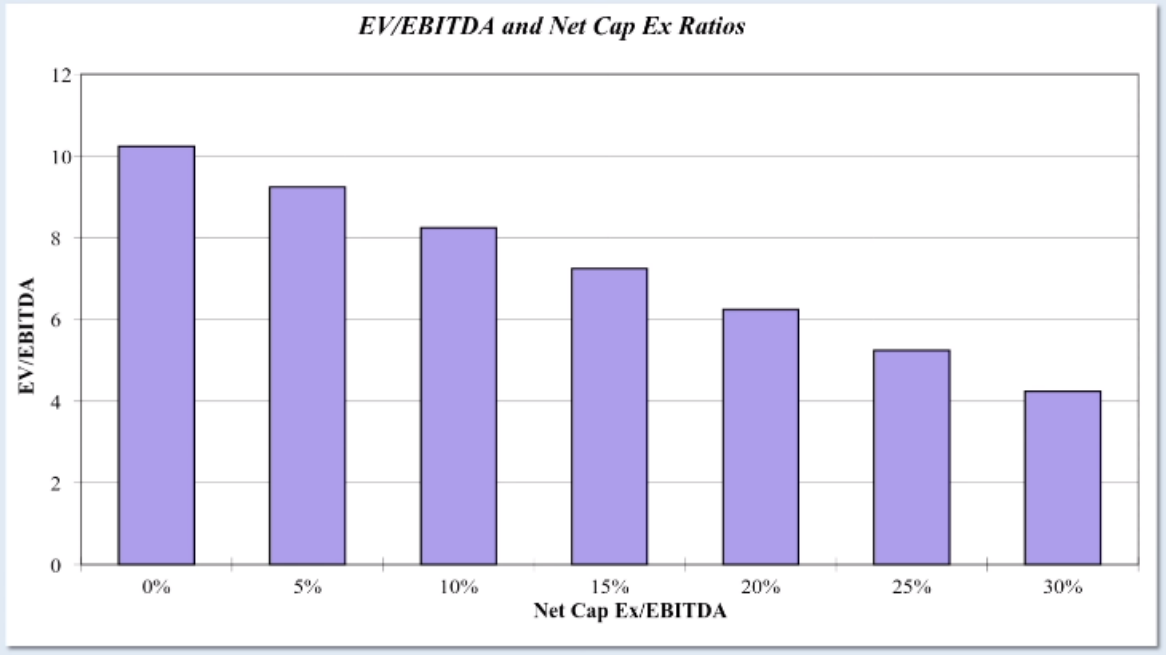
Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)



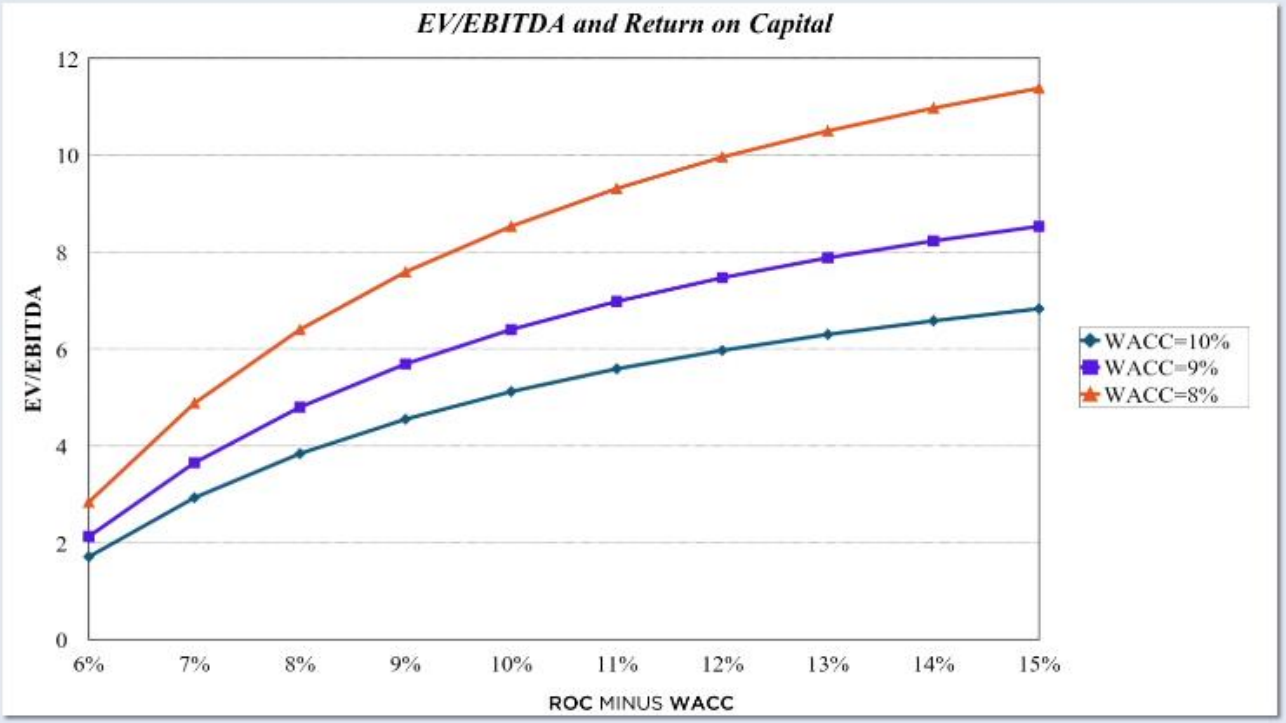
More I reinvest back in the business to get the same growth the lower the EBITA multiple will be for the company

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)



ROC – return on capital

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

When we look to companies we look to cheap companies

We want to buy a stock with:

- Low EV/EBITDA
- Low tax rate
- Low reinvestment rate
- High return on capital

This is how we bring the fundamentals to the process

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

II. EV TO EBITDA - DETERMINANTS

- The value of the operating assets of a firm can be written as:

$$EV_0 = \frac{FCFF_1}{WACC - g}$$

- Now the value of the firm can be rewritten as

$$EV = \frac{EBITDA\,(1-t) + Depr\,(t) - Cex - \Delta\,Working\ Capital}{WACC - g}$$

- Dividing both sides of the equation by EBITDA,

$$\frac{EV}{EBITDA} = \frac{(1-t)}{WACC - g} + \frac{Depr\,(t)/EBITDA}{WACC - g} - \frac{CEx/EBITDA}{WACC - g} - \frac{\Delta\ Working\ Capital/EBITDA}{WACC - g}$$

- The determinants of EV/EBITDA are:
  - The cost of capital
  - Expected growth rate
  - Tax rate
  - Reinvestment rate (or ROC)

L17D

Classification of the valuation methods

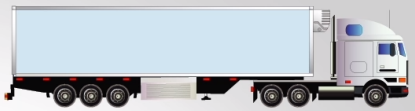
2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

Example:

Company Name	Value	EBITDA	Value/EBITDA
KLLM Trans. Svcs.	$ 111.32	$ 18.81	2.31
Ryder System	$ 5,158.04	$ 1,838.26	2.81
Rollins Truck Leasing	$ 1,368.35	$ 447.67	3.06
Cannon Express Inc.	$ 83.57	$ 27.05	3.09
Hunt (J.B.)	$ 982.67	$ 310.22	3.17
Yellow Corp.	$ 931.47	$ 292.82	3.18
Roadway Express	$ 554.96	$ 169.38	3.28
Marten Transport Ltd.	$ 116.93	$ 35.62	3.28
Kenan Transport Co.	$ 67.66	$ 19.44	3.48
M.S. Carriers	$ 344.93	$ 97.85	3.53
Old Dominion Freight	$ 170.42	$ 45.13	3.78
Trimac Ltd	$ 661.18	$ 171.28	3.79
Matlack Systems	$ 112.42	$ 28.94	3.88
XTRA Corp.	$ 1,708.57	$ 427.30	4.00
Covenant Transport Inc	$ 259.16	$ 64.35	4.03
Builders Transport	$ 221.09	$ 51.44	4.30
Werner Enterprises	$ 844.39	$ 196.15	4.30
Landstar Sys.	$ 422.79	$ 95.20	4.44
AMERCO	$ 1,632.30	$ 345.78	4.72
USA Truck	$ 141.77	$ 29.93	4.74
Frozen Food Express	$ 164.17	$ 34.10	4.81
Arnold Inds.	$ 472.27	$ 96.88	4.87
Greyhound Lines Inc.	$ 437.71	$ 89.61	4.88
USFreightways	$ 983.86	$ 198.91	4.95
Golden Eagle Group Inc.	$ 12.50	$ 2.33	5.37
Arkansas Best	$ 578.78	$ 107.15	5.40
Airlease Ltd.	$ 73.64	$ 13.48	5.46
Celadon Group	$ 182.30	$ 32.72	5.57
Amer. Freightways	$ 716.15	$ 120.94	5.92
Transfinancial Holdings	$ 56.92	$ 8.79	6.47
Vitran Corp. 'A'	$ 140.68	$ 21.51	6.54
Interpool Inc.	$ 1,002.20	$ 151.18	6.63
Intrenet Inc.	$ 70.23	$ 10.38	6.77
Swift Transportation	$ 835.58	$ 121.34	6.89
Landair Services	$ 212.95	$ 30.38	7.01
CNF Transportation	$ 2,700.69	$ 366.99	7.36
Budget Group Inc	$ 1,247.30	$ 166.71	7.48
Caliber System	$ 2,514.99	$ 333.13	7.55
Knight Transportation Inc	$ 269.01	$ 28.20	9.54
Heartland Express	$ 727.50	$ 64.62	11.26
Greyhound CDA Transn Corp	$ 83.25	$ 6.99	11.91
Mark VII	$ 160.45	$ 12.96	12.38
Coach USA Inc	$ 678.38	$ 51.76	13.11
US 1 Inds Inc.	$ 5.60	$ (0.17)	NA
AVERAGE FOR TRUCKING SECTOR			5.61

TRUCKING SECTOR



L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

TRUCKING SECTOR

Company Name	Value	EBITDA	Value/EBITDA
KLLM Trans. Svcs.	$ 114.32	$ 48.81	2.34
Ryder System	$ 5,158.04	$ 1,838.26	2.81
Rollins Truck Leasing	$ 1,368.35	$ 447.67	3.06
Cannon Express Inc.	$ 83.57	$ 27.05	3.09
AVERAGE FOR TRUCKING SECTOR			5.61

RYDER SYSTEM LOOKS VERY CHEAP ON A VALUE/EBITDA MULTIPLE BASIS, RELATIVE TO THE REST OF THE SECTOR

Why?

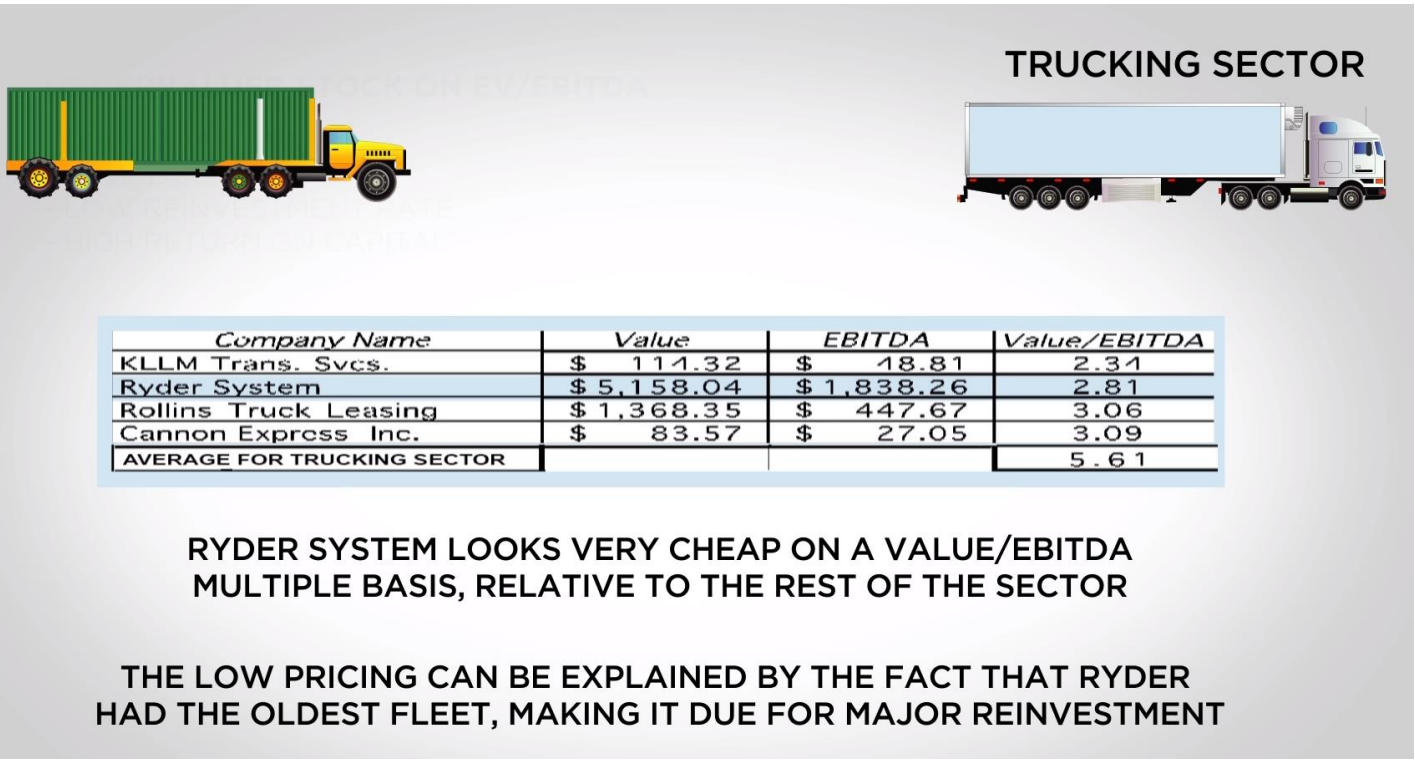
L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

Answer



L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

When we look first to Ryder Systems it looks cheap but then when we control for reinvestment that is just about to happen it does not look cheap anymore.

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or **EBITDA** (Earnings Before Interest, Taxes, Depreciation and Amortization)

EV/EBITDA – MARKET REGRESSIONS

Region	Regression – January 2016	R squared
United States	EV/EBITDA= 19.54 + 3.64 g - 1.97 WACC – 12.71 DFR – 3.30 Tax Rate	2.3%
Europe	EV/EBITDA= 17.28 + 18.82 g - 17.94 WACC – 7.55 DFR – 9.10 Tax Rate	9.0%
Japan	EEV/EBITDA= 22.49 + 1.75 g - 79.45 WACC – 6.03 DFR – 19.00 Tax Rate	6.8%
Emerging Markets	EV/EBITDA= 50.71 + 9.57 g - 212.55 WACC – 18.27 DFR – 21.40 Tax Rate	5.9%
Australia, NZ & Canada	EV/EBITDA= 25.86+ 10.10 g - 162.14 WACC – 1.41 DFR – 10.50 Tax Rate	8.6%
Global	EV/EBITDA= 27.42 + 6.90 g -55.15 WACC – 12.03 DFR – 16.20 Tax Rate	3.7%

g = Expected Revenue Growth: Expected growth in revenues: Near term (2 or 5 years)
DFR = Debt Ratio : Total Debt/ (Total Debt + Market value of equity)
Tax Rate: Effective tax rate in most recent year WACC = Cost of capital (in US$)

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

PEG ratios

PEG Ratio = PE ratio / Expected Growth Rate in EPS

PEG ratios like PER ratios are afected by expected growth, payout and risk.

It is also possible to run a regression for the all market:

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or **EBITDA** (Earnings Before Interest, Taxes, Depreciation and Amortization)

PEG ratios

Region	Regression – January 2016	R squared
United States	PEG = -0.58 + 1.85 Payout – 1.25 ln(g) -0.675 Beta	51.3%
Europe	PEG = 0.71 Payout –1.08 ln(g) -0.337 Beta	41.2%
Japan	PEG = 0.69 Payout –1.11 ln(g) -0.451 Beta	42.9%
Emerging Markets	PEG = 0.67 Payout –0.76 ln(g) -0.214 Beta	22.2%
Australia, NZ & Canada	PEG = 0.69 Payout –1.08 ln(g) -0.437 Beta	44.3%
Global	PEG = -0.392 + 1.32 Payout –1.15 ln(g) -0.435 Beta	38.4%

g = EXPECTED EPS GROWTH

PAYOUT = DIVIDENDS / NET INCOME

BETA = REGRESSION BETA

L17D

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

Advantages

This method also has as its main advantage the ease of calculation, once the EBIT or EBITDA is calculated, the value results only from multiplying this by the multiple that is agreed upon.

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

Disadvantages

The main disadvantage of EBIT (or EBITDA) lies in the fact that, as mentioned companies can be very different and as such this method sometimes distorts the analysis of value.

This is a method that has become **very popular** as an estimator of value, often hearing comments from company decision makers mentioning that the value of the company is 5 to 6 times EBIT or EBTIDA.

This type of comment lacks, however, scientific rigor.

Classification of the valuation methods

2. Market Approach/Relative Valuation

Multiples of EBIT (Earnings Before Interest and Taxes) or EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)

Limitations in using EBITDA (or EBIT)

No two companies are the same. Even two companies operating in the same sector of activity, from a valuation point of view, can be significantly different. The application of the EBITDA multiples concept to all businesses does not respect these differences. Among other limitations, the following can be mentioned:

- It is an analysis of the past
- It is not *cash flow*
- Ignores the risk
- Ignores the amount of invested capital
- It is subject to manipulation

In summary, while the value of a business or a company can be expressed as a multiple of EBITDA, multiples of EBITDA do not determine value.

Classification of the valuation methods

2. Market Approach/Relative Valuation

An illustrative example of the limitations previously mentioned

To illustrate the limitations of EBITDA, consider the empirical example of two industrial companies operating in the same industry. Both generate the same EBITDA as shown below.

	Company A	% (sales)	Company B	% (sales)
Sales	50,000		75,000	
Gross Margin	17,500	35%	22,500	30%
Operating Results	7,500	15%	6,750	9%
Amortization	2,500		3,250	
EBITDA	**10,000**		**10,000**	
Working Capital Needs	9,000	18%	19,000	25%
Investment in fixed assets	2,000		3,000	
Invested Capital	25,500		48,500	
Return on invested capital	31%		15%	

Company A, smaller, invested in systems and equipment that contributed to greater efficiency as can be seen in the higher gross margin (in relative terms) as well as in the more efficient use of working capital

Classification of the valuation methods

2. Market Approach/Relative Valuation

An illustrative example of the limitations previously mentioned

Initially, it could be assumed that the larger company (company B) would be worth more considering a Sales multiple, or, considering an **equal EBITDA multiple** for both businesses, it would be said that the two companies would have a similar value.

However, a more careful analysis would reveal that not only the operational performance of **company A** is considerably **better** than the performance of company B, but also that company A has a more effective management of its balance sheet.

Classification of the valuation methods

2. Market Approach/Relative Valuation

	Company A	% (sales)	Company B	% (sales)
Sales	50,000		75,000	
Gross Margin	17,500	35%	22,500	30%
Operating Results	7,500	15%	6,750	9%
Amortization	2,500		3,250	
EBITDA	**10,000**		**10,000**	
Working Capital Needs	9,000	18%	19,000	25%
Investment in fixed assets	2,000		3,000	
Invested Capital	25,500		48,500	
Return on invested capital	31%		15%	

In view of a longer average collection period and a longer average inventory period, **company B** requires proportionately more investment to generate one euro in sales.

With a **lower net cash flow** (EBITDA – Investment in Fixed Assets) and a higher investment in current assets, the **return** on **invested capital** for company B is about half of that generated by company A.

Contrary to the conclusion reached through the use of EBITDA multiples, an analysis based on value fundamentals would indicate that **company A** has a **higher value than company B**.

31% = (10.000 – 2000)/25.500

Exercise

Exercise 14

Based on public information search for examples (**one or two** examples) of companies that were valued using the **Market approach/ Relative Valuation**.

Explain the rationale for the adoption of this method on the examples that you could find.

Exercise

Exercise 15

Present a:

- Valuation (equity value) of a company listed in the PSI following the PER multiple method.
- Valuation (equity value) of the same company using the EBITDA multiple method.

Additionally, should be done a:

More detailed explanation of the PER used.

More detailed explanation of the EBITDA used.

PSI Index Composition

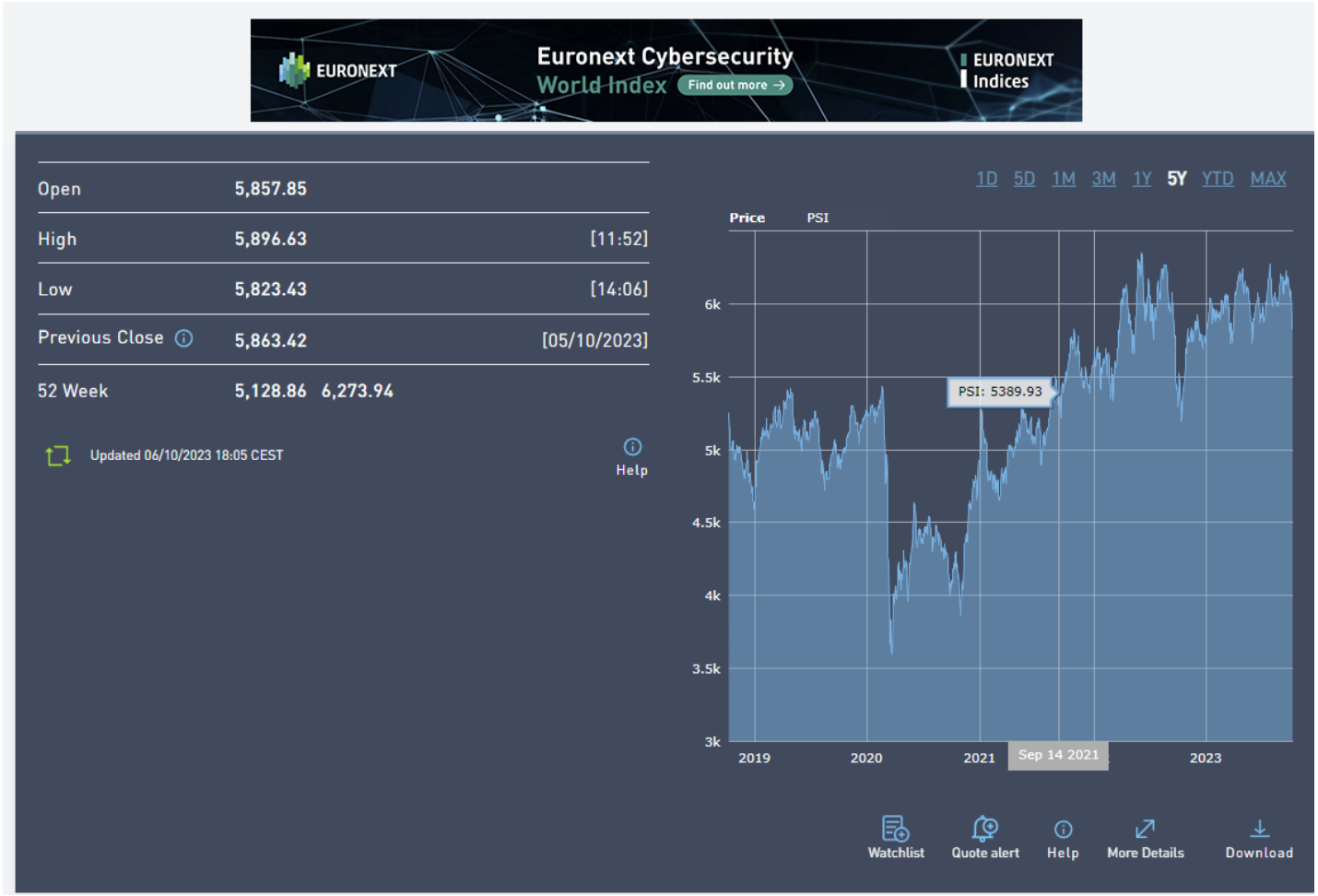
PSI
INDEX COMPOSITION

05/10/2023

COMPONENT	ISIN	TRADING LOCATION	ISSUER COUNTRY
ALTRI SGPS	PTALT0AE0002	Euronext Lisbon	Portugal
B.COM.PORTUGUES	PTBCP0AM0015	Euronext Lisbon	Portugal
CORTICEIRA AMORIM	PTCOR0AE0006	Euronext Lisbon	Portugal
CTT CORREIOS PORT	PTCTT0AM0001	Euronext Lisbon	Portugal
EDP	PTEDP0AM0009	Euronext Lisbon	Portugal
EDP RENOVAVEIS	ES0127797019	Euronext Lisbon	Spain
GALP ENERGIA-NOM	PTGAL0AM0009	Euronext Lisbon	Portugal
GREENVOLT	PTGNV0AM0001	Euronext Lisbon	Portugal
IBERSOL,SGPS	PTIBS0AM0008	Euronext Lisbon	Portugal
J.MARTINS,SGPS	PTJMT0AE0001	Euronext Lisbon	Portugal
MOTA ENGIL	PTMEN0AE0005	Euronext Lisbon	Portugal
NOS, SGPS	PTZON0AM0006	Euronext Lisbon	Portugal
REN	PTREL0AM0008	Euronext Lisbon	Portugal
SEMAPA	PTSEM0AM0004	Euronext Lisbon	Portugal
SONAE	PTSON0AM0001	Euronext Lisbon	Portugal
THE NAVIGATOR COMP	PTPTI0AM0006	Euronext Lisbon	Portugal

https://live.euronext.com/en/product/indices/PTING0200002-XLIS#index-composition

PSI Index performance



https://live.euronext.com/en/product/indices/PTING0200002-XLIS

Exercise

Exercise 16

Question 2: When you value assets, you are implicitly assuming that

a) The market is always right

b) The market is always wrong

c) The market is sometimes wrong, but that it corrects itself eventually

d) The market is sometimes wrong, and that it does not correct itself eventually

e) None of the above

Exercise

Exercise 17

Question 1

In recent years, analysts have shifted away from PE ratios to EV/EBITDA multiples in large segments of the equity markets. Which of the following is a sensible reason for this shift? (The others may be reasons but they may not be sensible).

Question 1 options:

__ EV/EBITDA multiples will yield values that are generally lower than PE ratios

__ EV/EBITDA multiples are not affected by growth

__ EBITDA is a good measure of free cash flow to the firm

__ EV/EBITDA can be compared across companies that use different depreciation methods

__ EBITDA can be used to service debt

__ All of the above

Exercise 17

Question 2

In computing the EV/EBITDA multiple, we estimate the enterprise value of a firm by adding together the values of debt and equity and netting out cash. Which of the following is the reason for netting out cash in computing this multiple?

Question 2 options:

__Cash is easy to value.

__Cash is liquid

__Cash can be used to pay down debt

__The income from cash is not part of EBITDA

__None of the above

Exercise

Exercise 17

Question 3

Infrastructure companies often trade at low multiples of EV to EBITDA. Which of the following is the best explanation for this phenomenon?

Question 3 options:

__ They pay little in taxes

__They have high earnings

__ They have high growth

__ They have high depreciation and amortization

__ They have high net capital expenditures (difference between capital expenditures and depreciation)

Exercise

Exercise 17

Question 4

You are trying to value Zimco Telecom Inc., a money losing company that reported EBITDA of -$80 million in the most recent year on revenues of $1 billion. You expect revenues to grow 6% a year for the next 5 years and the EBITDA/Revenue margin to improve to 8% by year 5. If healthy telecom companies trade at a multiple of 6 times EBITDA and you choose to apply this multiple to the fifth year's expected EBITDA, estimate the value of equity per share today. (You have a cost of capital of 12% for the next 5 years, a cash balance of $ 50 million, debt outstanding of $200 million and 12 million shares outstanding today.)

Question 4 options:

__ $0.00

__ $10.19

__ $17.87

__ $41.03

__ one of the above

Exercise

Exercise 17

Question 5

You have run a regression of EV/EBITDA multiples across all companies in the market and arrived at the following: EV/EBITDA = 5+80*(Growth rateRevenues)-20*(Cost of capital)-12*(Effective tax rate) Astor Inc. is a publicly traded company with EBITDA of $100 million and enterprise value of $ 480 million; it has an expected growth rate in revenues of 6% for the next 5 years and a cost of capital of 10%. Assuming that this stock is fairly priced, what is Astor's effective tax rate?

Question 5 options:

__ 0%

__ 15%

__ 25%

__ 40%

:__ 50%

Classification of the valuation methods

3. Income Approach

Classification of the valuation methods

3. Income Approach

Income approach considers that the value of a company results on its capacity in generate future cash flows.

According to this perspective, the company is valued for its potential to create wealth and should not be evaluated based on static models (Asset based approach / Equity approach).

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount Model (DDM)

Gordon Model

The Gordon Model or Gordon growth model or Gordon and Shapiro method is a stock price discounted model, developed in 1956, and named after its authors, Myron J. Gordon and Eli Shapiro The model, also called "perpetual growth" does not take capital gains into account.

The dividend discount model (DDM) is a quantitative method used for predicting the price of a company's stock based on the theory that its present-day price is worth the sum of all of its future dividend payments when discounted back to their present value.

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount Model (DDM)

Gordon Model

It is assumed that the company is in a stationary situation, with the dividends (and the underlying results) growing at a constant rate equal to **g**, perpetually:

$$\mathbf{P0} = \Sigma\ [\ (DPS0 \times (1+g) / (r-g)\ ] = \mathbf{DPS1\ /\ (r - g)}$$

where:

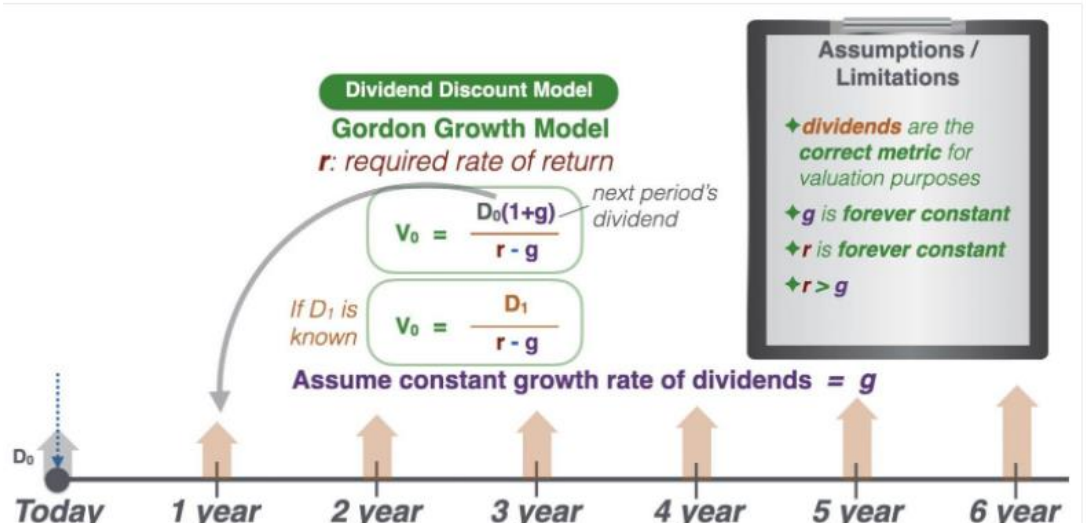
DPS1 - expected dividends for the next year
r – rate of return required by the investor (equity)
g - perpetual growth rate of dividends

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount (DDM)

Gordon Model



D0: Current / most recent dividend paid

g: assumed constant growth rate of dividends

r: required rate of return

A form of Dividend Discount Model which allows us to simplify all future dividends to one value by making assuming a constant growth rate of dividends.

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount Model (DDM)

Gordon Model

The advantage associated with this model is that only three variables have to be estimated – the expected dividends for the next year, the cost of equity and the growth rate of dividends.

However, this model has several limitations in terms of the valuation of shares that can be translated as follows:

- Dividends are neither certain nor predetermined.
- The financial market and shareholder demands vary over time and are not the same for all shareholders.
- This model only applies if the cost of equity is higher than the growth rate of dividends

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount Model (DDM)

Two stage model and three stage model

The **2-stage growth** model assumes that the initial high growth rate will slow to a constant sustainable long-term growth rate. This model is therefore more appropriate for a firm with high current growth rate that will drop to a stable rate in the future.

One variant of a multistage growth model assumes that the firm has three stages of dividend growth, not just two. These three stages can be categorized as growth, transition, and maturity. Such model would be appropriate for firms with an initial high growth rate, followed by a lower growth rate during a transitional period, followed by the constant growth rate in the long run.

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount Model (DDM)

Two stage model

In this model there is an initial period of high growth for n years and then a period of steady and stabilized growth in perpetuity.

Three stage model

Here it is assumed that there is a phase of extraordinary growth, a phase of transition and a phase of stabilized growth. In these two models, it is necessary to take into account several aspects such as the growth rates by phases, the number of years of the phases, the evolution of the cost of capital (beta to decrease) and the evolution of the payout ratio (to increase). It remains to be added that one of the greatest difficulties in applying models based on dividends arises in cases where companies do not distribute dividends.

Classification of the valuation methods

3. Income Approach

3.1 Dividend Discount Model (DDM)

Three stage model (cont)

In these situations, by mere algebraic application of the model, the discount of null dividends will give a null value and by absurdity, it is concluded that the company has no value.

However, even if companies do not distribute dividends, they have market value, since the reinvestment of profits can generate capital gains for shareholders and thus increase the residual value of the share.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

The Discounted Cash Flow is currently the most applied and most recognized method in fundamental analysis, being normally seen as the most "objective" of the valuation methods, since it explains in detail the **risk/return relationship** and the investments necessary to generate future income and is not limited by the analysis of accounting results (sometimes manipulated, namely when companies are not subject to a review/audit of the accounts).

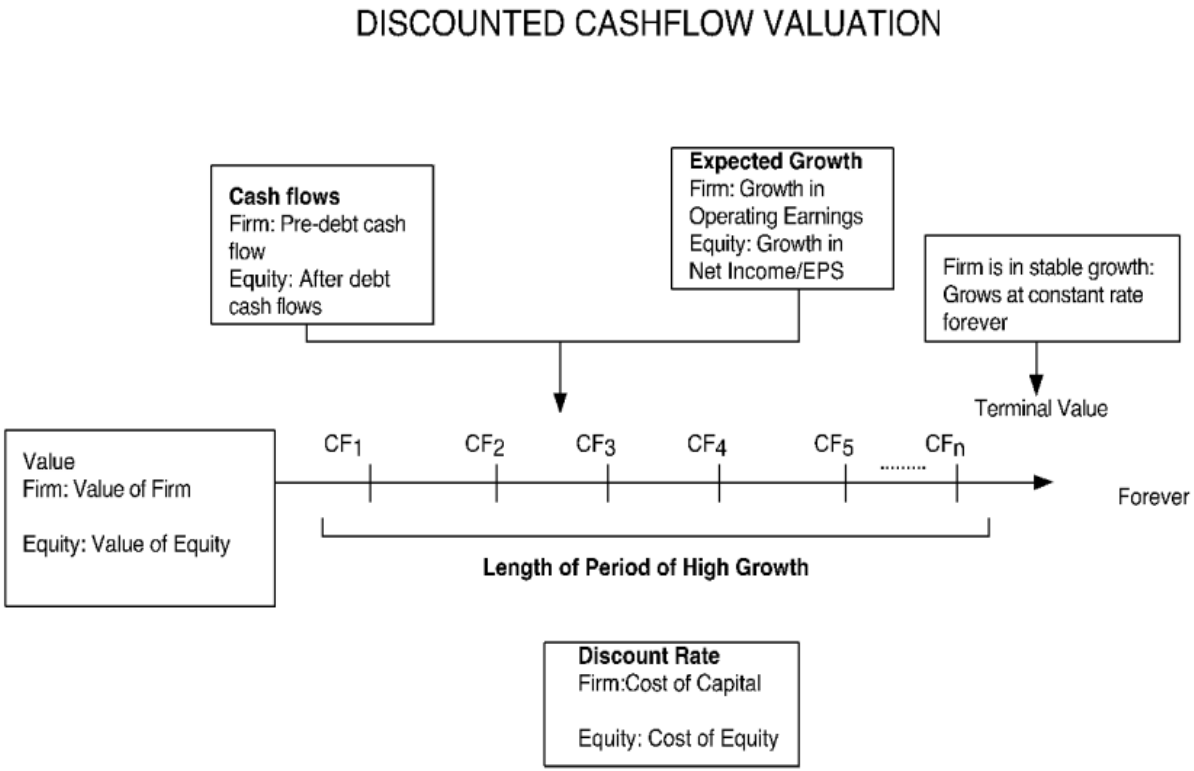
In addition, there is empirical evidence to suggest that equity markets value cash more than earnings.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

GENERIC DCF VALUATION MODEL



Source: Damodaran

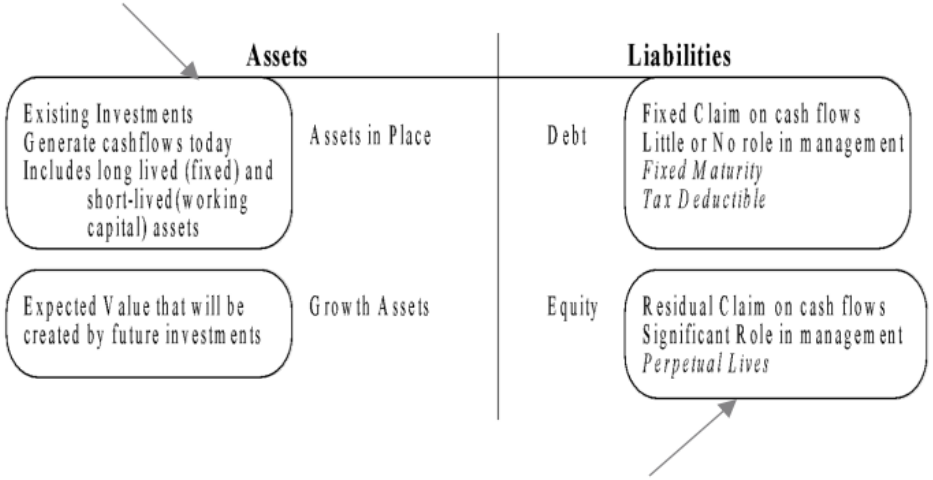
Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

DCF CHOICES: EQUITY VALUATION VERSUS FIRM VALUATION

Firm Valuation: *Value the entire business*



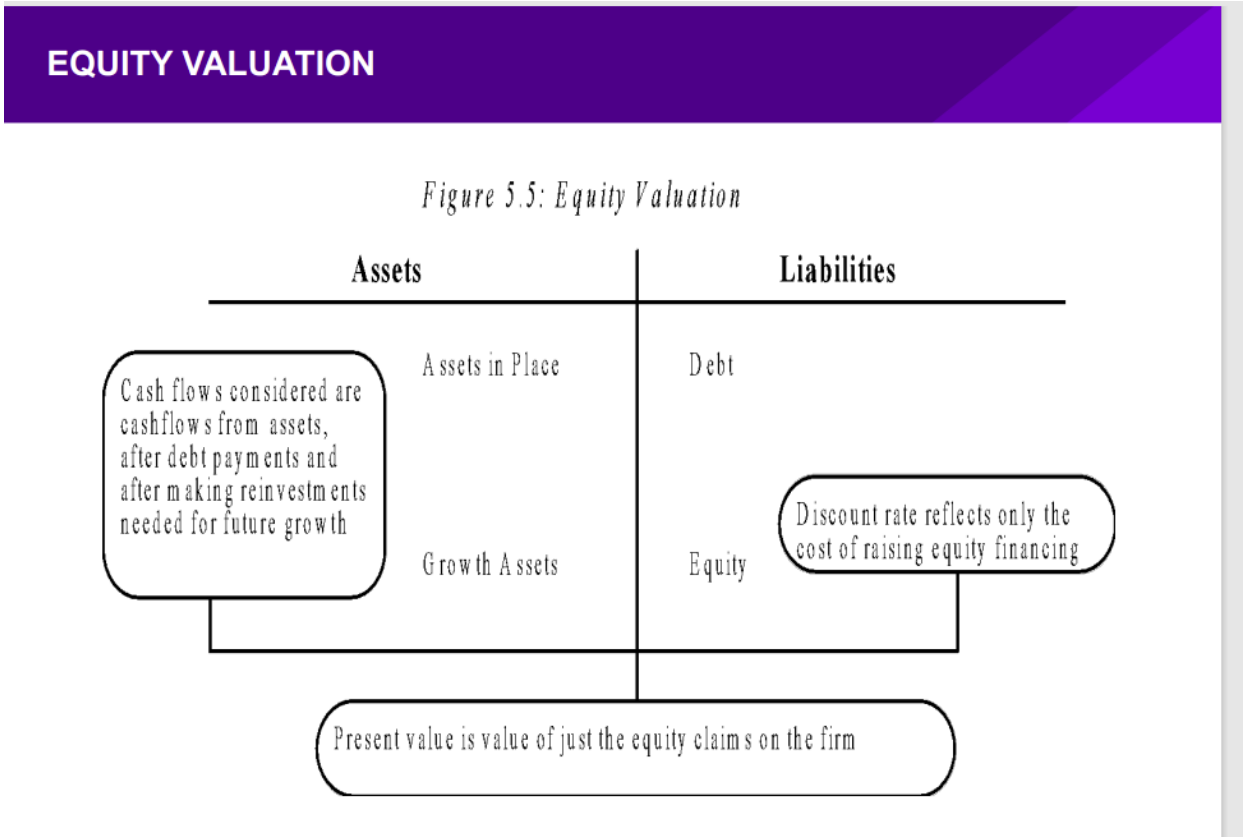
Equity valuation: *Value just the equity claim in the business*

Source: Damodaran LD2

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF



Source: Damodaran

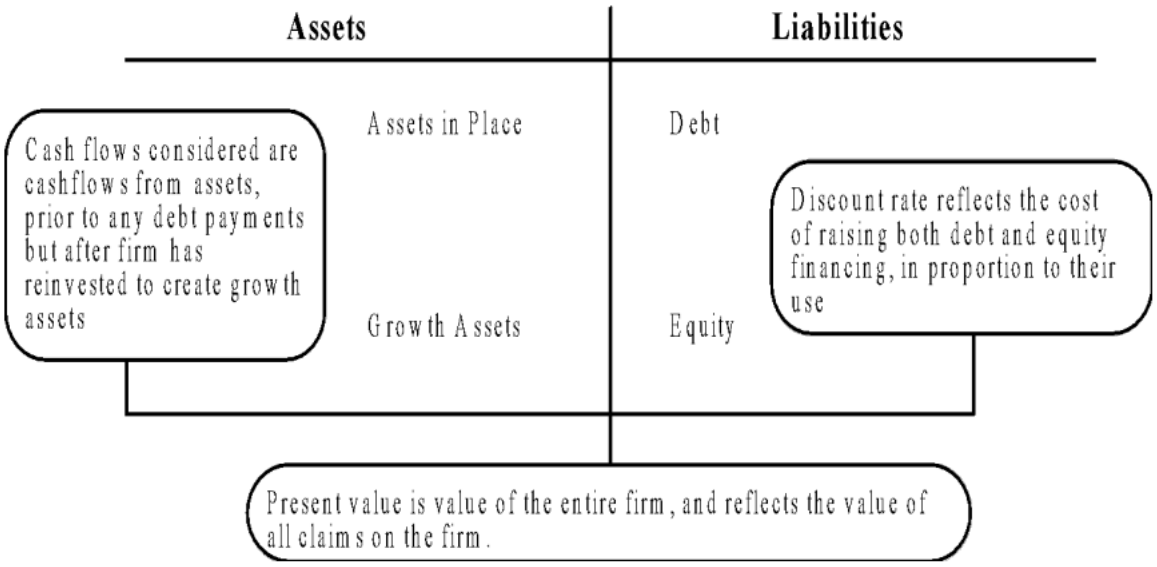
Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

FIRM VALUATION

Figure 5.6: Firm Valuation



Source: Damodaran LD2

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

This valuation method is based on the "present value" rule, where the value of a share is given by the sum of the present value of future cash flows, that is:

$$\text{value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

Where,
n = number of years of life of a share
CF_t = cash flow in period t
r = discount rate that reflects the risk of estimated cash flows
The discount rate will depend on the risk of the estimated cash flows, with higher rates for riskier shares and lower rates for safer projects.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Horizon and financial projections

In the DCF method, the valuation is normally carried out on the basis of two components, one translated into the cash flows generated in the period of detailed projections and the other corresponding to a residual value or going concern value.

Generally, the horizon for detailed projections should be at least 5 years, but more importantly, it should encompass a complete economic cycle and should be extended until cash flows are stabilized or positive.

The period of detailed projections must correspond to the period in which it is assumed that the company has supernormal profits, resulting from a competitive advantage that, in the period covered by the going concern value, is already admitted to be weakened or non-existent.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Horizon and financial projections

The **residual value** or continuing value should cover the useful life of the company from the period of detailed projections and at a time when a period of constant growth has been reached.

The financial projections to be prepared must include **Profit and Loss Statement**, **Balance Sheet** and **forecasted Cash Flows**, in order to ensure full coherence and integration, vital for good analysis and simulations.

Comparing to the Discounted Dividend Model (DDM) in stages, the **advantage of the DCF** is that, in addition to including (via the continuity value) the stabilized second stage, it **can vary the relevant parameters** as much as necessary in the period of detailed projections, thus improving the **capacity explanation and adherence to the model**.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Estimation of the Cash Flow

According to this model, the value of the company, or the company's shares, corresponds to the present value of the company's cash flows, also called operating cash flow (**Free Cash Flow to Firm - FCFF**), discounted at the **weighted average cost of capital (WACC).**

FCFF = Operational Result After Taxes
+ Amortizations, Depreciations and Provisions for the Year
– Δ Investment in Fixed Assets
– Δ Investment in Working Capital

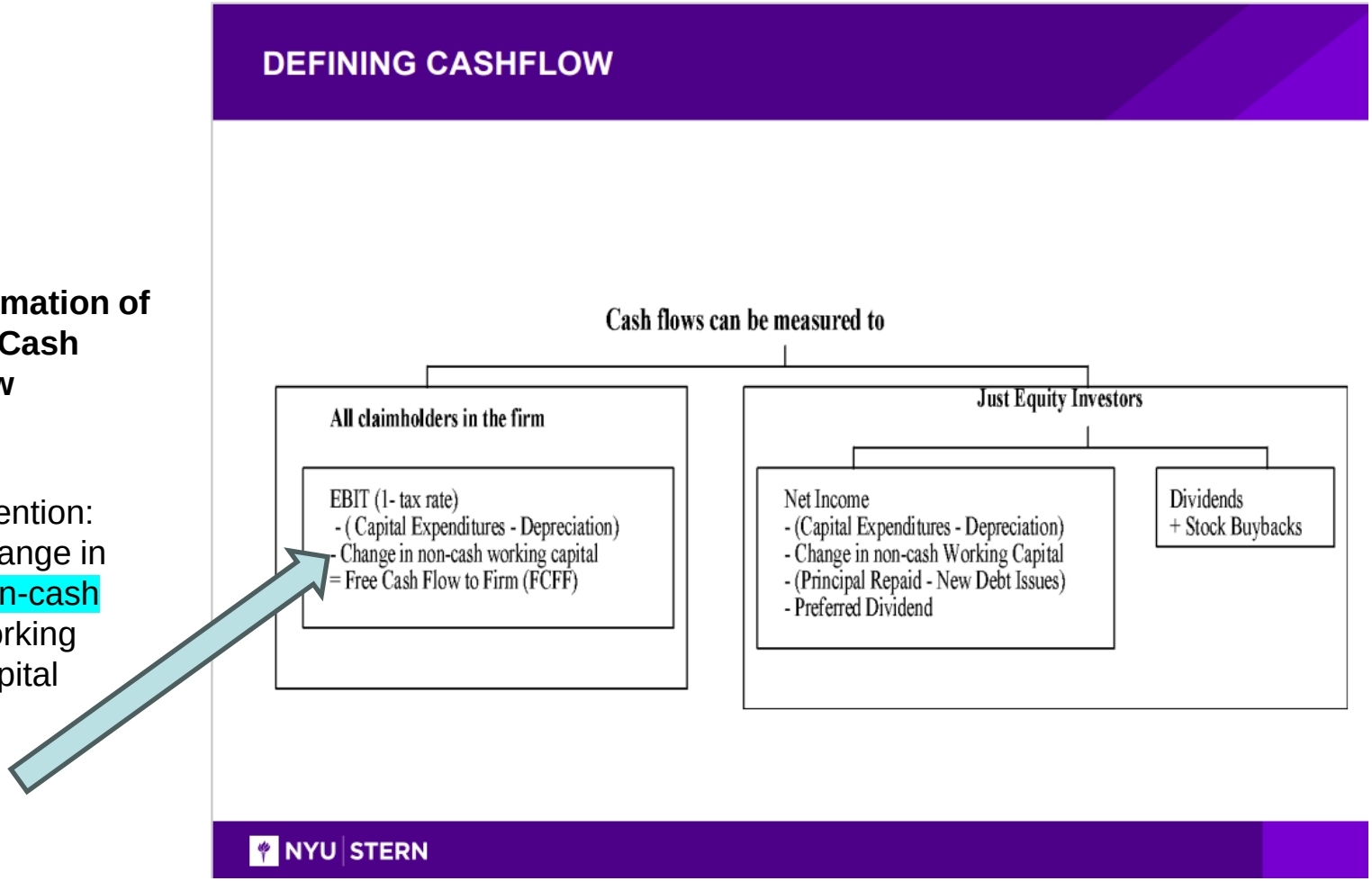
Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Estimation of the Cash Flow

Atention: change in non-cash working capital



Session 7 Damodaran: Estimating Cash Flows

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Exercise

6. You are trying to compute the change in working capital to use in computing free cash flow to the firm for Zapata Inc. The firm's total working capital increased from $100 million last year to $120 million this year. However, this working capital includes cash and short term debt; last year's cash balance had $ 30 million in cash and $15 million in short term debt, whereas this year's cash balance has $20 million in cash and $25 million in short term debt. What effect did working capital have on your cash flow this year?

a. Decreased cash flow by $20 million

b. Decreased cash flow by $30 million

c. Decreased cash flow by $35 million

d. Decreased cash flow by $40 million
e. None of the above

Session 7: Post Class tests Damodaran: https://pages.stern.nyu.edu/~adamodar/pdfiles/valonlinetests/

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Exercise Solution

6. d. Decreased cash flow by $40 million.

Compute the non-cash working capital for each year:

- Non-cash WC = WC – Cash + ST Debt
- Non-cash WC last year = 100 – 30 +15 = 85
- Non-cash WC this year = 120 -20 + 25 = 125
- Change in non-cash WC = 125 – 85 = +40 (Decreases CF – cash flow)

Session 7: Post Class tests Damodaran: https://pages.stern.nyu.edu/~adamodar/pdfiles/valonlinetests/

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Exercise

13. Tymba Inc. generated $20 million in after-tax operating income on revenues of $100 million during the course of the most recent year. You expect revenues to grow 10% a year next year and margins to stay stable. The firm's non-cash current assets are $40 million and its non-debt current liabilities are $50 million, and non-cash working capital as a percent of revenues is expected to remain unchanged next year. If the net cap ex is expected to be $10 million next year, what is your estimate of the FCFF for the next year?

a. $13 million
b. $11 million
c. $8 million
d. $23 million
e. None of the above

Session 7: Post Class tests Damodaran: https://pages.stern.nyu.edu/~adamodar/pdfiles/valonlinetests/

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Exercise Solution

a. $13 million. To compute the FCFF, first compute the non-cash working capital in both dollar terms and as a percent of revenues:

- Non-cash WC = 40 -50 = -10
- Non-cash WC as percent of revenues = -10/100 = -10%
- Expected revenues next year = $110 million
- Expected non-cash WC = -$11 million
- Change in WC (year n+1 – n) = -11-(-10) = -1

FCFF = EBITx(1-t) – (capital expenditures + depreciation) – change in non-cash working capital
20 (1.10) - $10 +1 = $13 million

Session 7: Post Class tests Damodaran: https://pages.stern.nyu.edu/~adamodar/pdfiles/valonlinetests/

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Estimation of the Cash Flow

Alternatively, to the use of the FCFF, it can be also used the ***Free Cash Flow*** **to Equity (FCFE).**

The share price of the company is the **Free Cash Flow to Equity – FCFE**, discounted to the minimum return rate demanded by the shareholders, that is, the cost of the equity (**ke**).

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Estimation of the Cash Flow

FCFE = Net Profit of the year
+ Amortizations, Depreciations and Provisions for the year
– Δ Investment in Fixed Assets
– Δ Investment in Working Capital
+ Δ Net Debt

Being so, the **FCFE** shows free cash flow or available cash of the company to distribute dividends, that is, they represent the potential dividends to be distributed.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

The use of appropriate discount rate

In a valuation, it is essential to use a discount rate consistent with the type of cash flow considered.

Using the FCFF or the FCFE is not irrelevant for the value obtained, if they are properly used.

If we use the FCFF, we will obtain the Company/Business value (Enterprise Value).

If we use the FCFE, we will obtain the Equity value.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF
CAPM – Capital Asset Pricing Model

The CAPM model is used to estimate the cost of equity, which corresponds to the return required by the investor.

The model is based on the assumption that the investor must choose an asset portfolio which maximizes his/her utility, taking into account the binomial risk/profitability. The CAPM formula is composed by several elements, such as the interest rate and the risk associated. It is represented as it follows:

$$Ke = Rf + \beta(Rm - Rf)$$

where Rf is the interest rate variant of risk-free assets, which can be the rate on **Treasury Bills** or **Treasury Bonds** (OT's).

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

CAPM – Capital Asset Pricing Model (cont)

In assessing the risks inherent to any investment, it is necessary to analyze two components:

Specific risk - this is the risk that affects only a single company, which allows diversification of the same;

Systematic risk (or non-diversifiable) - represents the market risk and its diversification is not possible, that is, it is measured by β (Beta).

The CAPM theory argues that the only remunerated risk is that of the market, i.e., the βeta, because it is the one that will always be present, while the other can be eliminated by diversifying assets.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

CAPM – Capital Asset Pricing Model (cont)

The standard procedure for estimating betas is to regress stock returns (Rj) against market returns (Rm) - Rj = a + b Rm where a is the intercept and b is the slope of the regression.

• The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.

• This beta has three problems:
- It has high standard error
- It reflects the firm's business mix over the period of the regression, not the current mix
- It reflects the firm's average financial leverage over the period rather than the current leverage.

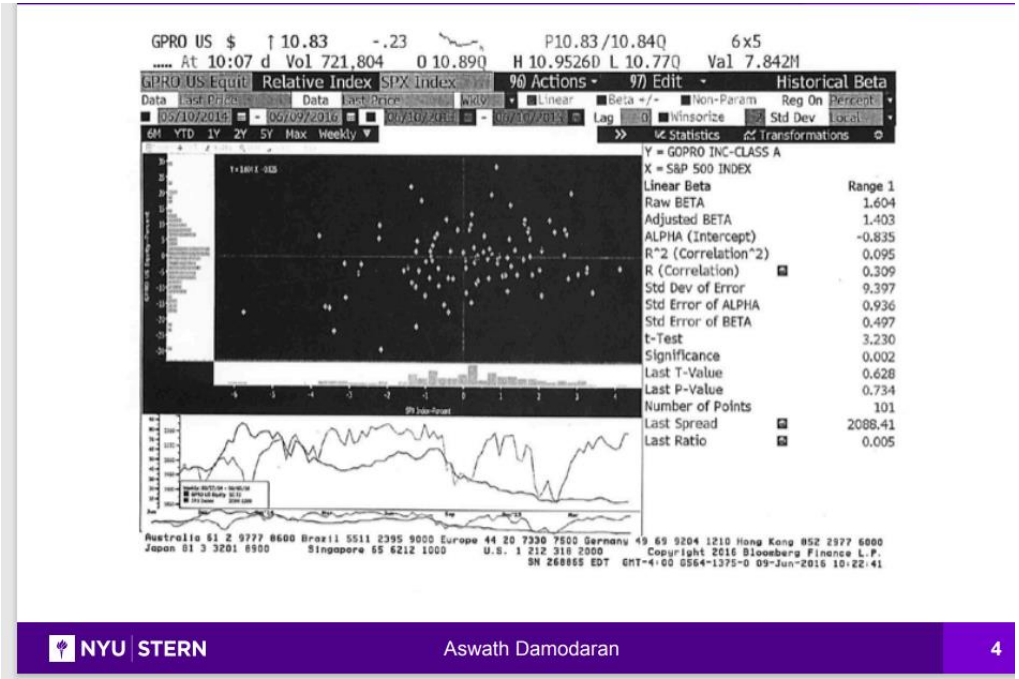
Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

CAPM – Capital Asset Pricing Model (cont)

UNRELIABLE, WHEN IT LOOKS BAD:



Damodaran – Session 5: Relative Risk

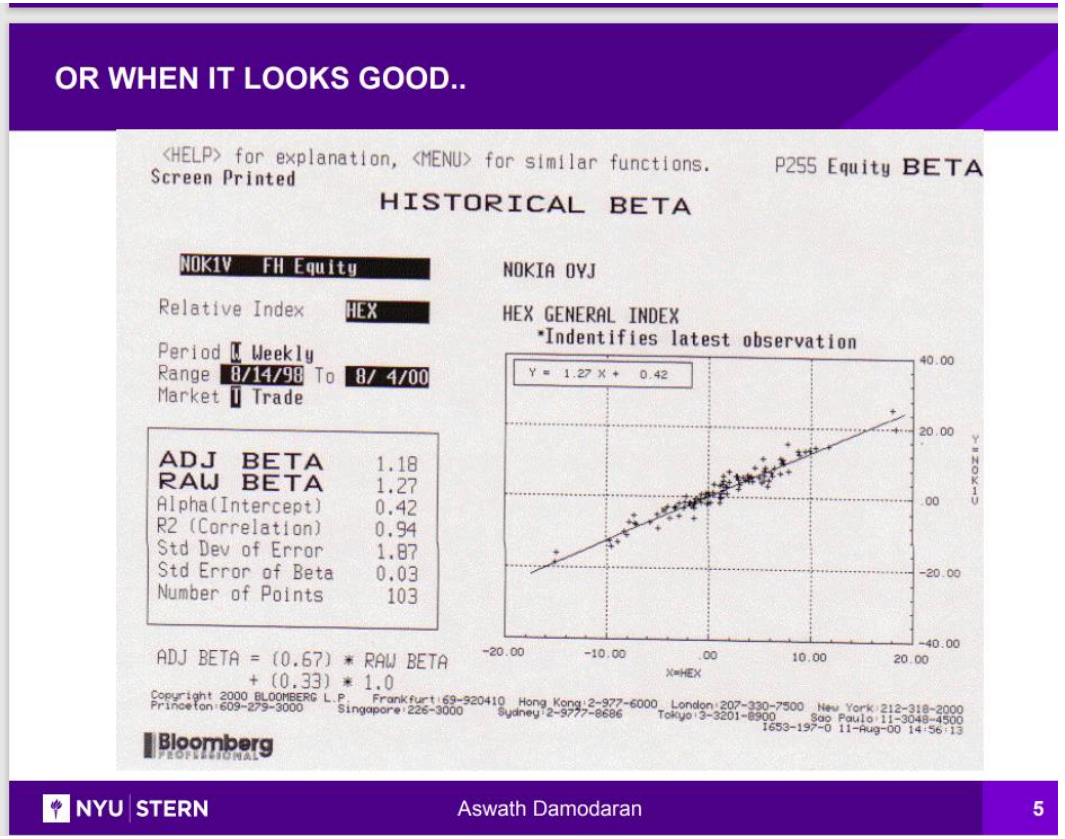
Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

CAPM – Capital Asset Pricing Model (cont)

When it looks Good:

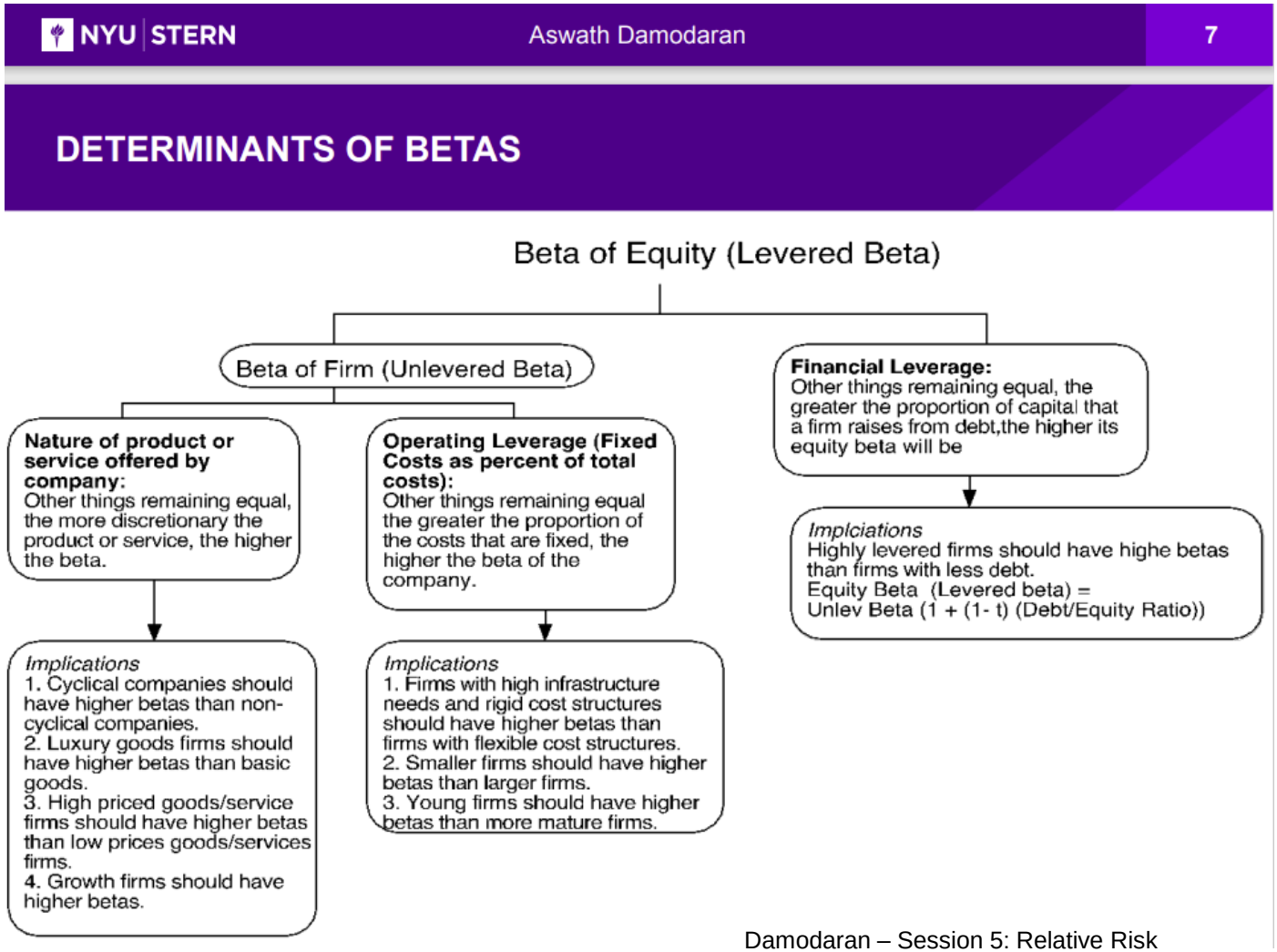


Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Determinants of Betas:

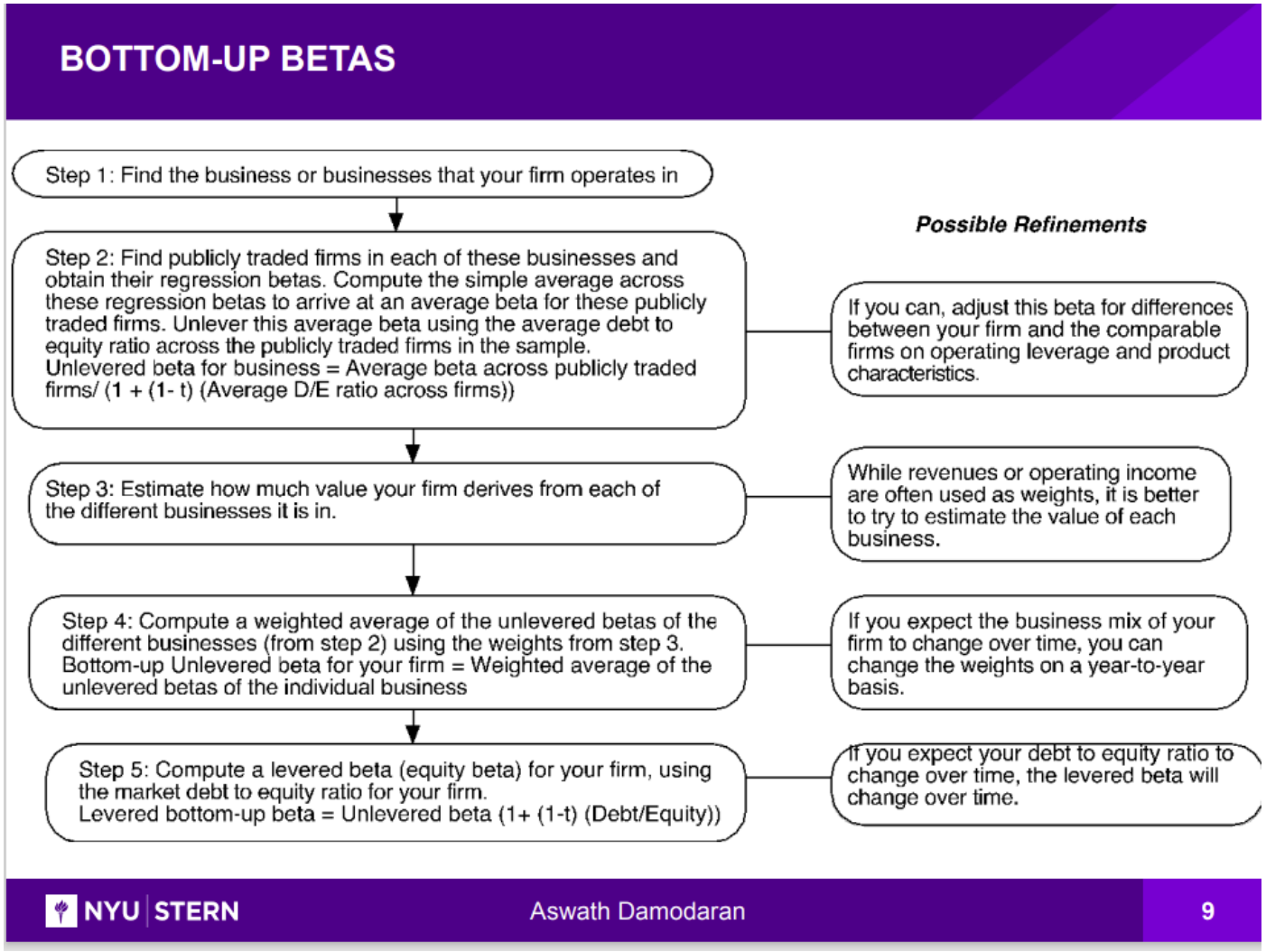


Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Bottom-up Betas:



Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Levered Beta vs Unlevered Beta

Step 5: Compute a levered beta (equity beta) for your firm, using the market debt to equity ratio for your firm.
Levered bottom-up beta = Unlevered beta (1+ (1-t) (Debt/Equity))

Damodaran – Session 5: Relative Risk

Leveraged and unleveraged beta β can be calculated as follows for a firm whose debt-to-equity ratio is denoted by D/E

$$B_L = B_u \left[1 + (1 - t)\left(\frac{D}{E}\right)\right]$$

$$B_u = \frac{B_L}{1 + (1 - t)(D|E)}$$

Source: DePamphilis, Donald (2018), Mergers, Acquistions and Other Restructuting Activities, chapter 7 – Cash Flow Valuation Basics, pp. 246

To calculate unlevered beta, the formula divides the levered beta by [1 plus the product of (1 minus the tax rate) and the company's debt/equity ratio]. Typically, a company's unlevered beta can be calculated by taking the company's reported levered beta from a financial database such as Bloomberg and Yahoo Finance and then applying the formula above.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Levered Beta vs Unlevered Beta

The process of manually calculating the beta of a company involves the following steps:

1.Calculating the covariance between the expected returns on the security and the returns of the overall stock market (market indices such as the S&P 500 are often used as the proxy)

2.Dividing that figure by the variance of expected returns on the stock market

Beta (β) = Covariance(Return of asset, Market Returns) / Variance (Return of Market)

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Levered Beta vs Unlevered Beta

How to Interpret Beta (β) and Market Sensitivity?

The general rules of thumb for interpreting beta are as follows.

- **β = 1**: Shares are just as risky as the market (no market sensitivity)
- **β > 1**: Shares are riskier than the market (high market sensitivity)
- **β < 1**: Shares are less risky than the market (low market sensitivity)
- **β = 0**: Shares have no correlation to the market (no market sensitivity)

The overall stock market is said to have a beta of 1.0, so companies with a beta of 1.0 should be expected to provide returns at an identical rate to the overall stock market, on average.

But if a company has a beta of 2.0, it should expect to realize returns that rise twice as fast (or decline twice as fast) compared to the broader market.

Source: https://www.wallstreetprep.com/knowledge/beta-levered-unlevered/

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

Levered Beta vs Unlevered Beta

For instance, if a company has a Beta of 1.2, it's theoretically 20% more volatile than the market.

Meaning, if the market increases by 10%, the company's returns increase by 12% (10%*1.2), and if similarly, the market declines by 10%, the company's returns would decrease by about 12%.

Source: https://www.studysmarter.co.uk/explanations/business-studies/corporate-finance/beta-in-finance/

Classification of the valuation methods

3. Income Approach

ESTIMATING A BOTTOM UP BETA FOR EMBRAER IN 2004

- Embraer is in a single business, aerospace, where there are no other listed firms in Latin America and very few in emerging markets. To estimate the bottom up beta, we therefore used all publicly listed companies in the aerospace business (globally), averaged their betas and estimated an average unlevered beta for the business of 0.95
- We then applied Embraer's gross debt to equity ratio of 18.95% and the Brazilian marginal tax rate of 34% to estimate a levered beta for the company.

Business	Unlevered Beta	D/E Ratio	Levered beta
Aerospace	0.95	18.95%	1.07

Levered Beta = Unlevered Beta (1 + (1- tax rate) (D/E Ratio)

= 0.95 (1 + (1-.34) (.1895)) = 1.07

- The fact that most of the other companies in this business are listed on developed markets is not a deal breaker, since betas average to one in every market. The fact that Brazil may be a riskier market is captured in the equity risk premium, not in the beta.

Classification of the valuation methods

3. Income Approach

3.2. Discounted Cash Flow – DCF

CAPM – Capital Asset Pricing Model (cont)

In practice, given the difficulty of finding comparables, the average beta of client and supplier companies or industries is sometimes used, if these are available.

Market Risk Premium

The Market Risk Premium (Rm-Rf) corresponds, roughly, to the increase in income required by investors in order to change their investments in risk-free portfolios to portfolios that have risk levels identical to the risk-weighted average of all existing applications on the market.

Existing studies in the USA (**Ibbotson**, covering more than 70 years) and the United Kingdom (**BZW**, for the same number of years) point to risk premiums of the order of 5% to 7.5%.

Classification of the valuation methods

3.2. Discounted Cash Flow – DCF

WACC – Weighted Average Cost of Capital

The weighted average cost of capital corresponds to weighting the cost of equity and the cost of debt by the respective weight in total capital, thus obtaining a weighted average cost of capital used.

$$WACC = \frac{E}{E+D} \times Ke + \frac{D}{E+D} \times Kd \times (1 - Tc)$$

where:
Ke – Cost of equity, estimated by the CAPM
D/E – Equity (E) and debt (D)
D – Debt value, that is, the remunerated debt
E – Equity value
Tc – Tax rate on profits (normally the nominal rate)
Kd – Cost of debt which is applicable to the liabilities or financing cost

Classification of the valuation methods

3.2. Discounted Cash Flow – DCF

The residual value

The residual value can be calculated in different ways, namely book value, liquidation value, PER, multiple of book value, multiple of EBITDA. However, the most common formula is that of perpetuity based on the cash flow of the last projected period:

$$VR = \frac{FCF_{t+1}}{(WACC - g)}$$

where,

FCF_{t+1} = FCF normalized for the first year after the projections period.
g = nominal growth rate of the *cash flows* in perpetuity.

The estimation of the residual value is critical since it can represent between 60% and 80% of the total value of the valuation.

Classification of the valuation methods

3.2. Discounted Cash Flow – DCF

Some points which we should be careful to estimate the residual value

Typically, some mistakes are made in calculating the residual value.

Bearing in mind that this can represent at least between 60% and 80% of the total value (for periods of detailed projections of 5 to 10 years and for stabilized businesses), there may be heavy impacts on the value.

FCFs should indeed be normalized, and special attention should be paid to the issue of working capital and fixed assets investments in the terminal year - they may not be suitable for perpetuity.

If the business is cyclical, use an average FCF.

As for g, note that it includes real growth + inflation (if relevant) - if we estimate g>inflation, there must be additional investment.

Example of a company valuation

Example of a company valuation

Example:

Company valuation

Stages

1) Analyze the accounts and the historical indicators (integrated historical perspective)
2) Prepare forecasted accounts
3) Define the valuation assumptions and the valuation models
4) Determine the i) Business value, ii) Enterprise value and iii) Equity value
5) Elaborate sensitivity analysis on key variables

Example of a company valuation

1) Analysis of the historical accounts and main indicators (integrated historical perspective) – **Income Statement by Nature**

Income Statement by Nature

Income Statement by Nature	Year n-2	Year n-1	Year n
Sales and services rendered	1.902.197	1.721.211	2.224.580
Government grants		2.885	8.397
Gains / (losses) of subsidiaries, associates and joint ventures		-1.560	-4.715
Variation in production			
Own work capitalised			
Cost of inventory sold and consumed	-130.106	-99.189	-96.734
Cost of materials and services consumed			
External supplies and services	-414.958	-430.944	-649.836
Payroll costs	-950.243	-1.104.495	-1.300.252
Inventory impairment			
Accounts receivable impairment ((expenses)/reversals)			
Provisions ((increases)/decreases)			
Other operating income	18.899	3.438	2.289
Other costs and losses	-5.399	-30.115	-4.268
Profit before taxes, depriciation and financing expenses	**420.390**	**61.232**	**179.461**
(Expenses) / reversals of depreciation and amortisation	-12.943	-17.005	-11.485
Impairment of depreciable / amortisable investments (Expenses / reversals)			
Operational results (before tax and financing expenses)	**407.447**	**44.226**	**167.975**
Interest and similar income			5.587
Interest and similar expenses	-1.576	-8.026	-7.932
Profit before tax	**405.871**	**36.200**	**165.631**
Income tax	-102.815	-15.141	-43.892
Net profit for the year	**303.056**	**21.059**	**121.738**

Example of a company valuation

1) Analysis of the accounts and the historical indicators (integrated historical perspective) – **Balance Sheet**

Balance sheet

ASSETS	Year n-2	Year n-1	Year n
Non-current assets	**38.943**	**28.179**	**21.960**
Intangible Assets	**0**	**0**	**0**
Intangible assets			
Goodwill			
Property, plant and equipment	38.943	28.179	21.960
Investment in subs and associates - Equity method			
Deferred tax assets			
Current assets	**811.613**	**778.319**	**908.380**
Inventories	0	0	0
Accounts receivable	261.257	433.561	579.191
Advances to suppliers	154		
State ans other public entities	17.607	51.753	1.572
Other current receivables	33.284	16.051	4.778
Shareholders	49.900	0	39.600
Cash and cash quivalents	145.357	270.291	280.086
Other financial assets	250.000	2.211	2.211
Deferred assets	54.055	4.452	942
TOTAL ASSETS	850.556	806.498	930.339
EQUITY AND LIABILITIES			
Equity			
Share capital	100.000	100.000	100.000
Legal reserves	7.559	22.715	22.715
Adjustments to financial assets			
Retained earnings			21.059
Other changes in equity	0	-16.628	-16.628
Sub-total	**107.559**	**106.087**	**127.146**
Net profit of the year	303.056	21.059	121.738
Total Equity	**410.615**	**127.146**	**248.884**
Liabilities			
Non current liabilities	**0**	**0**	**0**
Provisions			
Interest-bearing liabilities			
Pensions and other post-employment benefits			
Deferred tax liabilities			
Other non-current liabilities			
Current liabilities	**439.941**	**679.352**	**681.454**
Accounts payable	13.651	25.306	207.475
State and other public entities	221.364	160.016	194.201
Shareholders			
Interest-bearing liabilities	37.500	237.479	29.992
Other current liabilities	167.426	256.551	249.787
Total liabilities	**439.941**	**679.352**	**681.454**
Total equity and liabilities	850.556	806.498	930.339

Example of a company valuation

1) Analysis of the accounts and the historical indicators (integrated historical perspective) – **Main Ratios**

MAIN RATIOS

ITEMS	CALCULATION
Operating	
- Average Receivable Term	Avg. Trade Debtors less Provs. *365 / Net Sales
- Average Payment Term	Avg. Trade Creditors*365 / Purchases
- Average Stock Term	
- Average Stock Term of Finished Products	Average Stock of Finished Products / Cost of goods sold
- Average Stock Term of Merchandises	Average Stock of Merchandises / Cost of goods sold
- Average Stock Term of Raw Materials	Average Stock of Raw Materials / Cost of goods sold
- Asset Turnover	Operating Profit / Net Total Assets
- Current Assets Turnover	Operating Profit / Total Current Assets
- Stock Turnover	Sales / Stock
Financial	
- Working Capital (PTE 000')	(LT Debt+Equity) - Net Fixed Assets
- Working Capital Needs (PTE 000')	
- Treasury (PTE 000')	WC-WCN
- Equity Ratio	Shareholders' Funds / Net Total Assets
- Debt Ratio	Total Debt / Total Liabilities+Shareholders' Funds
- Debt to Equity Ratio	Total Debt (incl. financial leases) / Shareholders' Funds
- Interest Cover	EBIT + Depreciation / Interest Expense
Profitability	
- Return on Equity (ROE)	Net Profit * 100 / Shareholders' Funds
- Return on Investment (ROI)	EBIT * 100 / Net Total Assets
- Operating Income Return	EBIT / Operating Profit
- Return on Net Sales	Ret Profit / Sales

Example of a company valuation

2) Preparation of the forecasted accounts – Forecasted Income Statement by Nature

Forecast Income Statement by Nature

Income Statement by Nature	SNC	Year n	Year n+1	Year n+2	Year n+...		
Sales and services rendered		2.224.580	2.447.038	2.447.038	2.447.038	2.447.038	2.447.038
Goods	711	128.478	141.326	141.326	141.326	141.326	141.326
Services rendered	72	2.096.102	2.305.712	2.305.712	2.305.712	2.305.712	2.305.712
Government grants	75	8.397	8.397	8.397	8.397	8.397	8.397
Gains / (losses) of subsidiaries, associates and joint ventures	785	-4.715	-4.715	-4.715	-4.715	-4.715	-4.715
Variation in production	73						
Own work capitalised	74						
Cost of inventory sold and consumed	61	-96.734	-106.407	-106.407	-106.407	-106.407	-106.407
Cost of materials and services consumed	61						
External supplies and services	62	-649.836	-401.535	-415.769	-430.568	-445.957	-461.962
Payroll costs	63	-1.300.252	-1.304.278	-1.321.425	-1.339.044	-1.356.928	-1.375.317
Inventory impairment							
Accounts receivable impairment ((expenses)/reversals)							
Provisions ((increases)/decreases)							
Other operating income	78	2.289	2.518	2.518	2.518	2.518	2.518
Other costs and losses	68	-4.268	-4.268	-4.268	-4.268	-4.268	-4.268
Profit before taxes, depreciation and financing expenses		**179.461**	**636.750**	**605.368**	**572.950**	**539.678**	**505.283**
(Expenses) / reversals of depreciation and amortisation	64/761	-11.485	-18.738	-8.332	-5.110	-6.814	-8.517
Impairment of depreciable / amortisable investments (Expenses / reversals)	65/762	0					
Operational results (before tax and financing expenses)		**167.975**	**618.012**	**597.036**	**567.840**	**532.865**	**496.766**
Interest and similar income	79	5.587	4.764	13.137	21.178	29.875	38.220
Interest and similar expenses	69	-7.932	0	0	0	0	0
Profit before tax		**165.631**	**622.776**	**610.172**	**589.018**	**562.740**	**534.986**
Income tax	812	-43.892	-155.694	-152.543	-147.255	-140.685	-133.746
Net profit for the year		**121.738**	**467.082**	**457.629**	**441.764**	**422.055**	**401.239**

Example of a company valuation

2) Preparation of the forecasted accounts – Forecasted Balance Sheet

Forecast Balance sheet							
ASSETS	SNC	Year n	Year n+1	Year n+2	Year n+...		
Non-current assets		21.960	11.739	11.924	15.331	17.034	17.034
Intangible assets - Gross value	44	2.860	2.860	2.860	2.860	2.860	2.860
Intangible assets - Cumulative amortization	448	-2.860	-2.860	-2.860	-2.860	-2.860	-2.860
Goodwill							
Property, plant and equipment - Gross Value	43	85.717	94.234	102.752	111.269	119.786	128.303
Property, plant and equipment - Cumulative amortization	438	-63.758	-82.495	-90.828	-95.938	-102.752	-111.269
Investment in subs and associates - Equity method	4111+4121+4131						
Deferred tax assets	2741						
Current assets		908.380	1.192.945	1.553.751	1.997.142	2.423.416	2.831.622
Inventories		0	0	0	0	0	0
Accounts receivable	21	579.191	637.110	637.110	637.110	637.110	637.110
Advances to suppliers	228						
State and other public entities	24	1.572	0	0	0	0	0
Other current receivables	27	4.778	5.256	5.256	5.256	5.256	5.256
Shareholders	26	39.600	39.600	39.600	39.600	39.600	39.600
Cash and cash quivalents	11+12+13	280.086	509.943	870.749	1.314.140	1.740.415	2.148.621
Other financial assets	143	2.211	0	0	0	0	0
Deferred assets	28	942	1.036	1.036	1.036	1.036	1.036
TOTAL ASSETS		930.339	1.204.684	1.565.675	2.012.473	2.440.451	2.848.657
EQUITY AND LIABILITIES							
Equity							
Share capital	51	100.000	100.000	100.000	100.000	100.000	100.000
Legal reserves	551	22.715	22.715	22.715	22.715	22.715	22.715
Other reserves	552+56	0	121.738	588.821	1.046.450	1.488.214	1.910.268
Adjustments to financial assets							
Retained earnings	53	21.059	21.059	21.059	21.059	21.059	21.059
Other changes in equity	59	-16.628	-16.628	-16.628	-16.628	-16.628	-16.628
Sub-total		127.146	248.885	715.967	1.173.596	1.615.360	2.037.415
Net profit of the year	818	121.738	467.082	457.629	441.764	422.055	401.239
Total Equity		248.885	715.967	1.173.596	1.615.360	2.037.415	2.438.654
Liabilities							
Non current liabilities		0	0	0	0	0	0
Provisions	29						
Interest-bearing liabilities	25						
Pensions and other post-employment benefits	273						
Deferred tax liabilities	2742						
Other non-current liabilities	27						
Current liabilities		681.455	488.717	392.079	397.113	403.036	410.003
Accounts payable	22	207.475	191.466	196.713	202.292	208.094	214.129
State and other public entities	24	194.201	165.826	61.987	59.455	57.557	56.435
Shareholders	26	0	0	0	0	0	0
Interest-bearing liabilities	25	29.992	0	0	0	0	0
Other current liabilities	27	249.787	131.425	133.379	135.366	137.385	139.440
Total liabilities		681.455	488.717	392.079	397.113	403.036	410.003
Total equity and liabilities		930.339	1.204.684	1.565.675	2.012.473	2.440.451	2.848.657

Example of a company valuation

3) Valuation model

1.1. Cost of Capital		
1.1.1. Equity Cost		
Risk free	R f	3,00%
Risk Premium	R m - R f	9,50%
Beta	B	1,45
Equity cost	K e = Rf + B (R m - R f)	16,78%
1.1.2. Debt Cost		
Euribor 6 months		3,00%
Spread		5,00%
	k d	8,00%
Tax at 2011 (IRC + Municipal tax)	t	26,50%
Debt Cost	K d = (1 - t) k d	5,88%
1.1.3. Financial Structure		
Observed structure		
Equity		
Bearing debt		
Target structure		
Equity	E / (E + D)	60,00%
Bearing debt	D / (E + D)	40,00%
1.1.4. Weighted Average Cost Of Capital (WACC)		
WACC = R e . E / (E + D) + R d . D / (E + D)		12,42%

Example of a company valuation

3) Valuation model

1.2. "DISCOUNTED CASH FLOW" (DCF)						
1.2.1 Discount Factor						
Period	1	2	3	4	5	Normalized
Discount factor - anual = 1/(1+WACC)	0,890	0,890	0,890	0,890	0,8895	0,8895
Discount factor - period (cumulative)	0,890	0,791	0,704	0,626	0,557	0,56
1.2.2 Cash Flow						
EBIT	618.012	597.036	567.840	532.865	496.766	496.766
taxes	-155.694	-152.543	-147.255	-140.685	-133.746	-133.746
Variation taxes (unpaid balance)	72.299	12.418	9.966	8.156	7.130	7.130
Amortization + Var. Provision	18.738	8.332	5.110	6.814	8.517	8.517
Net Operating Profit Less Adjusted Taxes (NOPLAT)	553.355	465.243	435.661	407.149	378.667	378.667
1.2.3 Investment in Working Capital Needs and Fixed Asset						
Investment in Working Capital	323.274	-7.135	-7.487	-7.733	-7.992	-7.992
Investment in Fixed Assets	8.517	8.517	8.517	8.517	8.517	-8.602
1.2.4 Free Cash Flow						
Free Cash Flow	221.563	463.861	434.631	406.365	378.142	378.142
Discounted Free Cash Flow of the period	197.090	367.049	305.932	254.442	210.618	210.618
Discounted Free Cash Flow (Cumulative)	1.335.130					

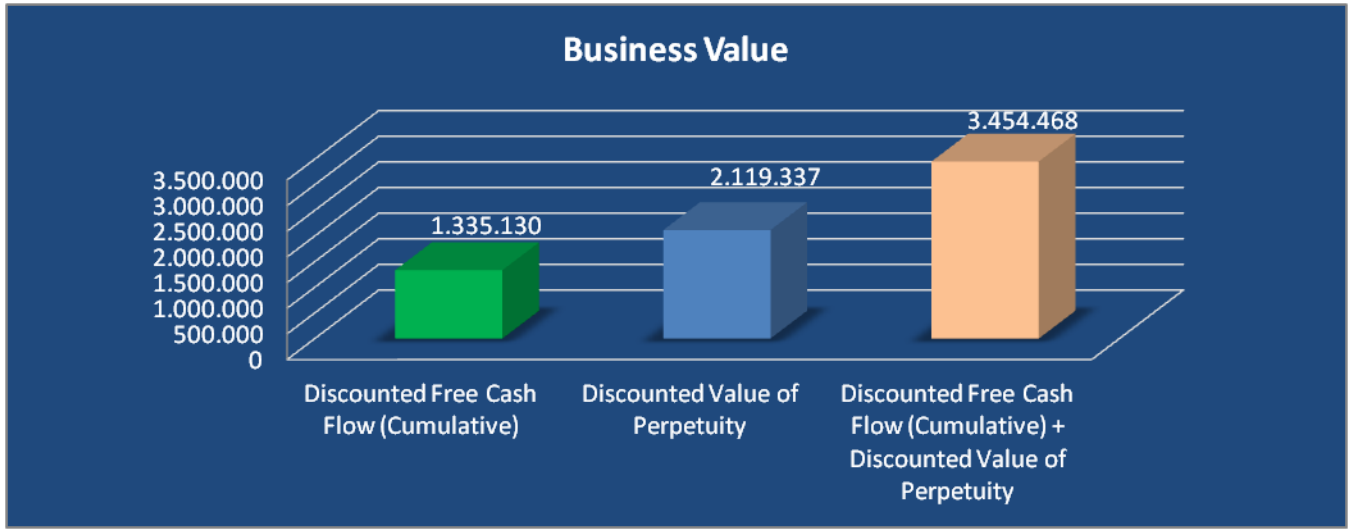
Example of a company valuation

3) Valuation model

1.3. Residual Value		
Free Cash Flow "Normalized"	FCF "normalized"	378.142
Free Cash Flow at t+1	FCF t+1	386.669
Growth rate in perpetuity	r	0,25%
inflation rate	π	2,00%
Growth rate assumed by the company	g	2,26%
Perpetuity	FCF t+1 / (WACC-g)	3.805.047
Discounted Value of Perpetuity		2.119.337

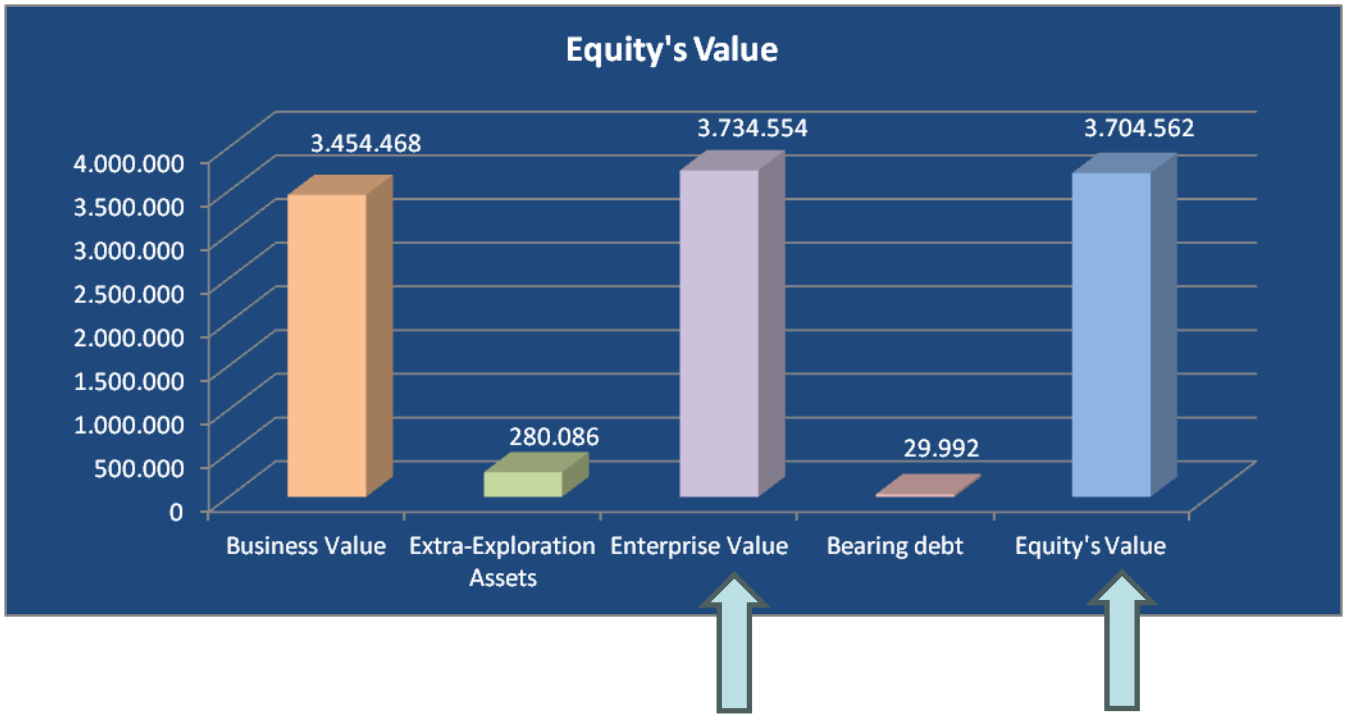
Example of a company valuation

4) Estimation of the Business value, Enterprise Value and the Equity value



Example of a company valuation

4) Estimation of the Business value, Enterprise Value and the Equity value



Example of a company valuation

5) Sensitivity analysis of the key variables

Sensitivity Analysis				
Scenarios	Pessimist	Conservative	Basis	Optimistic
r	-0,25%	0,00%	**0,25%**	0,50%
π	2,00%	2,00%	**2,00%**	2,00%
g=(1+i)(1+r)-1	1,75%	2,00%	**2,26%**	2,51%
Business Value	3.343.122	3.397.432	**3.454.468**	3.514.439
Extra-Exploration Assets	280.086	280.086	**280.086**	280.086
Enterprise Value	3.623.209	3.677.519	**3.734.554**	3.794.526
Bearing debt	29.992	29.992	**29.992**	29.992
Equity's Value	3.593.217	3.647.527	**3.704.562**	3.764.534

Sensitivity Analysis on Beta

Different Scenarios	Sensitivity Analysis on Beta	Business Value
		3.454.468
Scenario 1	1	4.516.816
Scenario 2	1,1	4.219.153
Scenario 3	1,2	3.962.484
Scenario 4	1,3	3.739.206
Scenario 5	1,4	3.543.472
Scenario 6	1,5	3.370.717
Scenario 7	1,6	3.217.319
Scenario 8	1,7	3.080.372
Scenario 9	1,8	2.957.519
Scenario 10	1,9	2.846.824

Exercise

Company valuation using the Discounted Cash Flow (DCF) method

Exercise

Make the financial valuation of EDP taking into account the financial reports available.

Purpose:

Make the valuation using the **DCF method** and compare it with the value obtained with other valuation methods that you consider appropriate.

Bibliography/references

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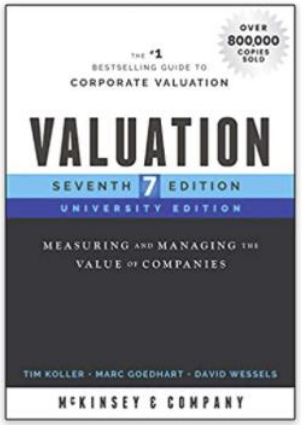

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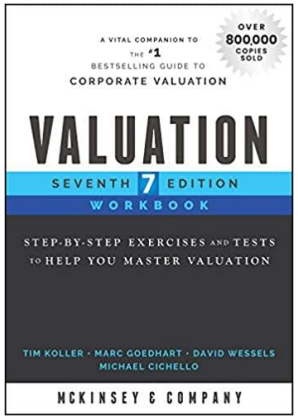

Exercise 16

When you value assets, you are implicitly assuming that

a) The market is always right

b) The market is always wrong

c) The market is sometimes wrong, but that it corrects itself eventually

d) The market is sometimes wrong, and that it does not correct itself eventually

e) None of the above

Answer:

The correct answer is c) The market is sometimes wrong, but that it corrects itself eventually.

You need the market to make mistakes for your valuation to have a chance, but you need the market to correct its mistakes if you want to make money.

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