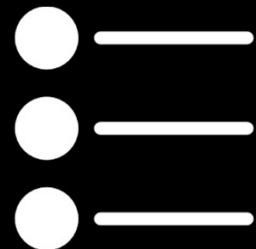




# Valuation



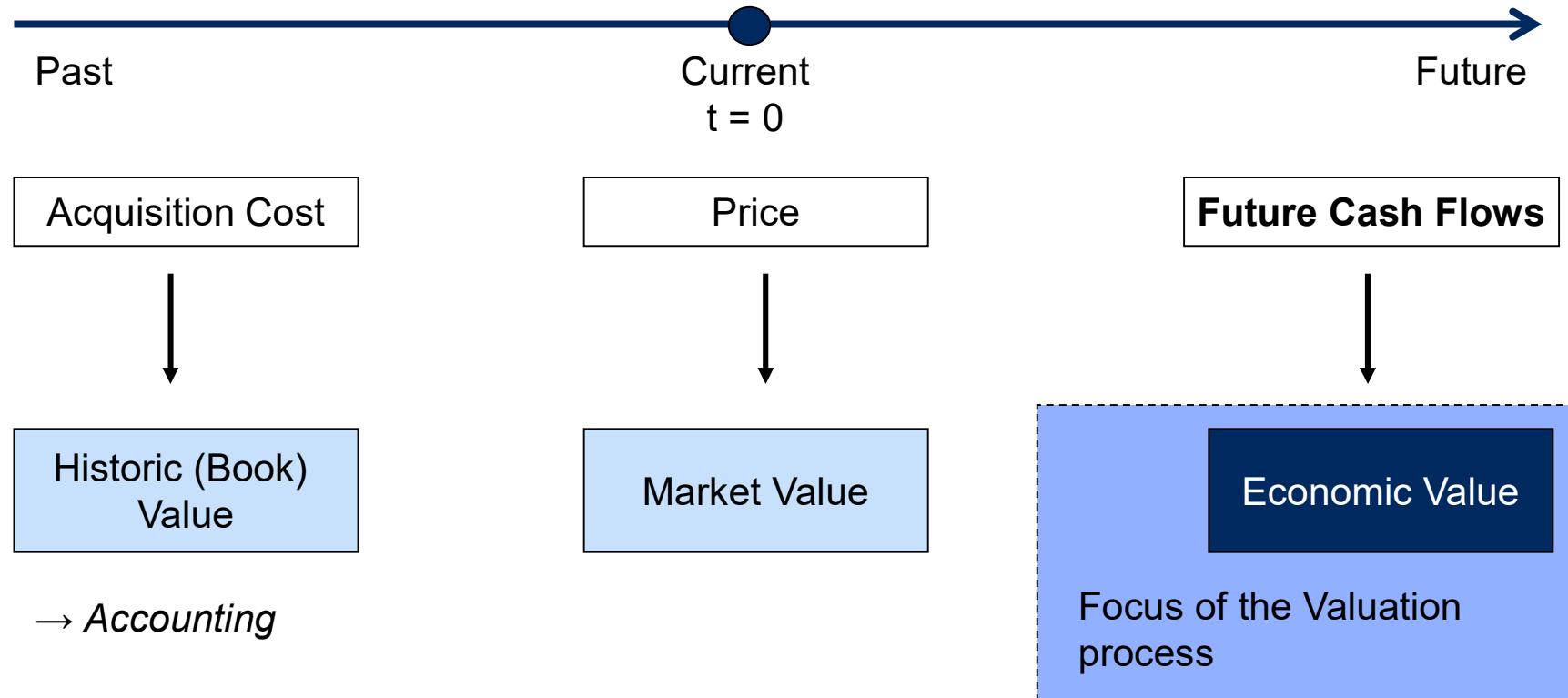
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➤ **Introduction**

## Defining VALUE



→ *Accounting*

## Equity valuation is used for a variety of reasons

- 1) Stock selection:** The analyst must determine whether a stock is fairly valued relative to its intrinsic value and the value of other securities.
- 2) Inferring (or extracting) expectations:** What does the current price say about the market's expectations for the stock (or an index: are valuations reasonable?)? What is the market saying about the firm's fundamentals (the firm's profitability, financial strength, and risk)? Expectations are sometimes used to value a comparable firm.
- 3) Evaluating corporate events:** If, for example, a firm merges with another firm, how does this affect firm valuation?
- 4) Rendering fairness opinions:** When a firm is sold, a third party may be asked to value the firm to determine whether the value is fair.
- 5) Evaluating business strategies and models:** To maximize shareholder wealth, companies should examine the effect on firm value of various firm strategies.
- 6) Communicating with analysts and shareholders:** Valuation is important to shareholders and analysts and will be an important part of any communication with them.
- 7) Appraising private businesses:** Determining the value of private businesses is important for tax reasons (e.g. valuing an estate or estate tax purposes), transfer of ownership (e.g. partnership interests transferred among limited partners) or when preparing a firm for its initial public offering (IPO) of stock.

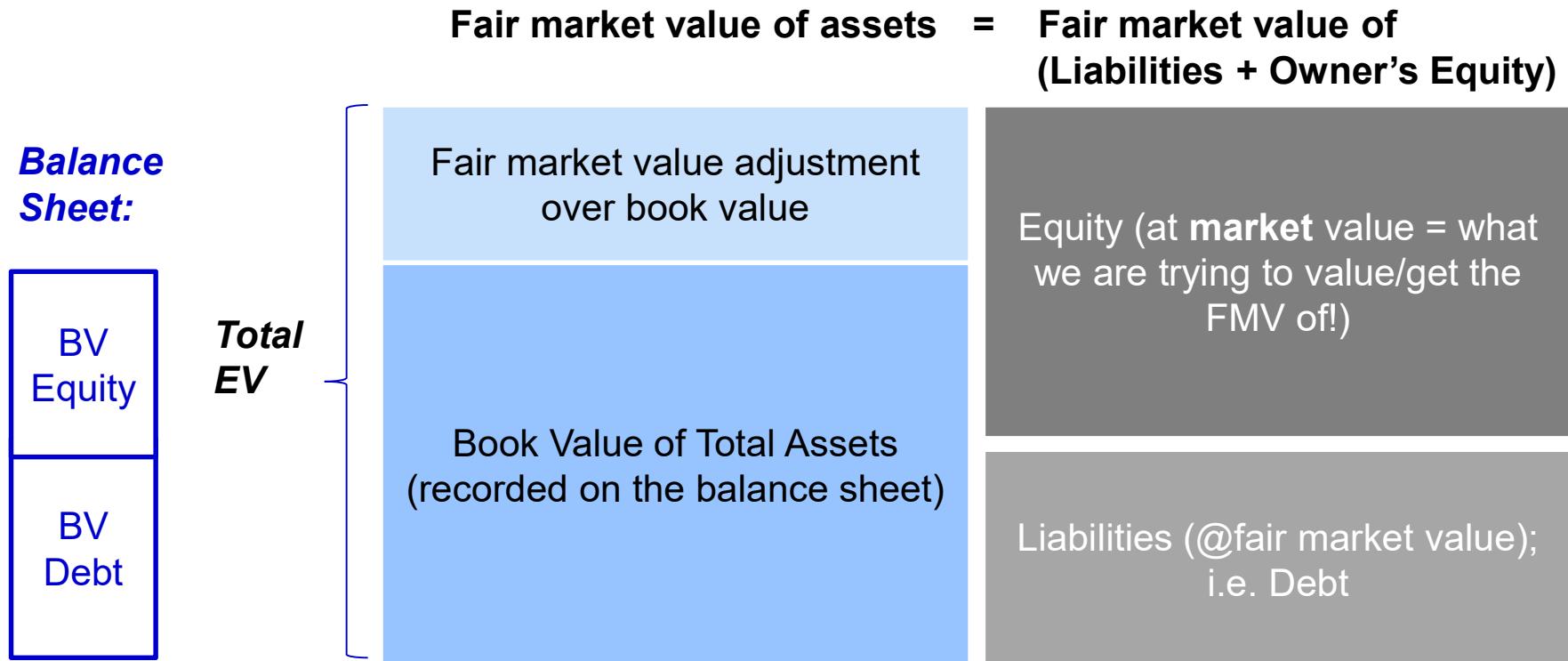
# Bankers rely heavily on valuations

Investment Banking	Debt	Research
<p><b>Mergers, Acquisitions &amp; Divestitures:</b></p> <ul style="list-style-type: none"><li>▪ How much should we pay to buy the company?</li><li>▪ How much should we sell our company/division for?</li><li>▪ Is the price offered for company/division fair (from a financial point of view: Fairness Opinion)?</li><li>▪ Is our company undervalued/vulnerable to a raider? (Hostile defense)</li></ul> <p><b>Equity Capital Markets:</b></p> <ul style="list-style-type: none"><li>▪ For how much should we sell our company/division in the public market? (IPO)</li></ul>	<ul style="list-style-type: none"><li>▪ What is the underlying value of the business/assets against which debt is being issued?</li><li>▪ What does our client nee? (Coverage)</li></ul>	<ul style="list-style-type: none"><li>▪ Should our clients buy, sell or hold positions in a given security?</li></ul>

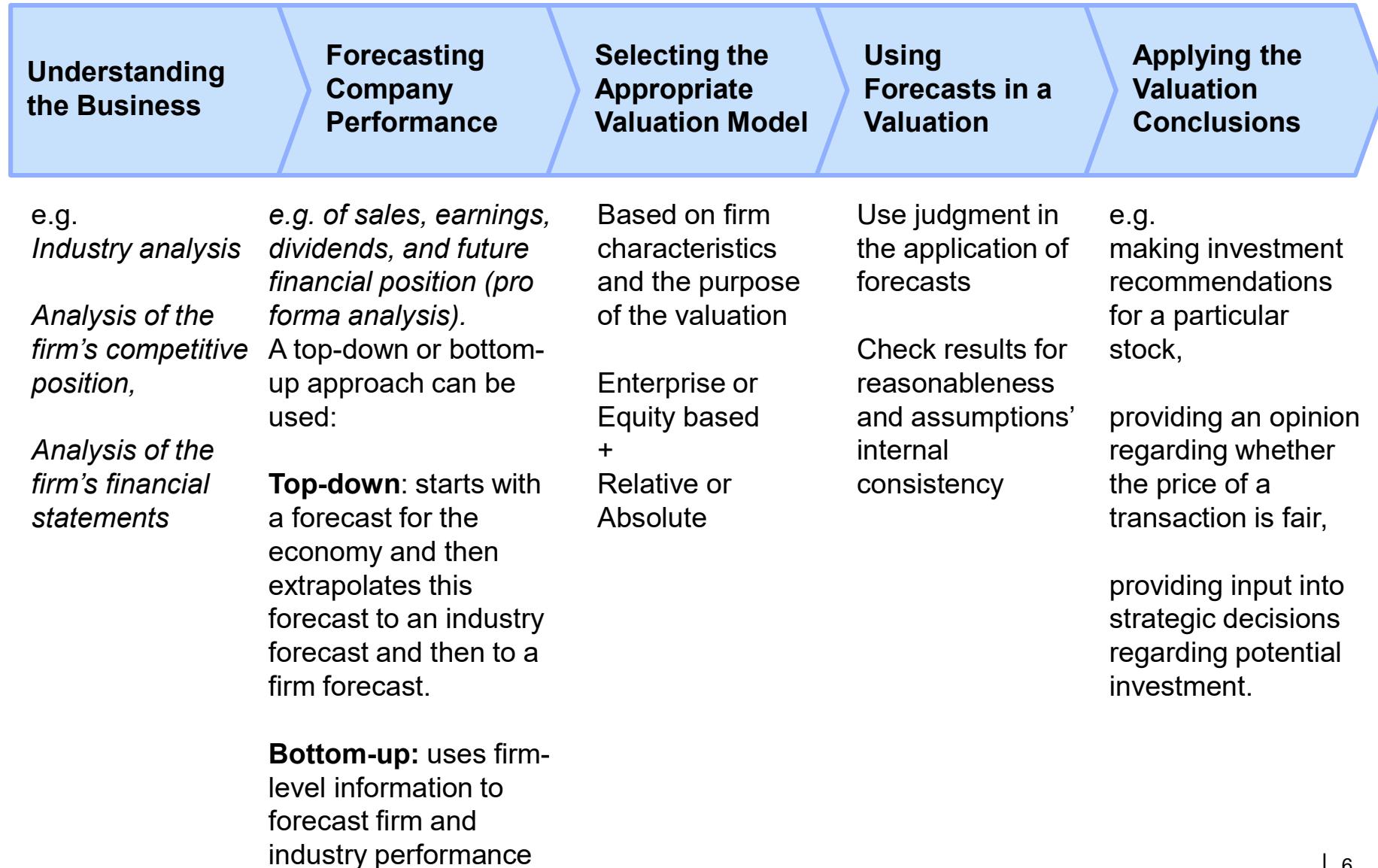
- **New business presentations:** Various applications

## First, let us clarify what we value: Equity vs Total Enterprise Value / Book vs Market value

- Total Enterprise Value (Entity, Firm Value) is **NOT** the same thing as equity. It represents the total value of the firm (which includes equity).
- It is a Market value, hence different from the (Book) value shown in the company's Balance Sheet



# Typical Valuation process



# There are 2 main types of Valuation models

	<p><b>Present value models:</b> Dividend discount models (DDM) Free cash flow to equity Residual net income</p> <p><b>Asset-based models:</b> (Adjusted) Book value of equity</p>	<p><b>Present value models</b> Free cash flow to the firm (DCF), APV Economic Profit</p> <p><b>Asset-based models:</b> Market based NAV</p> <p><b>Real Options</b></p>
<b>Absolute</b>	<p>Price-to-earnings ratio (PER)</p> <p>Price-to-book-value ratio (or Market to Book: M/B)</p>	<p>Enterprise value multiples:</p> <p>EV/Revenues EV/EBITDA EV/EBIT(A) EV/...</p>

# How to choose a valuation model?

In practice, most analysts use more than one approach to value equity, given the uncertainty in valuing equity... The most common approaches are DCF based and Multiples

## What are the characteristics of the company?

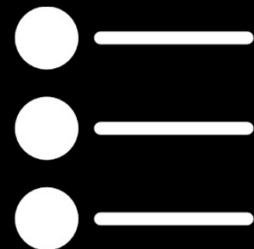
- A firm with few tangible assets would not be valued using an asset-based approach
- A company with negative profits cannot be valued using profit multiples

## What is the availability and quality of data?

- A dividend discount model cannot be applied to a firm that does not pay dividends..
- Cash flow models are difficult to use without information about investments/access to a company's balance sheet

## What is the purpose of the valuation?

- M&A (control premium= transaction based) or open market purchase (=trading based)
- Are we buying a majority or a minority? (a dividend based model might be more appropriate in case of a passive equity investment)



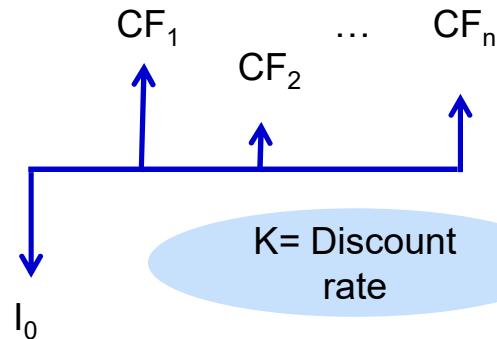
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- Introduction
- A (very) simple valuation model

## Valuing a company is like an investment decision: we use the same tools as for a Capital budgeting decision/NPV calculation...

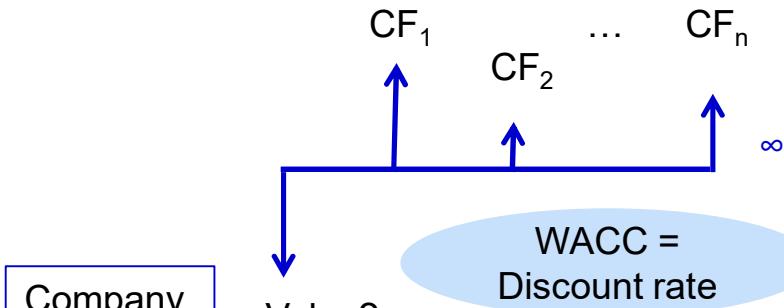
- In Finance, the valuation of an asset depends on the Present Value of the Future cash flows earned by the Asset
- Risk is reflected in the discount rate

### From CAPITAL BUDGETING...



- To make an investment decision, Discount future Cash Flows back to today (= Calculate Present Values), based on Discount rate
- Compare Initial investment ( $I_0$ , known) to the sum of the PVs of future cash flows. Calculate Net Present Value and **Invest if  $NPV > 0$**

### ... to VALUATION



- To value a company, Discount Future Cash Flows back to today, based on WACC; sum all the DCFs = **Value of the firm**
- Compare DCF with market price, if DCF > Price (which means **NPV from “investing” = buying the company today minus future CFs is positive**), it's a Buy...

## The simplest valuation model: perpetuity

➤ Assume a company with **stable performance**: no revenue growth, constant costs (and profits); investments required are for asset replacement only and are equal to depreciation: **Cash Flows, Net income and Dividends are constant**

➤ The present value of a stream of constant cash flows in perpetuity is equal to:

$$EV_0 = \sum_{t=1}^{+\infty} \frac{FCF}{(1+k)^t} \Leftrightarrow EV_0 = \frac{FCF}{k}$$

*k is the discount rate (eg. WACC), FCF are Free cash Flows (available to the Firm, i.e. debt and equity)*

The same formula can be used to value the equity of the company, the formula becomes:

$$S_0 = \sum_{t=1}^{+\infty} \frac{CFEq}{(1+k_s)^t} = \sum_{t=1}^{+\infty} \frac{D}{(1+k_s)^t} \Leftrightarrow S_0 = \frac{D}{k_s}$$

*$k_s$  is the cost of equity; D the dividends*

*Note: CFEq (Cash Flow to Equity holders) in this case are equal to Dividends as everything is constant.*

## FORMULA DERIVATION: PERPETUITY

Constant Dividends (**D**), so  $D_n = D$ :

$$\text{(A)} \quad PV = D/(1+k) + D/(1+k)^2 + \dots$$

Multiply both terms by **(1+k)** to obtain equation (B):

$$\begin{aligned}\text{(B)} \quad PV.(1+k) &= D.(1+k) / (1+k) + D.(1+k) / (1+k)^2 + \dots \\ &= D + D / (1+k) + D / (1+k)^2 + \dots\end{aligned}$$

subtract (A) from (B) which gives:

$$PV.(1+k) - PV = D$$

which after simplifying gives **PV = D/k**

## Growing perpetuity and the formula of Gordon Shapiro

➤ Assume a company with **stable and growing ( $g > 0$ ) performance**: revenue grows by  $g\%$ , constant margin (costs grow with sales); investments required grow at the same pace as sales: **Cash Flows, Net income and Dividends grow  $g\%$  each year**

➤ The present value of a stream of growing cash flows in perpetuity is equal to:

$$EV_0 = \sum_{t=1}^{+\infty} \frac{FCF_t}{(1+k)^t} \Leftrightarrow EV_0 = \frac{FCF_1}{k-g}$$

Note: use  $FCF_1$  in the formula to obtain  $EV$  at time 0

$k$  is the discount rate (eg. WACC),  $FCF$  are Free cash Flows (available to the Firm, i.e. debt and equity).

The same formula can be used to value the equity of the company, the formula (DDM, Gordon Shapiro) becomes:

$$S_0 = \sum_{t=1}^{+\infty} \frac{D_t}{(1+k_s)^t} \Leftrightarrow S_0 = \frac{D_1}{k_s - g}$$

with  $D_t = (1+g) * D_{t-1}$

Note: use  $D_1$  in the formula!!  
 $D_1 = D_0 * (1+g)$

$k_s$  is the cost of equity;  $D$  the dividends

## FORMULA DERIVATION: GORDON SHAPIRO

Assuming  $k$  is our discount rate, the Present value ( $P_0$ ) of an infinite stream of Dividends ( $D_t$ ), growing at a constant rate  $g$  is equal to:

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t} \quad (\text{A})$$

For each  $D_t$ , we can write that:

e.g.  $D_1 = (1+g) \cdot D_0$

$$D_t = (1+g)^t \cdot D_0 = (1+g)^{t-1} \cdot D_1$$

Replacing  $D_t$  by  $(1+g)^{t-1} \cdot D_1$ , we get:

$$P_0 = \sum_{t=1}^{\infty} \frac{(1+g)^{t-1} D_1}{(1+k)^t} = \frac{D_1}{1+k} \cdot \sum_{t=1}^{\infty} \frac{(1+g)^{t-1}}{(1+k)^{t-1}} \quad (\text{B})$$

The sum of the terms ( $q$ ) of a geometric suite (if  $q < 1$ ) is equal to:

$$\sum_{i=0}^{\infty} q^i = \frac{1}{1-q}$$

Assume  $q = (1+g)/(1+k)$ , restate (B):

$$P_0 = \frac{D_1}{1+k} \cdot \frac{1}{1 - \frac{1+g}{1+k}} = \frac{D_1}{1+k} \cdot \frac{1}{\frac{1+k-1-g}{1+k}} \quad (\text{C})$$

$= (1+k)/(k-g)$

After eliminating the  $(1+k)$  terms, Equation (C) becomes:

$$P_0 = \frac{D_1}{k-g}$$

# Deriving the ‘value driver formula’



## Standard FCF model

$$\text{Value} = \frac{\text{FCF}}{\text{WACC} - g}$$

## Value drivers of FCF

$$\text{FCF} = \text{NOPLAT} - \text{Net Investment}$$



$$\text{FCF} = \text{NOPLAT} \times \left[ 1 - \text{IR} \right]$$

Where IR = Investment Rate  
And we know that:  
 $g = \text{ROIC} \times \text{IR} \rightarrow \text{IR} = g/\text{ROIC}$



$$\text{FCF} = \text{NOPLAT} \times \left[ 1 - \frac{g}{\text{ROIC}} \right]$$

## Value driver model

$$\text{Value} = \frac{\text{NOPLAT} \times \left[ 1 - \frac{g}{\text{ROIC}} \right]}{\text{WACC} - g}$$

# Growth depends on ROIC and Investment rate

Volume Inc.



**Investment rate (IR) =  
50% (half of NOPLAT is  
reinvested each year)**

**Return on Capital  
(ROIC) = 10%  
(\$5 additional profit  
for \$50 invested)**

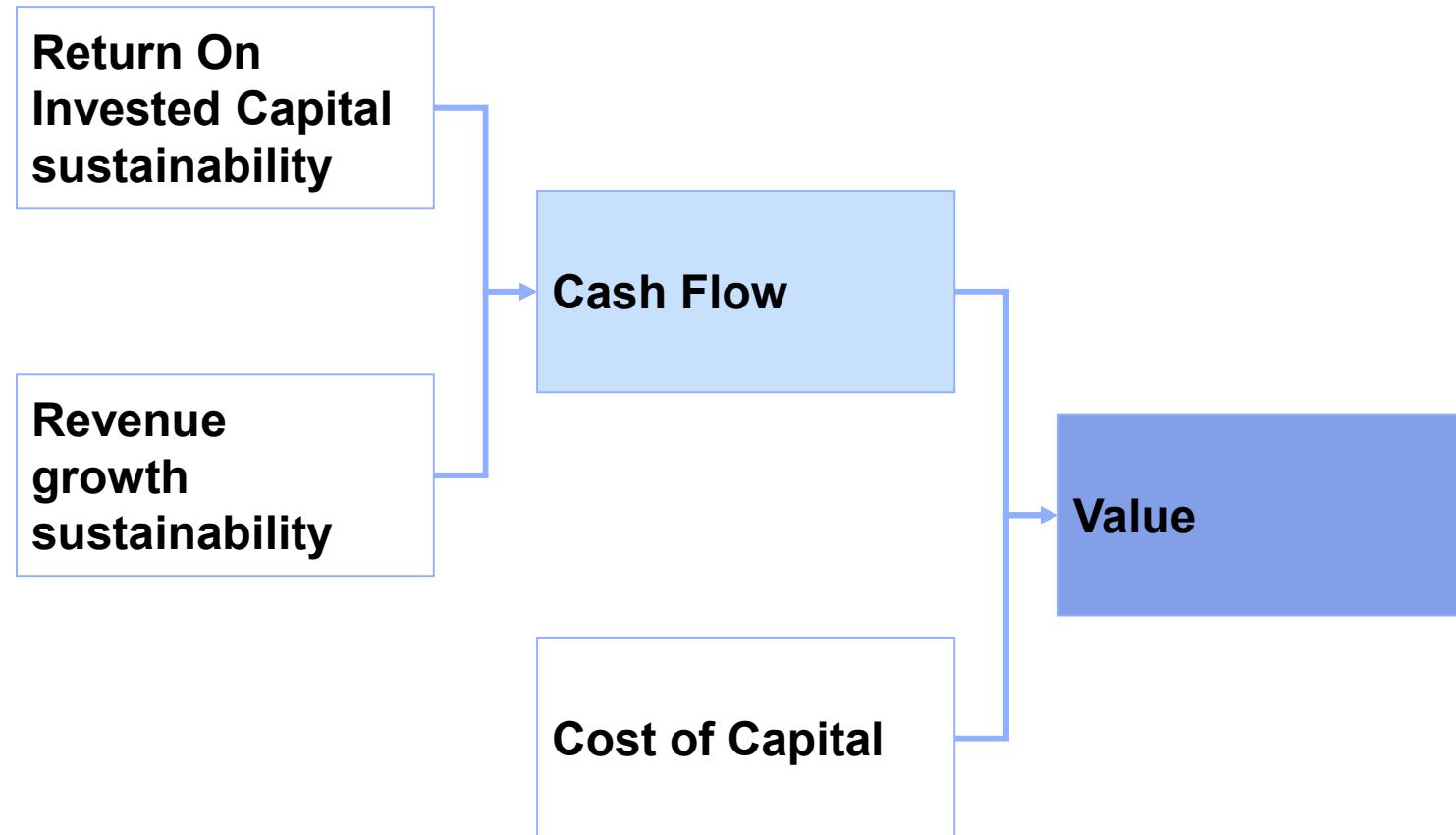
	Year 1	Year 2	Year 3
<b>NOPLAT</b>	100.0	105.0	110.2
<b>Net investment</b>	(50.0)	(52.5)	(55.1)
<b>Free cash flow</b>	50.0	52.5	55.1

**FCF growth (g)  
= 5% (50% x  
10%)**

$$g = \text{ROIC} \times \text{IR} \rightarrow \text{IR} = g/\text{ROIC}$$

# Conclusion: Level & sustainability of growth and ROIC drive value

“The Tao of Corporate Finance”



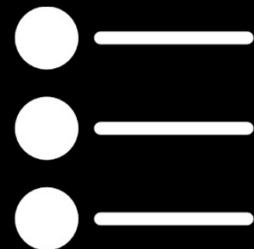
*Note that Value is created when  $ROIC > WACC$*

*The ‘excess return’ above  $WACC$  (i.e.  $ROIC - WACC$ ) is also called an **ECONOMIC PROFIT***

## Reminder: Value creation principles



- A company **creates value** by investing its capital to achieve a **Return (ROIC)** higher to its **Cost of capital (WACC)**
- The more a company is able to invest its capital to **generate high returns** (i.e. a ROIC above the cost of capital), the more value it creates (remember that growth creates value only if  $\text{ROIC} > \text{WACC}$ )
- Value creation depends on **ROIC** and **growth**:
  - Companies with a high ROIC create more value by focusing on generating additional growth;
  - Companies with a low ROIC should focus on improving their ROIC first (and « earning the right to grow »)
- Companies which pick value maximizing strategies will be worth more in the long run, but short term markets do not always reflect “intrinsic” values of all assets because of the irrational behavior of certain investors (e.g. bubbles)



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- Introduction
- A (very) simple valuation model
- **A simple DCF model**

## First step in a DCF valuation is to analyze historical performance

**Reorganize the company's financial statements:**

- Calculate **NOPLAT**
- Calculate **Invested Capital**

**Analyze operating performance/**

- Calculate **ROIC**
- Understand **growth**

**Analyze non-operating performance**

- Financing 'Health'
- Credit rating

***Use historical results to help forecast future and determine value***

- Historical performance analysis grounded in historical financial statements: Balance Sheet, Income Statements, Cash Flow Statement and relevant notes
- Separate operating versus non-operating items, analysis must reflect **economic performance not accounting**. This will help when bridging Enterprise value to Equity value
- Adjustments might be needed to take into account specific accounting issues (eg. Leases, pensions, provisions)
- Growth analysis should help understand **sources of growth** (internal/external, price vs volume) and level of **sustainable growth** (i.e. which can be funded internally)
- Non operating performance should assess **long term health** (enough funds to meet its ST and LT obligations? "optimal" company's capital structure relative to its strategic needs?)

## Remember our approach to financial analysis

Balance Sheet	Income Statement	Cash Flows
Invested Capital	NOPLAT	<i>Free cash flow</i>
Net non-operating assets	After-tax non-operating income	Non-operating cash flow
Total Funds Invested	Total income to all investors	Cash flow available to investors
Debt	After-tax interest	Debt financing flows
Equity	Net income	Equity cash flows

**$FCF = NOPLAT -$**   
*increase in Invested Capital*

**$ECF = \text{Net income} -$**   
**Increase in Equity**

i.e. ECF = 'dividendable' portion of Net income

# How to calculate Free Cash Flow (FCF): a general template

**Free Cash Flow = Cash Flow available for financing flows**

- FCF is the (cash) profit retained minus (operating) investments in the business
- Simple definition:  $FCF = NOPLAT - \Delta IC$

In practice, **pay attention to Depreciation:**

- Either *add back Depreciation and subtract Gross Capex*
- Or *subtract Net Capex* (= means net of Depreciation)
- Link FCF calculation to NOPLAT and investment needs

NOPLAT

+ Depreciation

**= Gross Cash Flow**

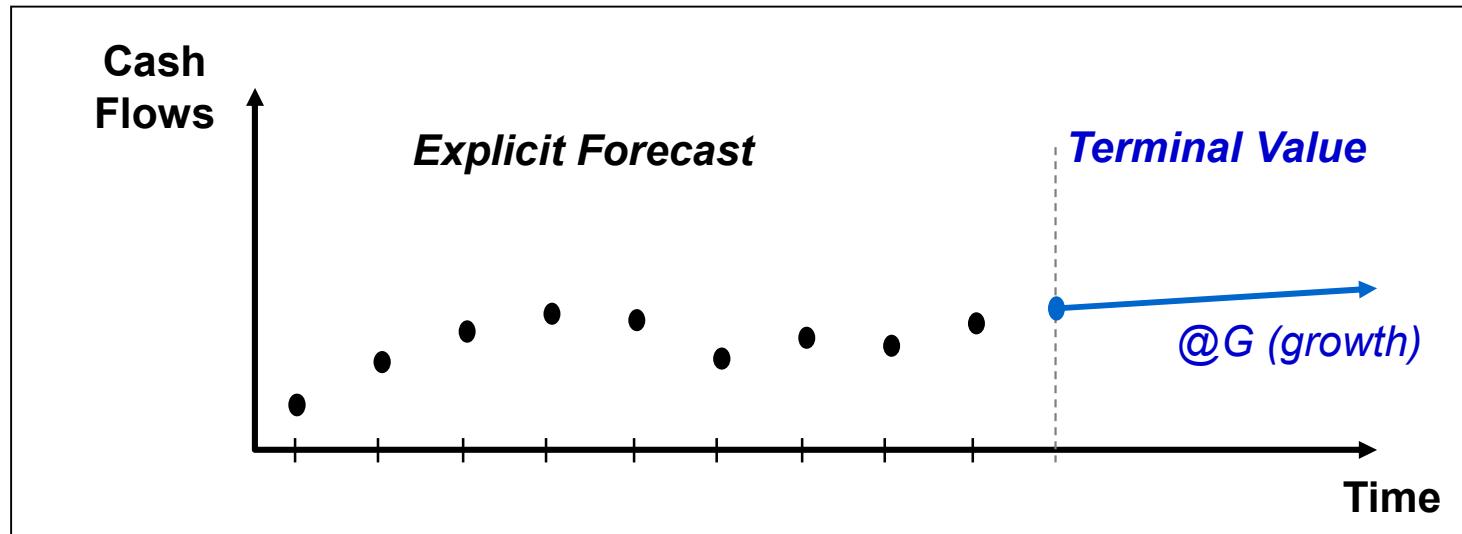
- Increase in working capital
- Capital expenditure

*[ ] = Gross investment  
Note: equivalent to “Increase in Invested Capital”*

**= Free Cash Flow (FCF)**

Remember that accounting profit is different from CFs... Depreciation is deducted from Revenues but this is a non cash expense (no impact on cash flows)

**As it is not practical to forecast Cash flows, until  $\infty$ , a DCF typically involves 5-20 years of explicit forecasts and a Terminal Value**



#### Duration

- Typically 5-10 years,  
*(but should ideally correspond to the Competitive Advantage Period of a company)*

▪  $\infty$

#### Rationale

- Proximity in time allows meaningful estimates of all line items and yields and relatively accurate ROIC and growth rates
- Returns might vary, significant investments required and growth still high
- Competitive situation still volatile
- Assumes stable (average) returns in perpetuity, stable competitive situation
- Low growth
- Too distant in future to be modeled precisely

## The (Operating) Enterprise value of a company using its CFs is obtained by discounting the FCFs at the appropriate cost of capital

- The value of an asset is equal to the PV of the future benefits generated by this asset
- Applying this concept to a company (Entity valuation), one can assume that the value of a company is equal to the **present value of the future “Free” Cash Flows (FCF)** the company will generate

### Generic formula:

The (Operating) Enterprise Value (EV) of a company will be equal to the present value of the cash flows available to all its financiers (debt and equity holders) = Cash Flows that remain (« free ») after operations and investments:

$$EV = \sum_{t=1}^{+\infty} \frac{FCF_t}{(1 + WACC)^t}$$

*WACC = Cost of Capital*

In practice, for modeling purposes, this will often be written as  
DCF = FCF \* Discount Factor

Where the ‘Discount Factor’ for year n is equal to  $1 / (1+WACC)^n$

## Terminal value: Overview

➤ As it is not practical to model Cash Flows forever, after the explicit period we will estimate the 'Terminal Value' (this is a **shortcut method** to estimate the value of the company's cash flow beyond the explicit forecast period)

### Calculation

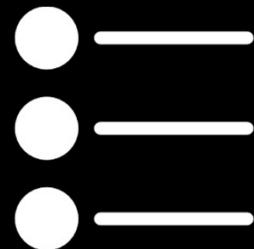
- Mathematically, remember Gordon Shapiro:
  - sum of the terms of a geometric suite,
  - growing perpetuity ( $g$  is the growth rate)
- We estimate the value of a cash flow forecast in perpetuity using a DCF method:

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

- $FCF$  = Normalized level of FCF in year after explicit forecast
- $g$  = growth rate of FCF in perpetuity

### Discounting

- Gordon Shapiro formula gives Present Value of cash flows in perpetuity as of the Beginning of Year  $t+1$
- FCF is for  $t+1$  but use the discount rate from **year  $t$ , NOT  $t+1$ !!**



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- A simple DCF model
- **Taking into account the timing of the valuation**

## Mid-year discounting

- Standard DCF assumes Cash Flow occurs **at year end**
- If the CFs accrue evenly through the year (i.e. on average half-way through the year), mid year discounting should be used
- Using mid year discounting will give a lower enterprise value and forgetting this/thinking about this can change your results by about WACC/2 %...

Illustration – mid-year discounting

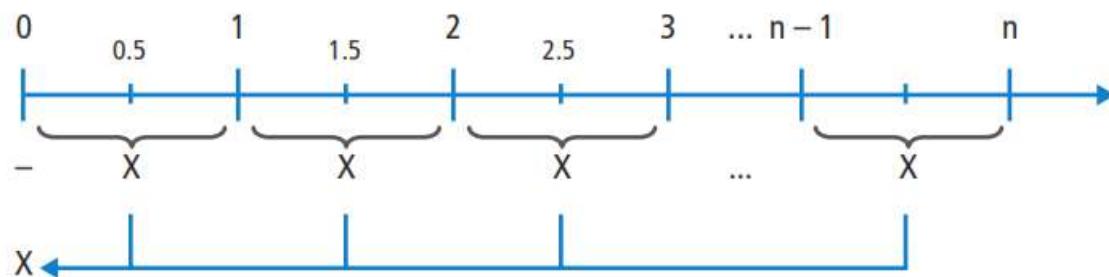
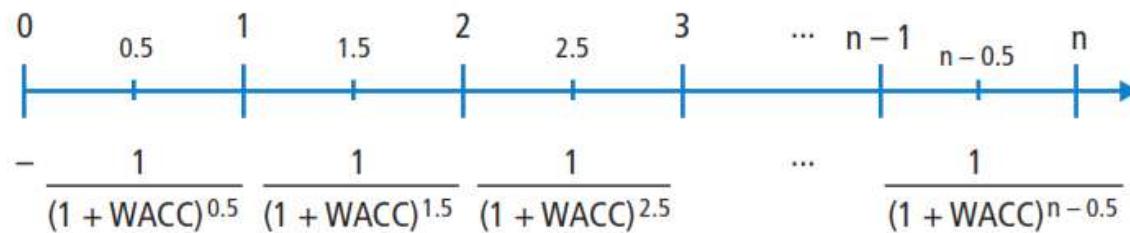
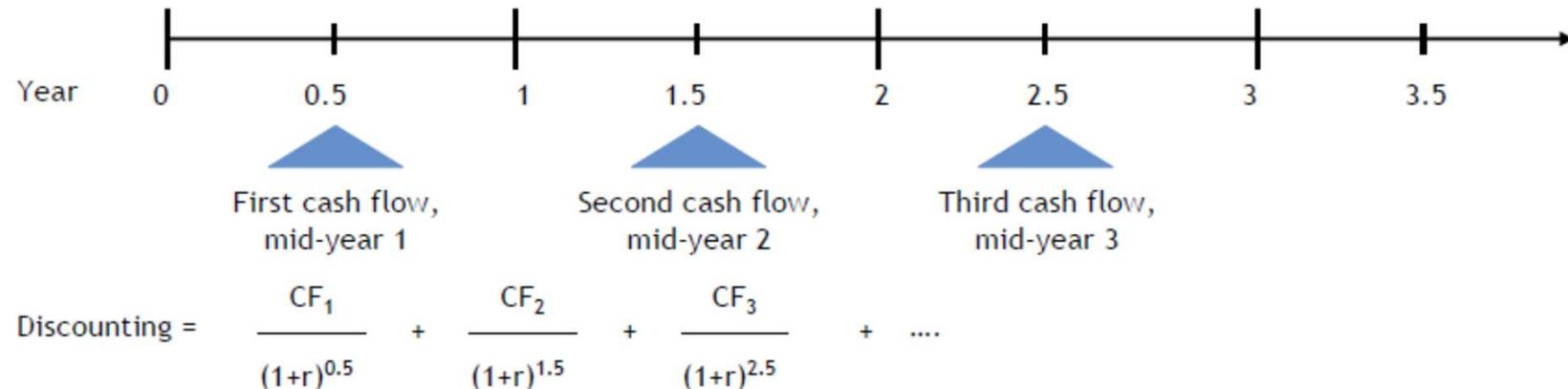


Illustration – mid year discount factors

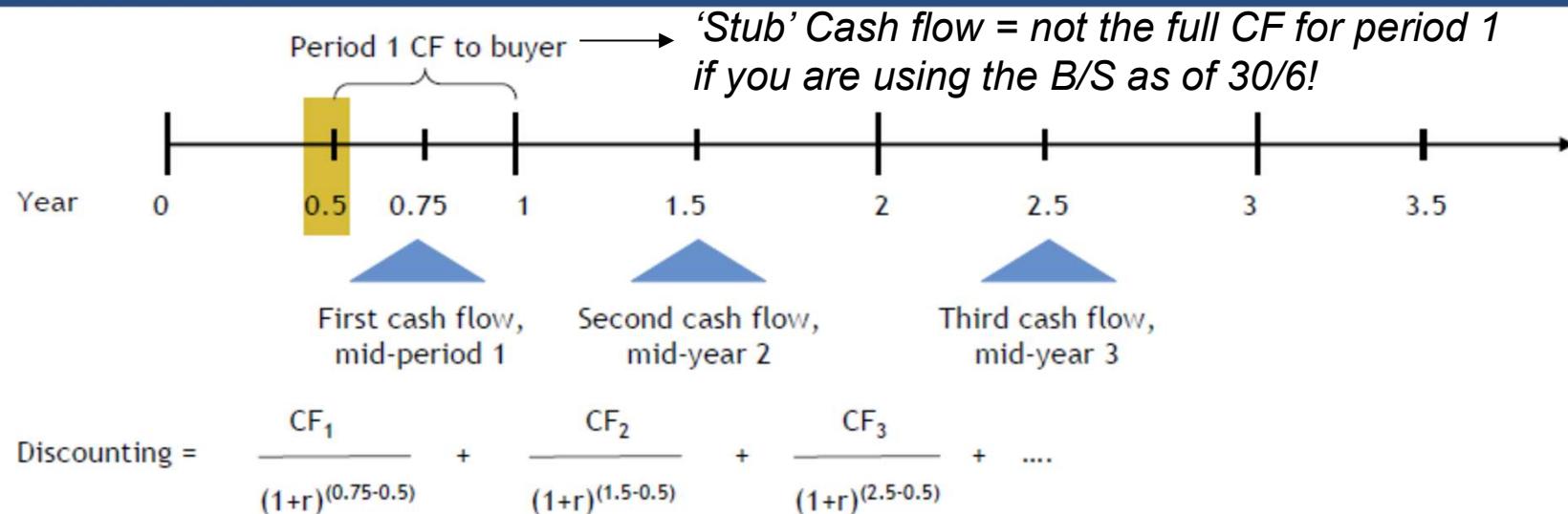


## In practice, be careful with the transaction date: separate its impact (stub period) and mid-year effect

Transaction date: 01/01

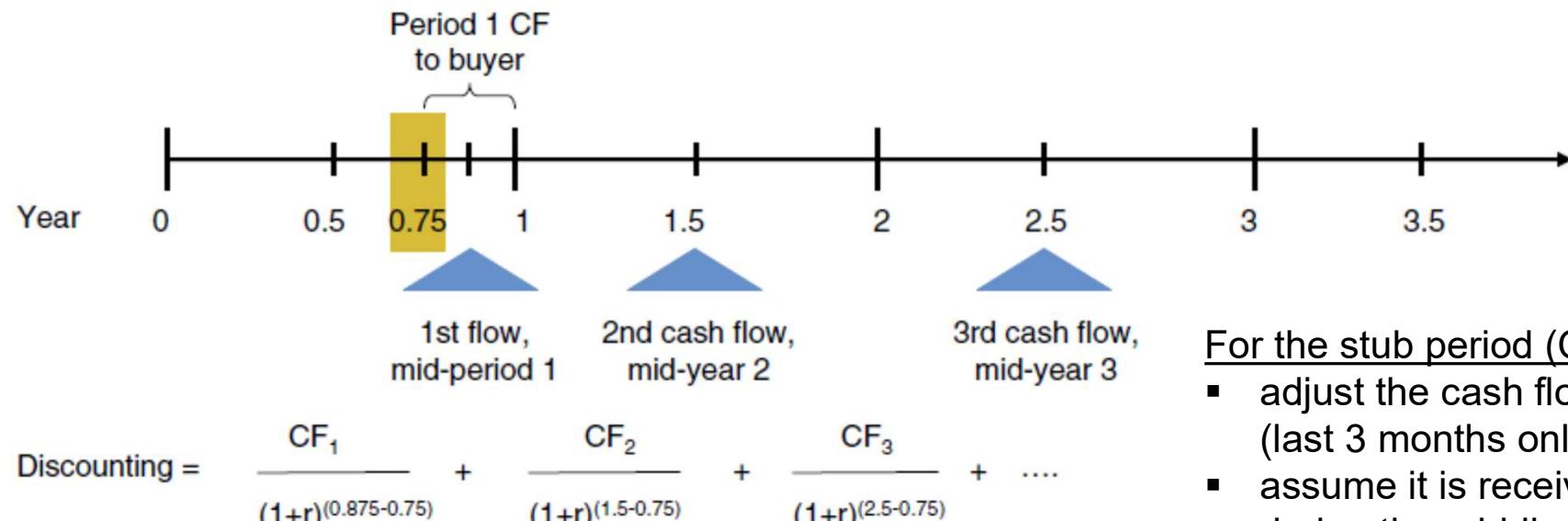


Transaction date: 06/30



## EXAMPLE: Discounting with a transaction date on 30/9

Transaction date: 09/30

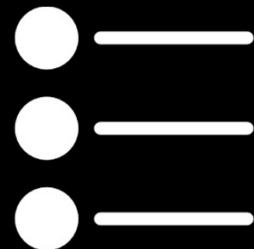


For the stub period (Q4):

- adjust the cash flow (last 3 months only)
- assume it is received during the middle of the stub period (Q4): i.e. 0.875

	Q4	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Normal Discount Periods with Stub:</b>	0.25	1.25	2.25	3.25	4.25	5.25
<b>Mid-Year Discount Periods with Stub:</b>	0.125	0.75	1.75	2.75	3.75	4.75

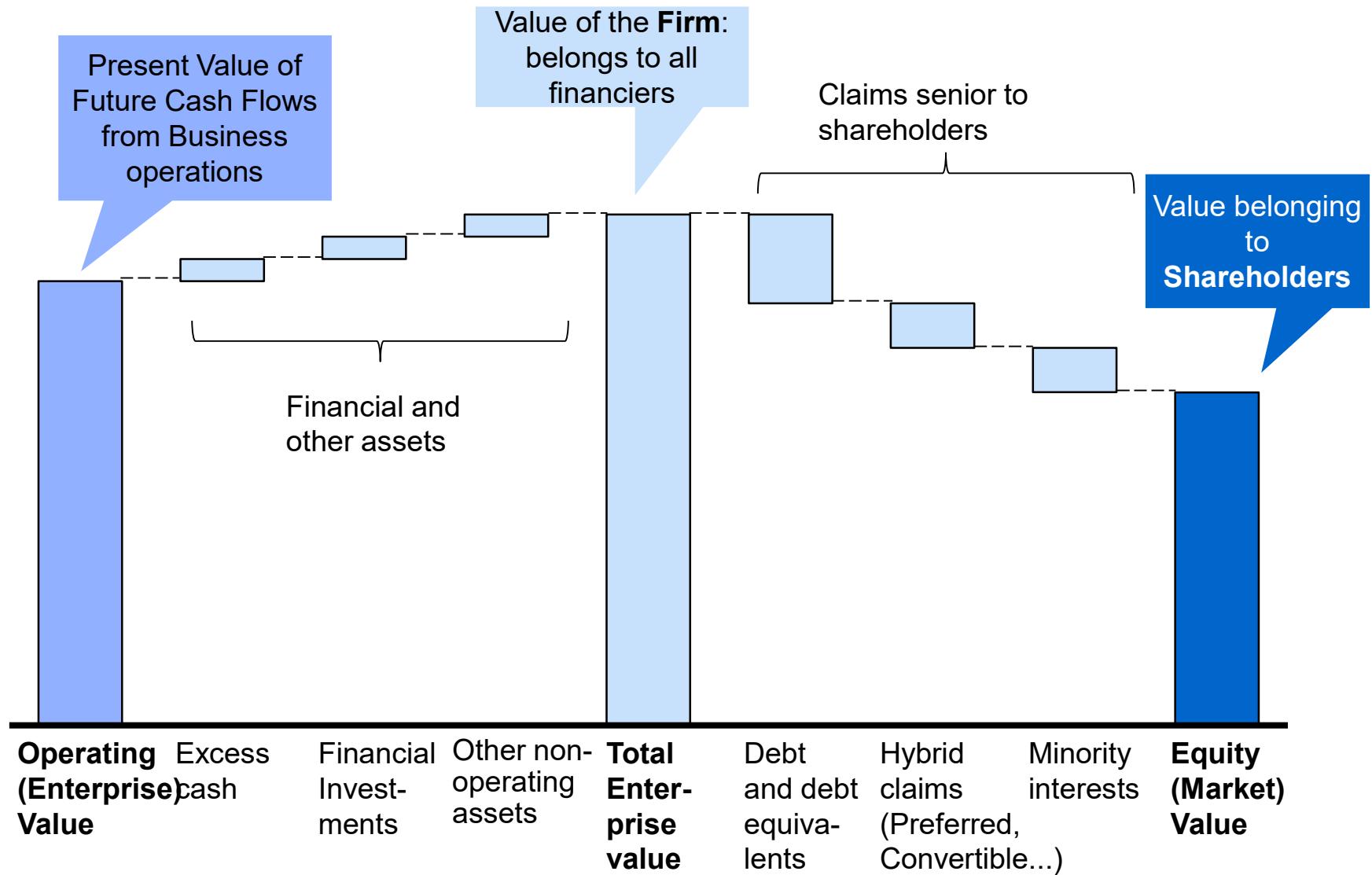
For all full future periods:  
cash flows are received during the middle of the fiscal period



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- Taking into account the timing of the valuation
- **The Enterprise to Equity ‘bridge’**

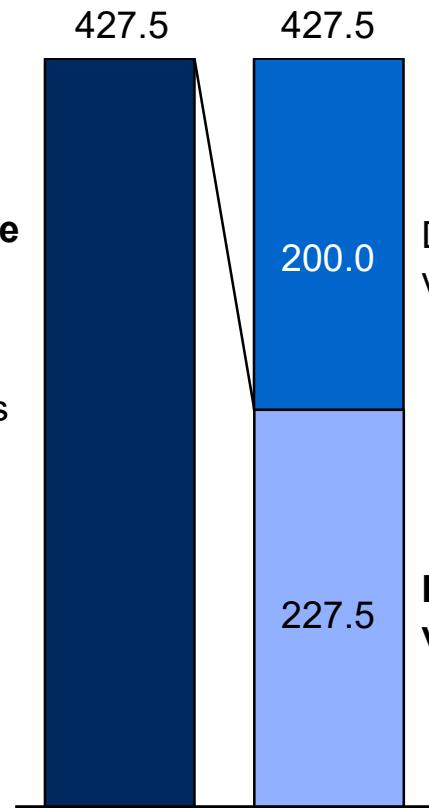
## What is *Operating Value* / (total) *Enterprise Value* / *Equity* value?



To value a company's Equity, we can 1) Look for the value of Equity directly or 2) Estimate Enterprise value and subtract debt to get to Equity

**2.1) Estimate Enterprise Value:**  
Value operations (DCF) and add financial assets

**Enterprise value =**  
Value of operations +  
Financial assets

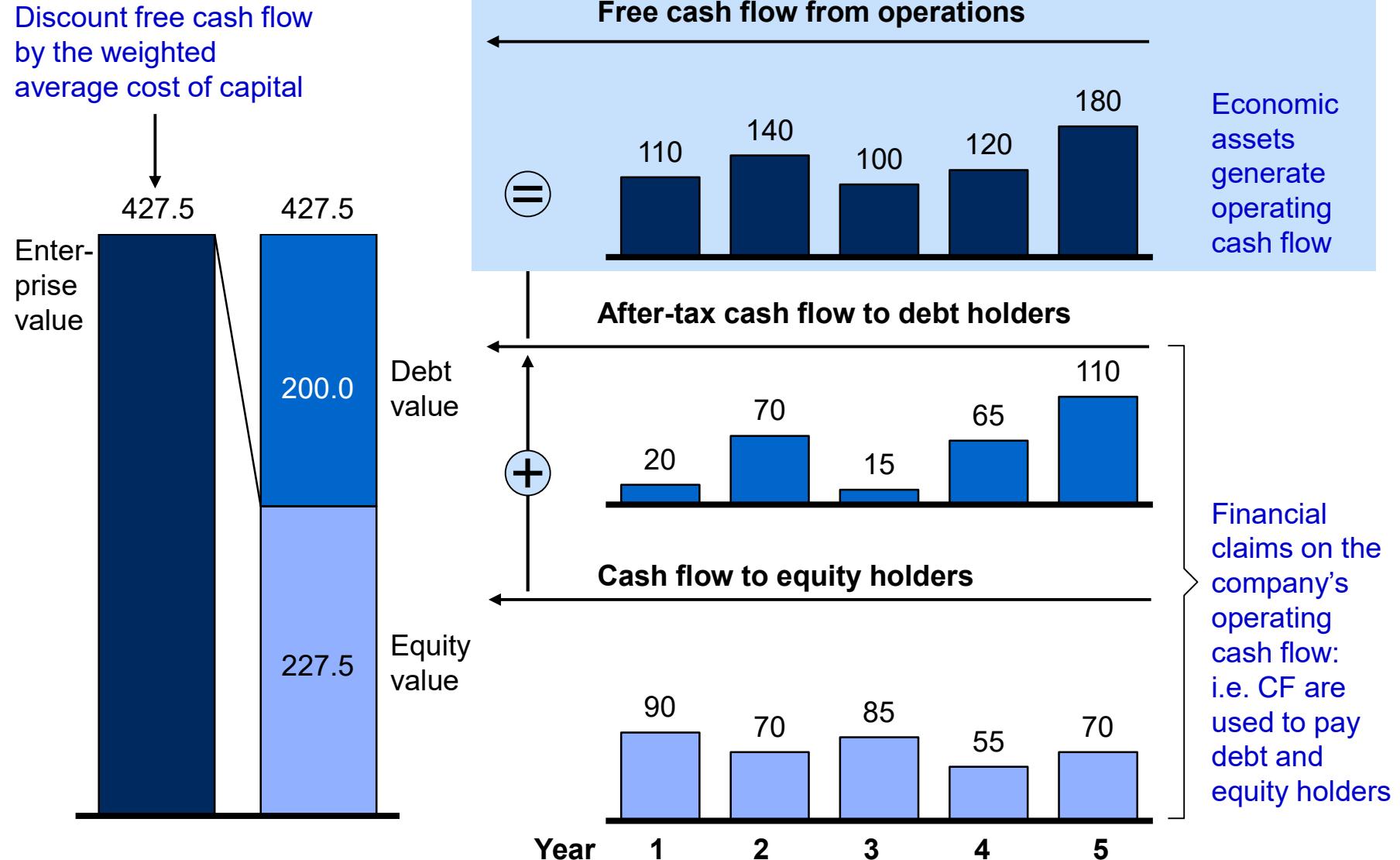


**2.2) Subtract debt value:**  
Estimated Market value, close to Book value

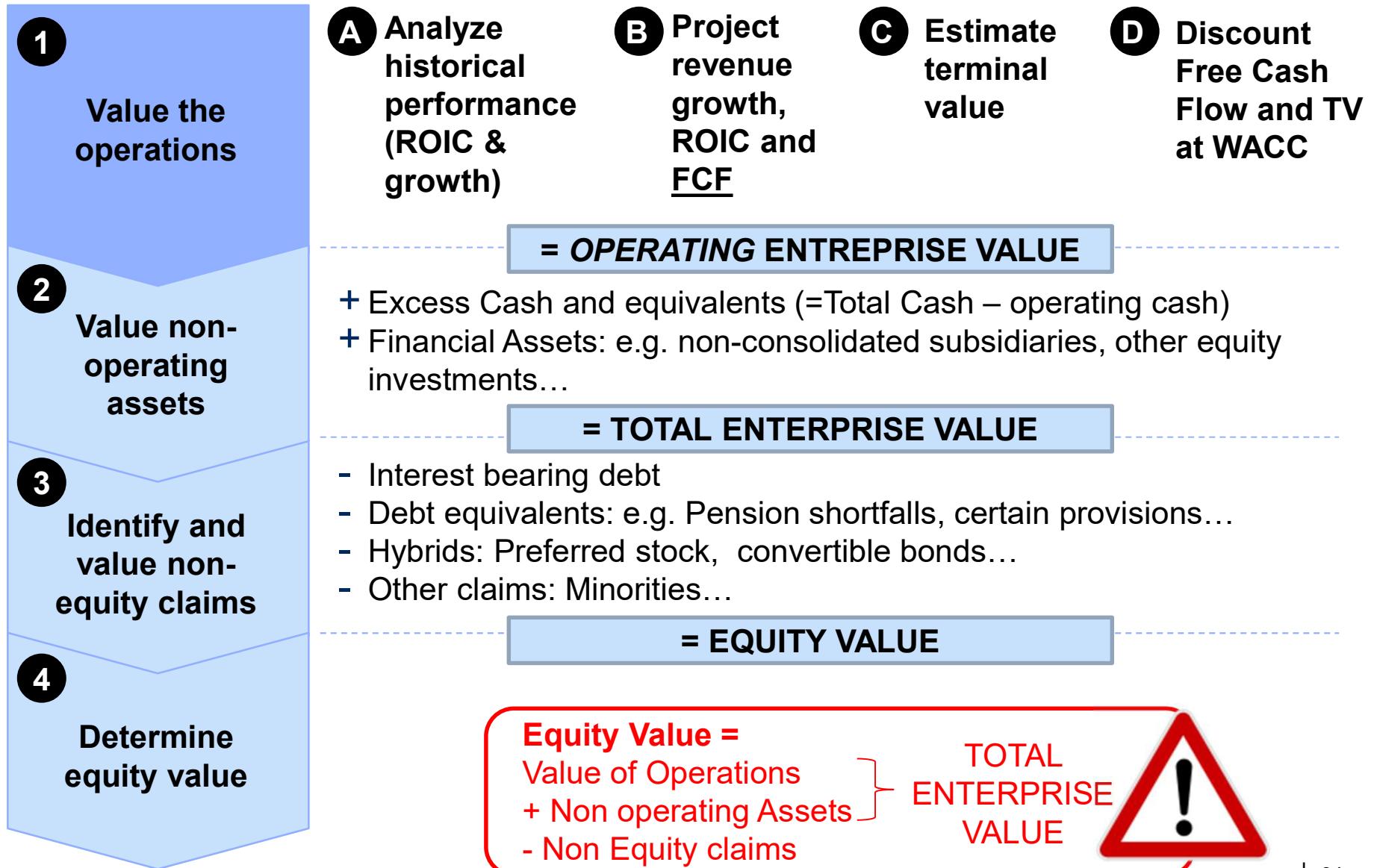
**1) Value equity directly:**  
Equity based method (e.g. Dividend Discount model; Equity Cash Flows method)

- 1. Equity method:** (+) most direct (conceptually) but (-) results are very sensitive to financing assumptions (Debt/Equity)
- 2. Enterprise value method:** (-) requires 2 steps and an assumption on leverage (in the WACC) but (+) value of debt is known and results less sensitive to financing

## Enterprise value represents the sum of Debt AND Equity value: Free Cash Flows belong to Debt AND Equity holders



# DCF: Detailed Equity valuation process



## In practice: calculating equity value

- **Include all assets/liabilities whose cash flows are not included in the DCF cash flows**  
(= start by listing all items from balance sheet which are not included in DCF analysis!)
- **Include all assets and liabilities at market value**
  - For some assets and liabilities, the **value may be dependent on the value of the operations**: be consistent with DCF assumptions
  - Where assets and liabilities **not related to the value** of the operations; use **current market value if the information is available, else use book value**

Non-operating assets and claims which are not dependent on the value of the company

### Examples

- Excess cash and marketable securities
- Other investments
- Discontinued operations
- Excess real estate
- Hidden liabilities: leases and pensions

Hybrid assets / claims which are dependent on the value of operations

- Options
- Convertible debt
- Distressed debt
- Net operating loss carry forwards

### Valuation approach

- Estimate market value
- If not available, use book value

- Value must be based on company value, which may be using DCF or options pricing methodology

## 2 Excess Cash and marketable securities

- Every firm has investments in cash and equivalents (treasury bills, short term liquid investments, commercial paper, marketable securities...), and this for different reasons: cash may be needed for operations (cash registers), as a precaution (crisis) or speculation/'strategic motives' (in case a great investment opportunity appears)
- Cash and cash equivalents do not generate operating income (= interest/financial income, e.g. below EBIT). Therefore they do not generate free cash flow (or economic profit) and, therefore, should not impact the value of operations
- As per generally accepted accounting principles (GAAP) and International Financial Reporting Standards (IFRS), companies must report such assets **at their fair market value** on the balance sheet i.e. **the most recent book value is a proxy for the current market value**
- Cash should be separated into **Operating cash and Excess Cash**:
  - **Operating Cash:** is usually defined as a percent of revenues, based on industry averages or rules of thumb. It is considered to be required for operations and is therefore included in the working capital (and the operating cash flows) and excluded from the EV to Equity bridge
  - **Excess cash:** is the difference between total cash and operating cash and is considered in the EV to Equity bridge

## 2 Equity investments/Nonconsolidated Subsidiaries: introduction

- They are companies in which the parent company holds a noncontrolling equity stake. As the parent company does not have formal control over these subsidiaries, their financials are **not consolidated** (equity method) and they do not contribute to EBIT (and hence to FCF or Economic Profit). These investments must be valued separately from operations.
- The best approach to valuing subsidiaries depends on information available:
  - **Publicly Listed Subsidiaries:** Use the market value for the company's equity stake. Verify that the market price reflects intrinsic value (i.e., that there is adequate liquidity and free float so that the trading price reflects current information)
  - **Privately Held Subsidiaries:**
    - If financial statements are available, perform separate DCF valuation. Use appropriate WACC, which may vary from parent company's WACC.
    - If no separate financial statements are available. There are three alternatives to value a subsidiary with limited financial information:
      1. Simplified cash flow to equity
      2. Multiples valuation
      3. Tracking portfolio

*Triangulate results as much as possible given the lack of precision of these three valuation approaches.*

## 2 Nonconsolidated Subsidiaries: Valuing Publicly Traded Subsidiaries

As of October 2008, Philips owned stakes in a few unconsolidated subsidiaries. One significant investment was LG Display, a South Korean manufacturer of TFT-LCD panels for use in televisions, notebook computers, and other applications

millions of euros			
Core operating value		21,630	
<b>Associates</b>	<b>Holding</b>		
LG Display	19.9%	1,236	←
TPV Technologies	13.4%	95	
NXP Semiconductors	19.9%	598	
Pace Micro Technologies	23.0%	76	
Excess cash		8,233	
Enterprise value		<u><u>31,868</u></u>	
<b>Valuation of LG Display stake</b>			
Market capitalization (millions of wons)		10,433,000	
÷ Currency conversion (wons/euros)		<u>1,680</u>	
Market capitalization		<u><u>6,211</u></u>	
× Percent ownership		<u>19.9%</u>	
Ownership stake		<u><u>1,236</u></u>	

Source: UBS Analyst Report, October 2008, Thomson First Call.

### Step 1

To estimate Philips's stake in LG Display, start with LG Display's market capitalization, and divide by the exchange rate of South Korean won to euros. This converts LG Display's local market capitalization into euros.

### Step 2

To determine the value of Philips's partial ownership, multiply the resulting market capitalization in euros by Philips's ownership stake.

## 2 Nonconsolidated Subsidiaries: Valuing Privately Held Subsidiaries

If the parent company's accounts are the only sources of financial information for the subsidiary, use the following alternatives:

- If the parent has a 20 to 50 percent equity stake, net income and approximate book equity are disclosed in the parent's accounts.
  1. ***Simplified cash-flow-to-equity valuation:*** Build forecasts for how the key value drivers will develop and discount at cost of equity for subsidiary (and not at the parent company's WACC).
  2. ***Multiples valuation:*** Build a valuation based on the price-to-earnings and/or market-to-book multiple. An appropriate multiple can be estimated from a group of listed peers.
- For parent equity stakes below 20 percent, the only information available may be the investment's original cost and the date when the stake was acquired.
  3. ***Tracking portfolio:*** Approximate its current market value by adding the relative price increase (or subtracting a decrease) for a portfolio of comparable stocks over the same holding period.

## 2 Customer Financing Arms

- To make their products more accessible/attractive, some companies operate a customer financing businesses. Others have historically inherited of a mixture of operating and financing activities
- Because financial subsidiaries differ greatly from manufacturing and services businesses, it is critical to separate revenues, expenses, and balance sheet accounts associated with the subsidiary from core operations. Failing to do so will distort return on invested capital, free cash flow, and ultimately your perspective on the company's valuation.
- Typically, you will need to evaluate the Industrial arm using ROIC, FCF etc... while the financing arm will be assessed/valued like a financial institution (ROE, Equity Cash Flows...)
- Example industries where you might encounter customer financing arms: Equipment manufacturers (=leasing their products), Automotive manufacturers (financing customers purchases), some retail companies (Nouvelles Galeries/Cofinoga, Carrefour), Postal companies (Deutsche Post/PostBank)...

## 2 Customer Financing Arms Financeco example

Let's examine FinanceCo. Last year, the company sold \$1,100 million of machinery at a cost of \$800 million. The company finances a significant percentage of its products for its customers, generating \$300 million per year in lease revenue.

The company currently holds \$3,500 million in financial receivables. To finance its leasing business, FinanceCo raises securitized debt, collateralized by the financial receivables. The company also has general obligation debt to fund everyday operations.

### FinanceCo: Reorganized Financial Statements

#### Income statement

Sales of machinery	1,100
Revenues of financial products	300
Total revenues	<u>1,400</u>
Cost of goods sold	(800)
Interest expense of financial products	<u>(250)</u>
Total operating costs	<u>(1,050)</u>
Operating profit	350
Interest expense, general obligation	<u>(50)</u>
Net income	<u>300</u>

#### Balance sheet

Operating assets	3,000
Financial receivables	<u>3,500</u>
Total assets	<u>6,500</u>
Operating liabilities	500
General obligation debt	700
Debt related to financial products	3,200
Stockholders' equity	<u>2,100</u>
Total liabilities and equity	<u>6,500</u>

## 2 Customer Financing Arms Financeco example

To analyze FinanceCo, start by constructing separate income statements and balance sheets for the manufacturing and customer financing subsidiaries (if not given by the company). Using the returns calculated below, we can benchmark each of FinanceCo's subsidiaries against its peers. We cannot, however, aggregate the ratios to determine a combined return for FinanceCo as a whole...

### FinanceCo: Reorganized Financial Statements

#### Manufacturing subsidiary

##### Operating profit

Sales of machinery	1,100
Cost of goods sold	(800)
Operating profit	<u>300</u>

##### Reorganized balance sheet

Operating assets	3,000
Operating liabilities	(500)
Invested capital	<u>2,500</u>
General obligation debt	700
Allocated equity	<u>1,800</u>
Invested capital	<u>2,500</u>

Return on invested capital

12.0%

#### Customer financing subsidiary

##### Net income

Revenues of financial products	300
Interest expense of financial products	(250)
Net income	<u>50</u>

##### Reorganized balance sheet

Financial receivables	<u>3,500</u>
Debt related to financial products	3,200
Allocated equity	<u>300</u>
Liabilities and allocated equity	<u>3,500</u>

Return on allocated equity

16.7%

## 2 Other Nonoperating Assets

Companies can have other forms of nonoperating assets as well:

- **Tax loss carry-forwards:** also known as Net operating losses (NOLs). When a company generates a loss in a given year, it can accumulate those and net them against future income. Create a separate account for the accumulated tax loss carry-forwards, and forecast the development of this account by adding any future losses and subtracting any future taxable profits on a year-by-year basis. Depending on the amount and the situation (check with experts the local law applicable), either discount the TLCFs separately at an appropriate discount rate (usually WACC) or modify the tax expense to take into account the use of TLCFs.
- **Discontinued operations:** Most recent book value is a reasonable approximation since assets and liabilities associated with discontinued operations are written down to fair value and disclosed as a net asset on the balance sheet.
- **Excess real estate and other unutilized assets:** Identifying these assets is nearly impossible unless they are specifically disclosed in a footnote. For excess real estate, use the most recent appraisal value, an appraisal multiple such as value per square meter, or discounting of future cash flows.

### 3 Valuing Investment Grade Corporate Debt

- Corporate debt comes in many forms: commercial paper, notes payable, fixed and floating bank loans, corporate bonds, leases...
- For companies with Investment Grade debt, the value of the debt will be independent from the value of operations
- If the Debt is **Publicly Traded**:
  - if the debt is relatively secure and actively traded, use its market value.
  - Book value is a reasonable approximation.
- If the Debt is **Privately Held** :
  - If the debt is not traded, discount the promised payments and principal repayment at the yield to maturity (or a YTM that reflects the riskiness of the debt, based on the company's estimated bond rating) to estimate current value.
  - Book value is a reasonable approximation if interest rates and default rates have not significantly changed since issuance.

### 3 Valuing Highly Leveraged Companies

For distressed companies, the value of the debt will be at a significant discount to its book value and will fluctuate with the value of the enterprise. Essentially, the debt has become like Equity and its value will fluctuate with the value of the enterprise.

To value debt in these situations, create multiple performance scenarios and deduct the full value of debt under each scenario. Weight each scenario by probability of occurrence. For distressed companies, apply an integrated-scenario approach to value operations as well as equity.

Consider a simple two-scenario example of equity valuation for a company with significant debt. In scenario A, the company's new owner is able to implement improvements in operating margin, inventory turns, and so on. In scenario B, changes are unsuccessful, and performance remains at its current level.

#### Valuation of Equity Using Scenario Analysis

	\$ million	Enterprise value	Face value of debt	Equity value <sup>1</sup>	Probability	Weighted equity value
<b>Scenario A</b>						
New owner successfully implements value improvements		1,500	1,200	300	50%	150
<b>Scenario B</b>						
Company maintains current performance		900	1,200	-	50%	-
Equity value:						<u>150</u>

<sup>1</sup>Equity value equals enterprise value less the face value of debt or zero, whichever is greater.

### 3 Debt Equivalents: Unfunded Pensions

#### A simple approach to value Retirement-related liabilities 1/2

- Retirement-related liabilities are obligations of the company to employees that will be owed to them when they retire (or already owed to retired employees). They typically include unfunded/under-funded pension plans and reserves for medical benefits

##### Impact on net debt

- The impact on net debt should equal the amount a company would have to pay a third party in order to outsource the liability
- As such, we include net pension liabilities (pension liability – fair value of dedicated assets) in net debt
- Pension contributions are tax deductible so the net liability should include a tax effect:

$$\text{Net pension liability} = (\text{PBO} - \text{FVA}) \times (1 - \text{tax rate})$$

or

$$\text{Net pension liability} = (\text{PBO} - \text{FVA}) - \text{deferred tax assets related to pension provision}^*$$

*\*If the amount of deferred tax assets generated by pension provision is provided in the company's annual report*

##### Pension assets

- Impact depends on jurisdiction considered. Rothschild methodology suggests not including these as the assets are ringfenced whereas Valuation includes them with a tax effect which depends on whether the plan is liquidated or not.

### 3 Debt Equivalents: Unfunded Pensions

A simple approach to value Retirement-related liabilities 2/2

#### From annual report's footnote on pension liabilities

(Note: same analysis would be done for other post-retirement benefits)

	2007	2006
Change in benefit obligation:		
Benefit obligation at beginning of year	\$515,179	\$500,994
Benefit obligation adjustments	8,952	(1,195)
Service cost	14,497	14,743
Interest cost	29,149	25,379
Plan participant contributions	823	734
Amendments	713	746
Actuarial loss gain	(23,812)	(17,010)
Foreign currency effect	31,721	16,933
Benefits paid	(30,969)	(25,802)
Curtailment gain	(193)	(403)
Benefit obligation at end of year	<u>\$546,060</u>	<u>\$515,179</u>
Change in plan assets:		
Fair value of plan assets at beginning of year	\$455,962	\$404,841
Other adjustments	(6,063)	—
Actual return on plan assets	53,898	41,301
Expenses paid	(649)	(1,195)
Plan participant contributions	823	734
Foreign currency effects	31,340	16,150
Employer contributions	22,695	18,930
Benefits paid	(29,477)	(24,799)
Fair value of plan assets at end of year	<u>\$528,529</u>	<u>\$455,962</u>

Value of assets

-

Amount of obligation

=

Amount which is  
(underfunded) or overfunded

This is a pre-tax  
non-operating  
(liability) asset.  
When calculating  
equity value, it  
should be after-  
tax

	2007
Funded status	\$(17,531)
Unrecognized net actuarial loss	51,813
Unrecognized prior service cost	5,760
Unrecognized initial net obligation (asset)	764
Additional contributions (September 1 to October 31)	8,100
Net amount recognized	<u>\$ 48,906</u>

### ③ Debt Equivalent Provisions

Certain provisions, other than Retirement liabilities, must be deducted as Debt-Equivalents:

- *Long-term operating provisions* (e.g., plant-decommissioning costs), should be deducted. the balance sheet value offers a reasonable approximation of their value
  
- *Nonoperating provisions* (e.g., restructuring charges) should be deducted. They are generally recorded at a non discounted value, and a discounted value would be ideal but as they are near term in nature, the balance sheet value offers a reasonable approximation of their value

### 3 Hybrid Securities: Convertible Debt

Convertible bonds differ from traditional debt in that they give the holder the additional right to convert the bonds into common stock.

- If the convertible bonds are actively traded, deduct their market value, but only if estimated stock price is near the traded stock price, as the value of convertible bonds depends on your estimate of equity value.
- If the market price differs from your estimate of share price,
  1. ***Option valuation approach:*** The value of convertible bonds can be estimated using an adjusted Black-Scholes convertible bond pricing model.
  2. ***Conversion value approach:*** This common approach assumes that all convertible bonds are immediately exchanged for equity and ignores the time value of the conversion option. The approach works well when the conversion option is deep in the money.

### 3 Hybrid Securities: Convertible Debt

- Consider Hasbro, which has both traditional debt and convertible debt outstanding.
- *The Facts:* Hasbro has \$250 million in convertible debt that can be converted into 11.56 million shares. Based on a share price of \$28, among other variables, the debt is valued at \$326.4 million.
- *The Solution:* To determine equity value, subtract the value of convertible debt (\$326.4 million) from enterprise value. Divide this value by the number of nondiluted shares (142.6 million).
- Note how the conversion value method, which assumes immediate exercise, mirrors actual share price.

#### Hasbro Convertible Debt, November 2008

	\$ million	Black-Scholes value	Conversion value
<b>Capital structure</b>			
Enterprise value		5,050.0	5,050.0
Traditional debt		(556.3)	(556.3)
→ Convertible debt at 2.75% due 2021		(326.4)	–
Unfunded pensions		(38.3)	(38.3)
Employee options		(134.0)	(134.0)
<b>Equity value</b>		<u>3,994.9</u>	<u>4,321.4</u>
 <b>Number of shares (million)</b>			
Number of nondiluted shares		142.6	142.6
→ New shares issued		0.0	11.6
Number of diluted shares		<u>142.6</u>	<u>154.2</u>
 Value per share (dollars)		28.0	28.0

Source: Hasbro 2007 10-K, NASD TRACE system, Black-Scholes option-pricing model.

### 3 Employee Stock Options

- Employee stock options give the holder the right, but not the obligation, to buy company stock at a specified price, known as the exercise price.
- If not specifically expensed as part of NOPLAT, outstanding options must be treated as a nonequity claim.
- Company disclosed fair value
  - *Option valuation models:* The value of options can be estimated using option-valuation models such as Black-Scholes or advanced binomial (lattice) models. Notes to the balance sheet report the value of all employee stock options outstanding as estimated by option-pricing models. This value is a good approximation only if your estimate of share price is close to the one underlying the option values in the footnotes.
  - *Exercise value approach:* This common method provides only a lower bound for the value of employee options. It assumes that all options are exercised immediately and thereby ignores the time value of options.

*Note: most investment banks prefer to ignore the options at this stage and adjust the number of outstanding shares. This is discussed later*

### 3 Employee Stock Options: An Example

- Consider Hasbro, whose equity is trading at \$28 per share.
- *The Facts:* The company has 9.73 million options outstanding. The options have an exercise price of \$20.50 and mature in five years. If the options are worth \$10.13 each, what is the value of the company?
- *The Solution:* To determine equity value, subtract total option value (\$134 million) from enterprise value. Divide this value by the number of nondiluted shares (142.6 million).
- Note how the exercise value method, which assumes immediate exercise, overestimates actual share price.

Hasbro Employee Options, November 2008

\$ million	Black-Scholes	
Company financial structure	Value of outstanding options	Exercise value approach
Enterprise value	5,050.0	5,050.0
Traditional debt	(556.3)	(556.3)
Convertible debt at 2.75% due 2021	(334.3)	(334.3)
Unfunded pensions	(38.3)	(38.3)
→ Employee options: value	(134.0)	-
→ Employee options: exercise proceeds	-	199.3
Equity value	3,987.1	4,320.3
 Number of shares (million)		
Number of nondiluted shares	142.6	142.6
→ New shares issued	-	9.7
Number of diluted shares	142.6	152.3
Value per share (dollars)	28.0	28.4

Source: Hasbro 2007 10-K, NASD TRACE system, Black-Scholes option-pricing model.

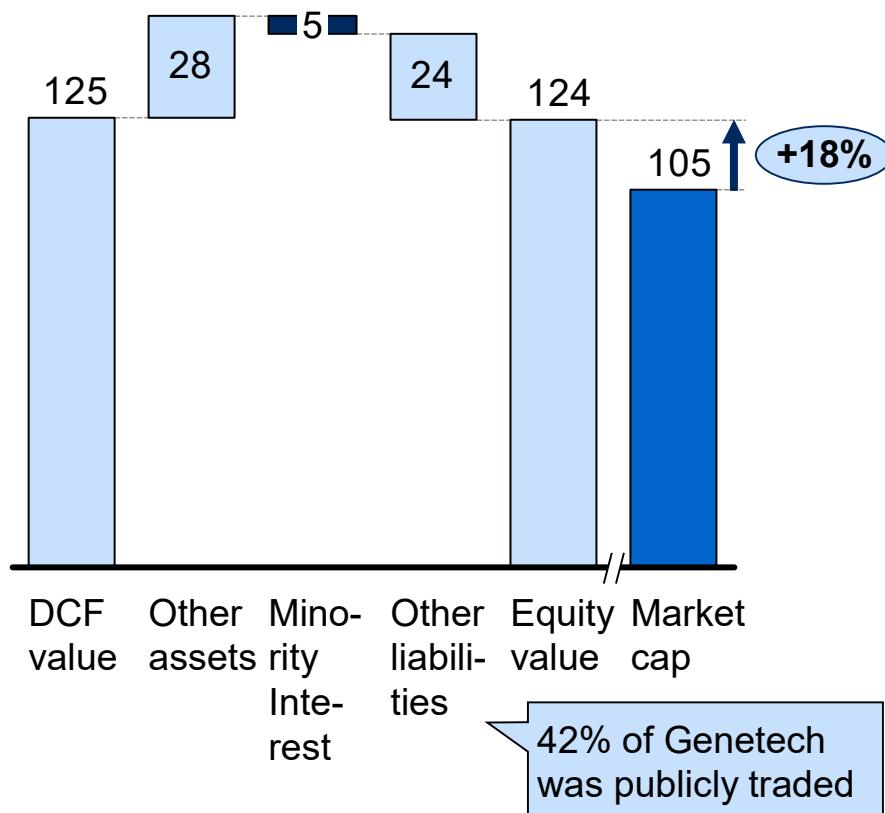
### 3 Minority Interest

- **What is a minority interest?** When a company controls a subsidiary without full ownership, the subsidiary's financial position must be fully consolidated in the group accounts. The portion of third-party ownership is classified as minority interest, and this must be deducted as a non-equity claim.
- A minority interest is a claim only on a particular nonconsolidated subsidiary; its valuation is related to the subsidiary, not the company as a whole.
  - If the subsidiary is publicly listed, deduct the proportional market value owned by outsiders from enterprise value to determine equity value.
  - If the subsidiary is privately held, you can perform a **separate valuation** of the minority interest using a DCF approach, multiples, or a tracking portfolio, depending on the information available.

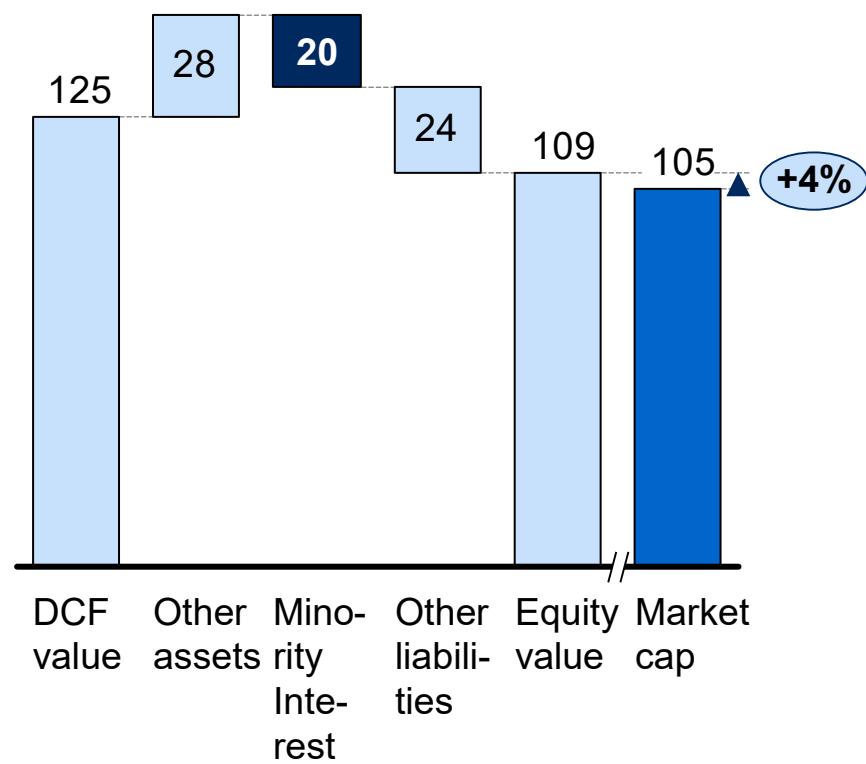
# PITFALL: Market value of minority interests can be > than book value

Roche Holdings, December 31, 2001, CHF

Minority interests at book value



Minority interests at market value



## 4 Calculating Value per Share

There are two methods to determine the value per share. The difference depends on how options and convertible debt are valued. :

➤ **Option-Based Valuation** ←

*Divide the total equity value by the number of undiluted shares outstanding.*

- Use undiluted shares outstanding because the value of convertible debt and stock options has already been deducted from the enterprise value.
- The number of shares outstanding is the gross number of shares issued, less the number of shares in treasury.

➤ **Conversion and Exercise Value Method**

*Divide the total equity value by the diluted number of shares.*

- Under this method, convertible debt and stock options are not incorporated as nonequity claims, but rather through the number of shares outstanding.
- This method generates a different equity value than the option-based valuation.

## 4 Calculating Value per Share

Why valuing options as a non equity claim is preferred...

- Assume you deal with Options in a ‘simple’ way: you simply adjust the denominator for shares when computing the Price per share by adding the that will become outstanding if the options get exercised.
- This ‘diluted approach’ fails to consider that exercising options **will bring in cash into the firm (share proceeds)**. Consequently, it overestimate the impact of options and understate the value of equity per share.
- If we add the proceeds from the exercise of options to the value of the equity (treasury stock approach) before dividing by the diluted number of shares outstanding, we avoid this issue BUT we fail to consider **the time premium** on the options (underestimating the real value of the options). The treasury stock approach also has problems with out-of-the money options. If considered, they can increase the value of equity per share. If ignored, they are treated as non-existent.
- Consequently, our preferred approach is to subtract the market value (or estimated market value) of Option like equity claims (Warrants, Conversion Option, Employee Options) and to divide the remaining value of equity by the number of shares outstanding to get value per share.

# Summary: Example Equity Value calculation

## DCF result: Operating enterprise value (including Terminal Value)

- Excess cash and marketable securities
- Investments and non-consolidated subsidiaries
- Other non-operating assets

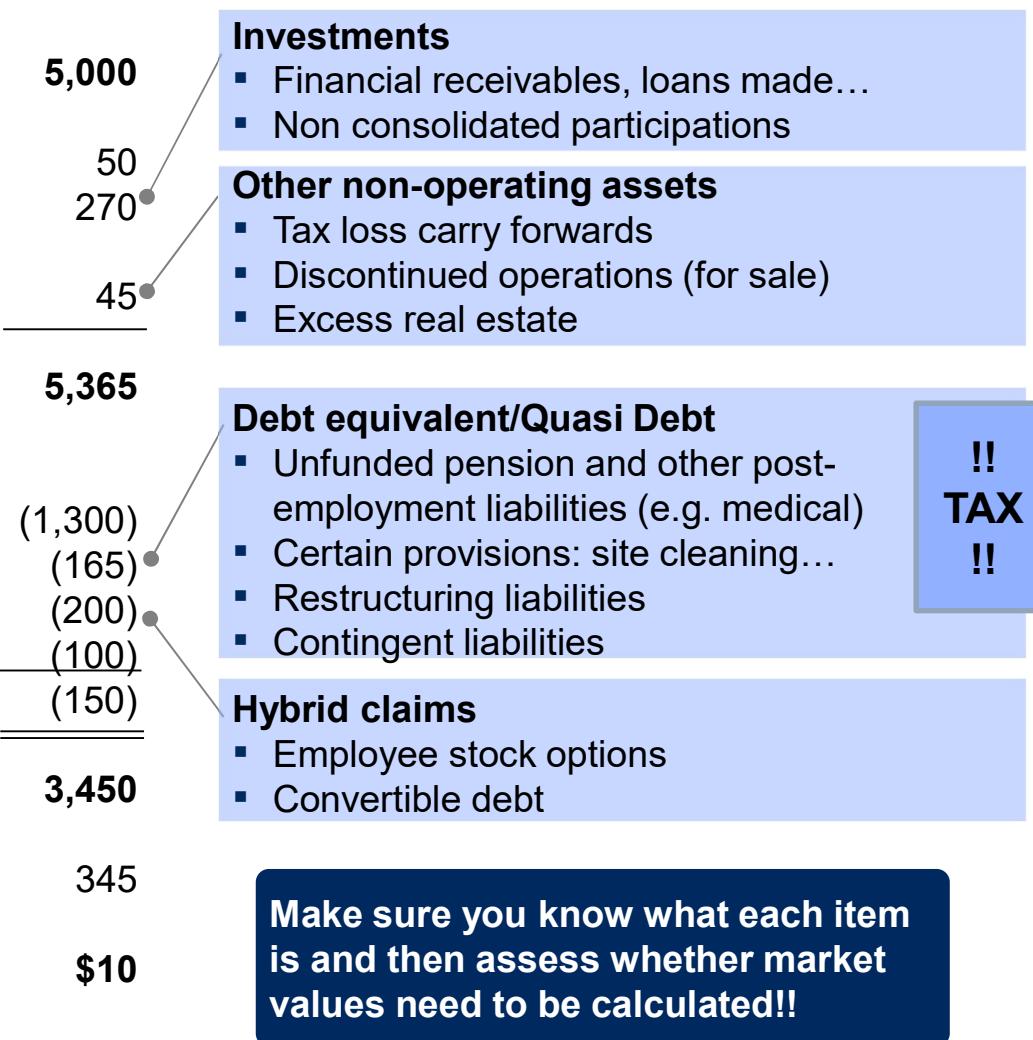
## Total Enterprise value (unadjusted)

- Interest-bearing debt and equivalent claims
- Quasi-debt claims
- Hybrid claims
- Preferred Equity
- Minority interest

## Equity value

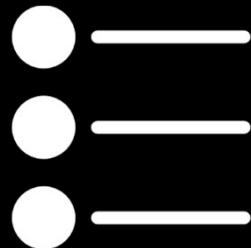
# Outstanding shares

Price per share



## Final thoughts: here is Damodaran's checklist regarding potential issues when bridging EV and Equity values

<b>Value of Operating Assets</b>	Since this is a discounted cashflow valuation, should there be a real option premium?
<b>+ Cash and Marketable Securities</b>	Operating versus Non-operating cash Should cash be discounted for earning a low return?
<b>+ Value of Cross Holdings</b>	How do you value cross holdings in other companies? What if the cross holdings are in private businesses?
<b>+ Value of Other Assets</b>	What about other valuable assets? How do you consider under utilized assets?
<b>Value of Firm</b>	Should you discount this value for opacity or complexity? How about a premium for synergy? What about a premium for intangibles (brand name)?
<b>- Value of Debt</b>	What should be counted in debt? Should you subtract book or market value of debt? What about other obligations (pension fund and health care)? What about contingent liabilities? What about minority interests?
<b>= Value of Equity</b>	Should there be a premium/discount for control? Should there be a discount for distress
<b>- Value of Equity Options</b>	What equity options should be valued here (vested versus non-vested)? How do you value equity options?
<b>= Value of Common Stock</b>	Should you divide by primary or diluted shares?
<b>/ Number of shares</b>	
<b>= Value per share</b>	Should there be a discount for illiquidity/ marketability? Should there be a discount for minority interests?

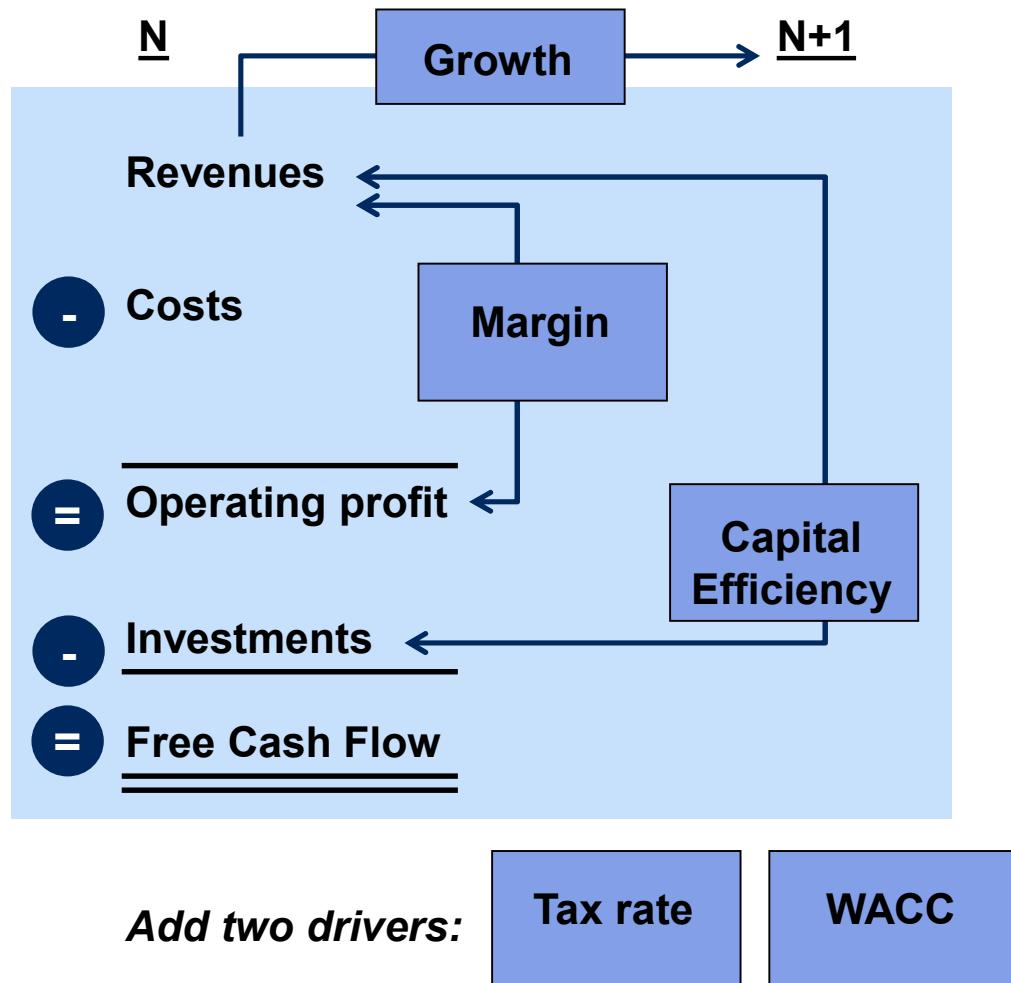


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- Introduction
- A (very) simple valuation model
- A simple DCF model
- Taking into account the timing of the valuation
- The Enterprise to Equity 'bridge'
- **A DCF model based on the value drivers**

# How to create a Valuation in less than 15 lines...

The basic forecasting logic...



... used to build a simple model

**DCF model includes 4 lines for Financial statements:**

- Revenues
- EBITA
- NOPLAT (=EBITA \* (1-Tax rate))
- Invested Capital (excl. goodwill)

**FCF calculation in 2 lines:**

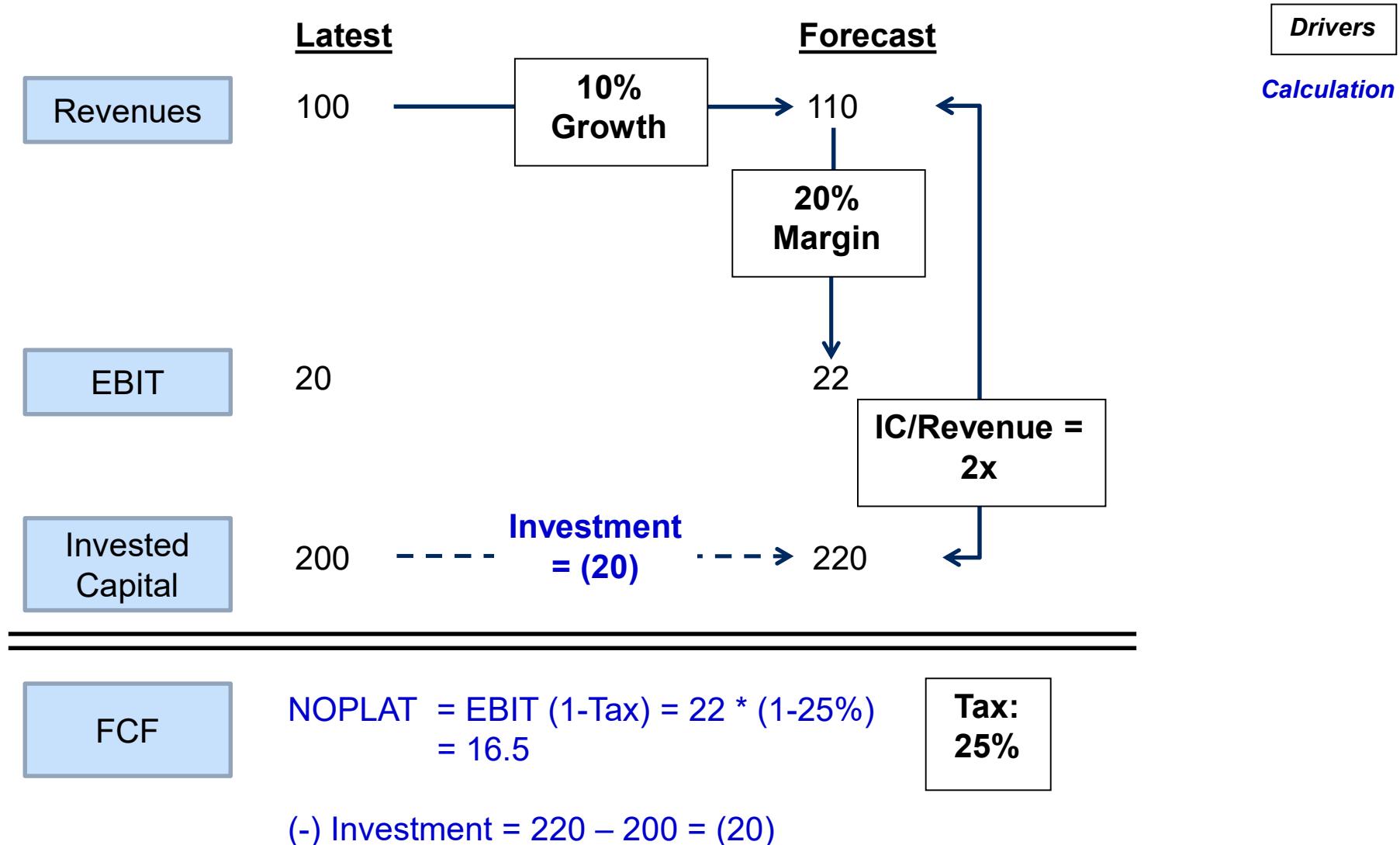
$$\begin{aligned} \text{NOPLAT} \\ (-) \text{ Change in Invested Capital} \\ = \underline{\underline{\text{FCF}}} \\ * \text{Discount Factor} \\ = \underline{\underline{\text{DCF}}} \end{aligned}$$

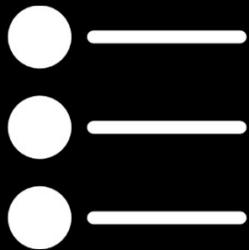
**Model drivers:**

- Revenue growth
- EBITA Margin
- Capital Turnover (Sales/IC)
- Tax rate
- WACC

*ROIC*

## Example quick valuation: FCF calculation





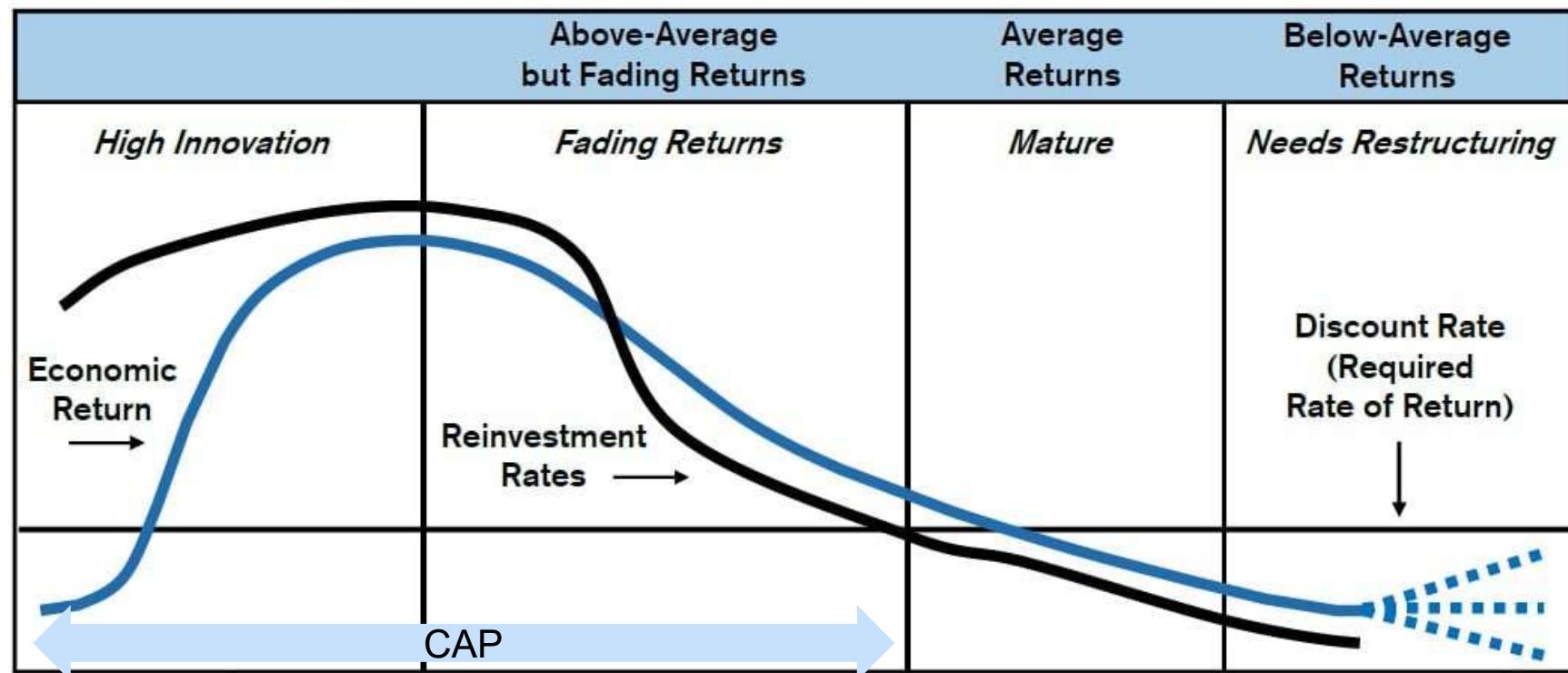
## CONTENTS

- Introduction
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- **Modelling the Competitive Advantage Period**
  - Introduction and the CAP

## The 'CAP' and a firm's life cycle

The **Competitive advantage period (CAP)** is the time during which a company is expected to generate returns on incremental investment that exceed its cost of capital

Exhibit 1: A Firm's Competitive Life Cycle



Source: Credit Suisse HOLT®.

Source: Measuring the Moat: Assessing the Magnitude and Sustainability of Value Creation; Michael J. Mauboussin, Dan Callahan, Darius Majd; Credit Suisse, 2016

To justify a ROIC that is sustainably above WACC, there must be at least one source of competitive advantage

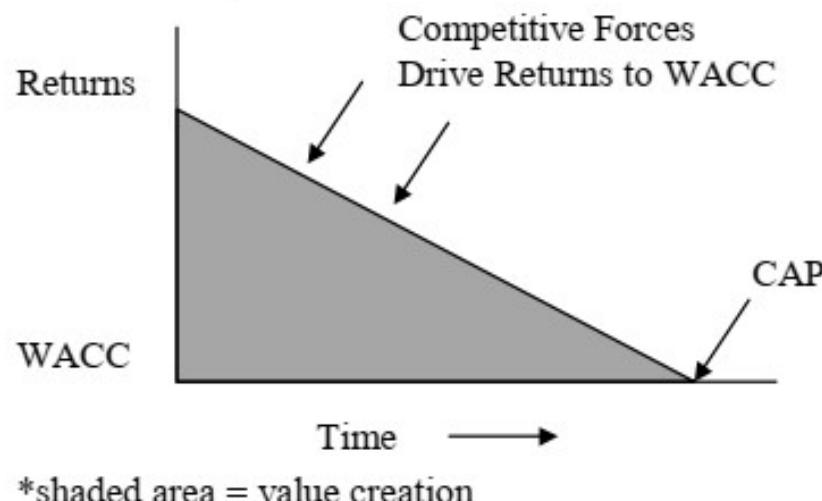
Source of advantage	Description	Examples
Price premium	<ul style="list-style-type: none"><li>▪ Being a price setter: not selling a commodity product</li><li>▪ But, consumer preferences can change over time</li></ul>	<ul style="list-style-type: none"><li>▪ Coca-Cola: price is not a factor for consumers when choosing drinks</li></ul>
Cost competitiveness	<ul style="list-style-type: none"><li>▪ Ability to manufacture products at a lower cost than competitors</li></ul>	<ul style="list-style-type: none"><li>▪ WalMart uses its purchasing power to obtain volume discounts and technology to keep costs low</li></ul>
Capital efficiency	<ul style="list-style-type: none"><li>▪ Selling more products per dollar of invested capital than competitors</li></ul>	<ul style="list-style-type: none"><li>▪ Airlines flying point-to-point fly more hours per day per plane than other airlines, increasing revenue / capital</li></ul>

**Is this competitive advantage  
sustainable for the long term?**

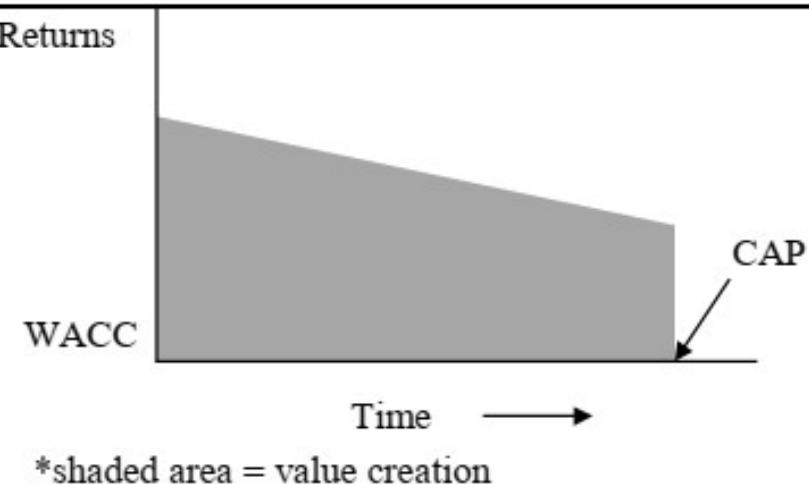
## The length and shape of the CAP are still open for (theoretical) discussion...

- Economic theory suggests that competitive forces will drive returns down to the cost of capital over time (and perhaps below it for a period). Said differently, if a company earns above market required returns, it will attract competitors that will accept lower returns, eventually driving industry returns lower.
- Mauboussin estimates that the CAP for the U.S. stock market, as a whole, is between 10 and 15 years (with individual company CAPs between 0-2 years to over 20 years)
- In practice, CAPs can last for really long periods and there is uncertainty around the decay in excess returns (how fast does it go down and to which level?)

**Figure 1**  
**Theoretical Decay in Excess Returns**

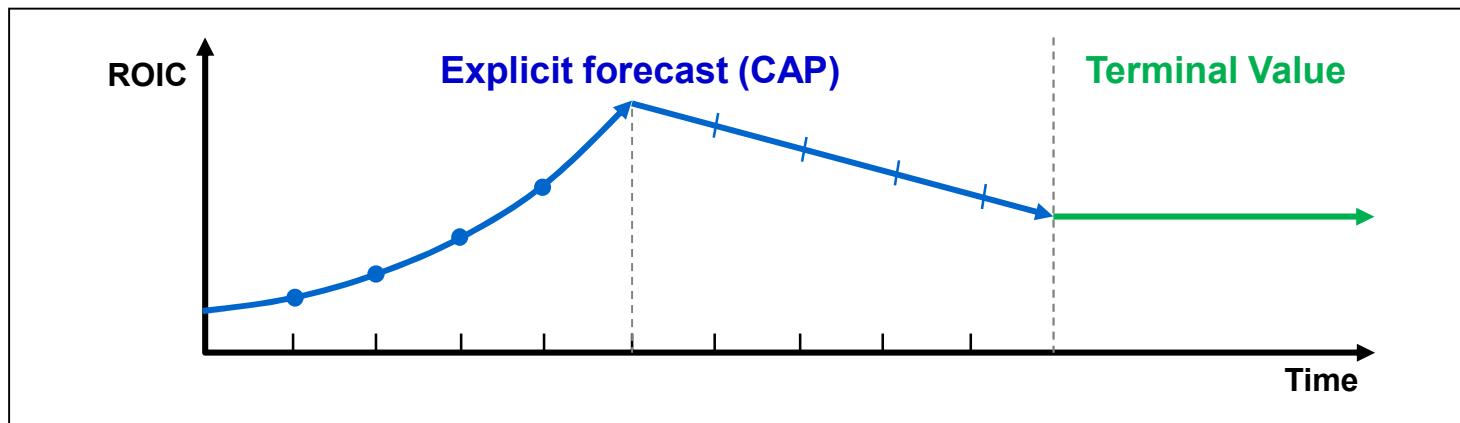


**Figure 2**  
**How the Market Works**



Source: Competitive Advantage Period “CAP” The Neglected Value Driver; Michael J. Mauboussin, Paul Johnson; Credit Suisse, 1997

**A detailed DCF model should incorporate the concept of CAP and include 3 stages of forecast with varying levels of detail,**



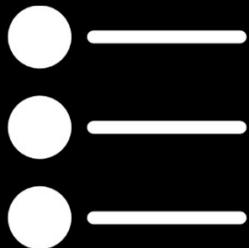
<b>Time segment</b>	▪ Forecast period 1		
<b>Duration</b>	▪ 1-5 years	▪ Simple Forecast period 2	▪ Terminal Value
<b>Items forecast</b>	▪ All items; create a line-by-line (linked) forecast of income statement and balance sheet	▪ Key operational/economic items (revenues growth, margin, capital turnover or capex, ROIC) are forecast for each year	▪ Constant RO(N)IC and NOPLAT growth rate only ▪ WACC in perpetuity
<b>Model</b>	<ul style="list-style-type: none"> <li>▪ Full financials model</li> <li>▪ Value drivers simplified model</li> <li>▪ Formula: value driver</li> </ul>		
<b>Rationale</b>	▪ Proximity in time allows meaningful estimates of all line items and yields relatively accurate ROIC and growth rates	▪ Allows ROIC and growth rate to continue to change year-by-year, but eliminates meaningless line-by-line detail	▪ Creates a credible forecast for the extra-long term based on industry fundamentals

## How long should your Forecasting Horizon be?

= When should you switch from an explicit forecast to a Terminal Value?

- In theory, the specific time horizon should be equal to the CAP (Competitive Advantage Period): the last year forecasted should be the one in which the company loses its differential benefits, in terms of competitive advantage, and aligns its results to the performance of competitors
- In practice, valuation time horizons generally range from 5 to 10 years, and vary according to the reference sector. They can be extended under specific circumstances:
  - duration of the economic cycle
  - development phase (e.g. large capex) which the relevant company is undergoing
  - when the company sustains significant investments that will produce benefits over a longer time period or in case of a license with a long-term duration (highway management, telecom spectrum, airport business...)
  - companies in the start-up phase: e.g. needing a longer period before economic financial stability is achieved

*Note: wrong reasons to pick a specific time horizon (although these are frequent ones!): 'the standard model is built with X years of specific forecasts' (usually 5 or 10 years) or 'it does not fit in a powerpoint slide'...*



## CONTENTS

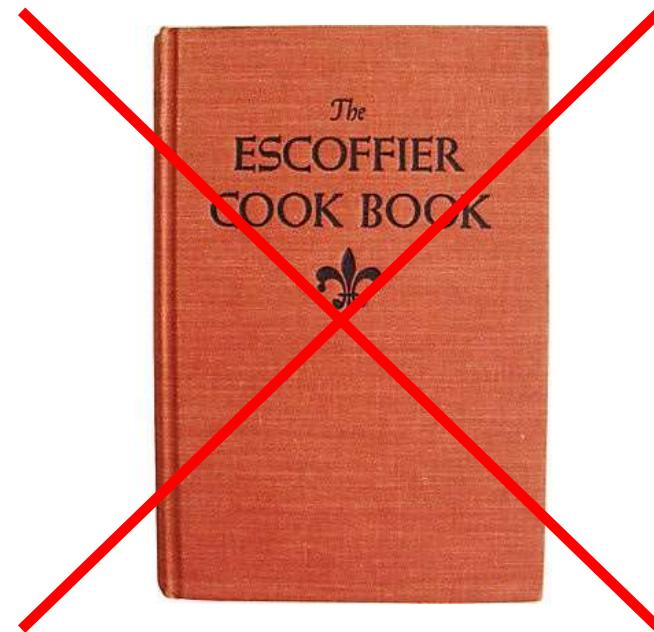
- Introduction
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- A simple DCF model
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- A DCF model based on the value drivers
- **Modelling the Competitive Advantage Period**
  - Introduction and the CAP
  - **Forecasting**

## What forecasting is NOT



### « No crystal ball »

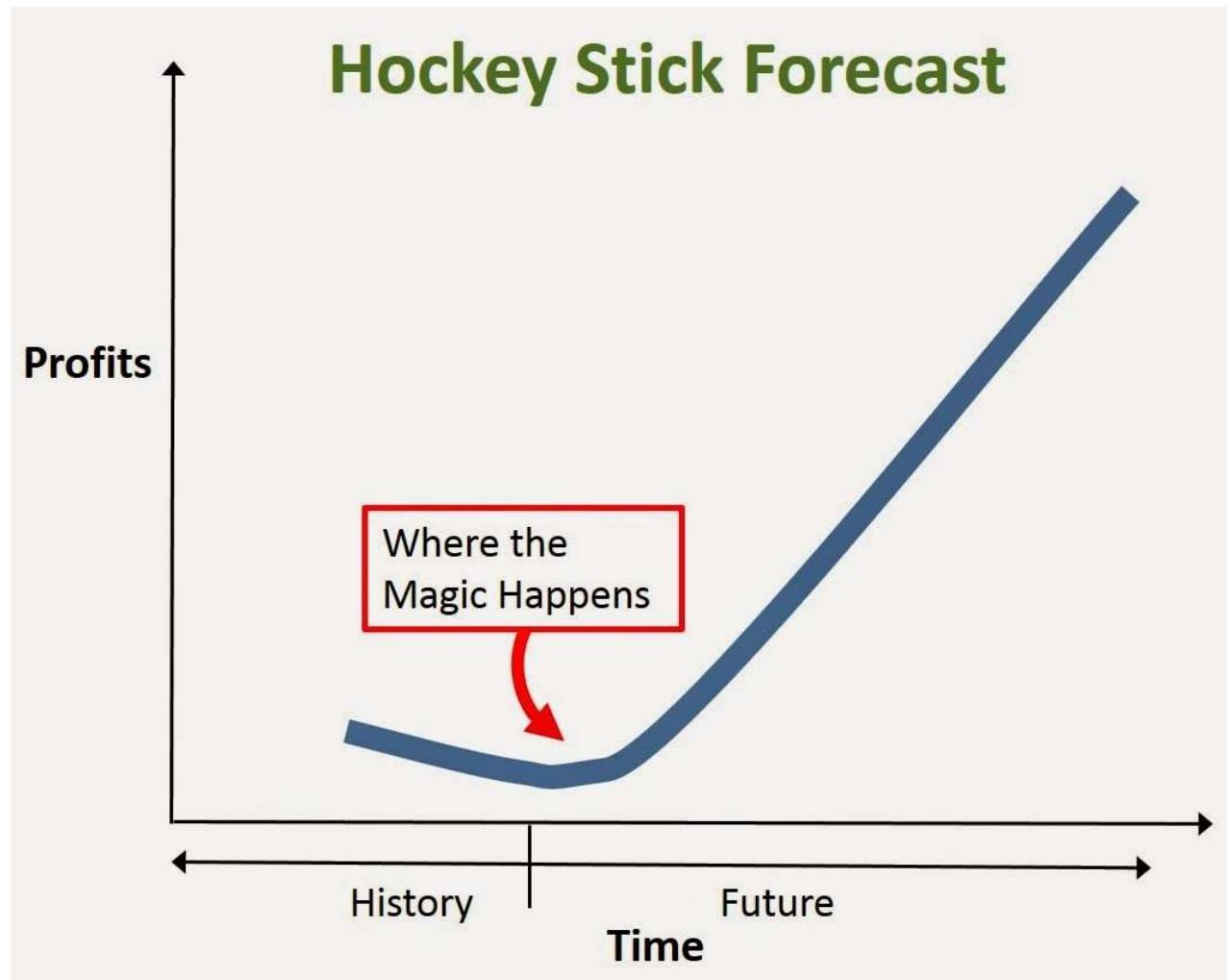
- Do not expect an overly precise answer
- The stock price of a publicly traded company can be decomposed into a number of plausible scenarios: so even the market does not have «one right forecast»!



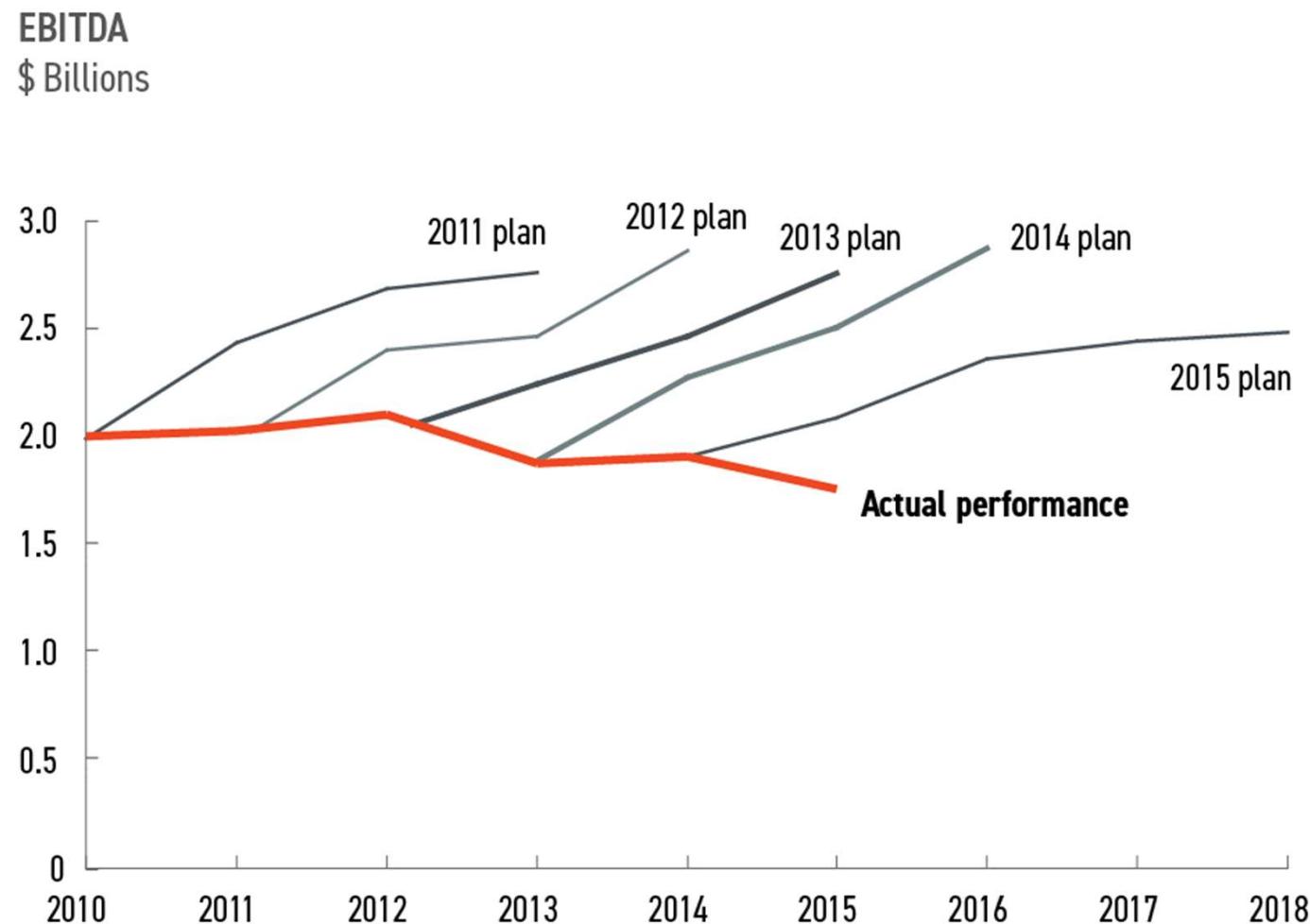
### « No cookbook »

- Although the overall forecasting process can be described systematically, each individual forecast will have to be crafted
- There is no standard « recipe » for dealing with difficult issues such as industry cycles or innovation value

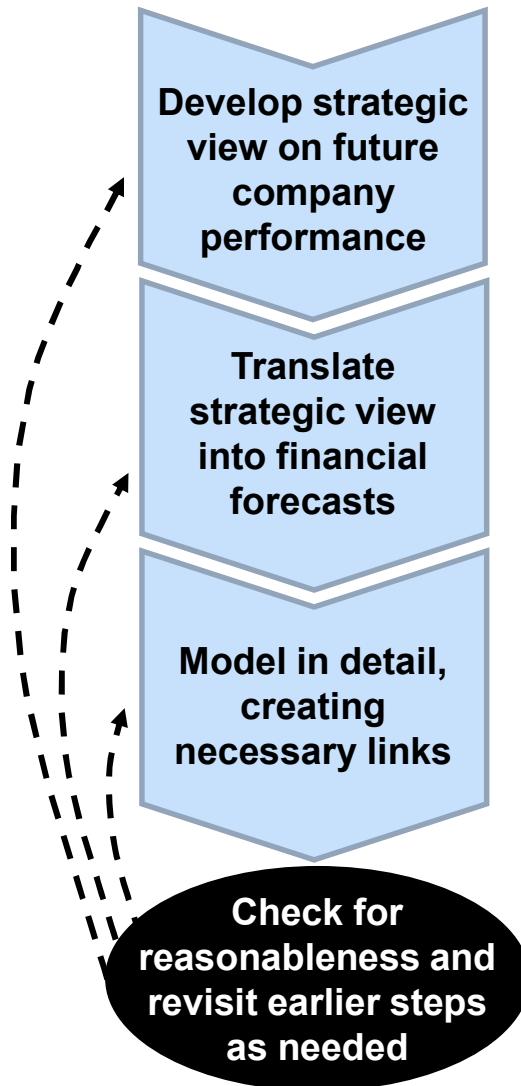
Beware...



## ...don't always trust Companies' forecasts



# Forecasting should focus on business forecasting, NOT just financial modeling



## Typical activities

- Story line creation, including
  - Perspective on industry evolution
  - Perspective on company's positioning within the industry
- Develop model structure
- Translation of story line into value drivers
- Decision on level of detail to put into forecast
- Make forward-looking financial statements work:
  - Economic links between value drivers
  - Accounting links
- Review for technical correctness
- Review for consistency with past performance
- Use multiples for sanity checks

## If available, the first 2-5 years are usually based on market consensus

Main Data sources	Items available			
	Revenues	EBIT(DA)	EPS	Capex/IC
<p>➤ <b>Aggregators</b></p> <ul style="list-style-type: none"> <li>■ I/B/E/S: with a subscription through data providers (Datastream, etc...)</li> <li>■ Bloomberg (<i>EE, ANR</i>): has its own overview, sometimes without indicating who the analyst is</li> <li>■ JCF (access through InFront analytics)</li> <li>■ <i>Yahoo finance (Analysis)</i>: <i>only average</i></li> <li>■ VisibleAlpha</li> </ul>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<p>➤ <b>Analyst reports</b></p> <ul style="list-style-type: none"> <li>■ Available with subscription through data providers (Thomson ONE) or with a direct subscription with the I-Bank (Credit Suisse, Goldman Sachs)</li> <li>■ Bloomberg (<i>BRC, RES</i>): reports from certain I-Banks are available for free</li> <li>■ Eikon: check the Research tab</li> <li>■ <i>Factiva</i>: used to provide a couple of recent reports for free (<i>TBC</i>)</li> </ul>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>  In some reports, included in B/S or FCF forecast

# Sometimes companies provide detailed forecast information

## Shell example

<https://vara-services.com/shell/>

Royal Dutch Shell plc

Vara Research  
CREATING TRUST

Estimates Overview

Estimates Overview >> Consensus

Last Update: 2021-07-22

Royal Dutch Shell plc Analysts' Consensus Estimates  
*Financial Figures in Million US-Dollar (except where indicated differently)*

Show all ▾

[in Mil. US Dollar]	Q2 2020	FY 2020	Q2 2021 E	FY 2021 E	FY 2022 E	FY 2023 E	FY 2024 E
Number of analysts participating	18	10	10	8	7		
Highest		2,314	9,004	11,183	10,347	10,380	
Consensus	362	4,383	1,807	8,181	9,648	9,031	8,564
Lowest		1,440	6,823	7,944	7,365	6,593	

EARNINGS BY SEGMENT (EXCLUDING IDENTIFIED ITEMS)

INTEGRATED GAS

Number of analysts participating	18	10	10	8	7	
Highest		2,314	9,004	11,183	10,347	10,380
Consensus	362	4,383	1,807	8,181	9,648	9,031
Lowest		1,440	6,823	7,944	7,365	6,593

UPSTREAM

Number of analysts participating	18	10	10	8	7	
Highest		2,827	7,584	11,322	9,257	7,380
Consensus	-1,512	-2,852	1,960	6,480	6,228	4,634
Lowest		1,356	5,197	4,129	3,306	2,820

# A forecast should be based on a plausible argumentation

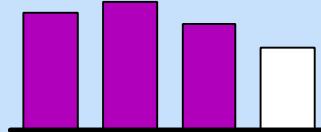
## Industry perspective

**Price cycle is on an upswing because:**

- Demand is increasing



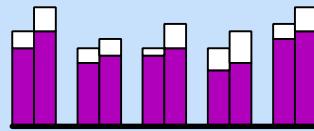
- Capacity has been reduced



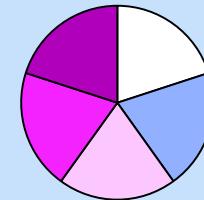
## Company perspective

**Company is well positioned because of:**

- Strong market share in fast-growing market segments

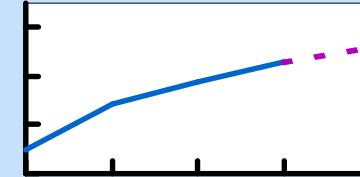


- Good product mix



## Forecasting story-line

**Therefore revenue growth is expected of x% p.a. over next 5 years**



Make sure that forecasts are consistent with industry outlook (e.g., if company's growth is greater than the market, they are increasing share)

# The basics of Business analysis

## Understanding the economic and competitive environment

- **Macroeconomic drivers:**
  - Sensitivity to overall economy (GDP)
  - Identifying best drivers: e.g. GDP or industrial production?
  - vs last period or with lag?
  - Other drivers: oil price?
- **Industry cycle:** revenue growth, investment patterns
- **Regulation:** if relevant
- **Industry structure analysis (Porter):** Competition, Suppliers, Customers, Substitutes, Barriers to entry
- **Industry Structure vs Companies Conduct and Performance**

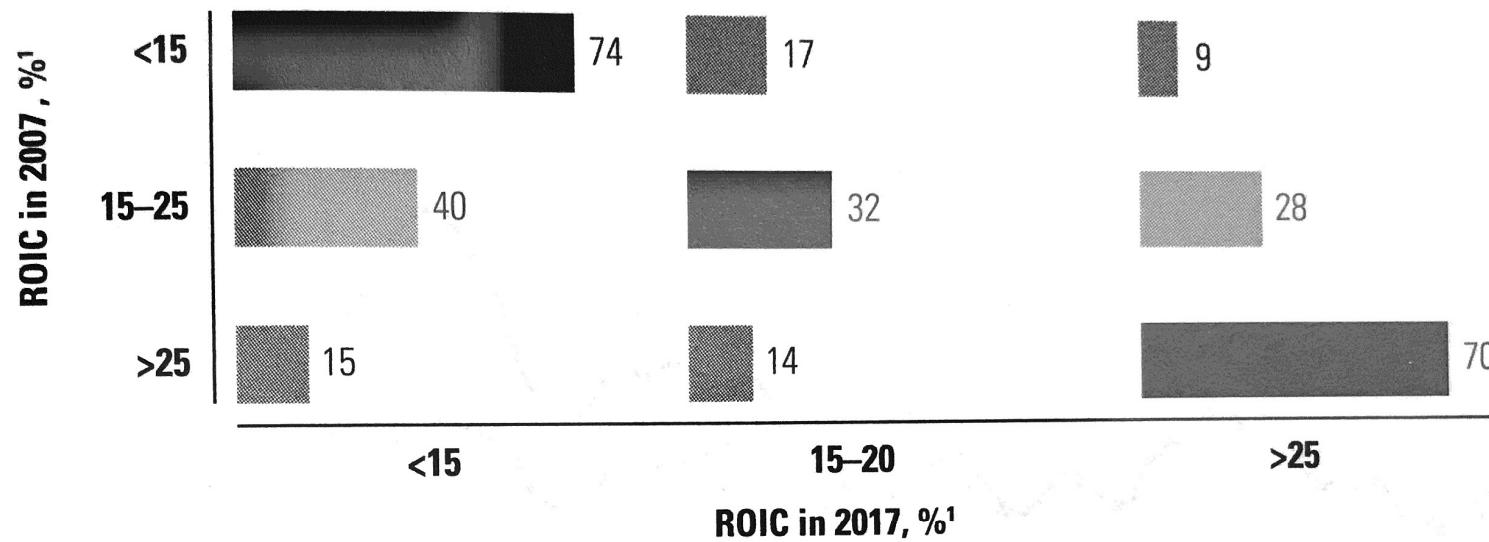
## Understanding the company

- **Operating performance** (ROIC, growth)
- **Business model:**
  - Capital: intensity, utilization
  - Prices and margin
  - Sources of competitive advantage
  - Market share
- **Operating leverage:** fixed vs variable costs, exposure to up/down cycles
- **Strategic plans:** future investments, attitude towards M&A
- **Company culture**

**In the short term, ROIC performance tends to be remain the same**

**EXHIBIT 8.13 ROIC Transition Probability**

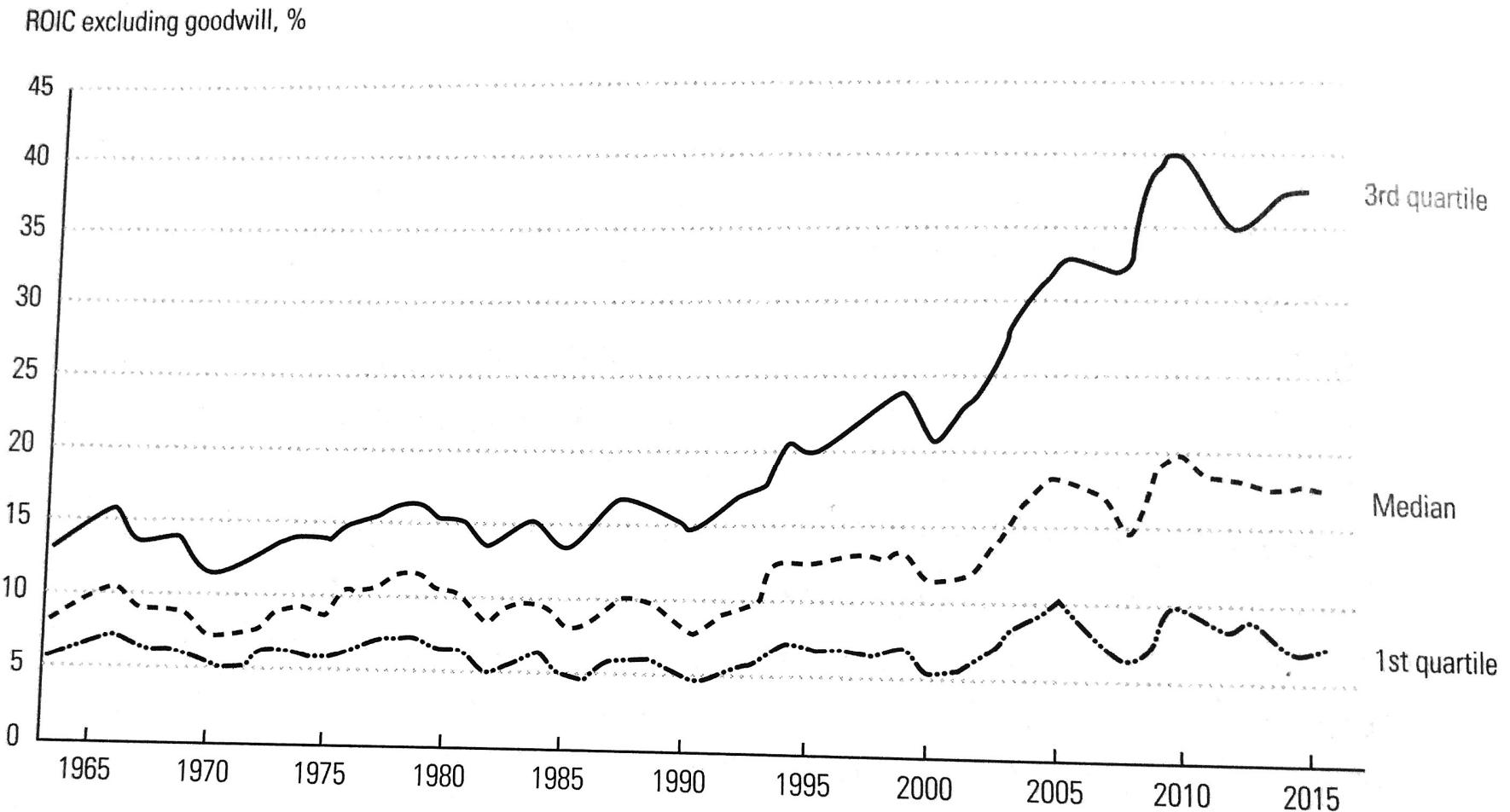
Probability of achieving ROIC in 2017, %



<sup>1</sup> ROIC excluding goodwill.

## ROIC TRENDS, OVERALL MARKET

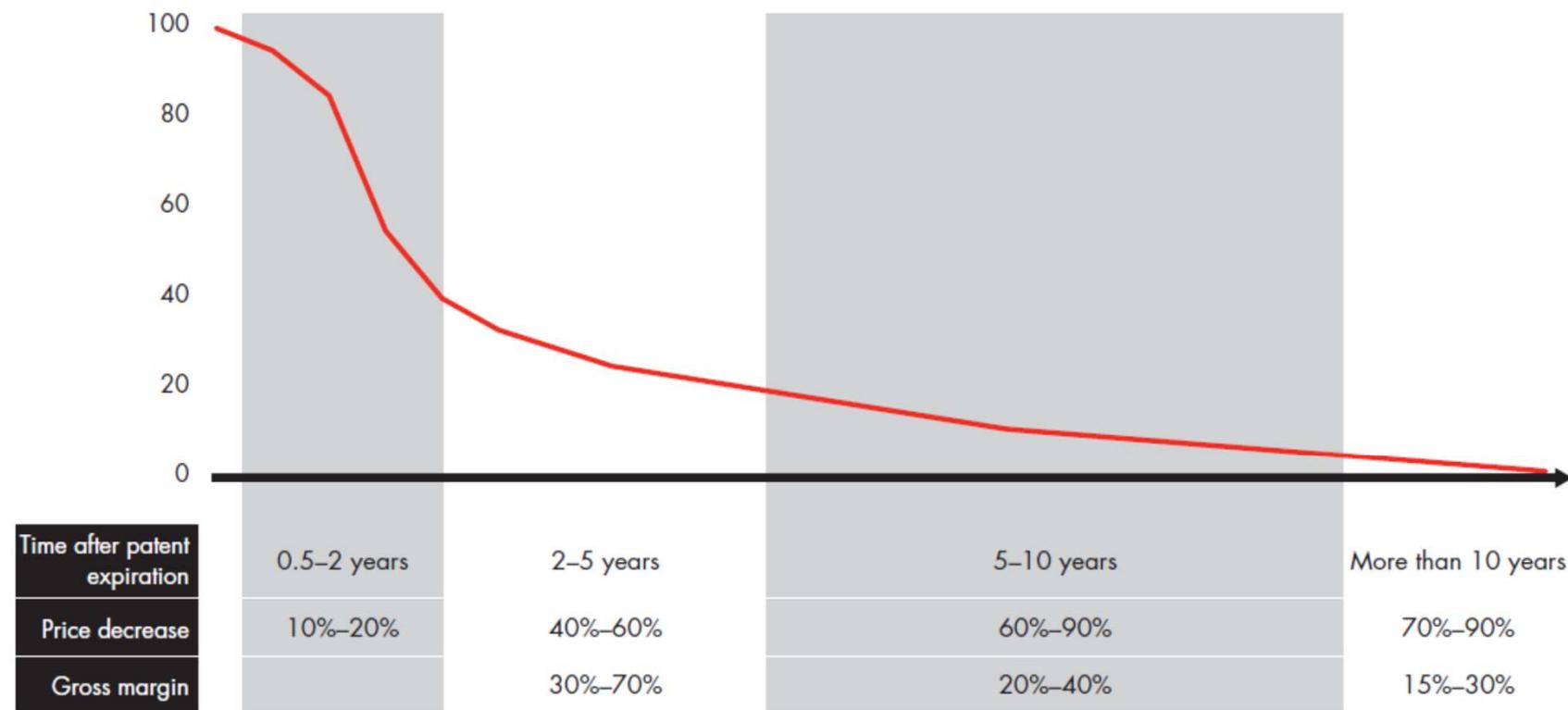
EXHIBIT 8.3 ROIC of U.S.-Based Nonfinancial Companies, 1963–2017



## In most industries, ROIC will decrease significantly when their Competitive Advantage runs out

*Figure 2.7:* Prices for most products decrease over time as competition and supply increase

Prescription drug example, price indexed to 100 at patent expiration

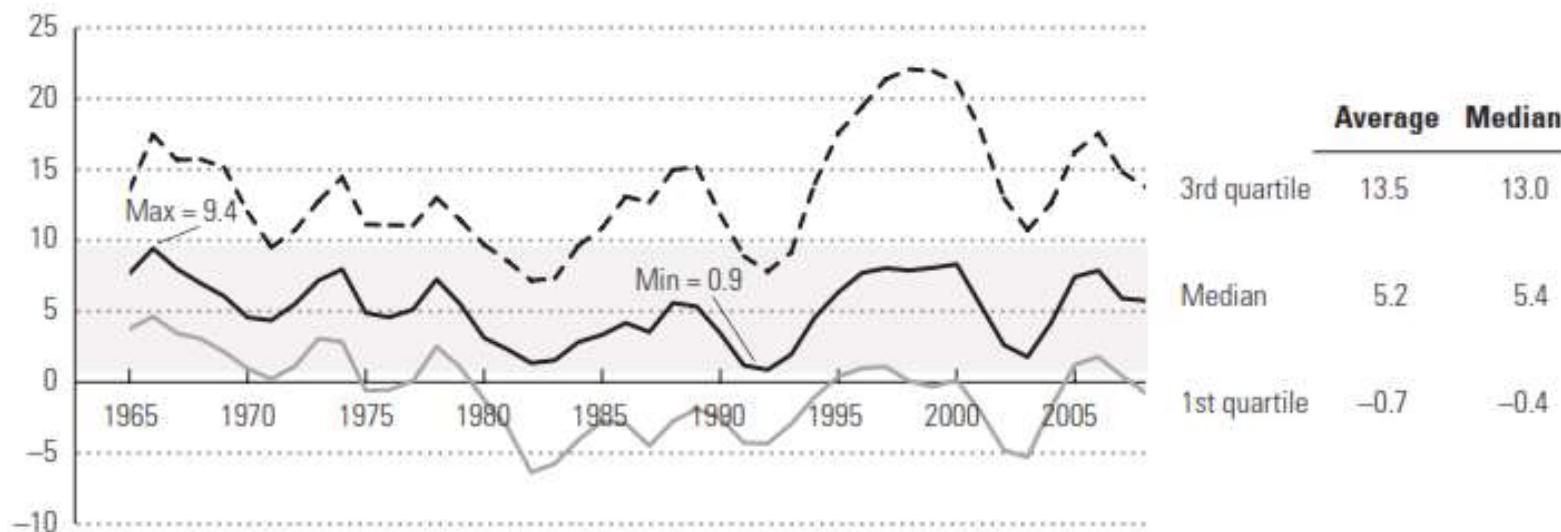


Source: Bain & Company

**However, growth rates vary considerably over time...**

**EXHIBIT 5.7 Long-Term Revenue Growth for Nonfinancial Companies**

3-year revenue growth rate,<sup>1</sup> adjusted for inflation, percent



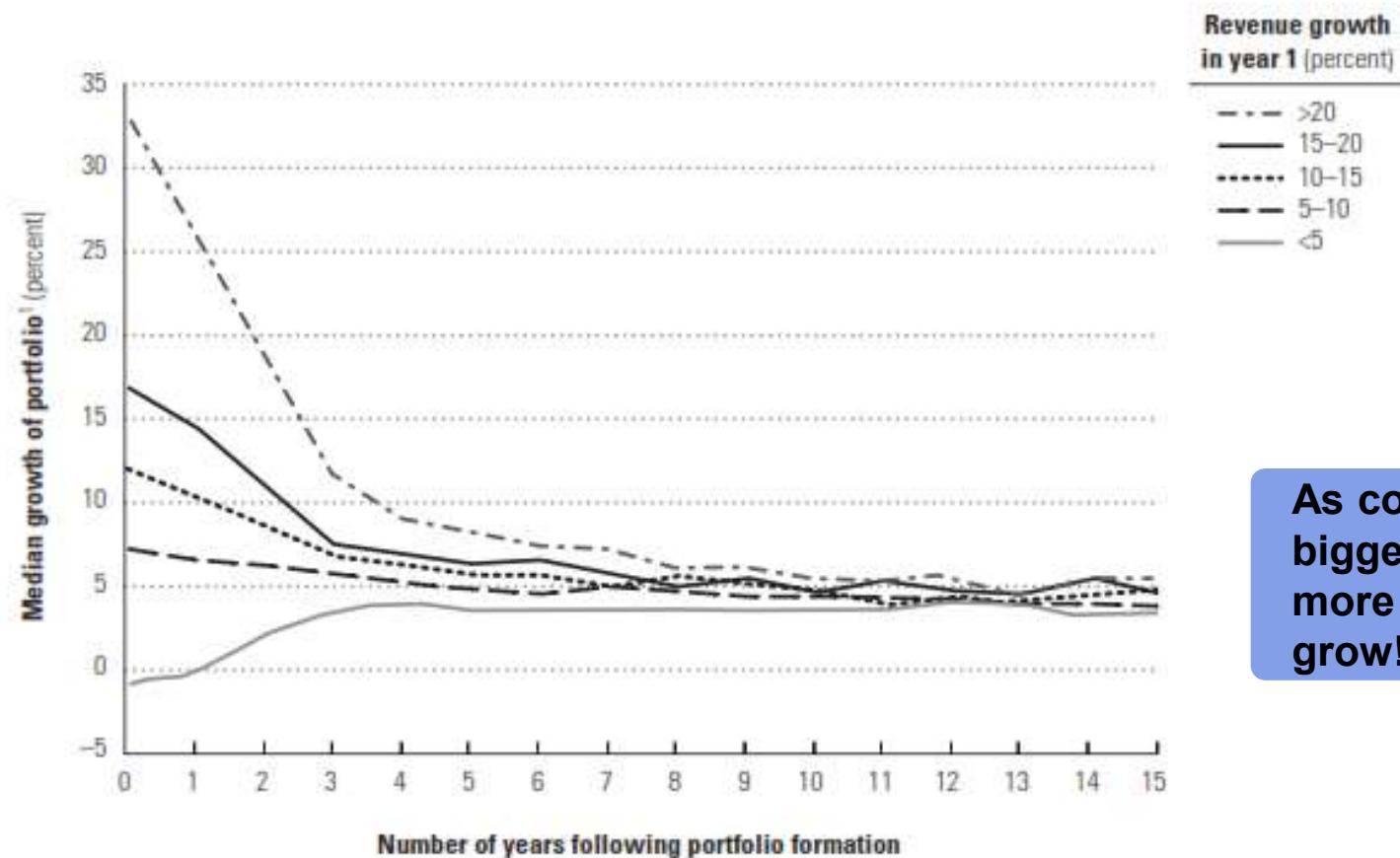
<sup>1</sup> Compound annual growth rate.

Source: Compustat; McKinsey Corporate Performance Center analysis.

**Industry and  
economic  
cycles...**

... and high growth rates do not last....

EXHIBIT 5.10 Revenue Growth Decay Analysis

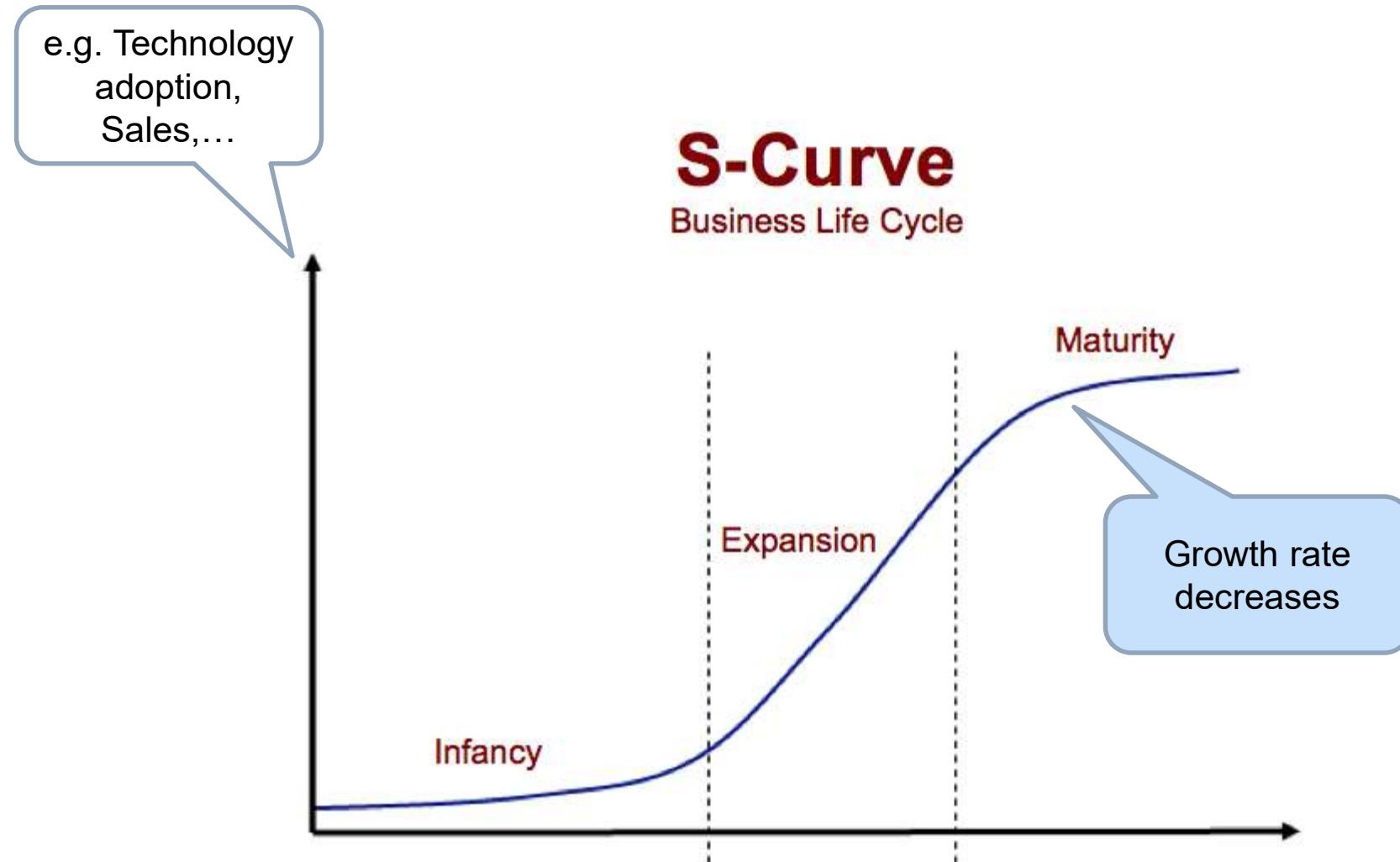


As companies get  
bigger it becomes  
more difficult to  
grow!

<sup>1</sup> At year 0, companies are grouped into one of five portfolios, based on revenue growth.

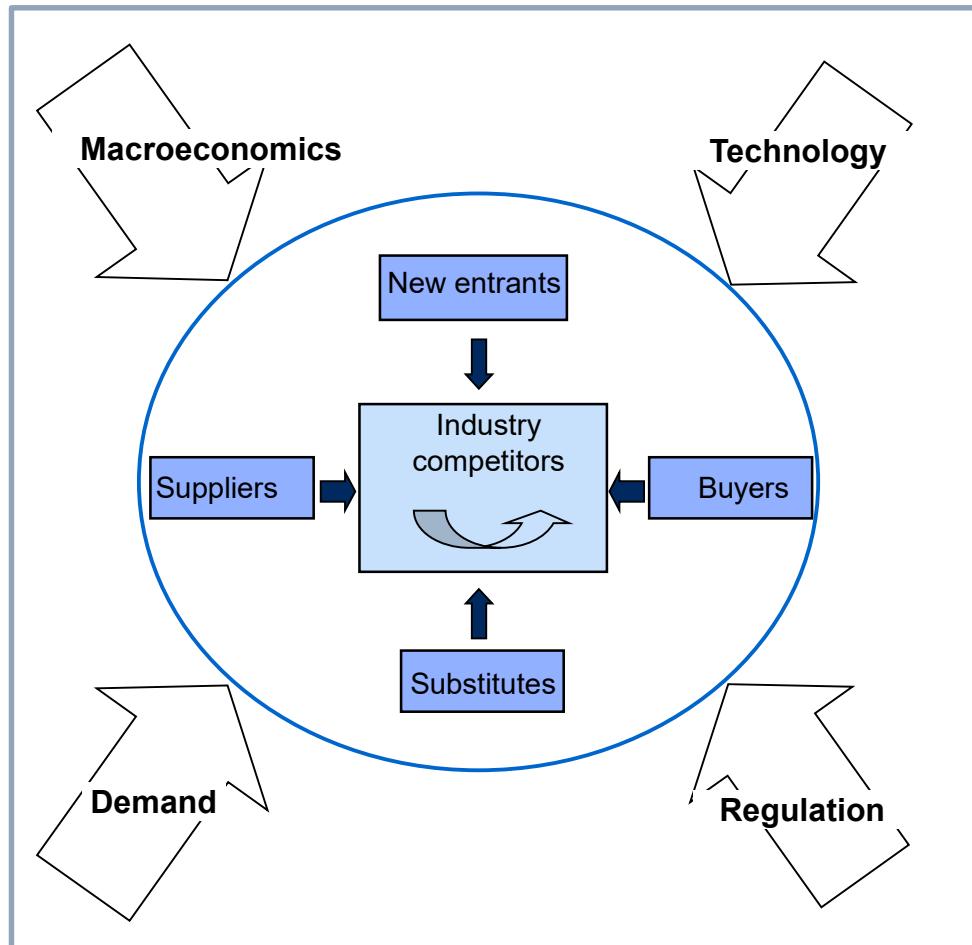
Source: Compustat, McKinsey Corporate Performance Center analysis.

Many industries follow an “S curve”



# Perspective on the industry is often backed by strategic frameworks

## PORTER'S FIVE FORCES (FORCES AT WORK)



- Identifies industry structures, environment and trends affecting a company's profitability:
  - Identifies key forces in an industry and assess a company's competitive position
  - Helps to draw conclusions about the competitive environment of a given industry
  - Helps to understand industry interaction and competition, how this will change over time, and what forces will drive it
- Organizes industry structure around the interplay of five key constituents (bargaining power of suppliers, threat of new entrants, bargaining power of buyers/consumers, substitute products and competitors/industry rivalry)

### ADDITIONAL BACKGROUND

"The Five Forces That Shape Strategy", M.Porter, Harvard Business Review, January 2008

## Impact of Porter's forces at work on forecasting (1/2)

Understanding the **competitive strength of the industry** in which a company operates helps to forecast ROIC. Tools to assess the competitive structure of an industry include **Porter's five forces**.

### ➤ **Bargaining power of suppliers:**

- If there are a few large suppliers with little or no ability to substitute inputs for any other suppliers, then suppliers have the ability to raise prices (or reduce quality) and, hence, increase costs to the company.
- If labor unions are powerful, companies may have little or no control over the price of labor.
- Using just-in-time inventory control shifts bargaining power over inputs from the company to the suppliers.

### ➤ **Bargaining power of customers:**

- If there are a few large customers, then customers may have the ability to refuse price increases
- A plausible threat for businesses that rely on a few large customers is that these customers may be able to produce the product in-house, extending their supply chain to within the firm.

### ➤ **Threat of entrants:**

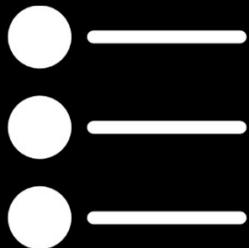
- If there are few or no barriers to entry, companies have less control over prices because a high ROIC will attract new entrants
- The threat of new entrants is high when there is little capital investment, economies of scale is not an issue, it is easy to set up distribution networks, and the ability of customers to switch to another company's product is high.

## Impact of Porter's forces at work on forecasting (2/2)

Understanding the **competitive strength of the industry** in which a company operates helps to forecast ROIC. Tools to assess the competitive structure of an industry include **Porter's five forces**.

- **Threat of substitutes:**
  - if there are products available that will satisfy the same function or need, there is a high risk of substitutes. a company has less ability to control prices
  - For retailers, customers disposable income is limited, so retailers must compete for the limited disposable income available.
  - A company's whose customers can create the product on their own has a high threat of substitution, which will affect the company's ability raise prices
- **Intense rivalry:**
  - The more intense the competition within the industry, the lower the ROIC; rivalry will not be able to control prices
  - In a concentrated market, companies can exert pressure on suppliers against price increases for goods and services because of inflation, whereas companies in a more fragmented market cannot exert such pressure.
  - A company's ability to pass on increased prices to customers depends on the bargaining power of customers and the degree of rivalry among competitors.
  - In a highly competitive industry, pricing is influenced by input prices.

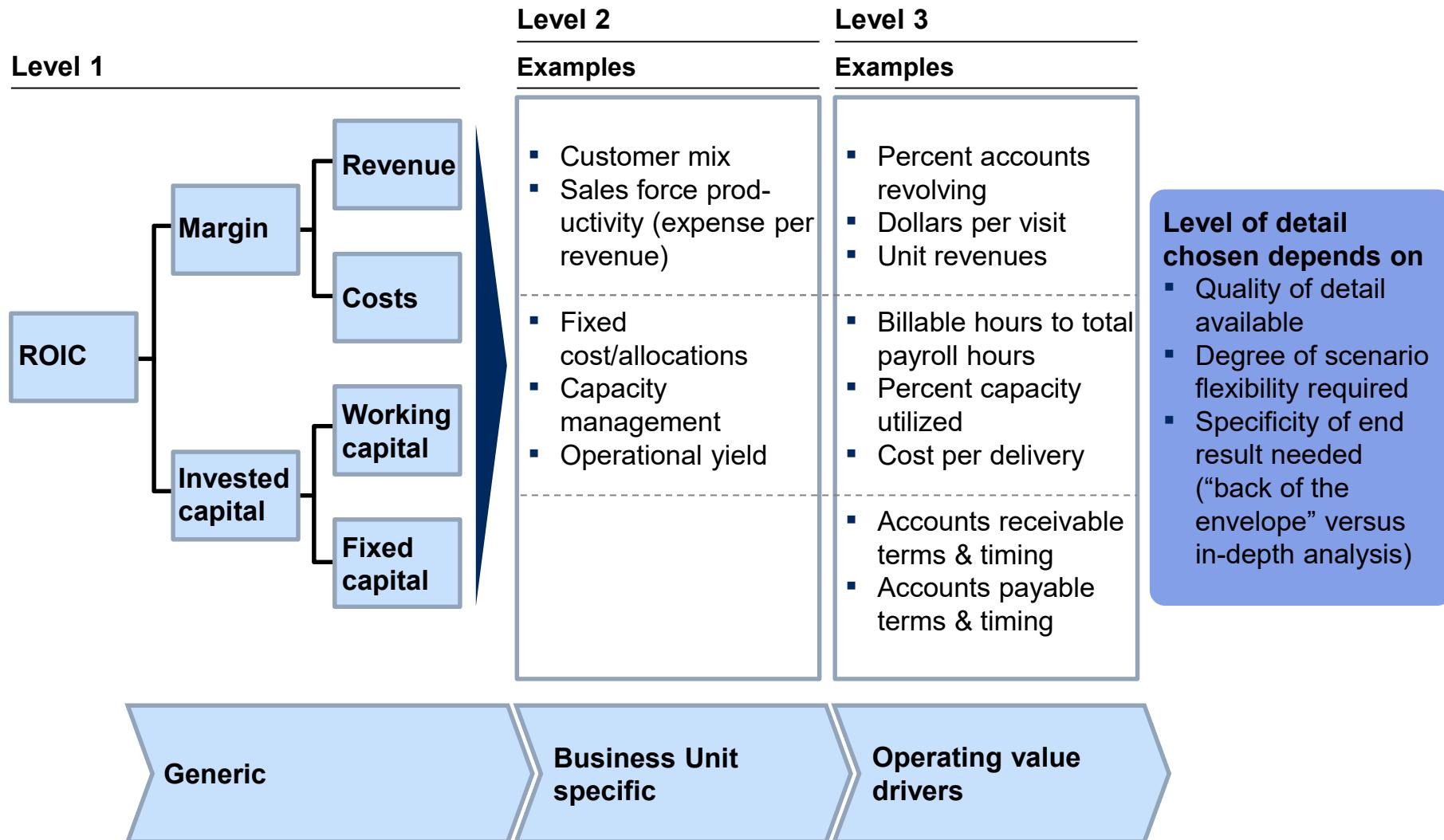
Finally, Technological developments can affect the demand for a product, the quantity of a product, or both: eg. technology can reduce the cost of manufacturing or create substitutes



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- **Modelling the Competitive Advantage Period**
  - Introduction and the CAP
  - Forecasting
  - **Modelling financial items**

# The explicit forecast can be more or less detailed depending on the data available and the timing/goal of the analysis

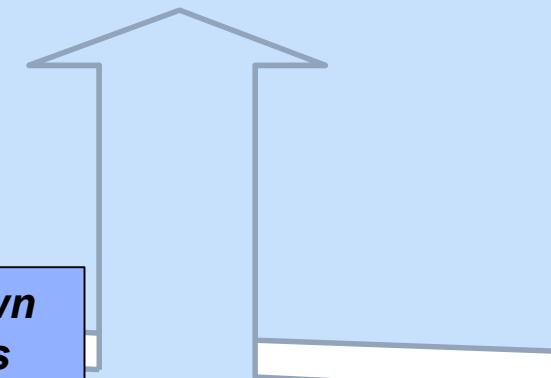


# Modeling revenues

- The first step in forecasting revenue is to analyze: the components of a company's revenues (product and geographic segments), the sources of growth (volume/price) and understand the Trends underlying revenue growth

## TOP-DOWN

- Begin with a forecast of a broad measure (e.g., GDP, market share), and then assess the company's revenues relative to that broad measure.
- Look at successively more narrowly defined levels
  - “Growth relative to GDP”: *Estimate growth related to GDP → forecast GDP → forecast company revenues.*
  - “Market growth and market share”: *Estimate market share → forecast market → forecast company revenues*



## ***HYBRID: Combine top-down and bottom-up approaches***

- Begin with individual product lines, locations, or business segments.
- Aggregate projections over products or segments to reach the company level
- Aggregate company revenues to reach the industry level
  - *Capacity-based measures (e.g., store sales year-to-year)*
  - *Time-series forecasts*

## BOTTOM-UP

## Modeling costs

- Depending on the industry/company, costs are presented by nature (Personnel, Purchases, Depreciation) or by function (Cost of production, Administration, R&D).  
**Keep the presentation consistent** with the approach used in historical statements
- Consider **fixed and variable** cost components of operating costs:
  - Variable costs are usually modeled as a percentage of revenues (or in terms of growth of unit sales). Typical default assumption is that a company's cost structure will stay the same in percentage terms as it grows (=most costs are variable)
  - Fixed costs are modeled as a variation vs previous year. If the costs are really fixed, then variation is 0%.
- Economies of scale are present if the average cost per unit falls as revenues increase. To check for the presence of economics of scale: operating margins positively correlated with revenues, visible size/performance effects
- When competitors have different margins, it could be attributed to economies of scale but also qualitative differences (e.g., customer service) or differences in efficiency (ag. Administrative costs, productivity)

# Modeling costs

## Cost by function

### Cost of goods sold

- **Focus on gross margins**
- Generally forecasted as a percentage of sales and can be broken down by product line or segment
- Consider a company's hedging activity that may affect costs of raw materials
- Compare with competitors' gross margins but beware of the impact of different business models (in house production vs subcontracting)

### Selling, general, and administrative (SG&A) expenses

- Some SG&A expenses vary with cost of goods sold, whereas other SG&A expenses are relatively fixed (e.g., overhead)
- Benchmarking against competitors may be useful, however organization complexity should be considered

### R&D

- Analyze expense as a percentage of sales (also vs sector average)
- Consider product maturity/new product pipeline

### Nonoperating income/costs

- Depends on the type of cost/income
- Interest income varies with cash and investments, whereas interest expense varies with debt
- Taxes are affected by the jurisdiction and the type of business

## Modeling Working Capital

- Operating working capital consists (mainly) of
  - Accounts receivable
  - Inventories
  - Accounts payable
- Generally modeled as a percentage of sales as, all other things being equal, as a company's operations grow it will need to extend additional credit, have more work-in-progress and finished goods, etc.
- If a company expects volume growth but volatile price evolution it may be more appropriate to link items to volume (instead of revenue)
- Beware of the impact of different product lines on the evolution of WC ratios:
  - If a product line grows faster than the others but require less inventories, or has different payment terms (credit vs cash sales), it will change the WC/Sales ratio
  - If modeling period is less than a year, be careful with seasonality effects

# Modeling Capex / Property Plant and Equipment

- Depreciation is usually modeled as a % of Gross PP&E (Beginning of year to avoid circularities)  
*Note: As a default, set as average of last few years*
- Capex: try to evaluate the amount maintenance capital expenditures (needed to sustain the business) vs growth capital expenditures (needed to expand the business)

PP&E calculation:

Net PPE (year 0)

- Depreciation

+ Capital Expenditure

- (Divestments)

= Net PPE (year 1)

➤ Choosing a Capital expenditure forecast option

## 1. Explicit Capex forecast

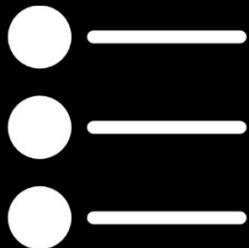
- + Best when Capex is “lumpy”, investment plans are known, and capacity is a major value driver
- Not appropriate for top-down analysis

## 2. Capex as a % of revenues

- + Simple to conceptualize
- Check Cap. Turnover to avoid drastic changes in ROIC

## 3. Net PPE as a % of revenues (=Capex is implied)

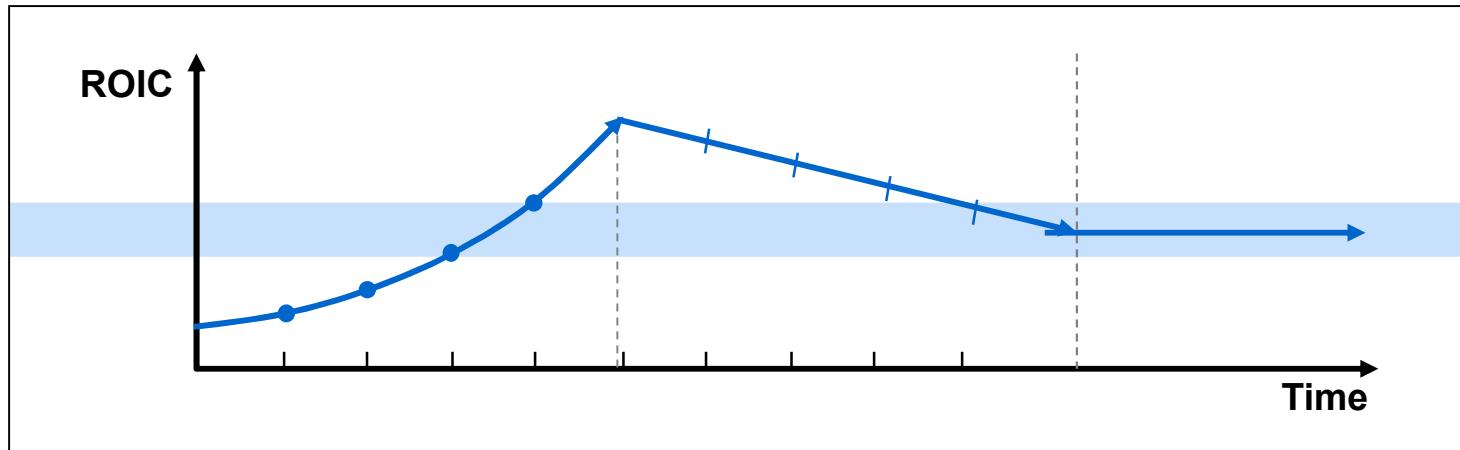
- + Helps ensure stable ROIC trends
- Capex not explicit



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- **Modelling the Terminal value**

# Terminal value in the context of forecasting process



**Time segment**

- Terminal value

**Typical duration**

- 15+ years

**Items forecast**

- Constant ROIC and NOPLAT growth rate only

**Rationale**

- Creates a credible forecast for the extra-long term based on industry fundamentals

## Calculating Terminal value – Alternative approaches

	DCF approach	Multiples	Liquidation or replacement cost
Rationale	<ul style="list-style-type: none"><li>Value is based on the free cash flows of the company at the end of the forecast period</li></ul>	<ul style="list-style-type: none"><li>Value is estimated as a multiple of earnings at the end of the forecast period</li></ul>	<ul style="list-style-type: none"><li>Value is based on the liquidation or replacement cost of the assets at the end of the forecast period</li></ul>
Issues	<ul style="list-style-type: none"><li>TV may be very sensitive to inputs used for long term growth rate and investment (e.g. ROIC)</li></ul>	<ul style="list-style-type: none"><li>How do you determine the right multiple to use? Answer may seem arbitrary as industry dynamics and multiples may change over time</li></ul>	<ul style="list-style-type: none"><li>Both methods are extremely difficult to estimate and don't represent the going-concern value</li></ul>

### Use DCF approach:

This method is consistent with value being based on future cash flows of the company

## Growing FCF perpetuity formula and Key Value Driver Formula should result in the same answer, if applied correctly

- In practice, the key value driver formula is easier to use as it is **cash flow based and links cash flow to growth and ROIC**:
  - In the growing perpetuity formula ( $FCF / WACC - g$ ), the level of investment at the end of the forecast period may not be consistent with the forecasted growth rate
  - The Value Driver Formula explicitly links the level of FCF (through the Investment rate,  $g/ROIC$ ) to the long-term growth rate
- The continuing value is measured at time  $t$  (not today!), and thus **will need to be discounted back  $t$  years to compute its present value**.

$$\text{Terminal Value}_t = \frac{\text{NOPLAT}_{t+1} \left(1 - \frac{g}{\text{RONIC}}\right)}{\text{WACC} - g}$$

After-tax operating profit in the base year ( $t+1!$ )

RONIC equals return on invested capital for new investment. ROIC on existing investment is captured by  $\text{NOPLAT}_{t+1}$

Weighted average cost of capital, based on long-run target capital structure

Expected long-term growth rate in revenues and cash flows

## Estimating parameters for the Terminal value

$$\text{Terminal value} = \frac{\text{NOPLAT}_{t+1} (1 - g/\text{RONIC})}{\text{WACC} - g} = \frac{\text{FCF}_{t+1}}{\text{WACC} - g}$$

**NOPLAT<sub>t+1</sub>** **Normalized level** (=midpoint of business cycle) of net operating profits for the first year after the explicit forecast period.

**RONIC** Long-term expected rate of return on new invested capital: in TV, the company receives a constant return on new invested capital and the same proportion of NOPLAT is invested every year ( $g/\text{ROIC} = \text{constant}$ )

**Note:** “RO(N)IC”, return on new (incremental) capital  $\neq$  ROIC, return on all IC  
**Key questions:**

- Can the company outperform its competitors forever e.g. does it have a sustainable competitive advantage?
- What are the typical long-term returns in this industry? Can they be above WACC? What is a defendable (sustainable) margin and ROIC?

**Growth (g)** Expected long-term growth rate in NOPLAT, expected to be achieved in perpetuity
 

- Do your TV growth rates reflect expected industry maturation?
- Will your company continue to gain/retain/lose market share in perpetuity?
- Are different industry segments growing at different rates?

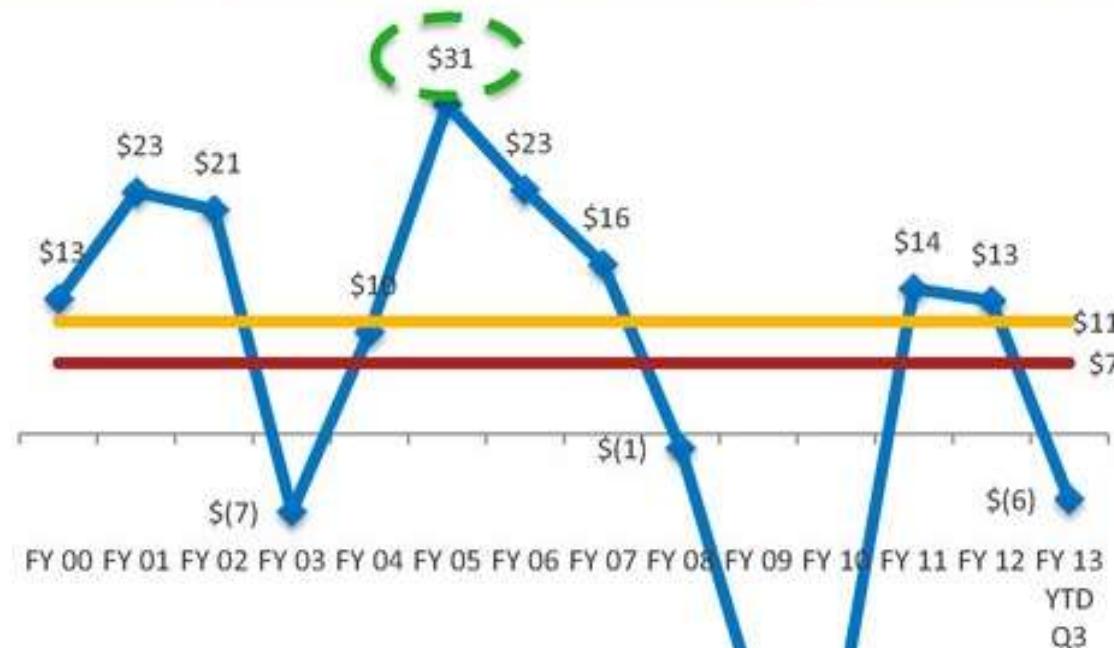
**WACC** Weighted average cost of capital, used to discount all FCFs
 

- What is the opportunity cost of debt and equity for a comparable investment?
- What is the target capital structure in this industry?

# NORMALISED NOPLAT: Beware of cyclical businesses!

## Smithfield (pork producer) example

Smithfield Hog Production Adjusted Operating Profit per Head



FY 09 and FY 10 negatively impacted by confluence of macro events including rising commodity costs, worldwide protein supply/demand imbalances, H1N1, etc.

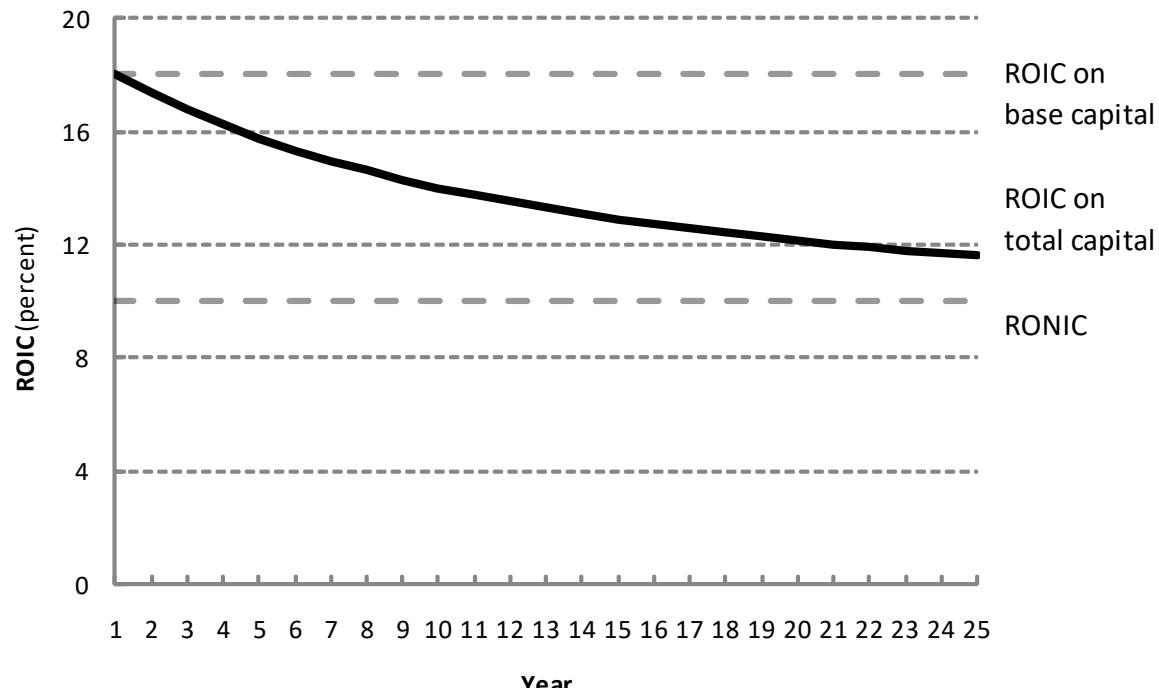
- Hog production operating profit (\$/head)
- Average since HPG inception
- Average since HPG inception excluding outliers

Using the latest reported NOPLAT in perpetuity is dangerous if the explicit period does not end mid cycle

# The Difference between RONIC and ROIC

- $RONIC = (NOPAT \text{ Year } 2 - NOPAT \text{ Year } 1) / (\text{Invested Capital Year } 2 - \text{Invested Capital Year } 1)$
- Assume you are using an explicit forecast period of 10 years, followed by a continuing value estimated with the KVD formula. In the formula, you assume RONIC equals WACC. Does this mean the firm creates no value beyond year 10?
  - No, RONIC equal to WACC implies new projects don't create value. Existing projects continue to perform at their base-year level.

## Gradual Decline in Average ROIC According to Continuing-Value Formula:



## Relation of ROIC and WACC in continuing value formula

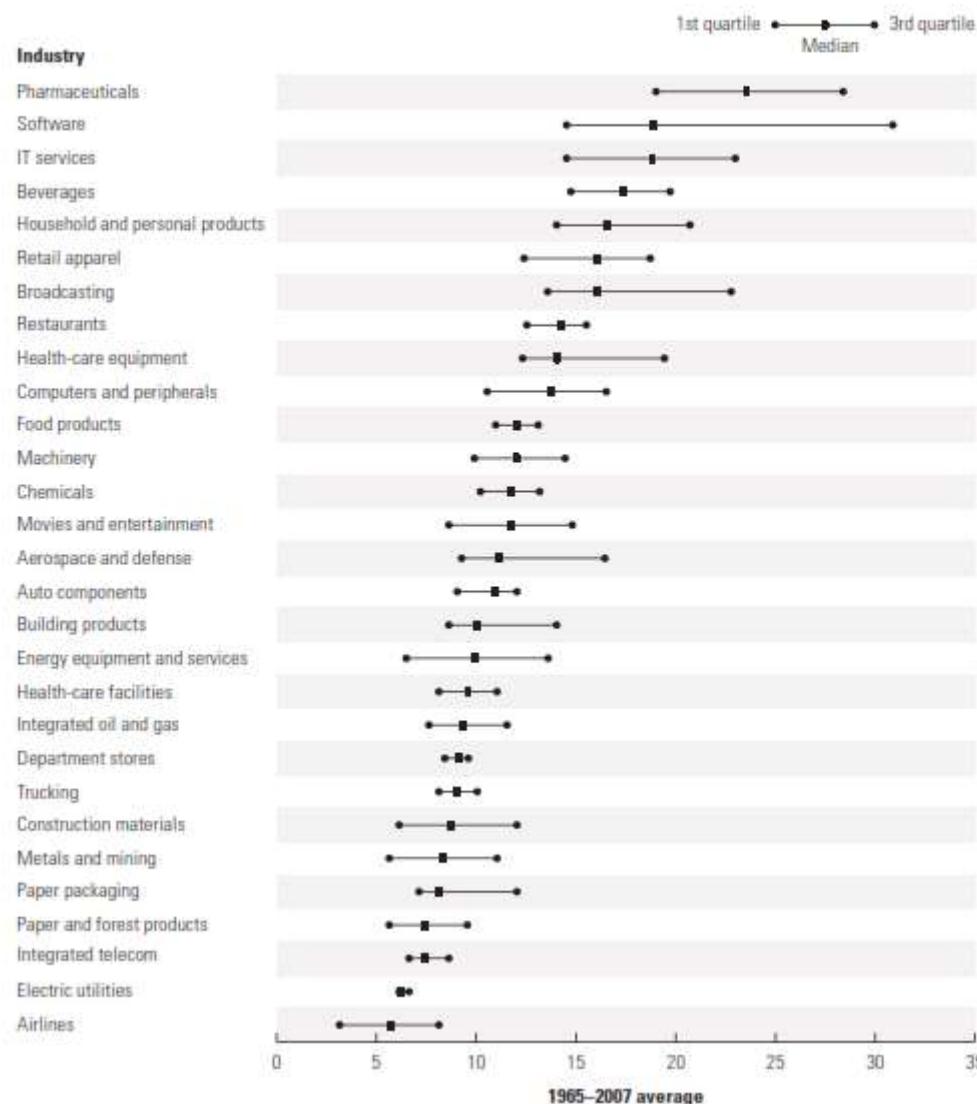
Assumption	Formula	Implication
<b>RONIC &gt; WACC</b>	$CV = \frac{NOPLAT * (1-g/RONIC)}{WACC - g}$	<ul style="list-style-type: none"><li>Firm will earn positive economic profit each year on its incremental investments in perpetuity</li></ul>
<b>RONIC = WACC</b>	$CV = \frac{NOPLAT}{WACC}$ <p>(derived by setting <math>r = WACC</math> in above formula)</p>	<ul style="list-style-type: none"><li>All incremental investments will exactly earn their cost of capital - no more, no less</li></ul>

- Returns in the Terminal Value formula are based on **incremental** (not average) ROIC
- Even if incremental ROIC is equal to the cost of capital, it will **take a substantial time for a company's ROIC to become close to its cost of capital**
- Higher growth will speed up the convergence!

# Typical ROICs for the main industries

EXHIBIT 4.6 ROIC Variations across and within Industries

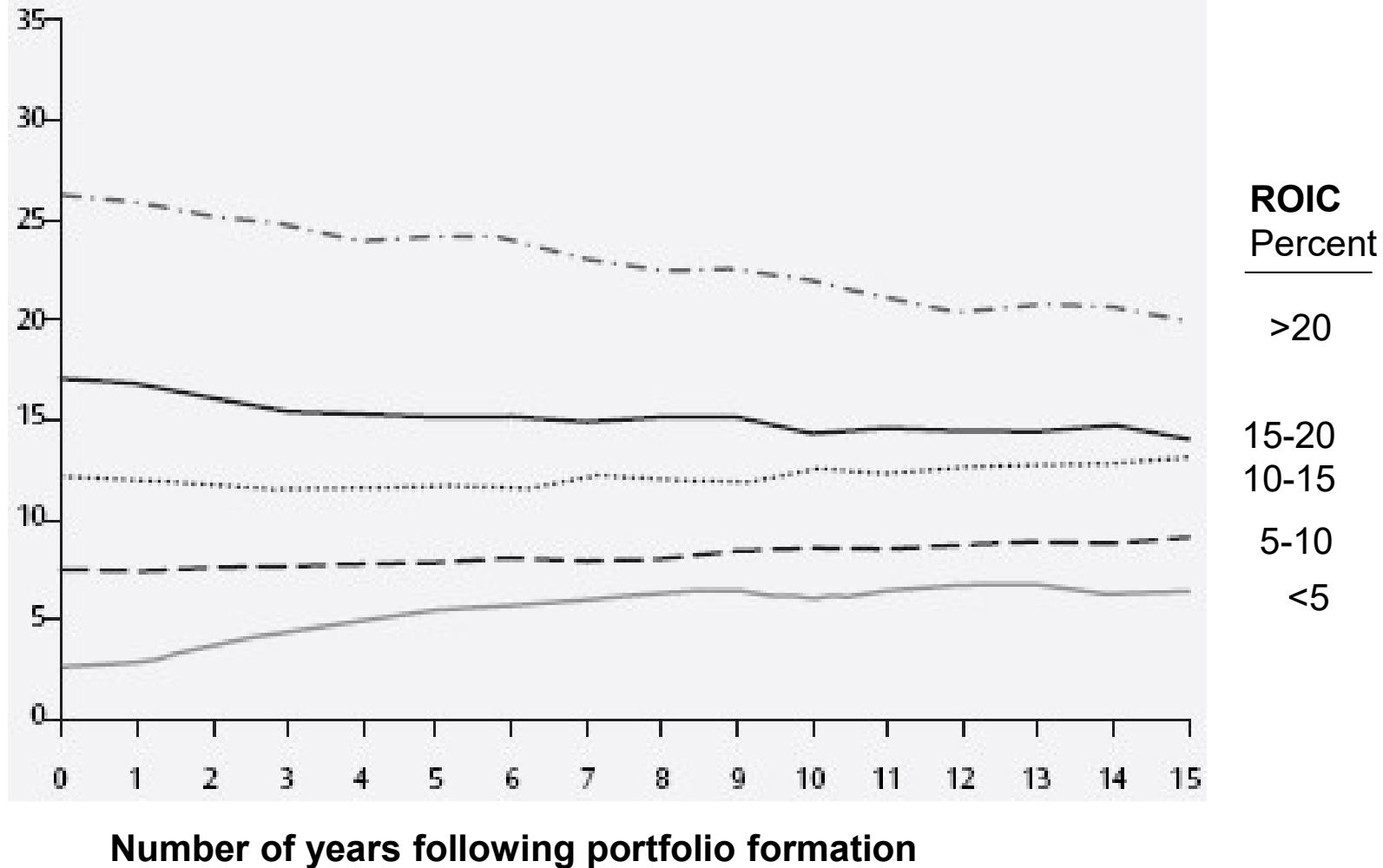
Industry median ROIC, without goodwill (percent)



## ROIC can be persistent in certain industries: An example of decay analysis for consumer products

Median ROIC of portfolio\*

Percent

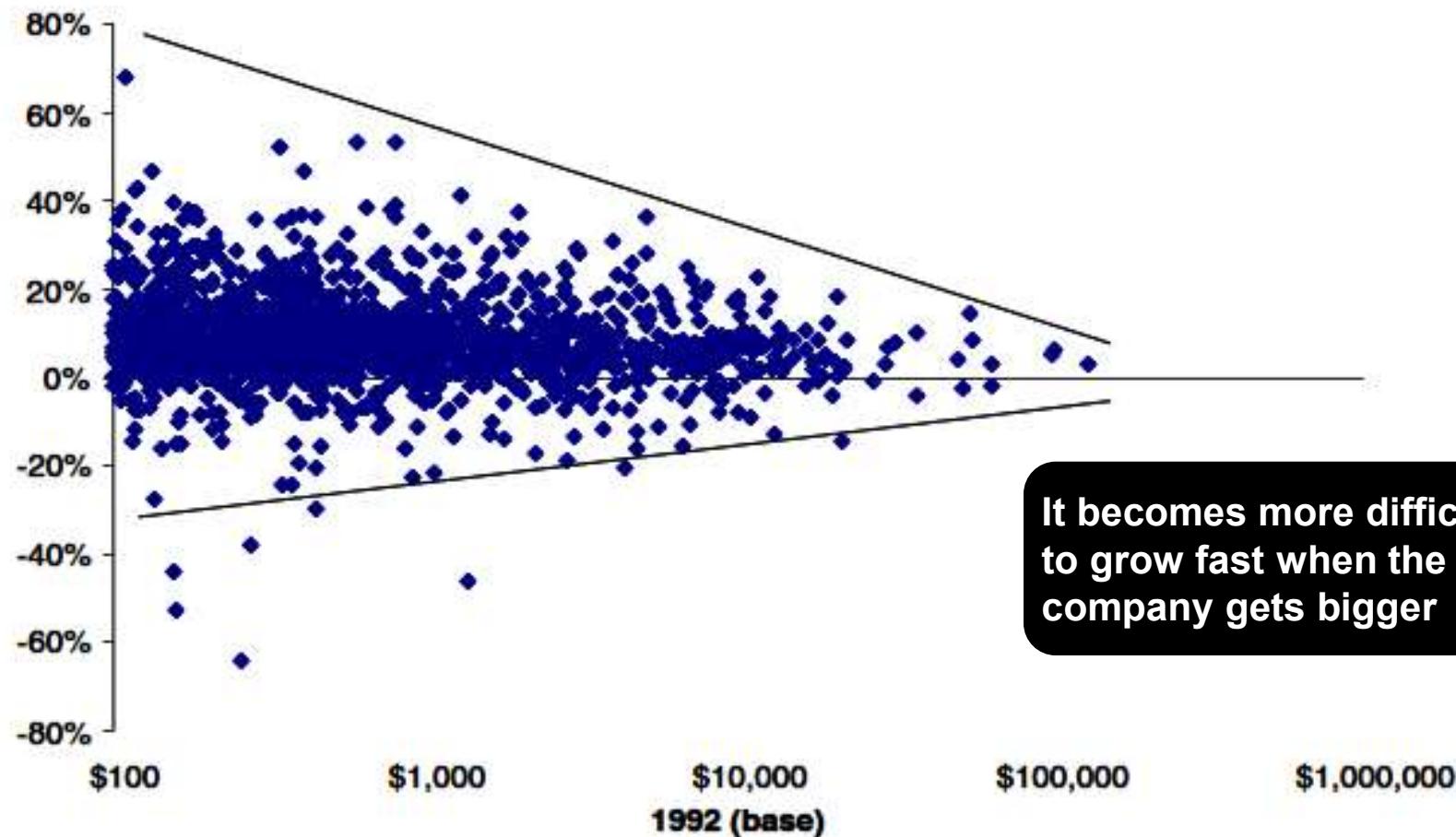


Number of years following portfolio formation

\* At year 0, companies are grouped into one of 5 portfolios, based on ROIC

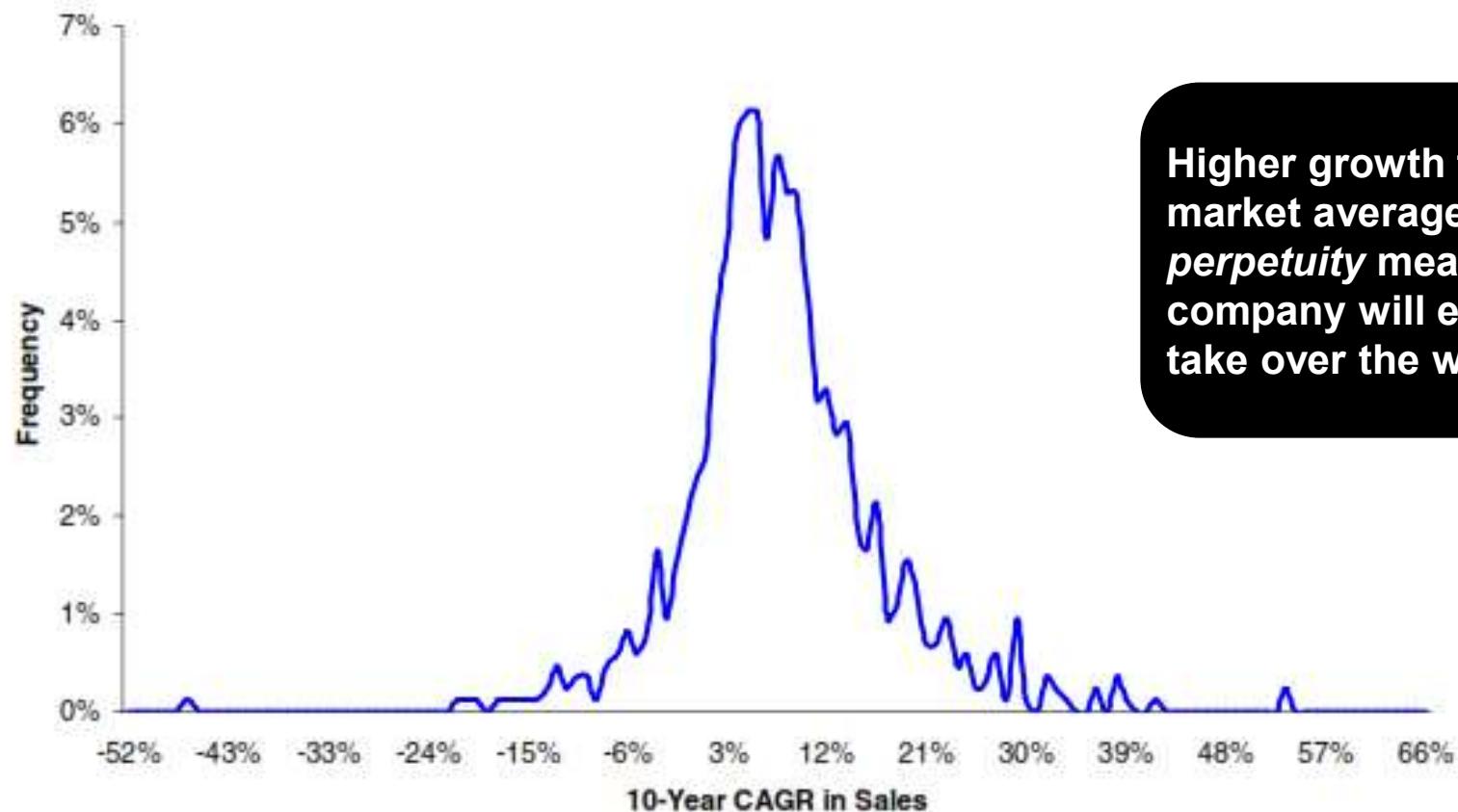
## GROWTH: High growth does not last... (1/2)

**Figure 4: Sales Growth CAGR**  
in millions



## High growth does not last... (2/2)

**Figure 2: Frequency Distributions of 10-Year CAGRs in Sales, 1992-2001**  
for companies with \$500M+ in base year revenue



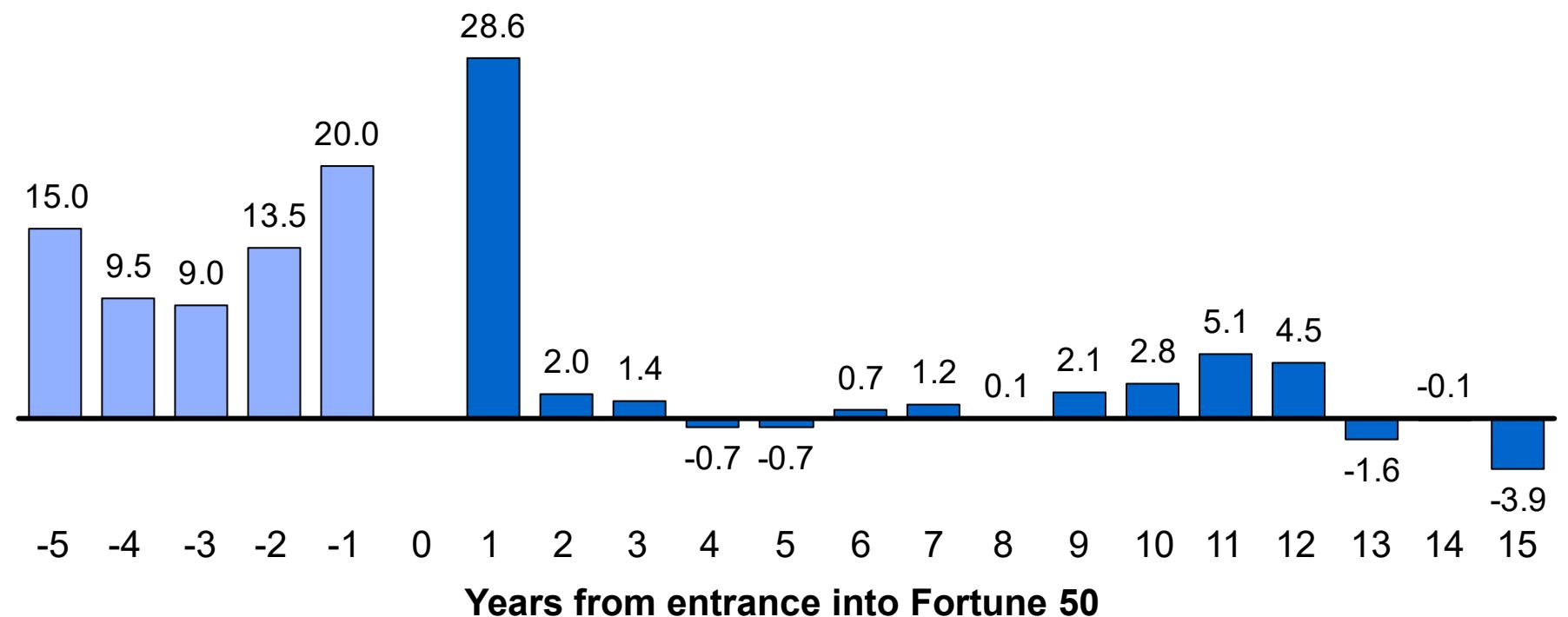
Higher growth than market average *in perpetuity* means the company will eventually take over the world...

**... as revenue growth rate falls dramatically for companies reaching the Fortune 50 list**

**Average annual real revenue growth rate**

Percent

Before entrance to Fortune 50  
After entrance to Fortune 50



Source: Corporate Executive Board, "Stall Points: Barriers to Growth for the Large Corporate Enterprise", 1998  
In The pyramid of numbers, M.Mauboussin, consilient observer, Credit Suisse

## Common Terminal Value pitfalls

### What you might see ...

-  ▪ Use of high growth rate in TV
-  ▪ Length of forecast period affects value of company
-  ▪ Using FCF<sup>1</sup> (1+g) for TV
-  ▪ Ignoring investment altogether by using NOPLAT / (WACC – g) as the TV

### What you should do ...

-  ▪ Few companies can be expected to grow faster than the economy for long periods of time. Use a lower growth rate
-  ▪ If continuing value is estimated at steady state, length of forecast period will NOT affect value. Explicit period is probably too short
-  ▪ Make sure investment (and hence FCF) is calculated correctly in the TV: using the value driver formula will eliminate this error (prior example)
-  ▪ Make sure investment (and hence FCF) is included in the TV: using the value driver formula will eliminate this error

# Common Pitfalls: Naive Base-Year Extrapolation

- A common error in forecasting the base level of free cash flow (FCF) is to assume that the reinvestment rate is constant, implying NOPLAT, investment, and FCF all grow at the same rate.

## Correct and Incorrect Methods of Forecasting Base FCF

\$ million	Year 9	Year 10	Incorrect	Correct
Revenues	1,000	1,100	1,155	1,155
Operating expenses	(850)	(935)	(982)	(982)
EBITA	150	165	173	173
Operating taxes	(60)	(66)	(69)	(69)
NOPLAT	90	99	104	104
Depreciation	27	30	32	32
Gross cash flow	117	129	136	136
→ Capital expenditures	(30)	(33)	(35)	(35)
Increase in working capital	(27)	(30)	(32)	(17)
Gross investment	(57)	(63)	(67)	(52)
Free cash flow	60	66	69	84
<b>Supplemental calculations</b>				
Working capital, year-end	300	330	362	347
Working capital/revenues (percent)	30.0	30.0	31.3	30.0

The \$30 million of investment was predicated on a 10 percent revenue growth rate.

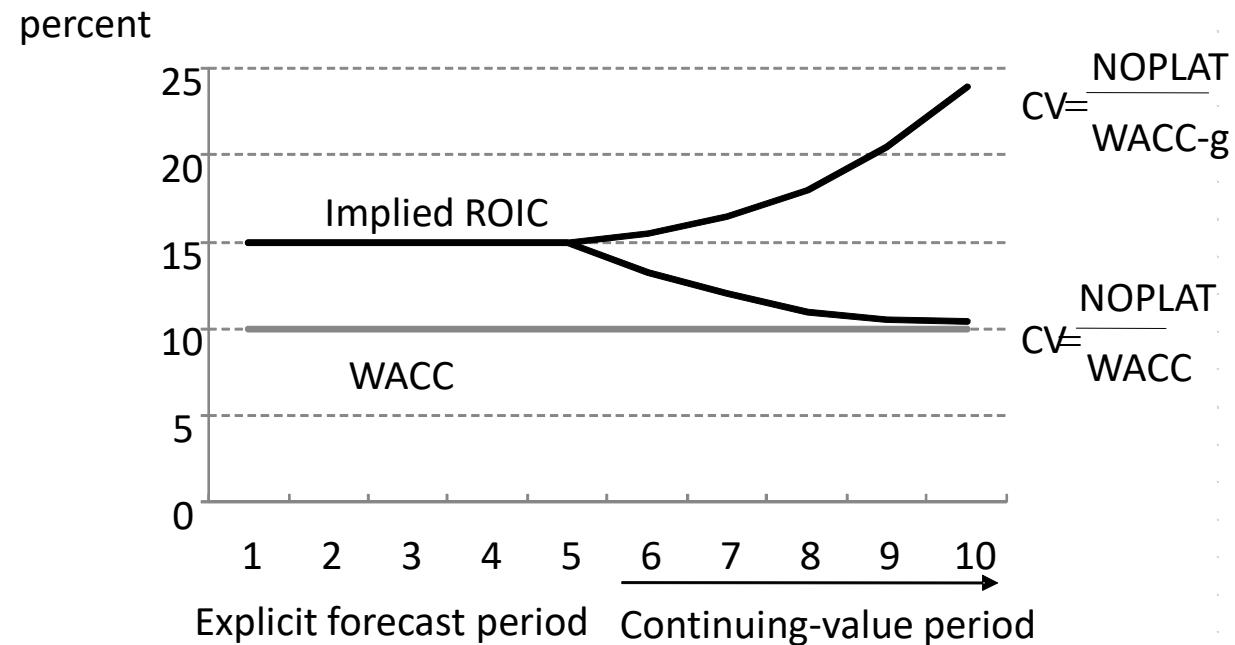
A 5 percent growth rate requires much smaller investments in working capital.

By growing working capital investment at 5 percent, free cash flow is dramatically understated.

## Common Pitfalls: Distorting the KVD Formula

- Simplifying the key value driver formula can result in distortions of terminal value.

*Rates of Return Implied by Alternative Continuing-Value Formulas*



Overly aggressive?

Assumes RONIC  
equals infinity!

Overly

conservative?

Assumes RONIC  
equals the weighted  
average cost of  
capital.

## Common Pitfalls: Overconservatism

### Naive Overconservatism

The assumption that RONIC equals WACC can be faulty, because strong brands, plants, and other human capital can generate economic profits for sustained periods of time, as is the case for pharmaceutical companies, *consumer products companies*, and some software companies.

### Purposeful Overconservatism

Many analysts err on the side of caution when estimating continuing value because of its size and uncertainty. But to offer an unbiased estimate of value, use the best estimate available. The risk of uncertainty will already be captured by the weighted average cost of capital.

An effective alternative to revising estimates downward is to model uncertainty with scenarios and then examine their impact on valuation.

Last thoughts: typical sensitivity shown in a Banker's valuation  
EV or share price based on different Terminal Growth rates and WACC...

## Sensitivity Analysis (Key Measure of Exposure)



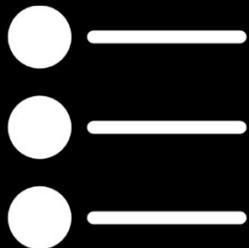
Discount Rate (WACC)	\$258,410.5	Sensitivity on Enterprise Value				
		2.00%	2.50%	3.00%	3.50%	4.00%
9.0%	\$273,180	\$284,954	\$298,689	\$314,922	\$334,402	
9.5%	\$252,099	\$261,770	\$272,930	\$285,949	\$301,336	
10.0%	\$233,548	\$241,561	\$250,719	\$261,286	\$273,614	
10.5%	\$217,085	\$223,773	\$231,353	\$240,015	\$250,010	
11.0%	\$202,365	\$207,982	\$214,301	\$221,462	\$229,646	
11.5%	\$189,117	\$193,859	\$199,159	\$205,121	\$211,879	
12.0%	\$177,123	\$181,144	\$185,613	\$190,607	\$196,225	
12.5%	\$166,205	\$169,629	\$173,413	\$177,617	\$182,316	
13.0%	\$156,221	\$159,144	\$162,360	\$165,915	\$169,864	
13.5%	\$147,050	\$149,553	\$152,294	\$155,310	\$158,643	
14.0%	\$138,592	\$140,740	\$143,083	\$145,648	\$148,471	
14.5%	\$130,765	\$132,610	\$134,616	\$136,804	\$139,200	
15.0%	\$123,497	\$125,084	\$126,803	\$128,672	\$130,710	

Discount Rate (WACC)	\$14.70	Sensitivity on Equity Value per Share				
		2.00%	2.50%	3.00%	3.50%	4.00%
9.0%	\$15.54	\$16.21	\$16.99	\$17.91	\$19.02	
9.5%	\$14.34	\$14.89	\$15.52	\$16.26	\$17.14	
10.0%	\$13.28	\$13.74	\$14.26	\$14.86	\$15.56	
10.5%	\$12.35	\$12.73	\$13.16	\$13.65	\$14.22	
11.0%	\$11.51	\$11.83	\$12.19	\$12.60	\$13.06	
11.5%	\$10.76	\$11.03	\$11.33	\$11.67	\$12.05	
12.0%	\$10.07	\$10.30	\$10.56	\$10.84	\$11.16	
12.5%	\$9.45	\$9.65	\$9.86	\$10.10	\$10.37	
13.0%	\$8.89	\$9.05	\$9.24	\$9.44	\$9.66	
13.5%	\$8.36	\$8.51	\$8.66	\$8.83	\$9.02	
14.0%	\$7.88	\$8.01	\$8.14	\$8.28	\$8.44	
14.5%	\$7.44	\$7.54	\$7.66	\$7.78	\$7.92	
15.0%	\$7.02	\$7.11	\$7.21	\$7.32	\$7.43	

\$7

\$19



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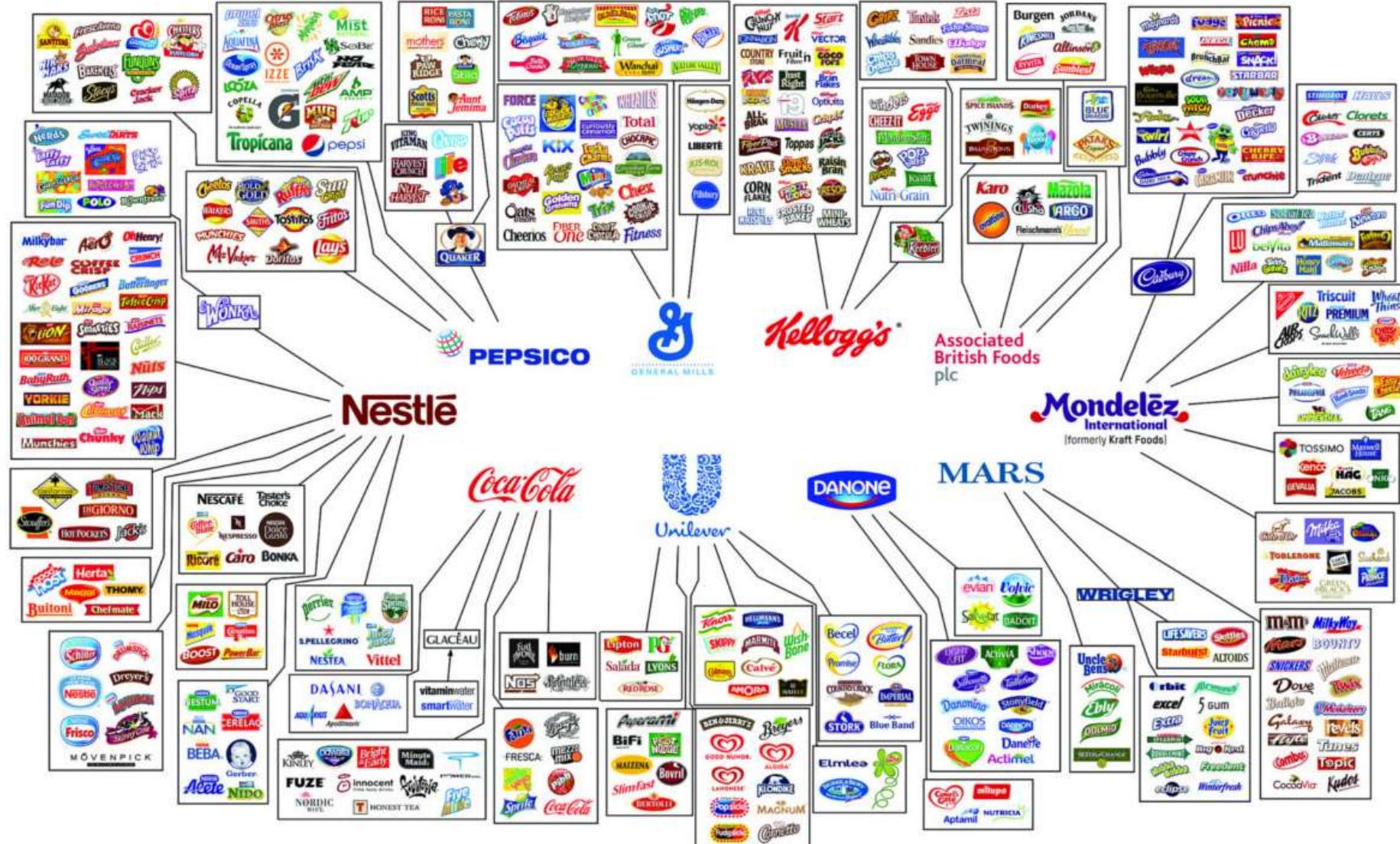
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- **Modelling in practice: consumer goods example**

## Danone main brands portfolio



# Food packaged goods: the lay of the land (competitors)

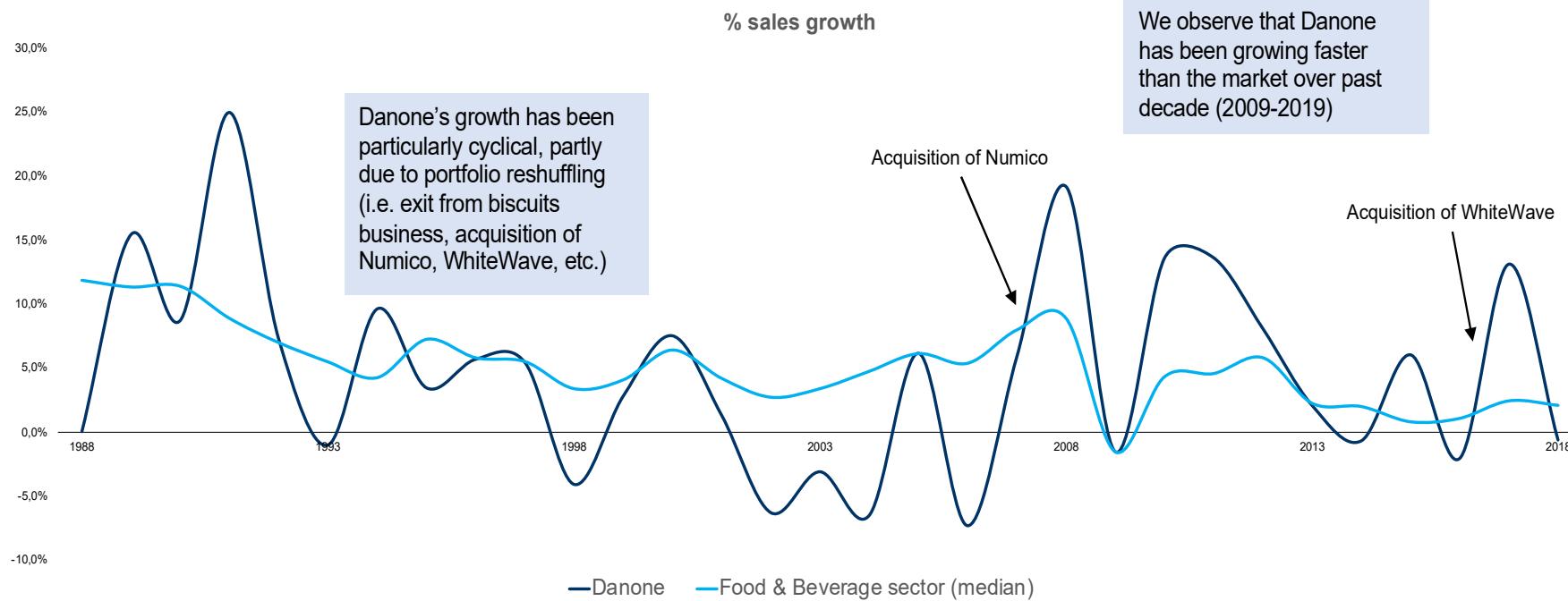
As of 2015



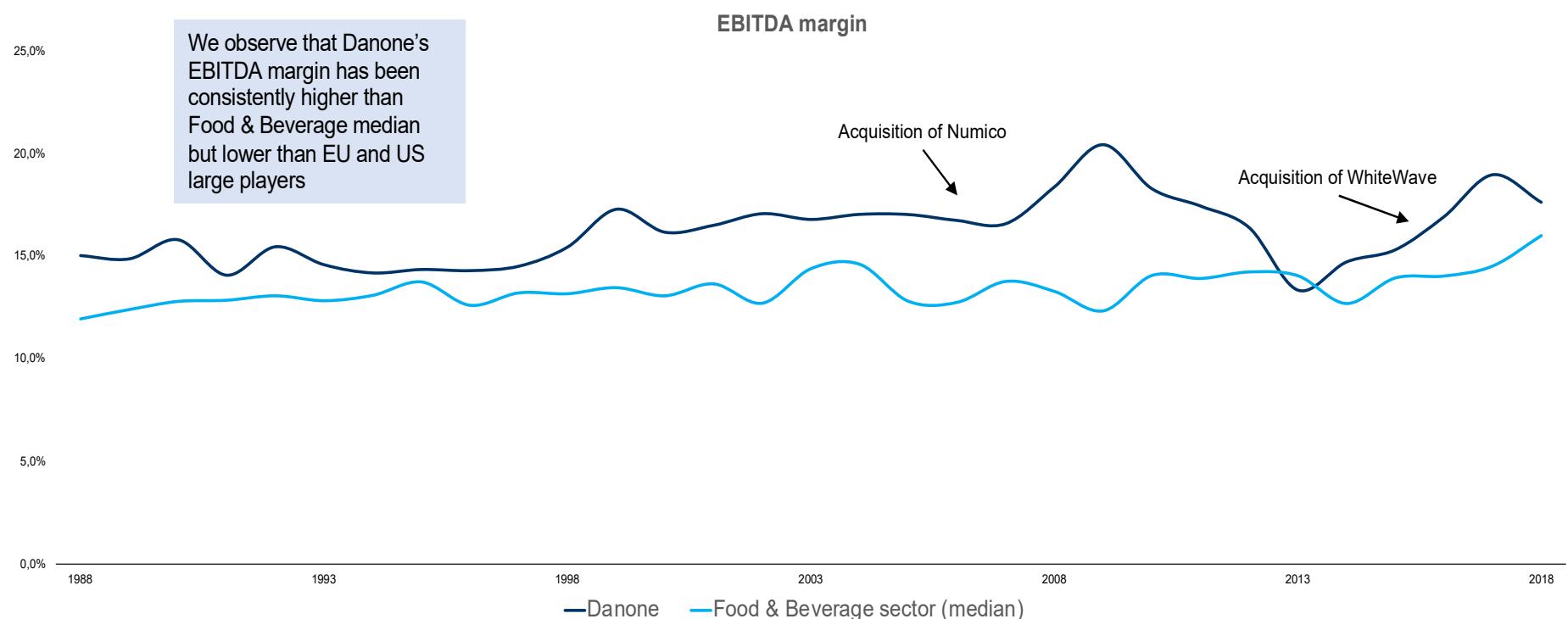
Source: Oxfam

# Danone vs industry

## Revenue growth

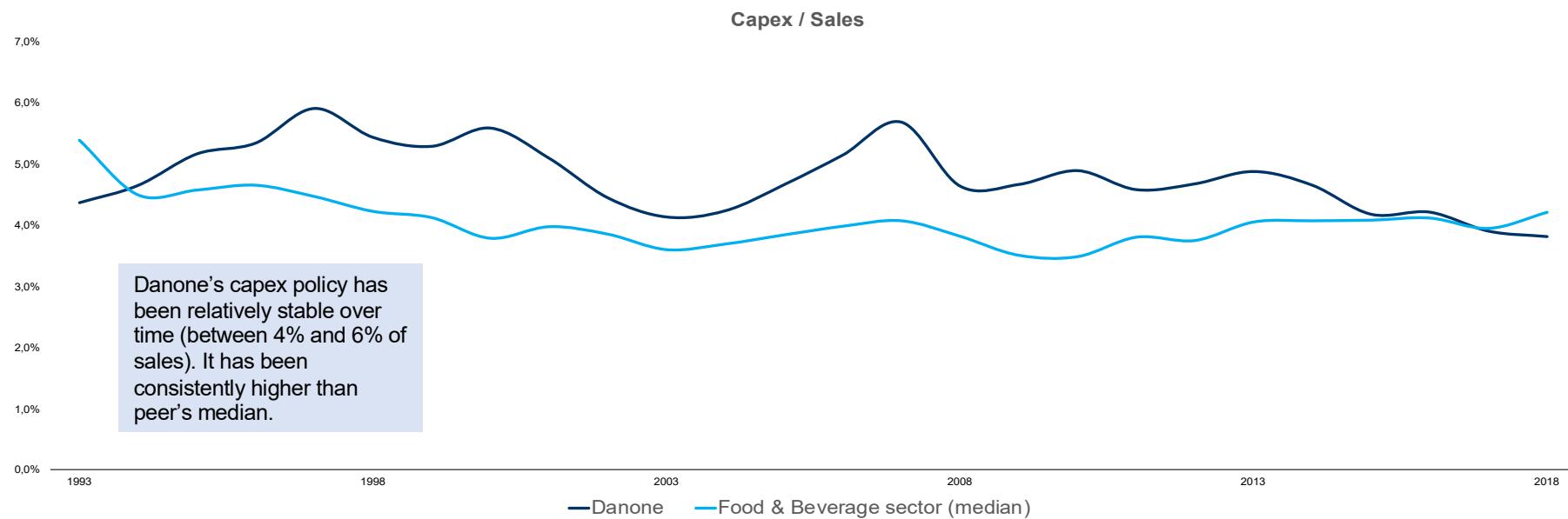


## Danone vs industry EBITDA margin



## Danone vs industry

### Capex/Sales

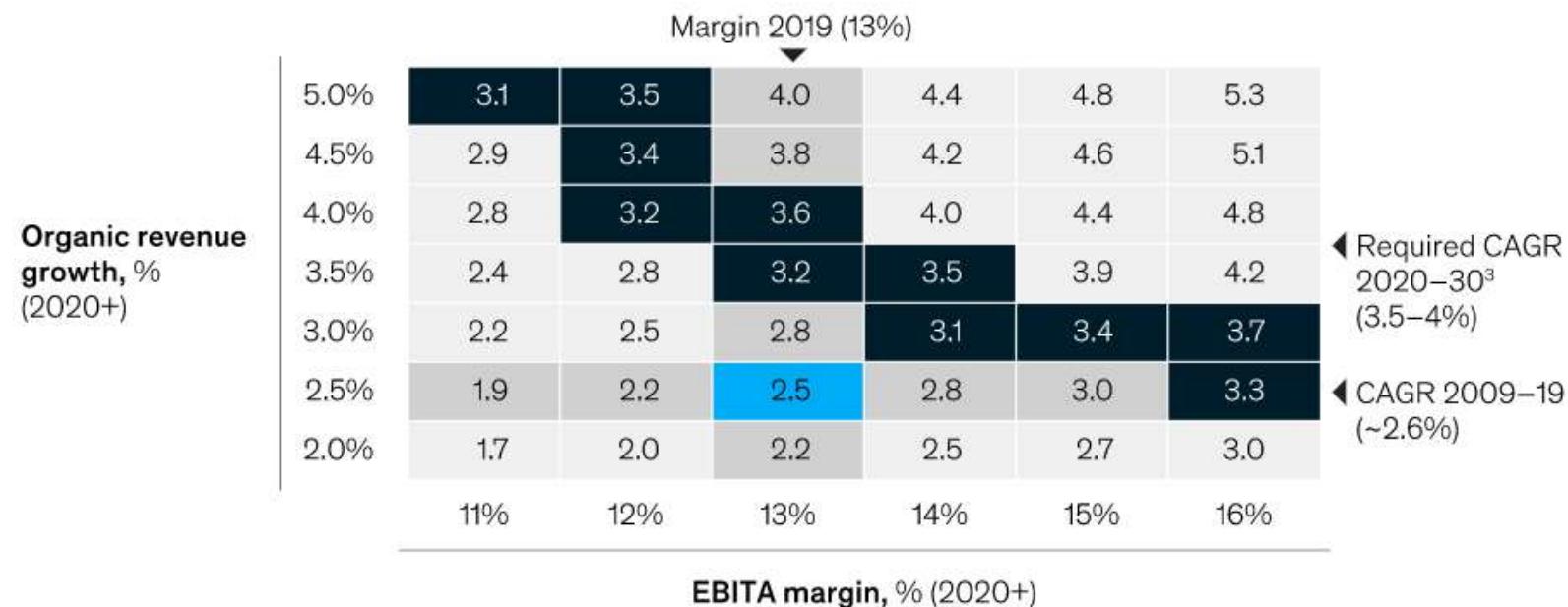


# Industry valuation: implied expectations

Assuming constant margins, CPGs need to deliver ~1–1.5 percentage points higher organic growth than in the last decade to meet investor expectations.

Large CPG companies—aggregate market cap at different growth and margin scenarios,<sup>1</sup> \$ trillion

■ Current valuation +/- 10%<sup>2</sup> ■ Momentum case (past trajectory) ■ Possible valuations at current margin/growth levels



<sup>1</sup>Based on DCF analysis using aggregated financial performance and assuming WACC of ~7.5% (D/E of 25%), tax rate of 24%, IC/Revenue ratio of 42% (based on last 5 years average), perpetuity growth beyond 10 years capped at 4%.

<sup>2</sup>Aggregate Market cap of \$3.4 trillion as of Dec 31, 2019 (pre-COVID-19 impact).

<sup>3</sup>Assuming constant margin.

Source: S&P CapitalIQ, company reports, McKinsey analysis

# Industry middlegame/endgame: Trends

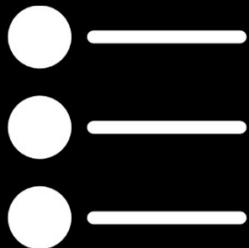
Ten trends are disrupting the historic value-creation model in the fast-moving-consumer-goods (FMCG) industry.

FMCG industry's 5-part model for value creation

Moderate 1 2 3 4 5 Very high

	Value created	10 disruptive trends	Trend impact									
			Past 5 years	Next 5 years								
1	Excellence in mass-market product innovation and brand building, including premiumization	<ul style="list-style-type: none"><li>Stable growth</li><li>25% gross margin advantage over nonbranded players</li></ul>	<ul style="list-style-type: none"><li>The millennial effect</li><li>Digital intimacy (data, mobile, IoT<sup>1</sup>)</li><li>Explosion of small brands</li><li>Better for you</li></ul>	<table><tr><td>2</td><td>4</td></tr><tr><td>2</td><td>5</td></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>5</td></tr></table>	2	4	2	5	2	4	3	5
2	4											
2	5											
2	4											
3	5											
2	Advantaged consumer access via mass-trade relationships	<ul style="list-style-type: none"><li>Broad distribution</li><li>Limited competitive set</li></ul>	<ul style="list-style-type: none"><li>E-commerce giants</li><li>Discounters</li><li>Mass-merchant squeeze</li></ul>	<table><tr><td>2</td><td>5</td></tr><tr><td>3</td><td>4</td></tr><tr><td>2</td><td>5</td></tr></table>	2	5	3	4	2	5		
2	5											
3	4											
2	5											
3	Developing market-category creation alongside rising incomes	<ul style="list-style-type: none"><li>75% of FMCG revenue growth over past 10 years</li></ul>	<ul style="list-style-type: none"><li>Rise of local competitors</li></ul>	<table><tr><td>2</td><td>3</td></tr></table>	2	3						
2	3											
4	Operating model that drives consistent execution and achieves cost reduction	<ul style="list-style-type: none"><li>~4–6% general and administrative</li></ul>	<ul style="list-style-type: none"><li>Pressure for profit from activist investors</li></ul>	<table><tr><td>2</td><td>4</td></tr></table>	2	4						
2	4											
5	M&A to consolidate markets and enable organic growth post acquisition	<ul style="list-style-type: none"><li>Attractive market structure</li><li>Opportunity to step change organic revenue growth</li></ul>	<ul style="list-style-type: none"><li>Building competition for deals</li></ul>	<table><tr><td>2</td><td>2</td></tr></table>	2	2						
2	2											

<sup>1</sup>Internet of Things.



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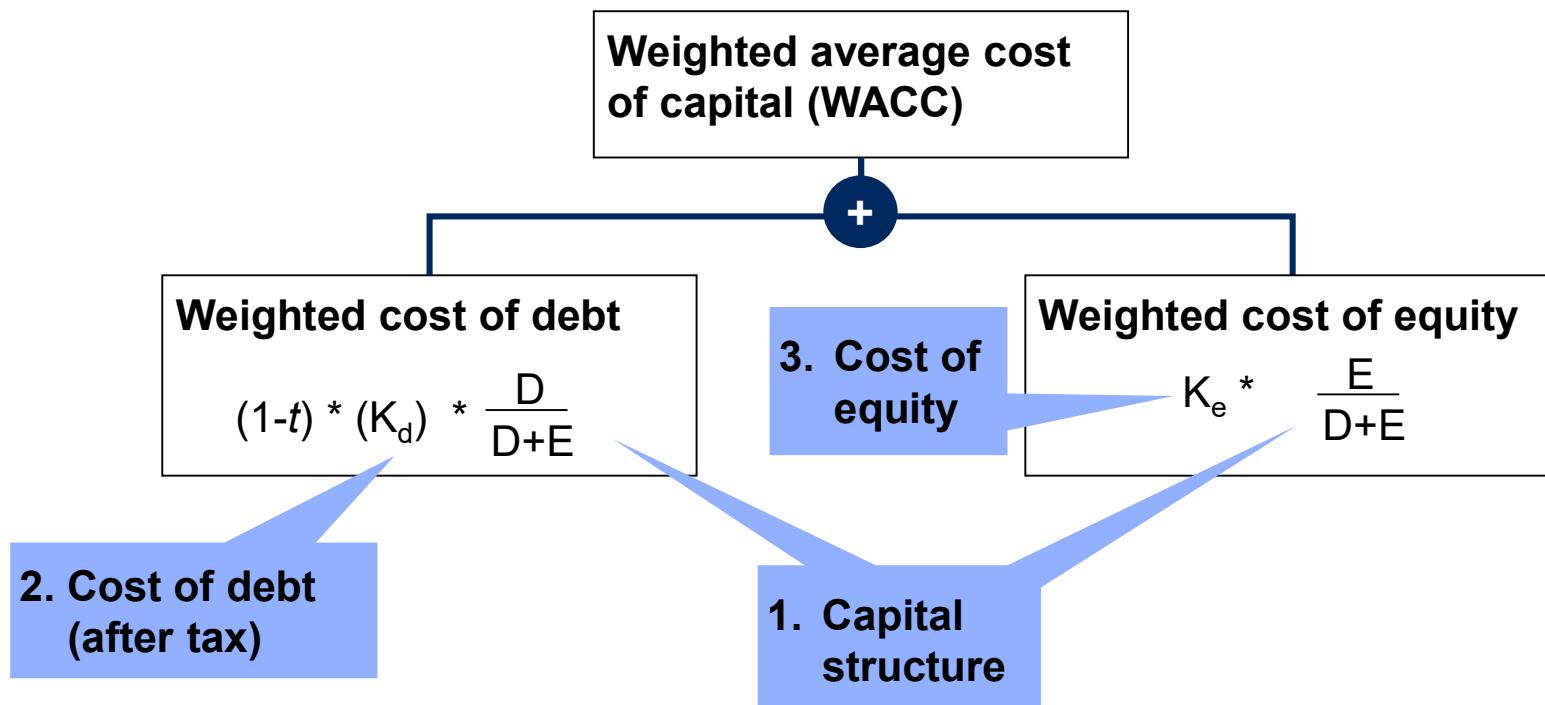
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- Modelling in practice: consumer goods example
- **Estimating the Weighted Average Cost of Capital**

# Cost of capital: an overview

**Definition:** The **rate of return** required by investors for a particular investment (this is the opportunity cost *not* the cash cost of capital).

- It is the **discount rate** for Free Cash Flow used to estimate a DCF value
- It is compared to ROIC to determine if a company is creating value
- It is driven by market rates, systematic risk and capital structure. WACC is unobservable directly and must be estimated, which can create a lot of discussions in practice...

**Three components to estimate the WACC:**

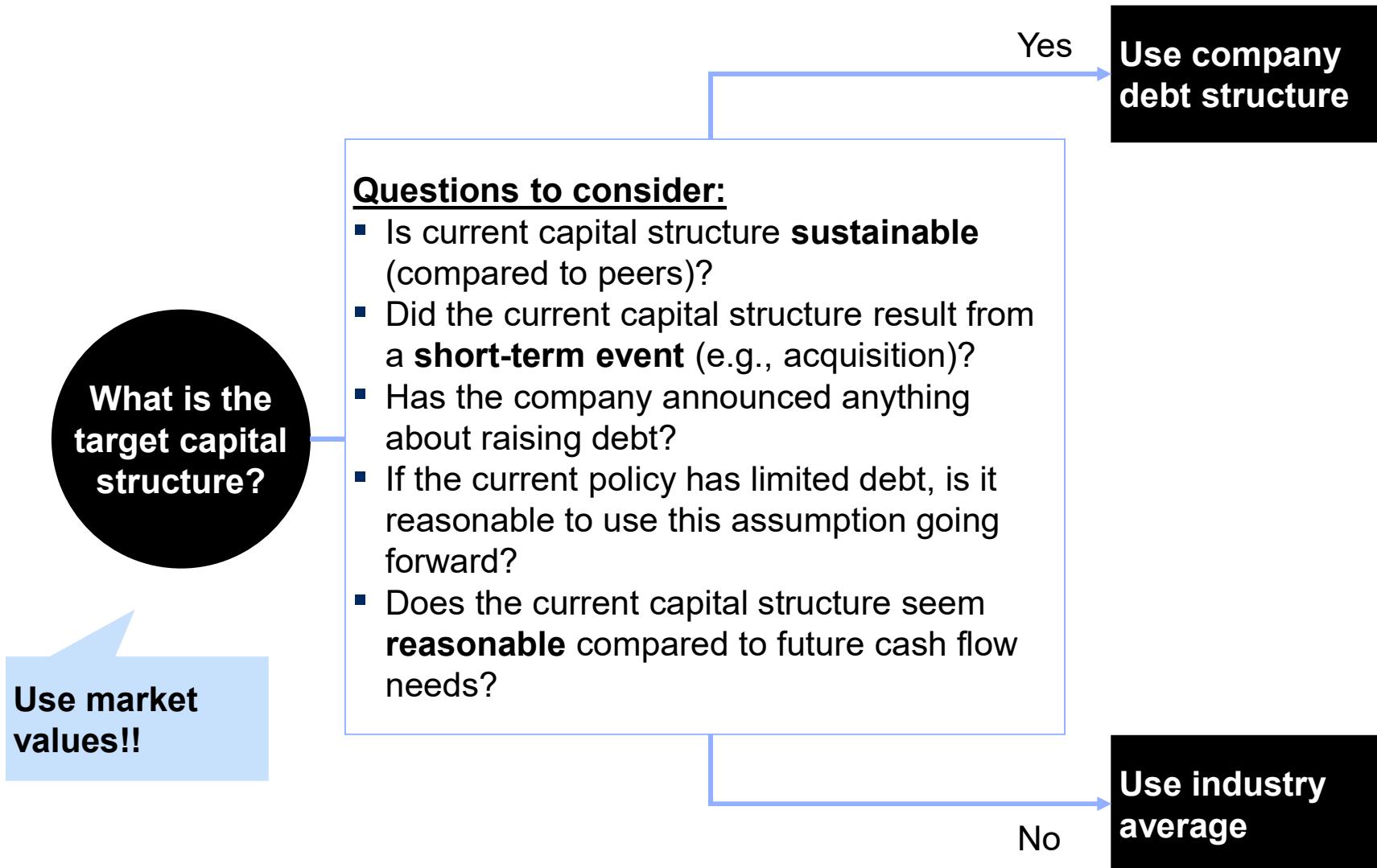


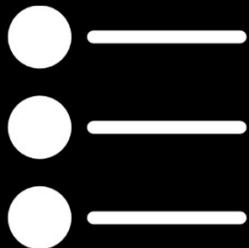
## A correct WACC calculation requires consistency

The most important principle underlying successful implementation of the cost of capital is **consistency between the components of WACC and free cash flow:**

- It must include the opportunity costs of all investors—debt, equity, and so on—since free cash flow is available to all investors, who expect compensation for the risks they take.
- It must weight each security's required return by its **target market-based weight**, not by its historical book value.
- Any financing-related benefits or costs, such as interest tax shields, not included in free cash flow must be incorporated into the cost of capital or valued separately using adjusted present value.
- It must be computed **after corporate taxes** (since free cash flow is calculated in after-tax terms), based on the **same expectations of inflation**, and **match the duration** of the cash flows.

## How to determine if the current capital structure is a good estimate for “target” capital structure





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- Modelling in practice: consumer goods example
- **Estimating the Weighted Average Cost of Capital**
  - **Cost of Debt**

# Estimating the Cost of Debt

## 1. Directly

e.g. for a company with listed bonds: check the cost of debt of (long term) debt financing: typically the **yield to maturity on a Long Term bond** (ideally about 10 years maturity but depending on the outstanding instruments).

- 💣 Not the coupon rate!!
- 💣 Not estimated by comparing actual interest expense to total balance sheet debt
- Zero coupons? Convertibles?...

## 2. Build-up

- Add a **credit risk premium** consistent with the default risk of the company considered to the **Risk free rate**
- Check the risk free rate (10 year AAA government rate)
- Evaluate/Check the credit rating of the company
- Check the typical credit spread for a comparable credit rating
- Add the credit spread to the Risk free rate

## 1. Yield to maturity

- When purchasing a bond, investors require compensation. The discount factor used to value a bond is known as its yield to maturity (YTM):

$$P = \frac{\text{Coupon}}{\text{YTM}} \left[ 1 - \frac{1}{(1 + \text{YTM})^N} \right] + \frac{\text{Face}}{(1 + \text{YTM})^N}$$

- Search Bloomberg (*YAS function on a bond*) or other financial databases for **the yield to maturity** on the company's long-dated, option-free debt.

*Note: In the United States, corporate bond trades are reported to the National Association of Securities Dealers, through its Trade Reporting and Compliance Engine (TRACE) system*

- A bond's yield to maturity (YTM) depends on the bond's time to maturity (duration). To find the yield to maturity for companies with liquid corporate debt, search for trading data on the company's long-term bonds (around/greater than 10 years)
- To determine price and yield accurately, use only large trades (> \$1 million). Since not all long-dated bonds trade on a frequent basis, use a bond with frequent and recent trades
- For U.S. bonds, coupons are paid twice a year. Therefore, the bond-equivalent yield must be divided by two for discounting semiannual cash flows (if you are computing the YTM yourself).

## 2a. Estimating Risk-free rate ( $r_f$ )

### Definition

- Theoretical rate of return attributed to **an investment with zero risk**
- **No variance** is anticipated around the expected return

### Methodology to calculate

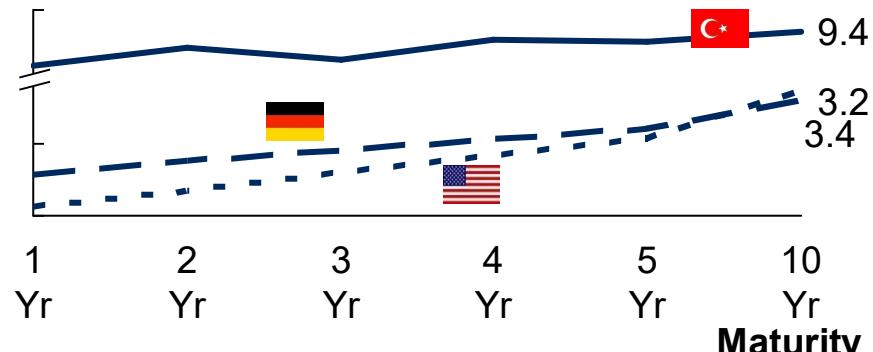
- Use **highly liquid, long-term government securities**, such as 10-year zero coupon strip
  - **Avoid coupon bonds**, since interim payment shortens the maturity
  - Use the **local government bond denominated in the currency of the cash flows** generated
  - **Approximate the concession period** with the maturity of government bond within the liquidity constraint
- Alternative: **10 year swap rate**

### An issue with non USD/EUR rates...

#### Yield curve for government bonds

##### Interest rate

Percent



#### Risk-free rate in local currency

##### Country

Country	10 year gvt bond
	Percent
Germany (€)	3.2
US (US\$)	3.4
Turkey (TRL)	9.4

## 2a. How to deal with low risk free rates: the issue

- Since 2008 crisis, Quantitative Easing and governments intervention have kept interest rates artificially low (vs historical averages)

Valuation models are another area of finance that need to be tweaked in a negative rate environment. Nobel prizes have been awarded to economists that developed concepts such as the efficient frontier, the Capital Asset Pricing Model and the Black-Scholes option pricing model. But when a negative value is assumed for the risk-free rate in these types of models, fair value results shoot off toward infinity. With trillions of securities and derivatives dependent on these models, valuation is critical...

Jim Bianco

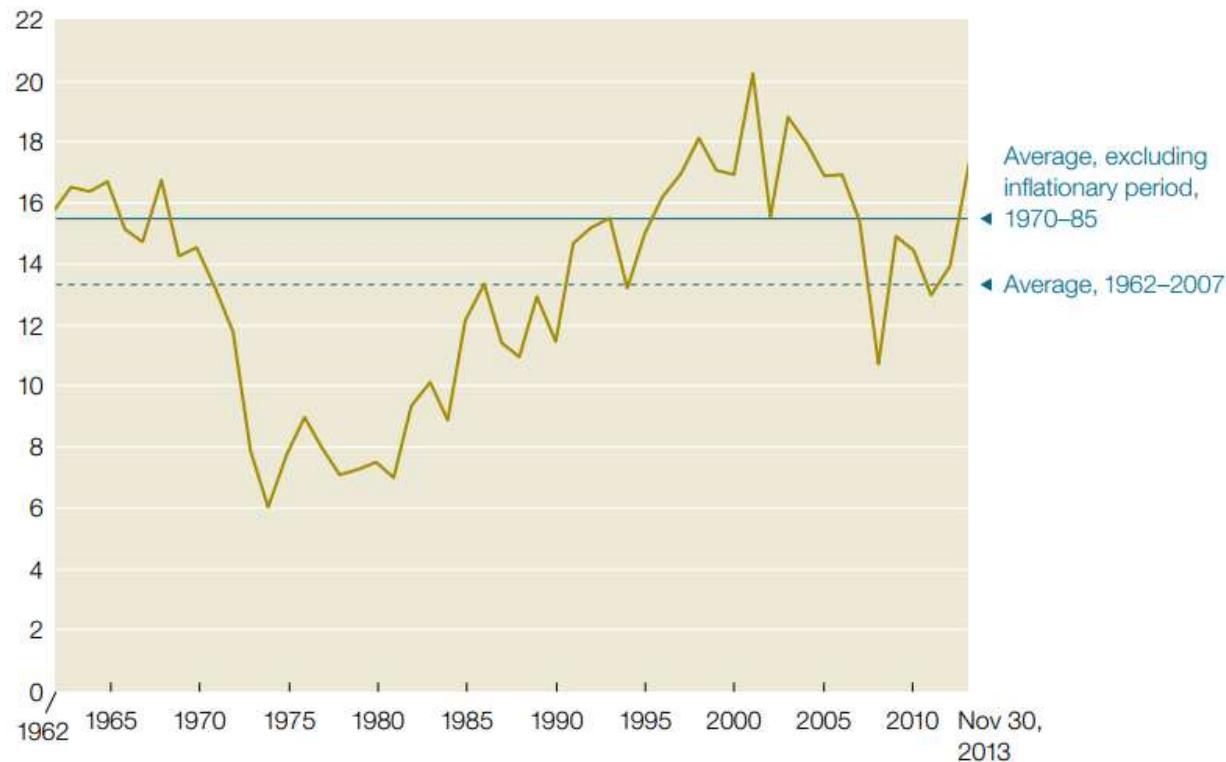
(Negative Interest Rates Threaten the Financial System, Bloomberg Opinion, 3rd September 2019)

## 2a. How to deal with low risk free rates: the issue

- Using a low (or even negative) Risk free rate does not make sense. Equity markets valuation levels suggest investors are still expecting ‘normal’ returns, hence using a ‘normal’ risk free rate

**Equity P/E ratios have not moved outside their long-run averages.**

Median 1-year forward P/E ratio, excluding financials, for S&P 500 index,  
end-of-year values



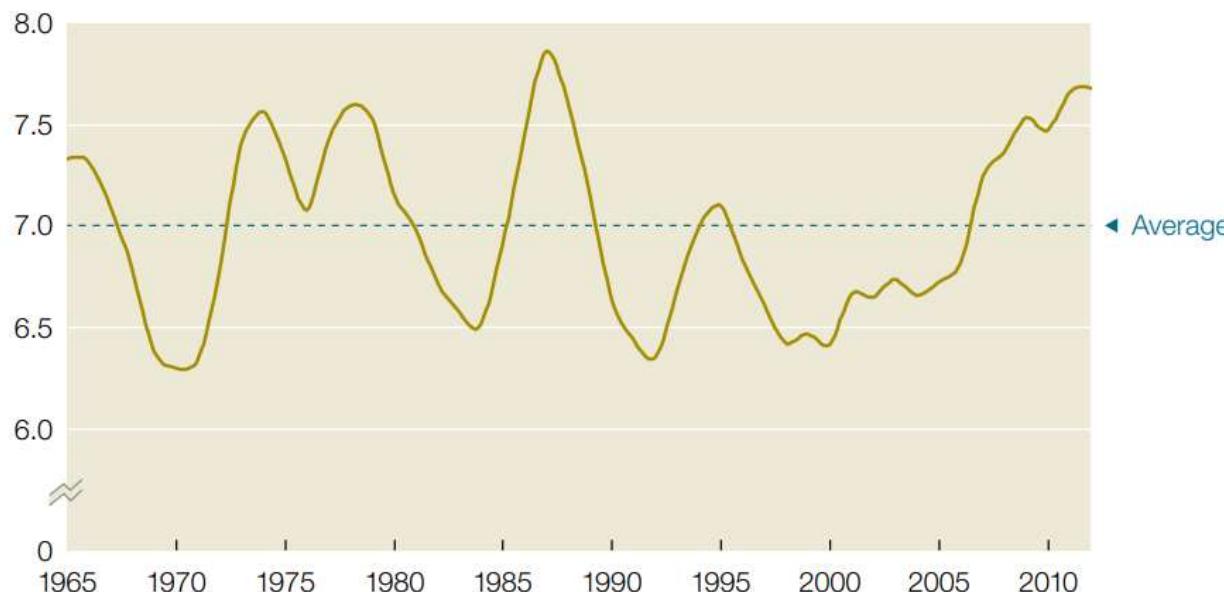
Source: What effect has quantitative easing had on your share price?, T.Koller, R.Dobbs, S.Lund;  
McKinsey on Finance 49, 2014

## 2a. How to deal with low risk free rates: the issue

- Based a simple Dividend Discount Model (inputs: corporate profits, growth expectations, dividend yield and market index value), the implied cost of equity can be estimated

**The implied real cost of equity in the United States has remained within the historical norms.**

Implied real cost of equity, 3-year moving average, %



*If  $K_e$  is stable, based on CAPM (and since Beta of the market is 1), we can assume that expected  $R_f$  is the same (else MRP has to raise to make up the difference)*

## 2a. How to deal with low risk free rates: the options

1. Use the current observed low/negative Risk Free rate and a 'normal' MRP
    - Will result in a low WACC (and higher valuation). Not consistent vs what we can see about the levels of valuation (market P/E) + most analysts/bankers continue to assume WACCs around 7%
  2. Use the current observed low/negative Risk Free rate and increase the MRP to compensate
    - Cost of Equity for companies with a beta very different from the market average will be different than what we would obtain with a 'normal' MRP and Rf... A (popular) alternative consists in adding all sorts of premiums to compensate...
  3. Use historical average for Rf (and MRP)  
“zero beta return”
    - E.g. **about 4% Rf and 5% MRP**. This is suggested in the Valuation book. However can be difficult to explain why you use borrowing rates that are very different from what is observed in the market.
- 
1. Use 2 WACCs in your model: near term and long term
    - As one could expect the interest rates to eventually revert to their long term average, you may use a low Rf (and potentially higher MRP e.g. 6-7%) for a couple of years and then assume the long term average for Rf (back to 4%) and MRP (around 5%)

## 2b. The Credit Spread/default premium

- A corporate bond's yield to maturity depends on the benchmark rate (Risk free rate often government Treasury bonds or LIBOR) plus a default premium.
- When a bank (or investor) lends money, it worries that it will not be paid back (=the borrower defaults). In order to be compensated for default risk, lenders charge a **premium over the default-free benchmark** rate to risky customers.
- The higher the chance (probability and timing) of default and the lower the amount potentially recovered in case of default, the higher the premium will be
- Rating agencies, such as S&P and Moody's, rate the default risk of most bonds when they issue **credit ratings**

## 2b. Credit Ratings

Investment Grade	
AAA/Aaa	EXTREMELY STRONG capacity to meet its financial commitments. AAA is the highest issuer credit rating assigned by rating agencies
AA/Aa	VERY STRONG capacity to meet its financial commitments. It differs from the highest-rated obligors only in small degree.
A/A	STRONG capacity to meet its financial commitments but somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligors in higher-rated categories.
BBB/Baa	ADEQUATE capacity to meet its financial commitments. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its commitments.
Speculative	
BB/Ba	LESS VULNERABLE in the near term than other lower-rated obligors. However, it faces major ongoing uncertainties and exposure to adverse business, financial, or economic conditions that could lead to the obligor's inadequate capacity to meet its financial commitments.
B/B	MORE VULNERABLE to nonpayment than obligations rated BB, but the obligor currently has the capacity to meet its financial commitments on its obligations. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitments.
CCC/Caa	CURRENTLY VULNERABLE, and is dependent upon favorable business, financial, and economic conditions to meet its financial commitments.

## 2b. Each credit rating has an implied probability of default (S&P)

**Cumulative probability of default (%)**

**years**

Global	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AAA	-	0.0	0.1	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.1
AA	0.0	0.1	0.1	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.2
A	0.1	0.2	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.8	2.0	2.1	2.3	2.5	2.7
BBB	0.2	0.7	1.1	1.7	2.3	2.9	3.4	3.9	4.4	4.9	5.4	5.9	6.3	6.8	7.2
BB	0.9	2.7	4.8	6.8	8.6	10.3	11.9	13.2	14.5	15.6	16.5	17.3	18.0	18.6	19.2
B	4.5	10.0	14.6	18.2	20.8	23.0	24.8	26.2	27.5	28.7	29.8	30.7	31.5	32.2	33.0
CCC/C	26.8	35.8	41.1	44.3	46.7	47.8	48.8	49.7	50.8	51.7	52.4	53.3	54.2	55.1	55.1
Investment grade	0.1	0.3	0.6	0.9	1.2	1.5	1.8	2.0	2.3	2.6	2.8	3.0	3.3	3.5	3.7
Speculative grade	4.2	8.2	11.7	14.6	16.8	18.7	20.3	21.7	22.9	24.1	25.1	25.9	26.7	27.3	28.0

Source: S&P 2011 Annual U.S. Corporate Default Study And Rating Transitions

## 2b. Credit ratings: default probability and loss rates (Moody's)

EXHIBIT 33

Average Cumulative Issuer-Weighted Global Default Rates, 1920-2010\*

Rating	1	2	3	4	5	6	7	8	9	10
Aaa	0	0.008	0.029	0.084	0.163	0.249	0.359	0.51	0.669	0.854
Aa	0.07	0.205	0.319	0.489	0.748	1.053	1.354	1.644	1.919	2.237
A	0.095	0.29	0.584	0.908	1.244	1.602	1.988	2.382	2.813	3.242
Baa	0.293	0.867	1.546	2.28	3.061	3.839	4.581	5.337	6.121	6.907
Ba	1.369	3.258	5.362	7.559	9.658	11.654	13.464	15.225	16.922	18.698
B	4.028	9.051	13.937	18.245	22.009	25.351	28.453	31.107	33.434	35.488
Caa-C	14.694	24.432	31.521	36.954	41.28	44.421	46.762	48.864	50.937	52.862
Inv Grade	0.156	0.463	0.84	1.259	1.717	2.189	2.659	3.134	3.629	4.132
Spec Grade	3.91	7.896	11.608	14.924	17.835	20.395	22.672	24.727	26.621	28.455
All rated	1.542	3.153	4.659	6.011	7.218	8.293	9.256	10.143	10.987	11.811

EXHIBIT 23

Average Cumulative Credit Loss Rates by Letter Rating, 1982-2010\*

	Year 1	Year 2	Year 3	Year 4	Year 5
Aaa	0.00%	0.01%	n.a.	0.00%	0.02%
Aa	0.01%	0.04%	0.07%	0.10%	0.18%
A	0.04%	0.10%	0.22%	0.37%	0.49%
Baa	0.12%	0.32%	0.57%	0.84%	1.19%
Ba	0.64%	1.91%	3.54%	5.41%	6.90%
B	2.77%	6.73%	10.45%	13.49%	15.57%
Caa-C	11.66%	19.62%	26.40%	30.64%	35.08%
Investment Grade	0.06%	0.15%	0.28%	0.43%	0.60%
Speculative Grade	3.09%	6.42%	9.56%	12.13%	14.00%
All Rated	1.13%	2.31%	3.38%	4.22%	4.85%

\* Based on average default rates and senior unsecured bond recoveries measured on issuer-weighted basis

## 2b. Credit spreads: Definition

**Definition:** “Premium”/Spread paid over risk free rate to cover company risk of default  
 (Spread = Bond’s yield to maturity minus risk free rate for the same maturity)

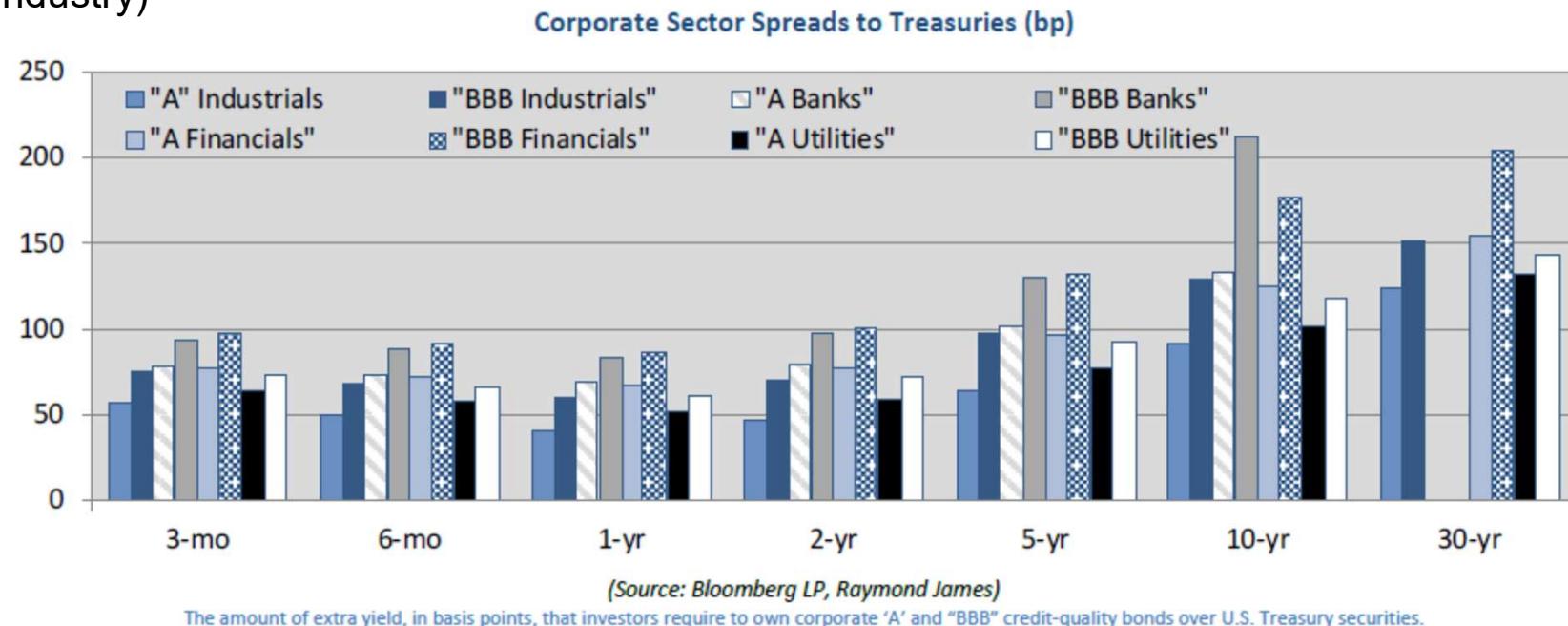
**Example: Reuters Corporate Spreads for Banks, basis points (1bp = 0.01%)**

03/01/2006

Rating	1 yr	2 yr	3 yr	5 yr	7 yr	10 yr	30 yr
Aaa/AAA	14	16	27	40	56	68	90
Aa1/AA+	22	30	31	48	64	77	99
Aa2/AA	24	37	39	54	67	80	103
Aa3/AA-	25	39	40	58	71	81	109
A1/A+	43	48	52	65	79	93	117
A2/A	46	51	54	67	81	95	121
A3/A-	50	54	57	72	84	98	124
Baa1/BBB+	62	72	80	92	121	141	170
Baa2/BBB	65	80	88	97	128	151	177
Baa3/BBB-	72	85	90	102	134	159	183
Ba1/BB+	185	195	205	215	235	255	275
Ba2/BB	195	205	215	225	245	265	285
Ba3/BB-	205	215	225	235	255	275	295
B1/B+	265	275	285	315	355	395	445
B2/B	275	285	295	325	365	405	455
B3/B-	285	295	305	335	375	415	465
Caa/CCC+	450	460	470	495	505	515	545
US Treasury Yield	4.74%	4.71%	4.68%	4.63%	4.60%	4.59%	4.56%

## 2b. Estimating credit spread: where to find current data

Option 1: Bloomberg has time series for Bond baskets (main Credit ratings, some per industry)



Option 2: Federal Reserve Bank of Saint Louis (free)

<https://fred.stlouisfed.org/categories/32348>

## 2b. Evolution of credit spreads (A)

Default spreads change over time. Default spreads rise during times of economic distress.  
Safe bonds trade at a small premium to Treasuries.



Source: FRED, Saint-Louis

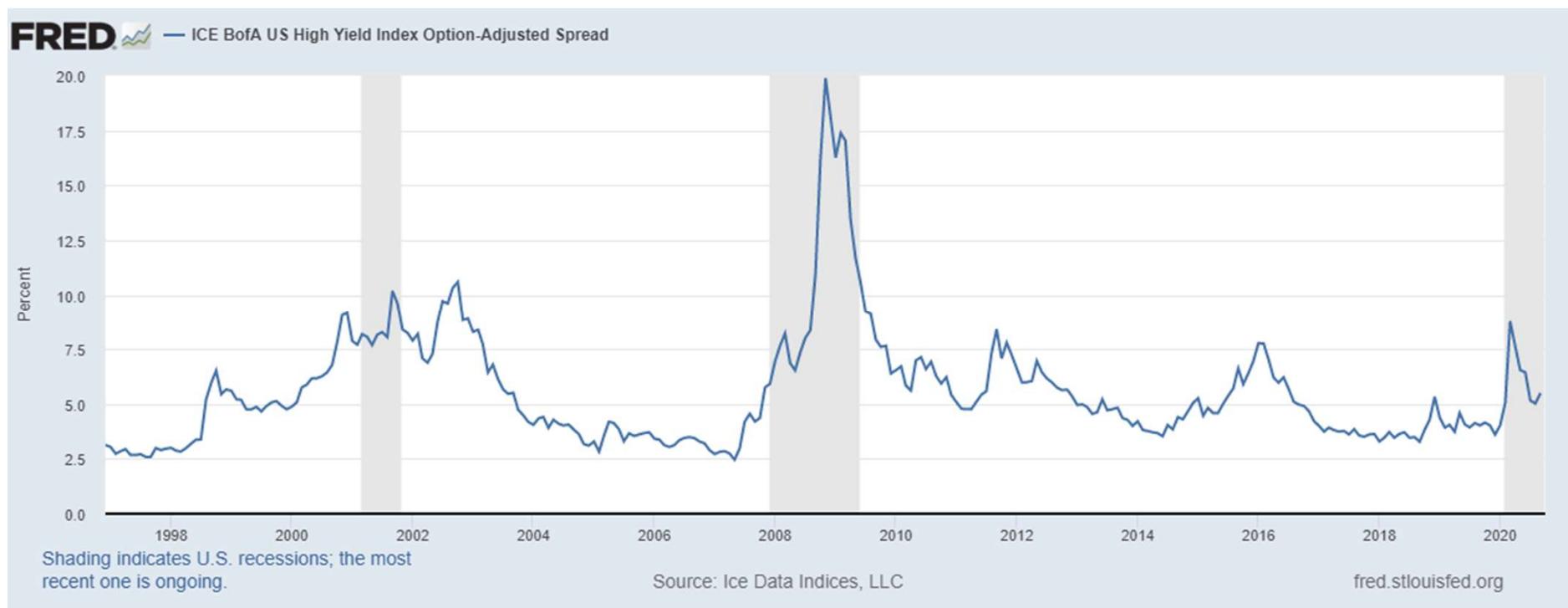
## 2b. Evolution of credit spreads (BBB)



Source: FRED, Saint-Louis

## 2b. Evolution of credit spreads (High yield, combined)

“Junk bonds” can easily yield more than 10 percent. But the yield is far from guaranteed...  
During the financial crisis of 2008, junk bond spreads spiked up



Source: FRED, Saint-Louis

## For High Yield companies: Observed yields assume a significant probability of default, meaning the ‘true’ cost of debt is lower

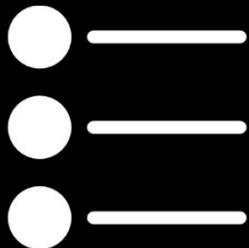
Table 1 **Promised yield spread and expected return on debt**

The table shows the relationship between the promised debt yield and the expected default loss in the Merton model.

The inputs are the leverage ratio  $p_D$ , the promised spread on debt in basis points  $s$ , the equity risk premium  $\pi_E$ , and the volatility of equity  $\sigma_E$ . The outputs are the expected default loss in basis points  $\delta$  and the proportion of the promised debt spread due to the expected default  $\delta/s$ . NA means that these input values are incompatible with the model. Sensitivity tests are underlined.

$p_D$	$s$ (b.p.)	$\pi_E$ (% p.a.)	$\sigma_E$ (% p.a.)	$\delta$ (b.p.)	$\delta/s$ (%)
<b>Panel A: Investment-grade debt firm</b>					
0.3	100	6.0	0.3	16	16.4
<u>0.4</u>	100	6.0	0.3	19	18.7
<u>0.2</u>	100	6.0	0.3	13	13.4
0.3	<u>50</u>	6.0	0.3	9	19.0
0.3	<u>150</u>	6.0	0.3	22	14.5
0.3	100	<u>5.0</u>	0.3	23	23.4
0.3	100	<u>7.0</u>	0.3	11	11.1
0.3	100	6.0	<u>0.2</u>	NA	NA
0.3	100	6.0	<u>0.4</u>	42	41.5
<b>Panel B: High-leverage firm</b>					
0.7	400	6.0	0.5	248	61.9
<u>0.8</u>	400	6.0	0.5	252	62.9
<u>0.6</u>	400	6.0	0.5	244	60.9
0.7	<u>300</u>	6.0	0.5	188	62.7
0.7	<u>500</u>	6.0	0.5	307	61.3
0.7	400	<u>5.0</u>	0.5	270	67.5
0.7	400	<u>7.0</u>	0.5	227	56.7
0.7	400	6.0	<u>0.4</u>	173	43.3
0.7	400	6.0	<u>0.6</u>	292	73.0

**About 60% of  
spread is due to  
expected default  
for Highly  
Leveraged debt**



## CONTENTS

- Introduction
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- Modelling in practice: consumer goods example
- **Estimating the Weighted Average Cost of Capital**
  - Cost of Debt
  - **Cost of Equity**

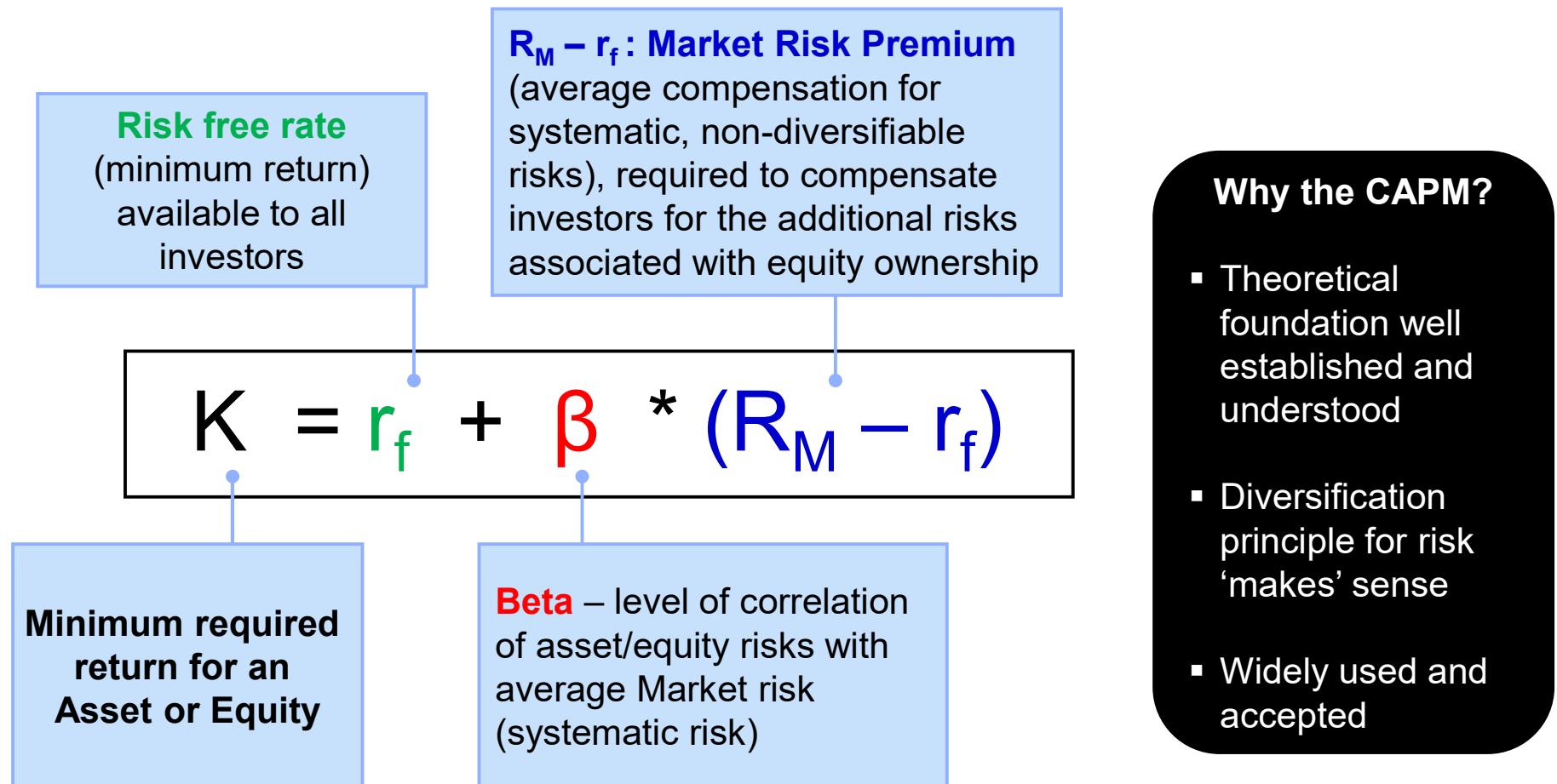
## Estimating the cost of equity

To estimate the cost of equity, we must determine the expected rate of return of the company's stock. Since expected rates of return are unobservable, we rely on asset-pricing models that translate risk into expected return.

The three most common asset-pricing models differ primarily in how they define risk:

- The capital asset pricing model (CAPM) states that a stock's expected return is driven by how sensitive its returns are to the market portfolio. This sensitivity is measured using a term known as beta. The CAPM is the most common method for estimating expected returns.
- **The Fama-French three-factor model** defines risk as a stock's sensitivity to three portfolios: the stock market, a portfolio based on firm size, and a portfolio based on book-to-market ratios.
- **The arbitrage pricing theory (APT)** is a generalized multifactor model, but unfortunately provides no guidance on the appropriate factors that drive returns.

## Cost of Equity: CAPM (Capital Assets Pricing Model) is the fundamental, widely-used, approach used by practitioners



# 1. Market risk premium $MRP = (R_M - r_f)$

**Definition:** The difference between the market's expected return ( $R_m$ ) and the risk free rate ( $r_f$ )

**Methodology:** there are different approaches to calculate market risk premium

## Historical approach

- Calculate the premium relative to **long-term government bonds**
- Use the **longest** period possible
- Use an **arithmetic average** of longer dated **intervals**

## Regression

- Use **observable variables to predict the market risk premium**, i.e
  - Dividend-to-price
  - Book-to-market
  - Earnings-to-price ratios

## Forward looking models

- Use **DCF valuation along with the estimates** or returns on investment and growth, to **reverse engineer the market's cost of capital**

### Example – cumulative returns on US market

Percent, 1903-2002

Intervals	Cumulative returns				Annualized US excess returns
	US stocks	US bonds	US excess return		
1-year	11. 3	5.3	6.2		6.2
2-year	24. 1	10. 9	12. 6		6.1
5-year	68. 2	29. 5	32. 3		5.8

$$R_M - r_f$$

### Example – US market between 1962-2002

$g$  = long-run GDP growth of 3.5%  
 $RoE$  = long-run return on equity of 13.5%

 Earnings/P ratio for the years of 1962-2002  
 ~7%  $R_M$   
 ~2% US TIPS\*  
 ~5%  $(R_M - r_f)$

\* US treasury inflation-protected securities yield

## 1. Embedded Market Risk Premium: methodology

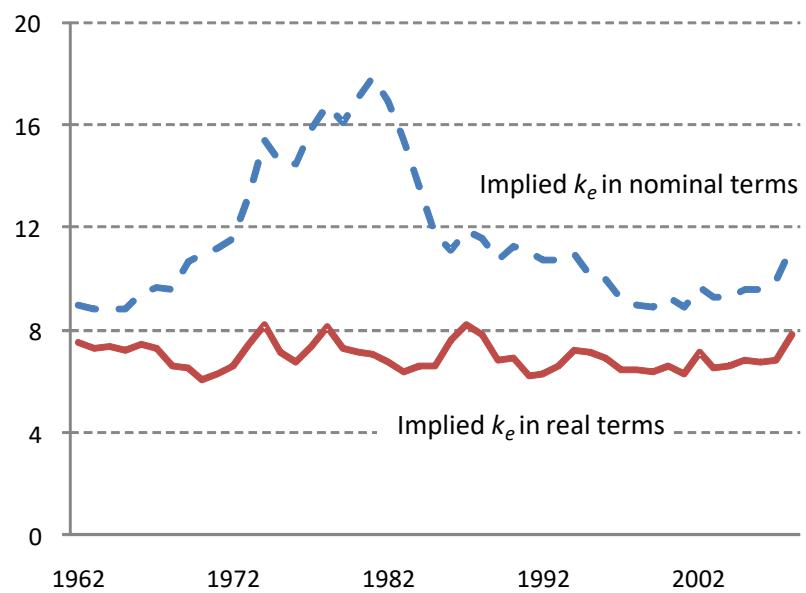
Using the key value driver formula, we can reverse engineer the cost of equity.

After inflation is stripped out, the expected market return (not excess return) is remarkably constant in the United States, averaging 7 percent. For the United Kingdom, the real market return is slightly more volatile, averaging 6 percent.

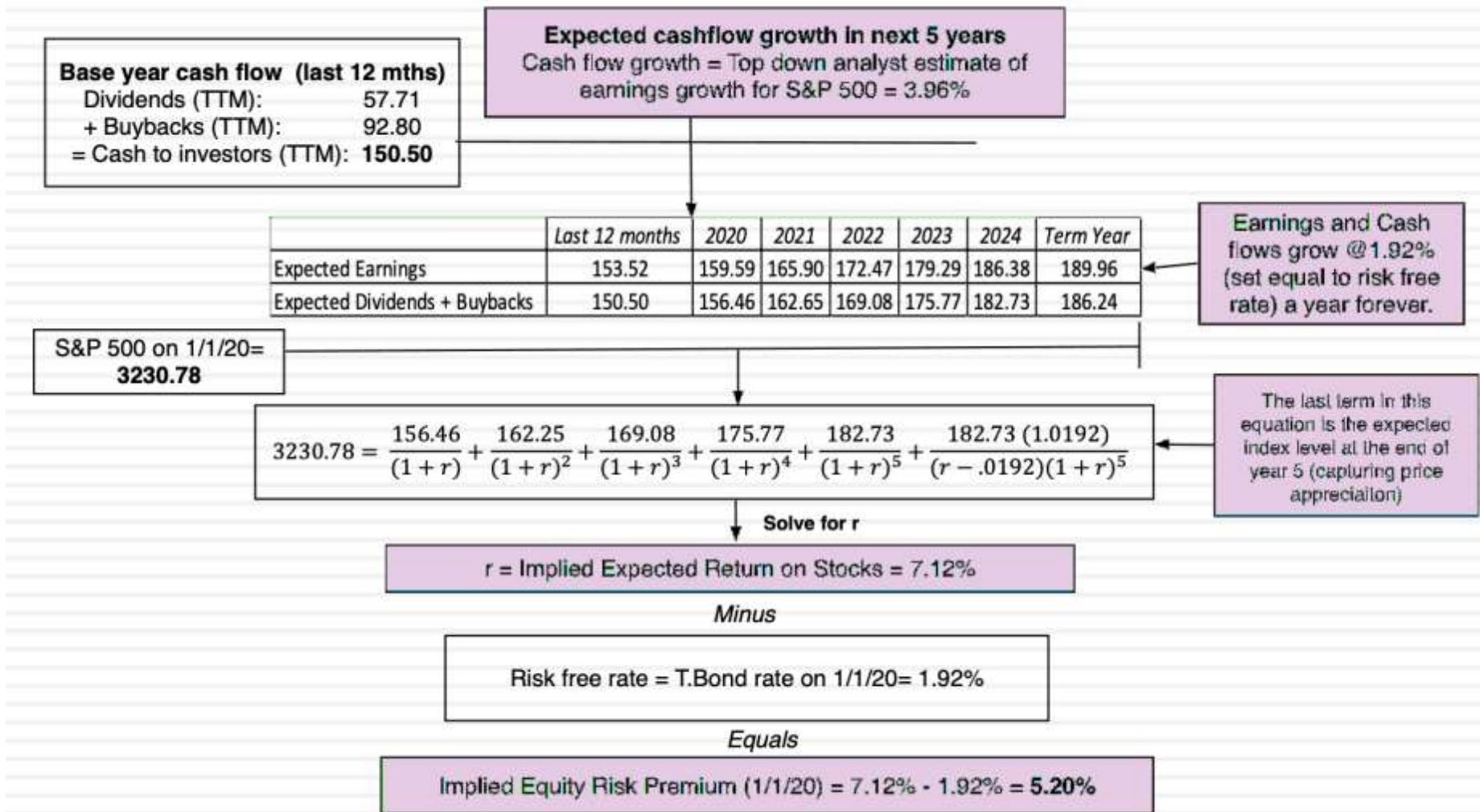
$$\text{Price} = \frac{\text{Net Income} \left(1 - \frac{g}{\text{ROE}}\right)}{k_e - g}$$

- To determine the market risk premium, subtract the real interest rate from the real cost of equity using Treasury inflation-protected securities (TIPS).

Real and Nominal Expected Market Returns



# 1. Current market risk premium: around 5.2% according to Damodaran (as of 2020, pre-CoViD)



## 1. Market risk premium estimates from academic sources

### Historical (ex-post) estimates

Arithmetic $\bar{\Omega}$ 1928-1998	7.5
Geometric $\bar{\Omega}$ 1928-1998	5.9
Arithmetic $\bar{\Omega}$ 1964-1998	4.1
Geometric $\bar{\Omega}$ 1964-1998	3.6

### Forward looking (ex-ante) estimates

Cornell	4.5
Fama & French	4.3
Siegel	3.8
Claus & Thomas	3.4
Blanchard	2.0

Typical Range: 3.5% - 6.0%

## 2. Estimating the Beta ( $\beta$ )

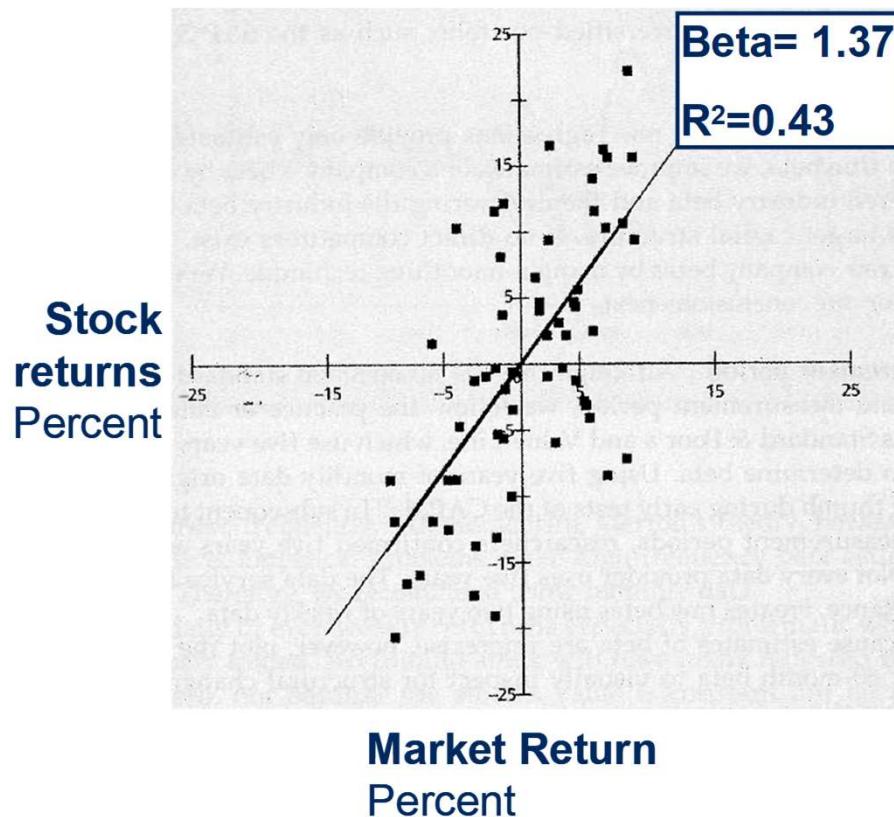
**Definition:** Coefficient measuring how much the stock and the market move together

### Methodology

- Regress the stock's return against the market return
- Use at least 60 data points
- Construct the regression on monthly returns (best)
- Ensure to regress returns to well-diversified index (value weighted eg. MSCI world index)
- Avoid using local indices since most of them dominated with few
- Beta is the slope of the regression
- **Formula:**

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2}$$

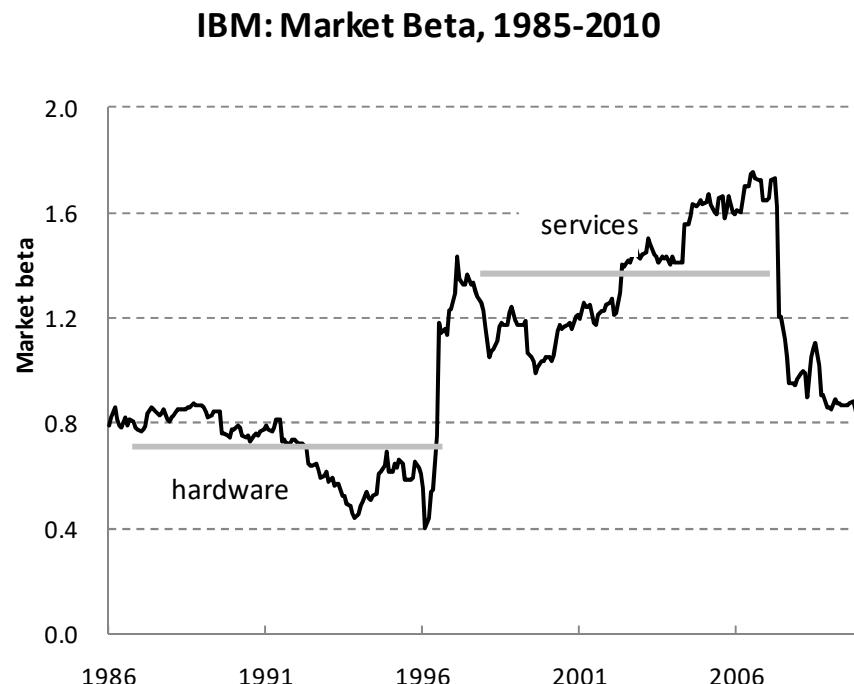
### Example



## 2. Beta Varies over Time

Between 1985 and 2008, IBM's beta hovered near 0.7 in the 1980s but rose dramatically in the mid-1990s to a peak above 1.7 before falling back down. It now measures near 0.8.

This rise in beta occurred during a period of great change for IBM, as the company moved from hardware (such as mainframes) to services (such as consulting).



## 2. Drivers of Equity Beta

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2}$$

and  $\sigma_{im} = \rho_{im} \sigma_i \sigma_m$

( $\sigma_{im}$  = Covariance)  
( $\rho_{im}$  = Correlation)

So:  $\beta_i = \frac{\rho_{im} \sigma_i \sigma_m}{\sigma_m^2}$  and after simplifying:

$$\beta_i = \rho_{im} * \frac{\sigma_i}{\sigma_m}$$

Correlation  
between returns of  
a company's stock  
and returns of the  
overall market

Volatility of a  
company's  
stock relative  
to market  
volatility

## 2. Estimating the Beta: Bloomberg “BETA” mnemonic

<HELP> explications, <MENU> pour autres fonctions.

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## 2. Adjusting Betas

### 1) Blume's Adjustment

Proposed by Marshall E. Blume, in 1975 in his paper “Betas and Their Regression Tendencies.” Blume noted the tendency of betas to converge towards the mean of all betas and therefore suggested to correct betas by adjust the beta to revert to 1, assuming that adjustment in one period is a good estimate in the next period.

Bloomberg makes this adjustment:

$$\text{Adjusted Beta} = \text{Regression Beta (0.67)} + 1.00 (0.33)$$

### 2) Other adjustments

Others also proposed adjustments to Beta (*Vasicek in 1973: “A Note on Using Cross-Sectional Information in Bayesian Estimation of Security Betas”*)

To reduce the estimation error, Valuation suggests making the following adjustment:

$$\beta_{\text{adj}} = \frac{\sigma_e^2}{\sigma_e^2 + \sigma_b^2} (1) + \left(1 - \frac{\sigma_e^2}{\sigma_e^2 + \sigma_b^2}\right) \beta_{\text{raw}}$$

where  $\sigma_e$  = standard error of the regression beta  
 $\sigma_b$  = cross-sectional standard deviation of all betas

The raw regression beta receives the most weight when the standard error of beta from the regression ( $\sigma_e$ ) is smallest. In fact, when beta is measured perfectly ( $\sigma_e = 0$ ), the raw beta receives all the weight. Conversely, if the regression provides no meaningful results ( $\sigma_e$  is very large), you should set beta equal to 1.

## 2. Unlevering/relevering the Beta

The riskiness of a firm is driven by 2 factors:

- The business(es) it competes in
- How much leverage it has

### Theoretical approach

- According to Modigliani and Miller theory, **the weighted average risk of company's financial claims equals to the weighted average risk of a company's economic assets**
- Based on this theory, the relation between (levered) beta ( $\beta_e$ ) and operating (unlevered) beta ( $\beta_a$ )

$$\beta_e = \beta_a + D/E (\beta_a - \beta_d) - V_{txa}/E (\beta_a - \beta_{txa})$$

$\beta_d$  = Beta of debt

$V_{txa}$  = Value of the company's interest tax shields

$\beta_{txa}$  = Beta of the company's interest tax shields

### Simplifying the theoretical approach

#### Key assumptions

- 1 Debt claims have the first priority, beta on debt tends to be low (assumed "0")
- 2 Given the constant capital structure, the value of the tax shield will follow the value of operating assets, hence

$$\beta_{txa} = \beta_a$$

$$\beta_e = \beta_a + D/E (\beta_a - \beta_d) - V_{txa}/E (\beta_a - \beta_{txa})$$

0

0

$$\beta_e = \beta_a * (1+D/E)$$

Alternative method if  $\beta_d$  is not equal to zero:  $\beta_e = \beta_a + D/E (\beta_a - \beta_d)$

## 2. Why several formulas exist to unlever/relever Betas

EXHIBIT D.3 **Levered Beta**

	Dollar level of debt fluctuates	Dollar level of debt is constant and debt is risky	Debt is risk free <sup>1</sup>
Tax shields have same risk as operating assets $\beta_{txa} = \beta_u$	$\beta_e = \beta_u + \frac{D}{E} (\beta_u - \beta_d)$	$\beta_e = \beta_u + \frac{D}{E} (\beta_u - \beta_d)$	$\beta_e = \left(1 + \frac{D}{E}\right) \beta_u$
Tax shields have same risk as debt $\beta_{txa} = \beta_d$	$\beta_e = \beta_u + \frac{D - V_{txa}}{E} (\beta_u - \beta_d)$	$\beta_e = \beta_u + (1 - T_m) \frac{D}{E} (\beta_u - \beta_d)$	$\beta_e = \left[1 + (1 - T_m) \frac{D}{E}\right] \beta_u$

Note:  $\beta_e$  = beta of equity

$\beta_d$  = beta of debt

$\beta_u$  = unlevered beta of equity

$\beta_{txa}$  = beta of capital for tax shields

$T_m$  = marginal tax rate

$D$  = debt

$E$  = equity

$V_{txa}$  = present value of tax shields

<sup>1</sup> When  $\beta_{txa} = \beta_u$ , the resulting formula holds for all debt patterns, not just constant debt.

## 2. Using the industry Beta

➤ Use industry-median beta to avoid distortions from a single company's beta estimate

### Methodology

- To improve the estimates, use industry beta by following the steps for every company in the industry

① Calculate company Beta's

② Unlever each Beta using D/E of each company (*in this example we used  $\beta_L = \beta_U (1+D/E)$* )

③ Take the median of unlevered Beta

④ Relever the Beta based on the target D/E

### Example

USD million

	Company X	Company Y
Net debt	6,310	5,569
MV of equity	80,101	43,592
D/E	0.079	0.128
① Raw Beta	1.37	1.15
② $\beta_U$	1.27	1.02
③ $\beta_{industry}$	1.14	
④ $\beta_{relevered}$	1.23	

## 2. Beta of Debt

- Many practitioners assume  $B_d = 0$  to simplify calculations, however in practice  $B_d$  is not zero. A common assumption is 0.15 for investment grade companies. Using index betas and the capital asset pricing model (CAPM), Debt betas can be estimated:

**Beta by Bond Rating (1990-2000)**

Asset class	Beta
Treasury bonds	0.19
Investment-grade corporate debt	0.27
High-yield corporate debt	0.37

- Note: Some practitioners will recommend using simply a ratio of the credit spreads / MRP to estimate the Beta of Debt (*based on CAPM equation: Cost of debt =  $R_f + EMRP \times B_d$  so  $B_d = Credit\ Spread/EMRP$* ). While this might be OK as an approximation for companies with high credit ratings, this approach probably overestimates  $B_d$  for companies with a non negligible distress probability

Source: D.Wessels; Valuation (Wiley) ; Lehman Brothers; "Global Family of Indices, Fixed Income Research"; Morgan Stanley Capital International; U.S. Treasury; Paul Sweeting

### 3. Alternative models to estimate Cost of Equity

#### Fama & French

- In 1992, Eugene Fama and Kenneth French published a paper in the *Journal of Finance* that received a great deal of attention because they concluded,  
  
*In short, our tests do not support the most basic prediction of the SLB [Sharpe-Lintner-Black] Capital Asset Pricing Model that average stock returns are positively related to market betas.*
- Based on prior research and their own comprehensive regressions, Fama and French concluded that:
  - Equity returns are inversely related to the size of a company (as measured by market capitalization).
  - Equity returns are positively related to the ratio of the book value to market value of the company's equity.
- With this model, a stock's excess returns are regressed on three factors: excess market returns, the excess returns of small stocks over big stocks (**SMB**), and the excess returns of high book-to-market stocks over low book-to-market stocks (**HML**).
- In practice, it is difficult to use this model as one needs to obtain data about the reference indexes (SMB and HML). This is available from professional data service providers or alternatively from K. French's homepage:
- [https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

### 3. Alternative models to estimate Cost of Equity

#### Arbitrage pricing theory

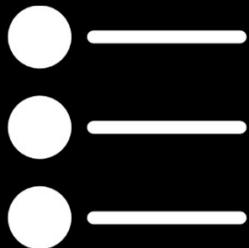
- The arbitrage pricing theory (APT) can be thought of as a generalized version of the Fama-French three-factor model. In the APT, a security's returns are *fully* specified by  $k$  factors and random noise:

$$\tilde{R}_i = a + b_1 \tilde{F}_1 + b_2 \tilde{F}_2 + \dots + b_k \tilde{F}_k + \tilde{\epsilon}$$

- By creating well-diversified factor portfolios, it can be shown that a security's expected return must equal the risk-free rate plus its exposure to each factor times the factor's excess return (denoted by lambda):

$$E[R_i] = r_f + b_1 \lambda_1 + b_2 \lambda_2 + \dots + b_k \lambda_k$$

- Implementation of the APT, however, has been elusive, as there is little agreement on either the number of factors, what the factors represent, or how to measure the factors.



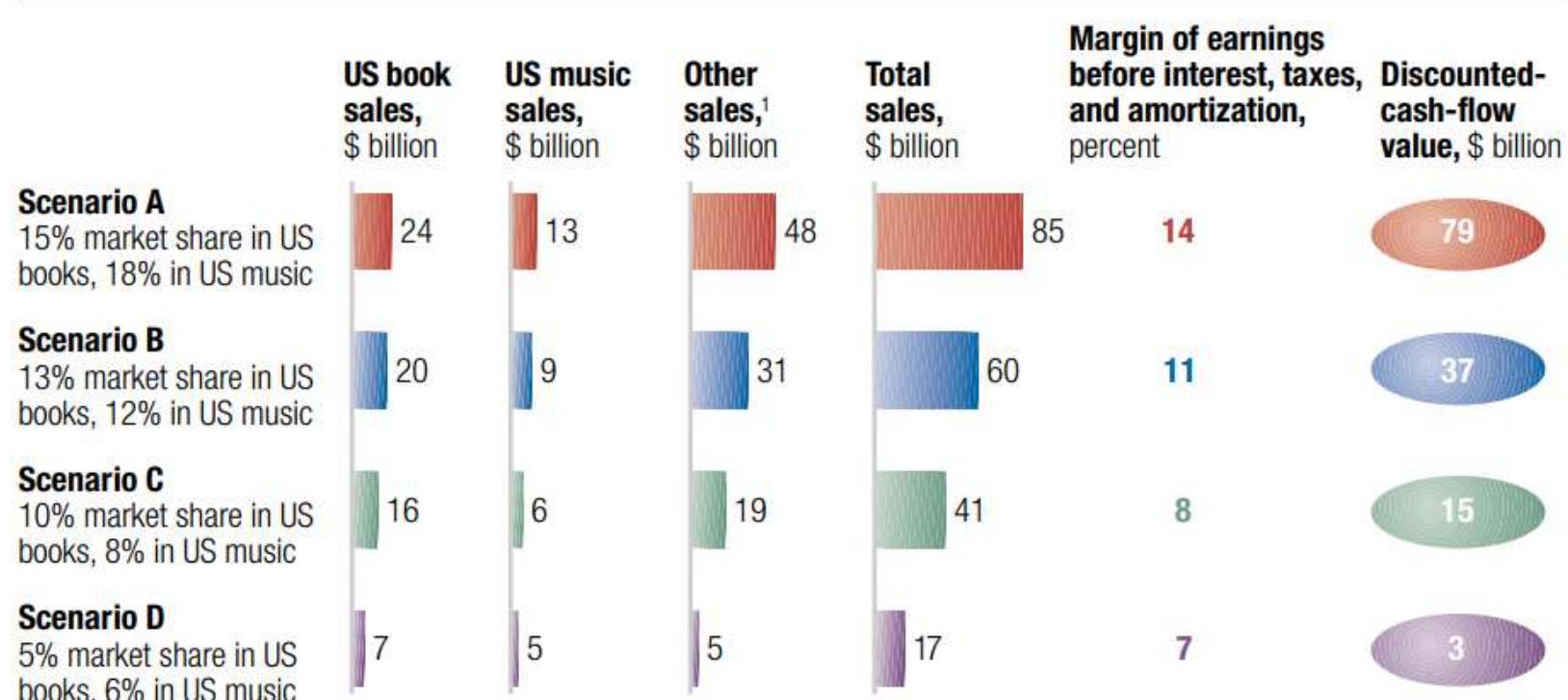
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- **Using scenarios**

# Example: valuing a high growth company

## Amazon.com as of 2000

### Amazon.com: Potential outcomes



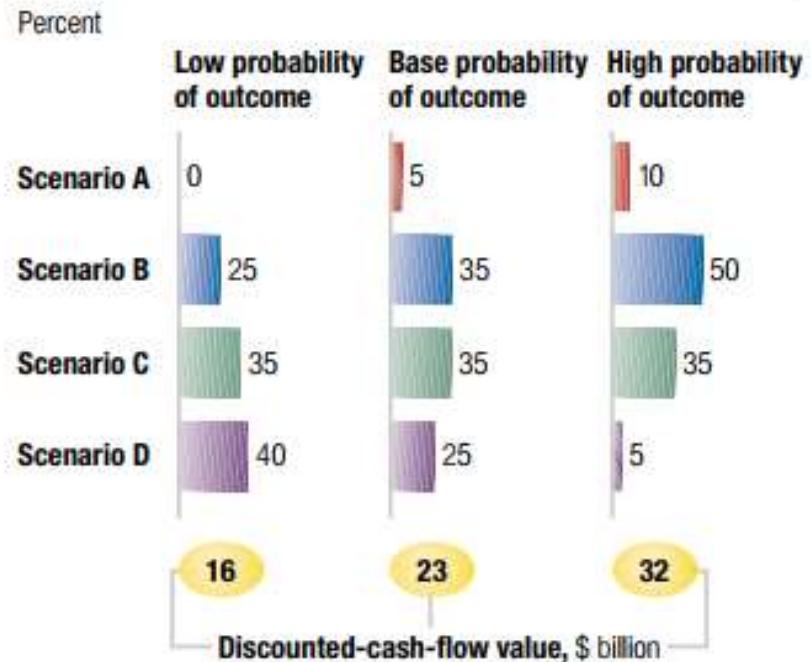
## Example: valuing a high growth company

Amazon.com as of 2000

### Amazon.com: Expected value

	Discounted-cash-flow value, \$ billion	X	Probability, percent	=	Expected value, \$ billion
Scenario A	79		5		3.9
Scenario B	37		35		13.0
Scenario C	15		35		5.3
Scenario D	3		25		0.8
					\$23.0 billion

### Amazon.com: Volatility of expected values



## Example: emerging markets valuation

### Scenarios are a better way to model additional risk than premiums

Cash-flow-scenario approach (for identical facilities)													
European market					Emerging market								
		Cash flows in perpetuity, <sup>1</sup> \$						Cash flows in perpetuity, <sup>2</sup> \$					
		Probability	Year 1	Year 2	Year 3	Year 4...	Probability	Year 1	Year 2	Year 3	Year 4...		
<b>Business as usual</b>	100%		100	103	105	108		80%	100	103	105	108	
<b>Distressed business</b>	0		0	0	0	0		20%	25	26	26	27	
Expected cash flows			100	103	105	108		85	87	89	92		
Cost of capital = 10.0%							Cost of capital = 10.0%						
<b>Net present value = \$1,333</b>							<b>Net present value = \$1,133</b>						

Country-risk-premium approach (for identical facilities)													
European market					Emerging market								
		Cash flows in perpetuity, <sup>1</sup> \$						Cash flows in perpetuity, <sup>1</sup> \$					
		Year 1	Year 2	Year 3	Year 4...			Year 1	Year 2	Year 3	Year 4...		
<b>Business as usual</b>	100	103	105	108				100	103	105	108		
Cost of capital = 10.0%							Cost of capital = 10.0%						
<b>Net present value = \$1,333</b>							Country risk premium = 1.3%						
Adjusted cost of capital = 11.3%							<b>Net present value = \$1,133</b>						

<sup>1</sup> Assumes cash flow growth in perpetuity of 2%.

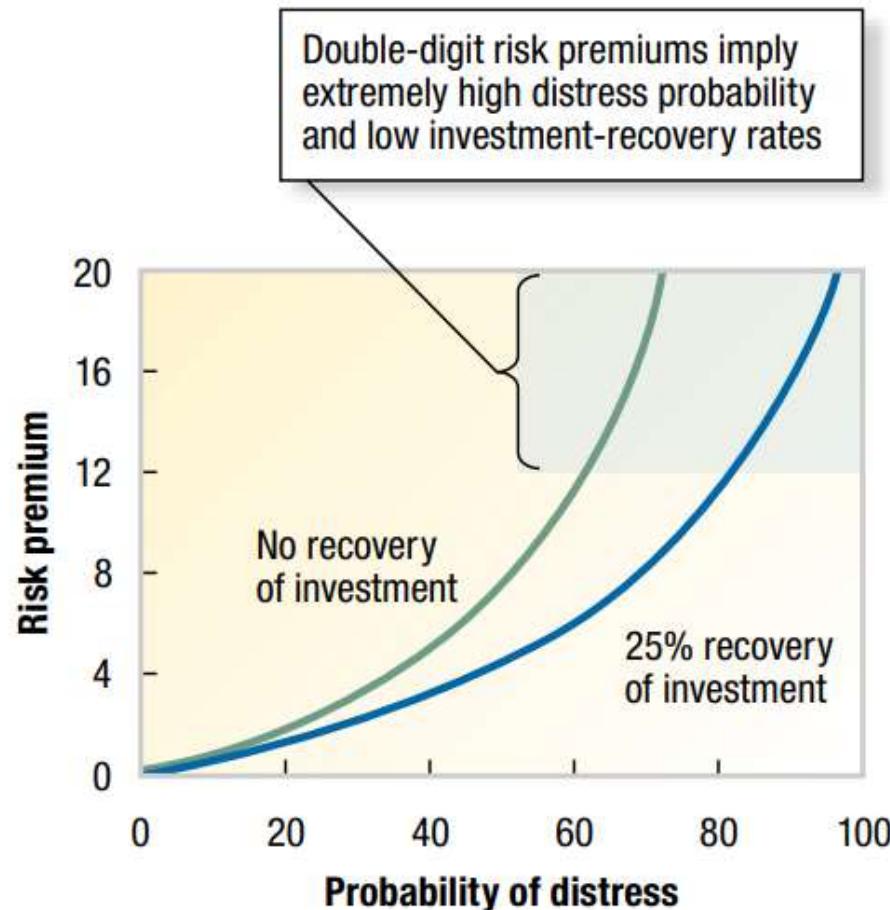
<sup>2</sup> Assumes cash flow growth in perpetuity of 2% and recovery under distress of 25% of business-as-usual cash flows.

Both approaches  
give the same result  
**IF the country risk  
premium is correct**

**Modeling risk through an additional premium to the WACC is dangerous as high premiums imply extremely high implied distress probabilities**

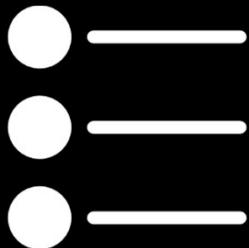
### Problematic premiums

Percent



Source: Emerging markets aren't as risky as you think, M.Goedhart, P.Haden, McKinsey quarterly, 2003

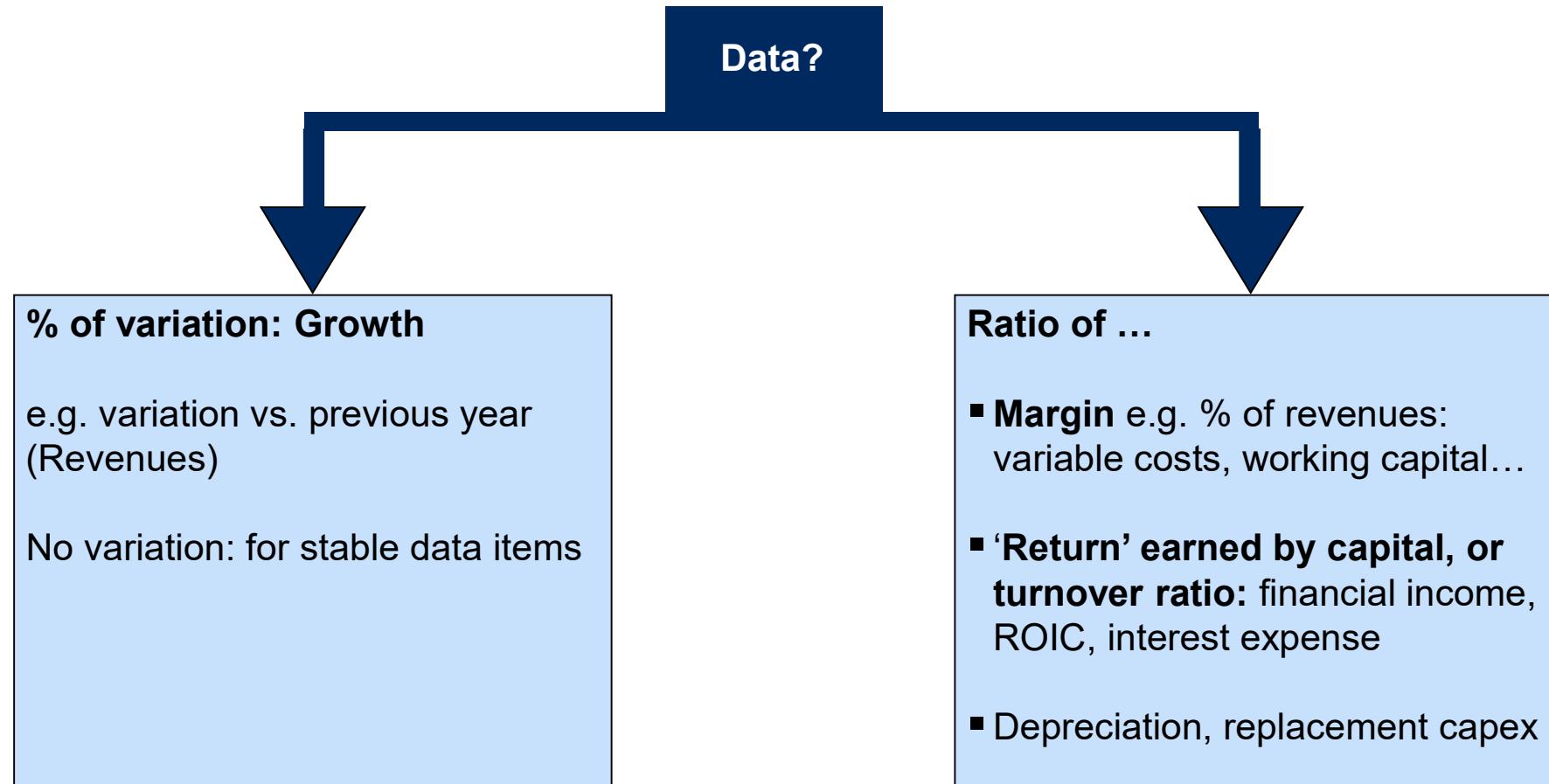
| 163



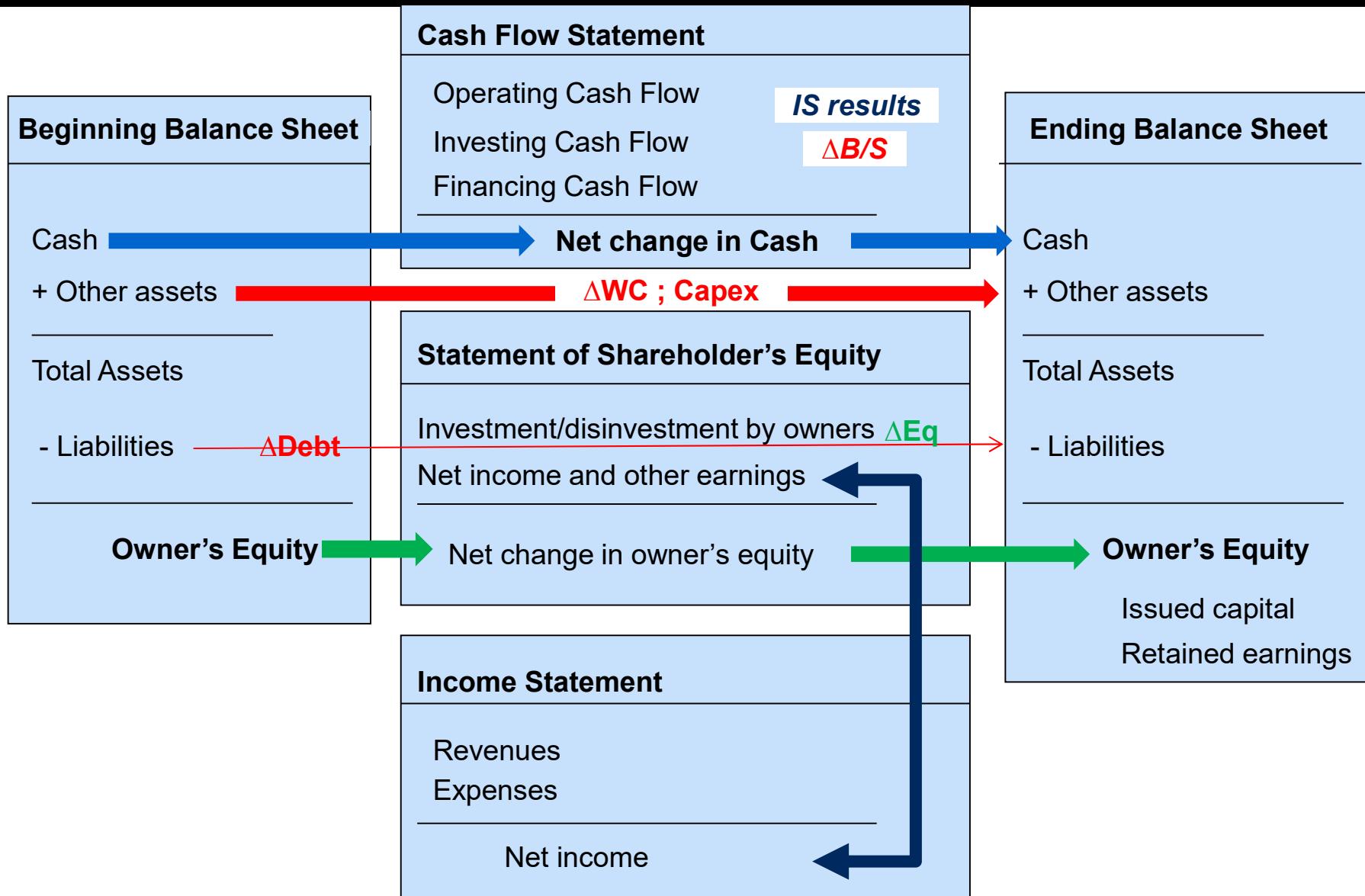
## CONTENTS

- Introduction
- A (very) simple valuation model
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- Estimating the Weighted Average Cost of Capital
- Using scenarios
- **Financial statements modelling**
  - **Principles**

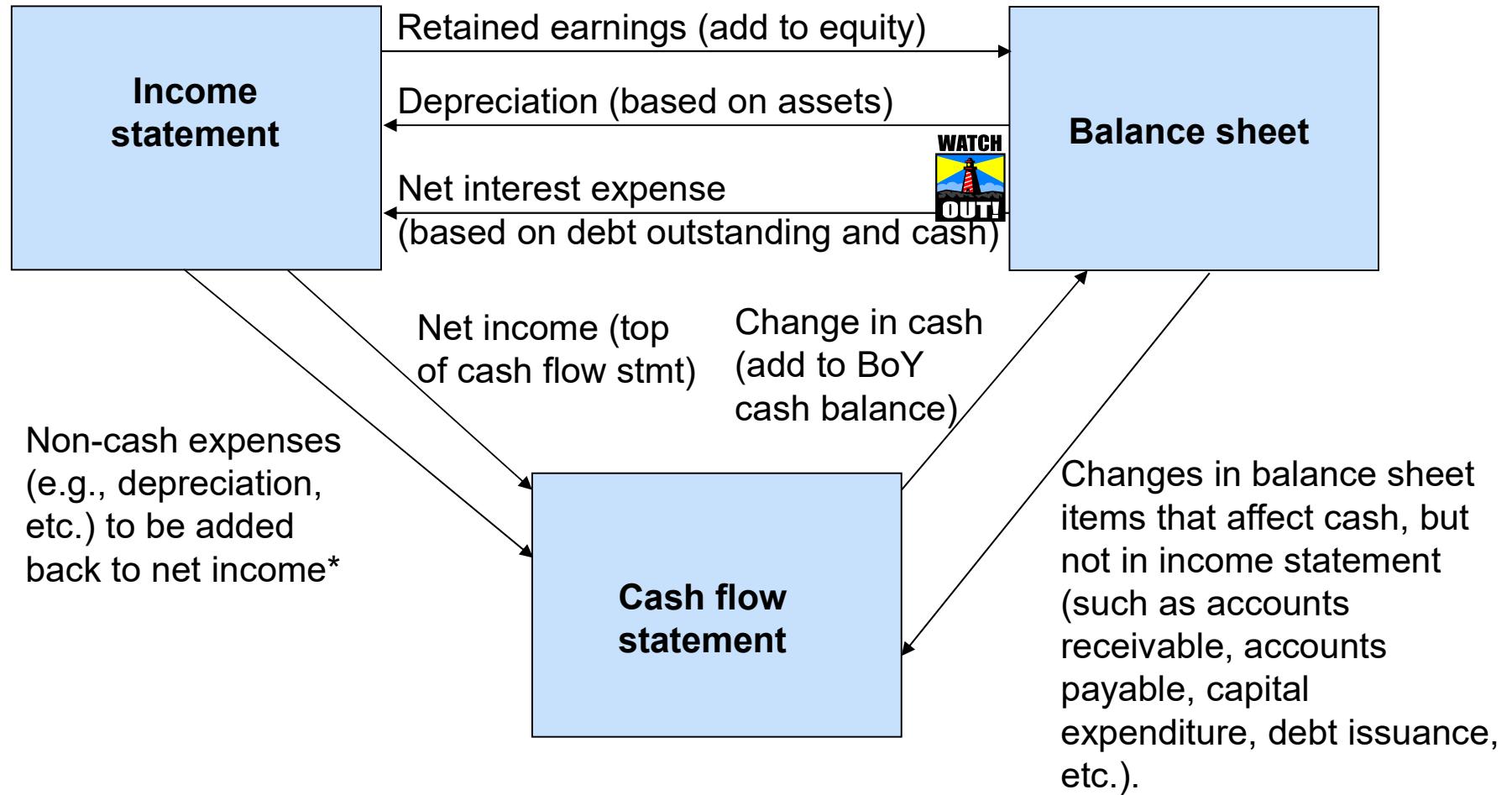
## Basics of modeling: 2 possible relationships between 2 data items



# Articulation of Financial Statements: a simplified view



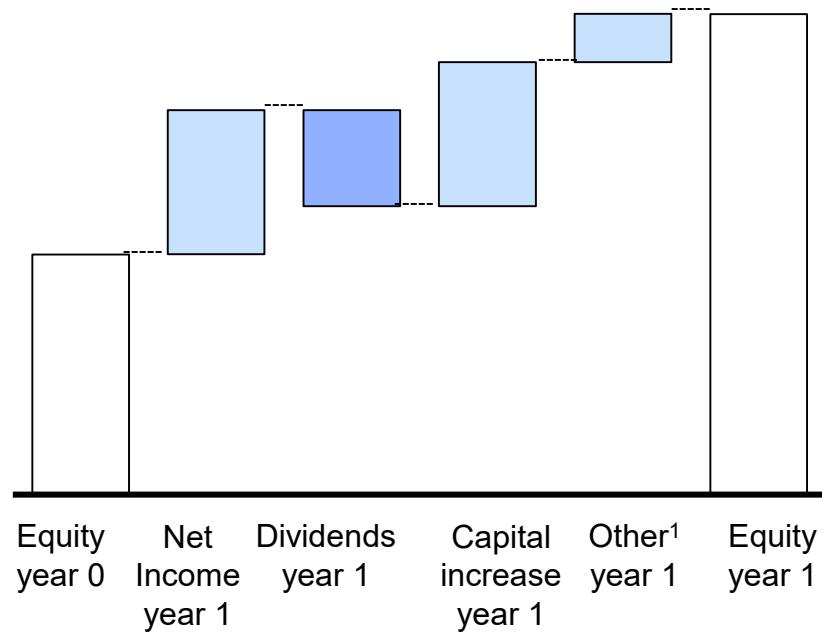
# Financial statements dynamics in Excel



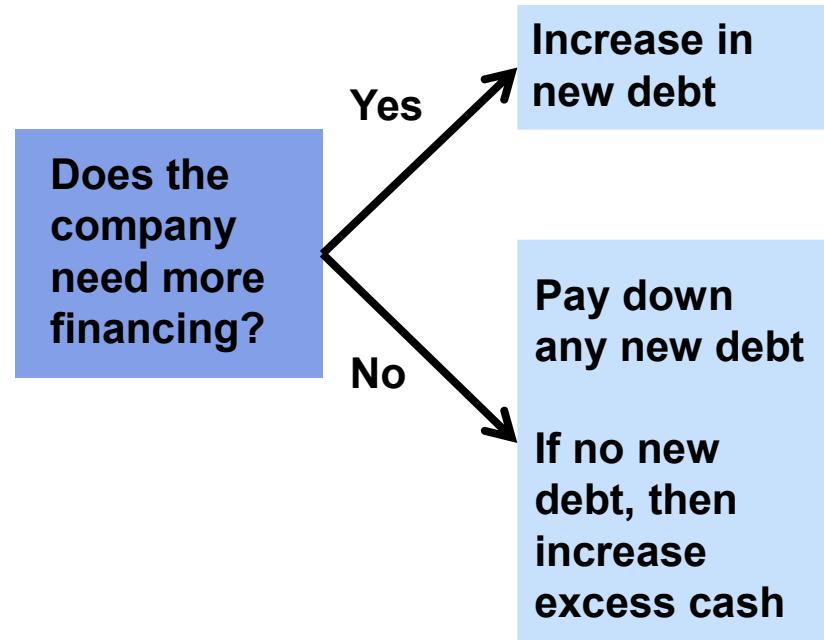
\* Increases in net working capital (current assets-current liabilities) are subtracted from net income in the cash flow statement. Increases in current assets (e.g., accounts receivable) represent an income item that is on the income statement but for which no cash has been received; thus, a negative adjustment to income is needed on the statement of cash flows.

## Modeling links: Debt and Equity

### Equity forecast: mechanical



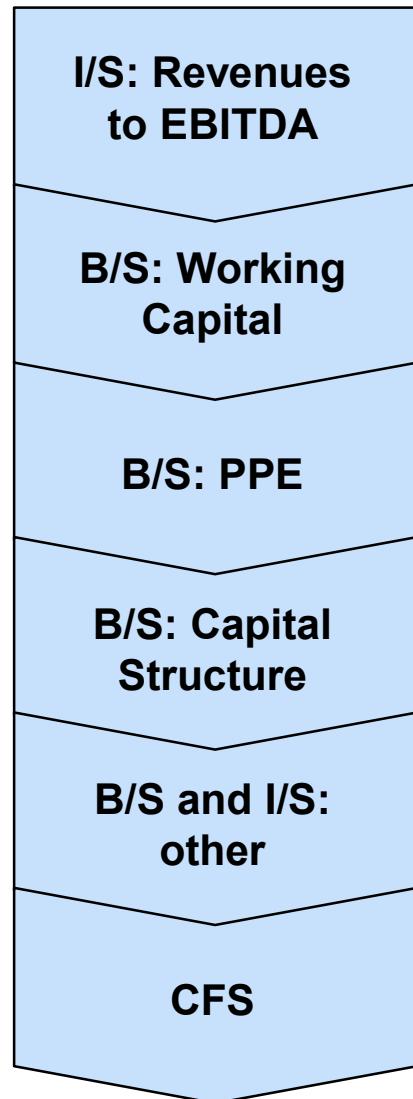
### Debt forecast: plug



(!) Changes in equity are driven by accounting definitions

<sup>1</sup> e.g. foreign currency translation effects, goodwill write off, revaluations...

## Typical process and points of attention



If possible model as volume \* price (can be helpful to drive eg. Investments)

Linked to sales usually

Pay attention to **investment level required vs growth in sales** assumed. Link Depreciation to PP&E

**Debt/cash as a plug**

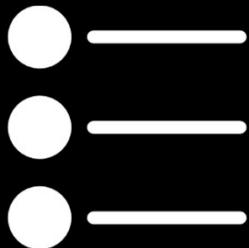
**Deal with circularity between interest/Debt**

Equity impacted by Net income



Finish leftover items

Build cash flow statement (or FCF)



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  - Principles
  - **Step by step example**

# Step 1: insert historical data and prepare the skeleton

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4			Excess cash	2.9			EBITA	14.5	-	-
Operating costs	(85.4)			Operating cash	2.1			Taxes on EBITA	(4.8)		
Depreciation	(5.5)			Operating current assets	13.2			NOPLAT	9.7	-	-
EBITA	14.5	-	-	Current assets	18.2	-	-	Depreciation	5.5		
Interest expense	(1.3)			Net PPE	52.7			Gross Cash Flow	15.2	-	-
Interest/dividend income	0.3			Financial assets	17.0			-Capex	(12.5)		
Profit before Tax	13.5	-	-	Total assets	87.9	-	-	-Investment in WC	(0.7)		
Income tax	(4.5)			Operating current liabilities	10.5			FCF	2.0	-	-
Net income	9.0	-	-	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	-	-				
Retained earnings	6.0	-	-	LT Debt	19.4						
Prepare standardized I/S, B/S and FCF. Separate operating and non operatingn items. Add a "New Debt" category in B/S				New Debt							
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	-	-				
				Check	0.00	0.00	0.00				

## RATIOS

Revenue growth	15.4%	Op. cash/Revenues	2.0%
Operating Costs/Revenues	81.0%	Op. current assets./Revenues	12.5%
Interest exp. / Debt (BoY)	4.5%	Op. current liab./Revenues	10.0%
Interest inc. / Fin. assets (BoY)	1.6%	Net PPE/Revenues	50.0%
Tax rate	33.3%	Depreciation/Net PPE (BoY)	12.0%
Payout ratio (Dividend/NI)	33.0%		

## Calculations:

Operating cash	2.1
Operating assets	13.2
- Operating liabilities	(10.5)
Working Capital	4.8
Investment in WC	0.7

## Step 2: link business assumptions into model, operating costs and revenues

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9			EBITA	14.5	22.4	24.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1			Taxes on EBITA	(4.8)		
Depreciation	(5.5)			Operating current assets	13.2			NOPLAT	9.7	22.4	24.6
EBITA	14.5	22.4	24.6	Current assets	18.2	-	-	Depreciation	5.5		
Interest expense	(1.3)			Net PPE	52.7			Gross Cash Flow	15.2	22.4	24.6
Interest/dividend income	0.3			Financial assets	17.0			-Capex	(12.5)		
Profit before Tax	13.5	22.4	24.6	Total assets	87.9	-	-	-Investment in WC	(0.7)		
Income tax	(4.5)			Operating current liabilities	10.5			FCF	2.0	22.4	24.6
Net income	9.0	22.4	24.6	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	-	-				
Retained earnings	6.0	22.4	24.6	LT Debt	19.4						
<b>Forecast revenues:</b> generally as % change vs previous year				New Debt							
<b>Forecast operating costs:</b> generally variable costs as % revenues, other as % change vs previous year				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	-	-				
				<b>Check</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>				
<b>RATIOS</b>											
Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%						
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%						
Interest exp. / Debt (BoY)	4.5%			Op. current liab./Revenues	10.0%						
Interest inc. / Fin. assets (BoY)	1.6%			Net PPE/Revenues	50.0%						
Tax rate	33.3%			Depreciation/Net PPE (BoY)	12.0%						
Payout ratio (Dividend/NI)	33.0%										

## Step 3: link business assumptions into model, working capital and PPE

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9			EBITA	14.5	22.4	24.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)		
Depreciation	(5.5)			Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	22.4	24.6
EBITA	14.5	22.4	24.6	Current assets	18.2	17.1	18.9	Depreciation	5.5		
Interest expense	(1.3)			Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	22.4	24.6
Interest/dividend income	0.3			Financial assets	17.0			-Capex	(12.5)		
Profit before Tax	13.5	22.4	24.6	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)			Operating current liabilities	10.5	11.8	12.9	FCF	2.0	21.8	24.1
Net income	9.0	22.4	24.6	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	22.4	24.6	LT Debt	19.4						
<b>Link PPE to driver: here as % of revenues. Note: PPE could also be linked to Capex</b>				New Debt	2.0						
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	11.8	12.9				
				<b>Check</b>	<b>0.00</b>	<b>-64.41</b>	<b>-70.85</b>				
<b>RATIOS</b>											
Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%				
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%				
Interest exp. / Debt (BoY)	4.5%			Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest inc. / Fin. assets (BoY)	1.6%			Net PPE/Revenues	50.0%	50.0%	50.0%				
Tax rate	33.3%			Depreciation/Net PPE (BoY)	12.0%						
Payout ratio (Dividend/NI)	33.0%										

Calculations:

Operating cash	2.1	2.4	2.6
Operating assets	13.2	14.8	16.3
- Operating liabilities	(10.5)	(11.8)	(12.9)
Working Capital	4.8	5.4	5.9
Investment in WC	(0.7)	(0.6)	(0.5)

Link WC to  
FCF  
calculation

## Step 4: link depreciation to last year's net PPE

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9			EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)		
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	16.1	17.6
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)			Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	22.4	24.6
Interest/dividend income	0.3			Financial assets	17.0			-Capex	(12.5)		
Profit before Tax	13.5	16.1	17.6	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)			Operating current liabilities	10.5	11.8	12.9	FCF	2.0	21.8	24.1
Net income	9.0	16.1	17.6	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	16.1	17.6	LT Debt	19.4						
Link depreciation to driver: here as % of previous year PPE.				New Debt							
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	11.8	12.9				
				Check	0.00	-64.41	-70.85				
<b>RATIOS</b>											
Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%				
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%				
Interest exp. / Debt (BoY)	4.5%			Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest inc. / Fin. assets (BoY)	1.6%			Net PPE/Revenues	50.0%	50.0%	50.0%				
Tax rate	33.3%			Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%				
Payout ratio (Dividend/NI)	33.0%										

## Step 5: link net PPE and depreciation into capex

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9			EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)		
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	16.1	17.6
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)			Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	22.4	24.6
Interest/dividend income	0.3			Financial assets	17.0			-Capex	(12.5)	(12.6)	(13.0)
Profit before Tax	13.5	16.1	17.6	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)			Operating current liabilities	10.5	11.8	12.9	FCF	2.0	9.2	11.1
Net income	9.0	16.1	17.6	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	16.1	17.6	LT Debt	19.4						
				New Debt							
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	11.8	12.9				
				<b>Check</b>	<b>0.00</b>	<b>-64.41</b>	<b>-70.85</b>				
<b>RATIOS</b>											
Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%				
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%				
Interest exp. / Debt (BoY)	4.5%			Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest inc. / Fin. assets (BoY)	1.6%			Net PPE/Revenues	50.0%	50.0%	50.0%				
Tax rate	33.3%			Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%				
Payout ratio (Dividend/NI)	33.0%										

### Calculations:

Operating cash	2.1	2.4	2.6
Operating assets	13.2	14.8	16.3
- Operating liabilities	(10.5)	(11.8)	(12.9)
Working Capital	4.8	5.4	5.9
Investment in WC	(0.7)	(0.6)	(0.5)

(Gross) Capex calculated  
based on change in Net PPE  
plus Depreciation

## Step 6: forecast interest income and expenses

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9			EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)		
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	16.1	17.6
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)	(2.1)	-	Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	22.4	24.6
Interest/dividend income	0.3	0.4	-	Financial assets	17.0			-Capex	(12.5)	(12.6)	(13.0)
Profit before Tax	13.5	14.4	17.6	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)			Operating current liabilities	10.5	11.8	12.9	FCF	2.0	9.2	11.1
Net income	9.0	14.4	17.6	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	14.4	17.6	LT Debt	19.4						
<span style="background-color: yellow; padding: 5px;">Link interest expense to previous year Debt Note: Link to New Debt as well, ST and LT debt not used in forecast</span>				New Debt							
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	11.8	12.9				
				<b>Check</b>	<b>0.00</b>	<b>-64.41</b>	<b>-70.85</b>				
<hr/>											
<b>RATIOS</b>				Op. cash/Revenues	2.0%	2.0%	2.0%				
Revenue growth	15.4%	12.0%	10.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%				
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest exp. / Debt (BoY)	4.5%	6.0%	6.0%	Net PPE/Revenues	50.0%	50.0%	50.0%				
Interest inc. / Fin. assets (BoY)	1.6%	2.0%	2.0%	Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%				
Tax rate	33.3%										
Payout ratio (Dividend/NI)	33.0%										

## Step 7: Use Excess Cash And New Debt To Balance The Model

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9	-	-	EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)		
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	16.1	17.6
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)	(2.1)	(3.9)	Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	22.4	24.6
Interest/dividend income	0.3	0.4	-	Financial assets	17.0			-Capex	(12.5)	(12.6)	(13.0)
Profit before Tax	13.5	14.4	13.7	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)			Operating current liabilities	10.5	11.8	12.9	FCF	2.0	9.2	11.1
Net income	9.0	14.4	13.7	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	14.4	13.7	LT Debt	19.4						
<p>1. Sum all assets except Excess cash, subtract all liabilities except financial debt          2. if the difference is positive, plug it as new Debt, else as Excess cash          3. Check that Total assets minus Liabilities equals zero  <i>Note: some parts of the B/S are still not filled, but the plug should still run on empty cells</i></p>				New Debt	64.4	70.8					
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	76.2	83.8				
				Check	0.00	0.00	0.00				

### RATIOS

Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%
Interest exp. / Debt (BoY)	4.5%	6.0%	6.0%	Op. current liab./Revenues	10.0%	10.0%	10.0%
Interest inc. / Fin. assets (BoY)	1.6%	2.0%	2.0%	Net PPE/Revenues	50.0%	50.0%	50.0%
Tax rate	33.3%			Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%
Payout ratio (Dividend/NI)	33.0%						

### Calculations:

Operating cash	2.1	2.4	2.6
Operating assets	13.2	14.8	16.3
- Operating liabilities	(10.5)	(11.8)	(12.9)
Working Capital	4.8	5.4	5.9
Investment in WC	(0.7)	(0.6)	(0.5)

## Step 8: incorporate taxes

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9	-	-	EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)	(5.4)	(5.9)
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	10.7	11.7
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)	(2.1)	(3.9)	Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	17.0	18.8
Interest/dividend income	0.3	0.4	-	Financial assets	17.0			-Capex	(12.5)	(12.6)	(13.0)
Profit before Tax	13.5	14.4	13.7	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)	(4.8)	(4.6)	Operating current liabilities	10.5	11.8	12.9	FCF	2.0	3.8	5.3
Net income	9.0	9.6	9.1	ST debt	15.0						
Dividends	3.0			Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	9.6	9.1	LT Debt	19.4						
				New Debt		64.4	70.8				
				Provisions	2.0						
				Paid in capital	15.0						
				Retained earnings	26.0						
				Equity	41.0	-	-				
				Total equity and liabilities	87.9	76.2	83.8				
				<b>Check</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>				
<b>RATIOS</b>											
Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%				
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%				
Interest exp. / Debt (BoY)	4.5%	6.0%	6.0%	Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest inc. / Fin. assets (BoY)	1.6%	2.0%	2.0%	Net PPE/Revenues	50.0%	50.0%	50.0%				
Tax rate	33.3%	33.3%	33.3%	Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%				
Payout ratio (Dividend/NI)	33.0%										

### Calculations:

Operating cash	2.1	2.4	2.6
Operating assets	13.2	14.8	16.3
- Operating liabilities	(10.5)	(11.8)	(12.9)
Working Capital	4.8	5.4	5.9
Investment in WC	(0.7)	(0.6)	(0.5)

Taxes on EBITA based on marginal tax rate and EBITA  
Note: different from income taxes from I/S

## Step 9: assume pay-out ratio and complete equity

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9	-	-	EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)	(4.8)	(5.5)
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	11.3	12.0
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)	(2.1)	(1.0)	Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	17.6	19.1
Interest/dividend income	0.3	0.4	-	Financial assets	17.0			-Capex	(12.5)	(12.6)	(13.0)
Profit before Tax	13.5	14.4	16.6	Total assets	87.9	76.2	83.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)	(4.8)	(5.5)	Operating current liabilities	10.5	11.8	12.9	FCF	2.0	4.4	5.6
Net income	9.0	9.6	11.0	ST debt	15.0						
Dividends	3.0	2.9	3.3	Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	6.7	7.7	LT Debt	19.4						
Assume payout ratio to calculate <b>dividends</b> Retained earnings equal to Net income minus dividends				New Debt		16.7	15.4				
				Provisions	2.0						
				Paid in capital	15.0	15.0	15.0				
				Retained earnings	26.0	32.7	40.5				
				Equity	41.0	47.7	55.5				
				Total equity and liabilities	87.9	76.2	83.8				
				<b>Check</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>				
<b>RATIOS</b>											
Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%				
Operating Costs/Revenues	81.0%	81.0%	81.0%	Op. current assets./Revenues	12.5%	12.5%	12.5%				
Interest exp. / Debt (BoY)	4.5%	6.0%	6.0%	Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest inc. / Fin. assets (BoY)	1.6%	2.0%	2.0%	Net PPE/Revenues	50.0%	50.0%	50.0%				
Tax rate	33.3%	33.3%	33.3%	Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%				
Payout ratio (Dividend/NI)	33.0%	30.0%	30.0%								

Calculations:

Operating cash	2.1	2.4	2.6
Operating assets	13.2	14.8	16.3
- Operating liabilities	(10.5)	(11.8)	(12.9)
Working Capital	4.8	5.4	5.9
Investment in WC	(0.7)	(0.6)	(0.5)

**Paid in capital** constant  
**B/S Retained earnings** equal to previous year value plus retained earnings from I/S for the year

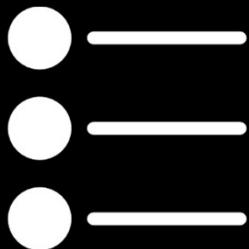
## Step 10: fix other left over items

Profit&Loss	Actual	Forecast	Forecast	Balance Sheet	Actual	Forecast	Forecast	Cash flow	Actual	Forecast	Forecast
	2012	2013	2014		2012	2013	2014		2012	2013	2014
Revenues	105.4	118.0	129.9	Excess cash	2.9	-	-	EBITA	14.5	16.1	17.6
Operating costs	(85.4)	(95.6)	(105.2)	Operating cash	2.1	2.4	2.6	Taxes on EBITA	(4.8)	(4.8)	(5.3)
Depreciation	(5.5)	(6.3)	(7.1)	Operating current assets	13.2	14.8	16.3	NOPLAT	9.7	11.3	12.2
EBITA	14.5	16.1	17.6	Current assets	18.2	17.1	18.9	Depreciation	5.5	6.3	7.1
Interest expense	(1.3)	(2.1)	(1.9)	Net PPE	52.7	59.0	64.9	Gross Cash Flow	15.2	17.6	19.3
Interest/dividend income	0.3	0.4	0.3	Financial assets	17.0	17.0	17.0	-Capex	(12.5)	(12.6)	(13.0)
Profit before Tax	13.5	14.4	16.0	Total assets	87.9	93.2	100.8	-Investment in WC	(0.7)	(0.6)	(0.5)
Income tax	(4.5)	(4.8)	(5.3)	Operating current liabilities	10.5	11.8	12.9	FCF	2.0	4.4	5.8
Net income	9.0	9.6	10.7	ST debt	15.0						
Dividends	3.0	2.9	3.2	Current liabilities	25.5	11.8	12.9				
Retained earnings	6.0	6.7	7.5	LT Debt	19.4						
				New Debt		31.7	30.7				
				Provisions	2.0	2.0	2.0				
				Paid in capital	15.0	15.0	15.0				
				Retained earnings	26.0	32.7	40.2				
				Equity	41.0	47.7	55.2				
				Total equity and liabilities	87.9	93.2	100.8				
				<b>Check</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>				
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Revenue growth	15.4%	12.0%	10.0%	Op. cash/Revenues	2.0%	2.0%	2.0%				
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Interest exp. / Debt (BoY)	4.5%	6.0%	6.0%	Op. current liab./Revenues	10.0%	10.0%	10.0%				
Interest inc. / Fin. assets (BoY)	1.6%	2.0%	2.0%	Net PPE/Revenues	50.0%	50.0%	50.0%				
Tax rate	33.3%	33.3%	33.3%	Depreciation/Net PPE (BoY)	12.0%	12.0%	12.0%				
Payout ratio (Dividend/NI)	33.0%	30.0%	30.0%								

Calculations:

Operating cash	2.1	2.4	2.6
Operating assets	13.2	14.8	16.3
- Operating liabilities	(10.5)	(11.8)	(12.9)
Working Capital	4.8	5.4	5.9
Investment in WC	(0.7)	(0.6)	(0.5)

**Financial items and quasi equity or quasi debt provisions** estimated on a case by case basis.  
Modeled as constant, % of change vs previous year or user input



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- Using scenarios
- **Financial statements modelling**
  - Principles
  - Step by step example
  - **Good (and bad) practices**

# Planning the model and a typical layout

## Planning the model



Do not switch  
on the machine!

- Agree model's requirements and decide what type of model you are building
- Plan the analytical approach: use schematic diagrams and “back of the envelope” calculations
- Decide model layout: pay attention to separating assumptions from inputs and outputs<sup>1</sup>...

## Typical layout

### INPUT

- **Detailed forecasting:** Income Statement, Balance sheet
- **Terminal Value assumptions:** Growth, ROIC
- **Cost of Capital assumptions (WACC)**

### CALCULATIONS

- **Valuation concepts:** NOPLAT, Invested Capital, Free Cash flow, Economic Profit
- **Key ratios**
- **Valuation:** Operating Value, Enterprise Value, Equity Value, Implied Multiples

### OUTPUT

#### **Executive summary and presentation:**

- Financials: Income Statement, Balance sheet
- Free Cash Flow and Valuation Summary
- Graphics on key drivers and implied valuation multiples

<sup>1</sup> Not necessarily in different sheets: can be different sections in the same sheet, color coding...

## Some thoughts on model ‘hygiene’

	Common practice	But in reality...
<b>Layout</b>	<ul style="list-style-type: none"><li>▪ Layout is less important and can be fixed later</li><li>▪ Assume model will never be worked on by anyone else</li><li>▪ Model is ‘only’ an Excel tool</li></ul>	<ul style="list-style-type: none"><li>▪ Your superior wants to look at a print-out with 1 minute warning!</li><li>▪ Model will be passed on to other individuals/teams later</li><li>▪ Hard copy versions of the model are distributed all the time...</li></ul>
<b>Formatting</b>	<ul style="list-style-type: none"><li>▪ Using lots of colors as a reminder for yourself</li><li>▪ Relying on Excel Comments function for storing relevant info</li><li>▪ Keeping model short and ‘simple’ by calculating concepts in cells</li></ul>	<ul style="list-style-type: none"><li>▪ Everything prints as a shade of grey!</li><li>▪ Notes require a special command to print...</li><li>▪ Calculations/concepts are not clear from a print-out of the model</li></ul>
<b>Titles/ Units/ Sources</b>	<ul style="list-style-type: none"><li>▪ File names don’t indicate version</li><li>▪ No date and time stamp in model</li><li>▪ No indication of units (\$, %...)</li><li>▪ No sources mentioned</li></ul>	<ul style="list-style-type: none"><li>▪ Lots of people may look at your model at various moments in time!!</li></ul>

## FORMAT

- Every firm has its own format but they look reasonably similar e.g. inputs are shown
  - in yellow background
  - in Blue ink
- One thing does not change: format should be consistent throughout the whole file and help people understand what is happening in the file
- Numbers need to be **formatted**: ~~-4.533568232~~ → **(4.53)**
- Must have: SOURCE / UNITS
- A suggestion for File names:  
**DATE\_NAME\_VERSION** → **20160229\_TEST\_V01**
- Free web resource to improve your models:  
<http://www.fast-standard.org/the-fast-standard/>

Parentheses show negative numbers in anglo saxon format

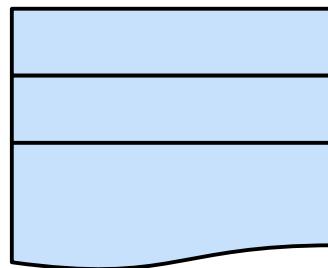
# STRUCTURE

## (1) Basics

- **Models structures** can vary widely, decide what kind of model you want to create BEFORE you start working:
  - What will the INPUTS be, how will you enter them, how often will you change them?
  - What kind of OUTPUT do you need? What will you do with it?
  - Will the model need to evolve in the foreseeable future? How complex does it need to be?
- Models should have an ‘internal Logic’ re. how the information is presented, in particular regarding the **TIME dimension**. Most common is to show years in column, from left to right.
- There are **two main types of structures** (which can be combined...):

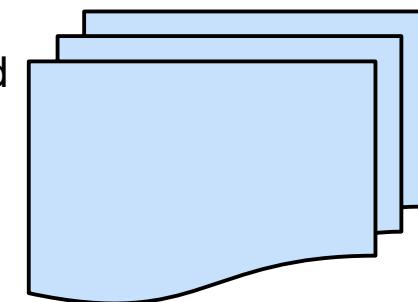
TOWER model

1 sheet,  
information  
and  
calculations  
‘piled up’



BOOK model

Information and  
calculations  
across sheets



## STRUCTURE

### (2) Key principles

#### TOWER model

#### BOOK model

##### PROS

Easy to navigate ;  
Can see result of  
changes directly

Can be open ended;  
Clear structure

##### CONS

Large models: many lines...  
Consolidation of different  
parts less clear

Harder to check formulae  
(across spreadsheets);  
No data tables

- Avoid complex **calculations across sheets**: large models become difficult to audit. Consider importing the data you need from other sheets in a duplicate input section and THEN link to calculations
- Design model structure so you **can spread all (or almost all) formulae**: every time you hand pick a figure, this is a potential error!
- **Maintain internal consistency** in the model: years in same column (eg. 2015 always in column 'D'), same formats and convention across sheets

## STRUCTURE

### (3) Formulae and Macros

- **No hard coded figures inside formulae!**
  - Think of Excel as a **dynamic** network of ‘mini calculators’ that can be linked; hard coded values, make part of this network **static**
  - Hard coded figures are **invisible parameters**
- **Use simple intuitive formulae:** avoid nests; break down your calculations in steps (and remember space in Excel is almost free!)
- **Using MACROS** or not? Big debate...
  - **Yes**, when they really add value by **automating tedious iterations**
  - Yes, because Macros show you know VBA? This not particularly impressive in (decent) I-Banks...
  - **Otherwise No:** they complicate things, make certain operations completely opaque (a black box takes over), introduce the risk of Bugs in your model and can frustrate users who do not know how to use them (Senior bankers...)

# EXCEL FUNCTIONS YOU NEED TO KNOW

## SHORTCUTS:

<https://exceljet.net/blog/the-54-excel-shortcuts-you-really-should-know>

- Finance functions: NPV, IRR
- Vlookup/Hlookup
- Index/Match/Find
- Indirect
- Choose
- Concatenate (&)
- Rank
- Offset
- DB... functions
- Sumproduct
- Iferror (If + Iserror)

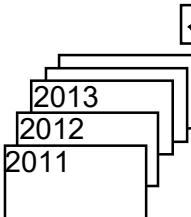
## Excel tools you should know:

- Scenario manager; Solver; Goalseek...
- Filters (*ADVANCED*→ copy unique records to remove duplicates)
- Freeze panes/split windows
- Data validation (*to create a drop down menu without macros...*)

## Bottom-up checks for reasonableness



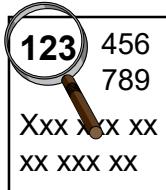
- Does the balance sheet balance?
- Do the calculations of NOPLAT, invested capital and free cash flow balance?



- Is the forecast long enough (rule of thumb: 7 years minimum, 10 years average, more possible)?



- No “frogs” - i.e., no items that suddenly jump up or down in value for no apparent reason



- Is there a consistent level of detail throughout?



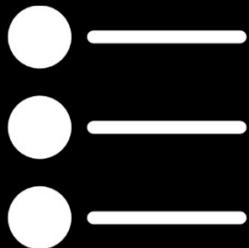
- No “hockey sticks” - i.e., no dramatic unexplained upward trends



- Are there links to value drivers and are they built correctly?
- Are the links within the financial statements logical and correct?

# Top-down checks for reasonableness

		Checked?
<b>Key value drivers</b>	<ul style="list-style-type: none"><li>▪ Is the company's performance on the key value drivers consistent with the company's economics and the industry competitive dynamics?</li></ul>	✓
<b>Revenue growth</b>	<ul style="list-style-type: none"><li>▪ Is revenue growth consistent with industry growth?</li><li>▪ If the company's revenues are growing faster than the industry, which competitors are losing share?</li><li>▪ Does the company have the resources to manage that rate of growth?</li></ul>	✓
<b>ROIC</b>	<ul style="list-style-type: none"><li>▪ Is the return on capital consistent with the industry's competitive structure?</li><li>▪ If entry barriers are coming down, shouldn't expected returns decline? Conversely, if the company's position in the industry is becoming much stronger, should you expect increasing returns?</li><li>▪ How will returns and growth look relative to the competition?</li><li>▪ How will technology changes affect returns?</li></ul>	✓
<b>Financing</b>	<ul style="list-style-type: none"><li>▪ Will the company have to raise large amounts of capital? If so, can it obtain the financing? Should it be debt or equity?</li><li>▪ If the company is generating excess cash, what options does it have for investing the cash or returning it to the shareholders?</li><li>▪ Can the company manage its investments?</li></ul>	✓



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- **Valuation Using Multiples**

## Valuation multiples: the intuition

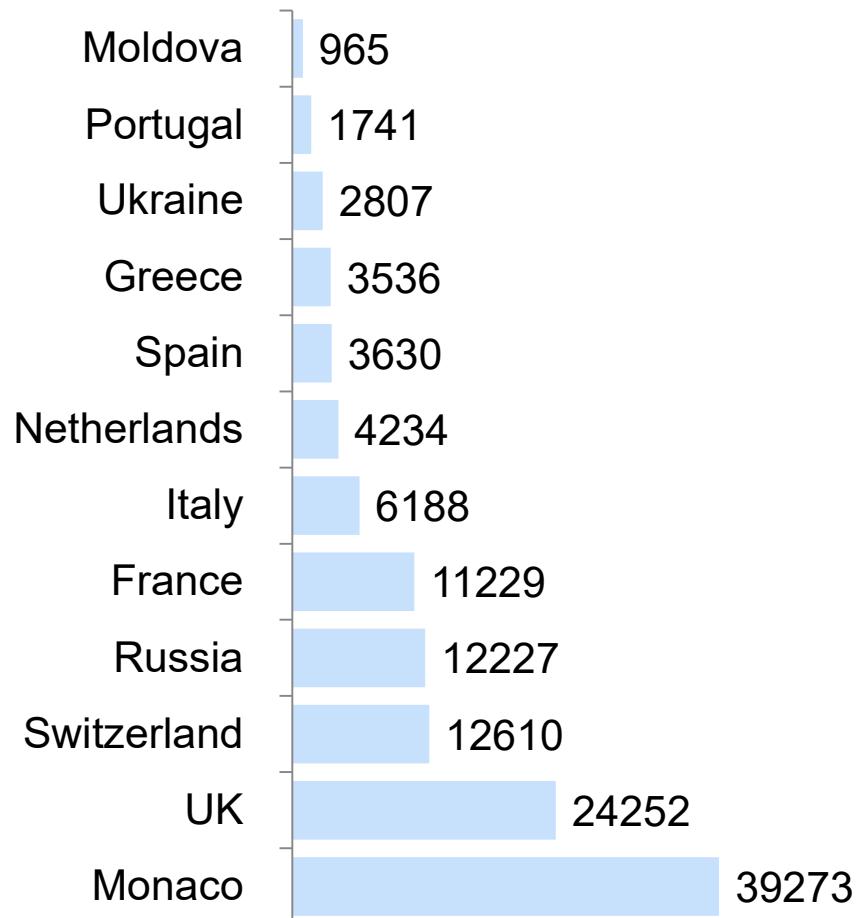
Monaco



Chisinau (Moldova)

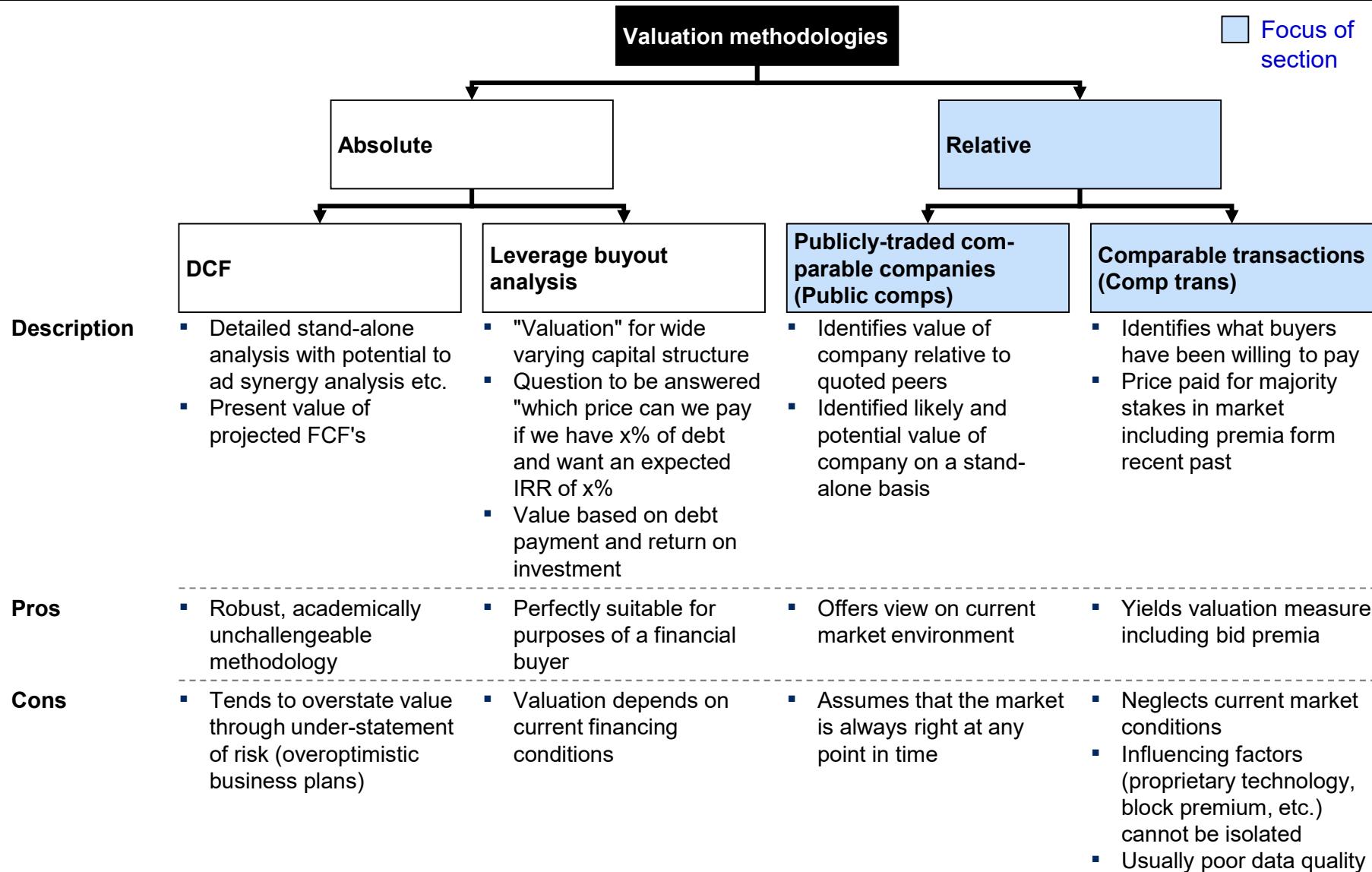


Square meter prices, premier city centre, €



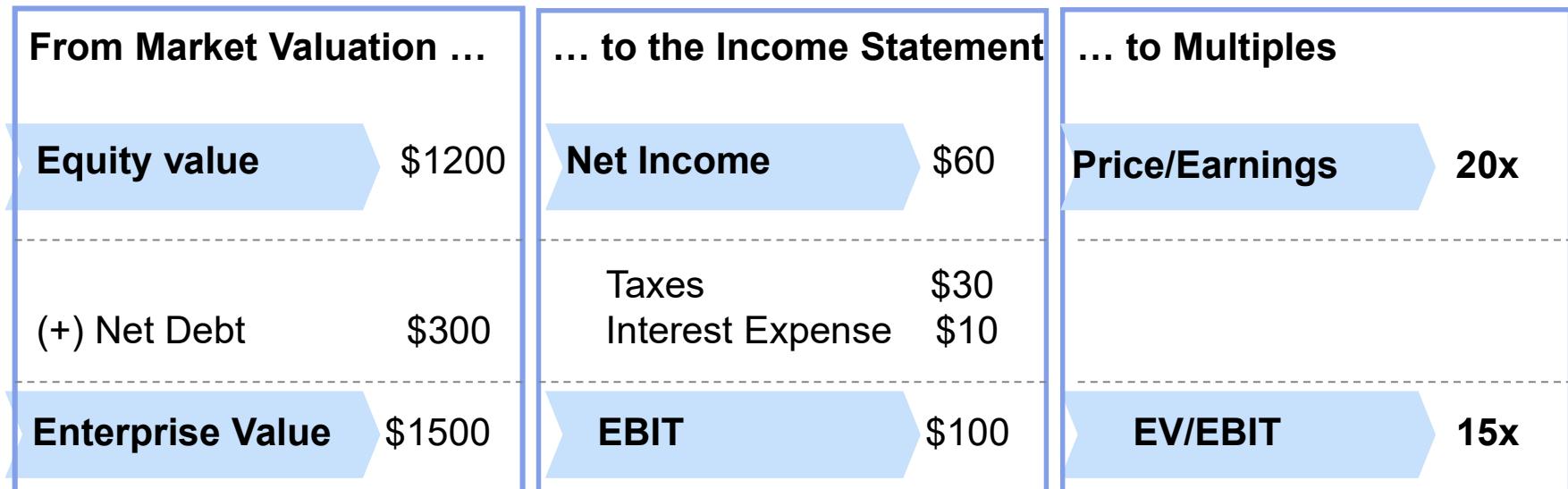
*Average per square meter (sq.m.) prices of 120-sqm. apartments located in the centre of the most important city of each country, 2013  
(<http://www.globalpropertyguide.com>)*

# Multiple valuation method is based on relative values



## What are multiples?

- Ratios used to compare companies' valuation
- They normalize market values by profits, book values or operational statistics
- The basis for valuation can be the **Equity value or the Enterprise value** (Equity+Debt)

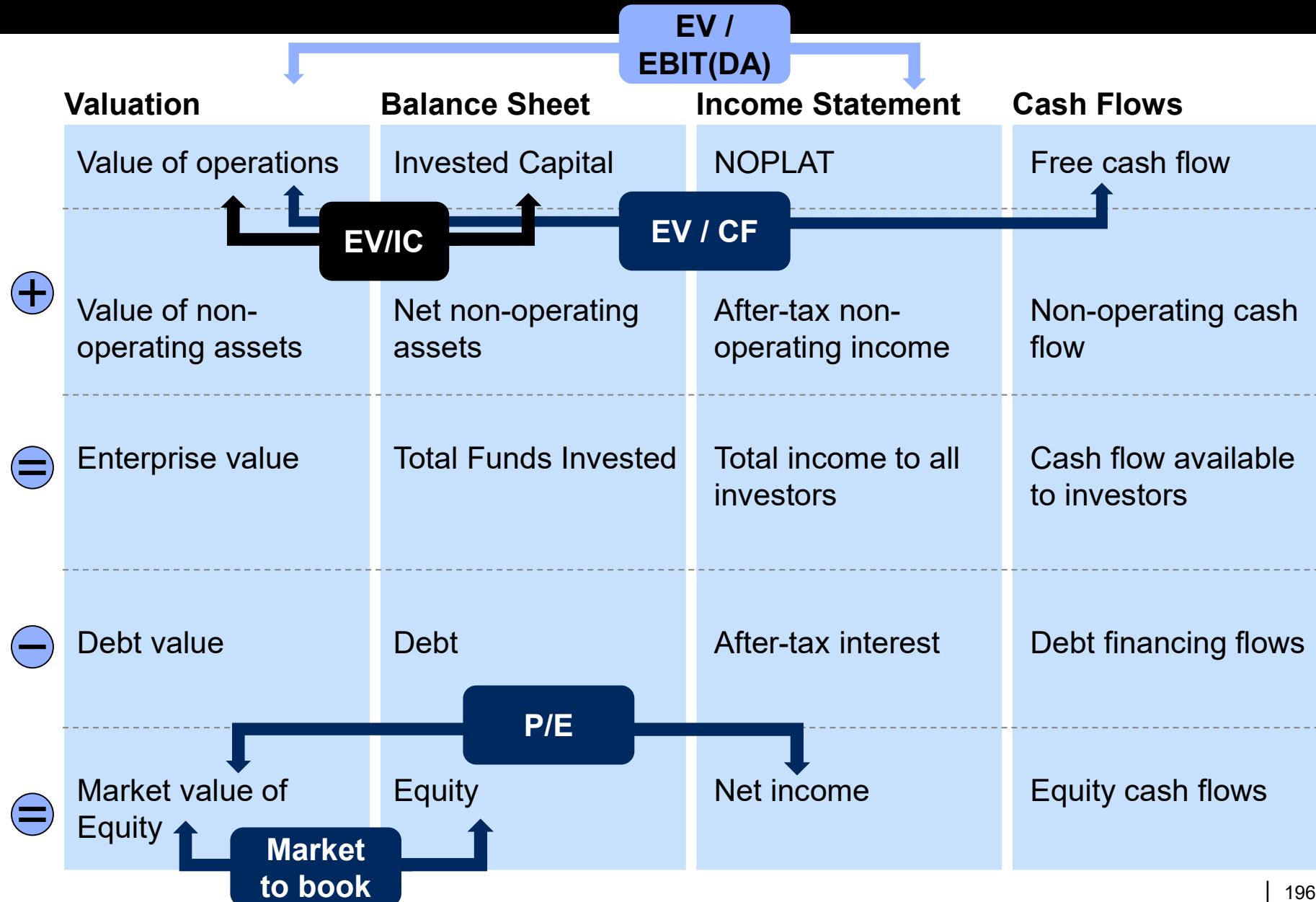


Other multiples examples:  
**EV/Invested Capital** and  
**EV/EBITDA**

## Remember the consistency in our approach to valuation and financial analysis

	Market Valuation	Balance Sheet	Income Statement	Cash Flows
✓	<b>Value of operations DCF</b>	Invested Capital	NOPLAT	Free cash flow
+	Value of non-operating assets	Net non-operating assets	After-tax non-operating income	Non-operating cash flow
=	Enterprise value	Total Funds Invested	Total income to all investors	Cash flow available to investors
-	Debt value	Debt	After-tax interest	Debt financing flows
=	<b>Equity value</b>	Equity	Net income	Equity cash flows

## Multiples are ‘shortcuts’ allowing for a quick valuation process



## Two types of multiples – Trading multiples and Acquisition multiples

	Trading multiples ("public comps")	Acquisition multiples (comparable transactions)
Pros	<ul style="list-style-type: none"> <li>▪ Most information available</li> <li>▪ Current market conditions taken into account (good for IPOs)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Includes <b>control premium</b></li> <li>▪ Result of 'real' M&amp;A activity</li> </ul>
Cons	<ul style="list-style-type: none"> <li>▪ Volatility to recent stock price performance</li> <li>▪ No control premium taken into account</li> </ul>	<ul style="list-style-type: none"> <li>▪ Availability of info</li> <li>▪ Outdated transactions</li> <li>▪ Specific 'strategic' value for a buyer may be embedded</li> </ul>

### Morgan Stanley: Aéroports de Paris, August 2009

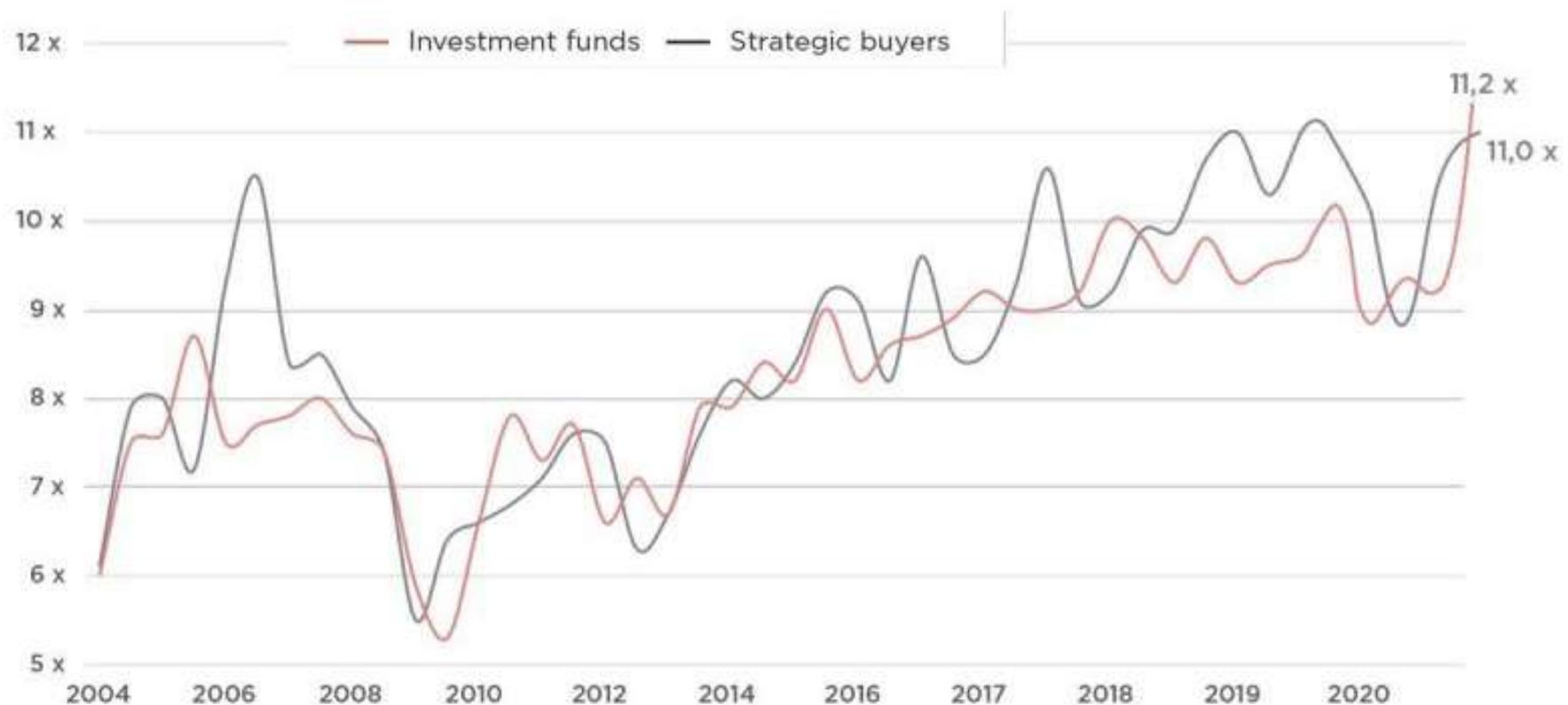
Ratios (x)	2008	2009E	2010E	2011E	2012E
P/E	17.6	21.0	20.4	19.2	17.3
P/Op Cash Flow	7.4	8.9	8.6	8.3	7.8
P/BV	1.5	1.8	1.7	1.6	1.5
EV/EBITDA	8.4	9.1	8.9	8.6	8.0
EV/Sales	2.8	3.0	2.9	2.8	2.7
DividendYield (%)	2.9	2.4	2.5	2.6	2.9

"ADP is trading slightly below its historical average". We believe the market has underestimated the short-term potential of the business"

"M&A activity in the airport sector has been relatively consistent over the past few years, with a large spike in 2006/2007.

**The average EV/EBITDA multiple achieved over the past 32 deals was 23.9 times, and 16.8 times if we exclude the major outlying transactions in 2006/2007."**

## M&A Valuation levels EV/EBITDA



Source: Mid-market Argos Index® / Epsilon Research

# There are Enterprise and Equity based multiples: The difference lies in the treatment of debt and its associated cost

## (1) Equity value

Represents market value of the shareholder's investment in the business



## (2) Enterprise value

Represents the market value of the company's net operational assets plus the value of its future growth opportunities and intangible assets not on the balance sheet

Denominator	Has interest expense been subtracted?	Numerator
▪ Revenues	No	Debt + equity
▪ EBITDA	No	Debt + equity
▪ EBITA	No	Debt + equity
▪ EBIT	No	Debt + equity
▪ Net income	Yes	Equity
▪ Cash flow from operations	No	Debt + equity
▪ Book value Equity	Yes	Equity

A multiple that has **debt** in the **numerator** must have a statistic **before** interest expense in the **denominator**

## (1) The most frequently used Equity based multiple is the P/E (Price/Earnings Ratio)

- The reasons for using P/E ratios in a valuation include:
  - Earnings power, (as measured by EPS), is a primary driver of investment value
  - The P/E is widely recognized and used by investors
  - P/E differences are significantly related to long-run average stock returns according to empirical research
- However using P/E also has drawbacks:
  - P/E is not applicable if earnings are very small, zero, or negative
  - The transitory portion of earnings can be difficult to distinguish from the permanent component that is most important for valuation
  - Managers have discretion in determining reported earnings, which lessens the comparability of P/Es across firms.
- There are two broad definitions of the P/E: Trailing P/E vs Forward P/E:
  - The trailing P/E (also referred to as current) uses the past 4 quarters of earnings (trailing 12-month, TTM, EPS)
  - The forward P/E (also referred to as the leading or prospective P/E) uses next year's expected earnings (based on analyst or database estimates).
- The forward P/E is preferred over the trailing P/E when trailing earnings are not representative of the firm's future (if earnings are zero or negative, an analyst may use a longer-term or future –positive- earnings figure). The trailing P/E is preferred when forecasted earnings are not available, which is often the case for small firms that are not widely followed. Regardless, an analyst should use the same definition of earnings when making comparisons across firms

## (1) Adjusting the accounting Earnings (EPS)

When using **trailing P/Es**, an analyst should adjust the EPS for the following:

- 1. Potential dilution of EPS.** Firms are required to report basic EPS (= actual number of shares outstanding during the period) and diluted EPS (= number of shares that would be outstanding and the accompanying earnings if all executive stock options, equity warrants, and convertible bonds were exercised). The P/E from diluted EPS is typically higher and generally preferred by analysts as it makes comparisons across firms more relevant.
- 2. Transitory, nonrecurring earnings components that are firm specific.** An analyst should focus on the earnings that are expected to continue into the future (recurring/ underlying/ persistent/ continuing/ core earnings)
- 3. Transitory earnings components that are attributable to business or industry cycles.** Because of earnings volatility from business or industry cycles (auto, steel, airlines...), the most recent four quarters of earnings for a firm may not reflect the long-term earning potential of a firm. This effect is known as the Molodovsky effect and is corrected by calculating an EPS under midcycle conditions, (normalized EPS).
- 4. Differences in accounting methods (when comparing P/Es of various firms).** For example, an analyst may be comparing one company using LIFO (last in, first out) inventory accounting (permitted by US GAAP but not the IFRS) with another using FIFO (first in, first out) accounting.

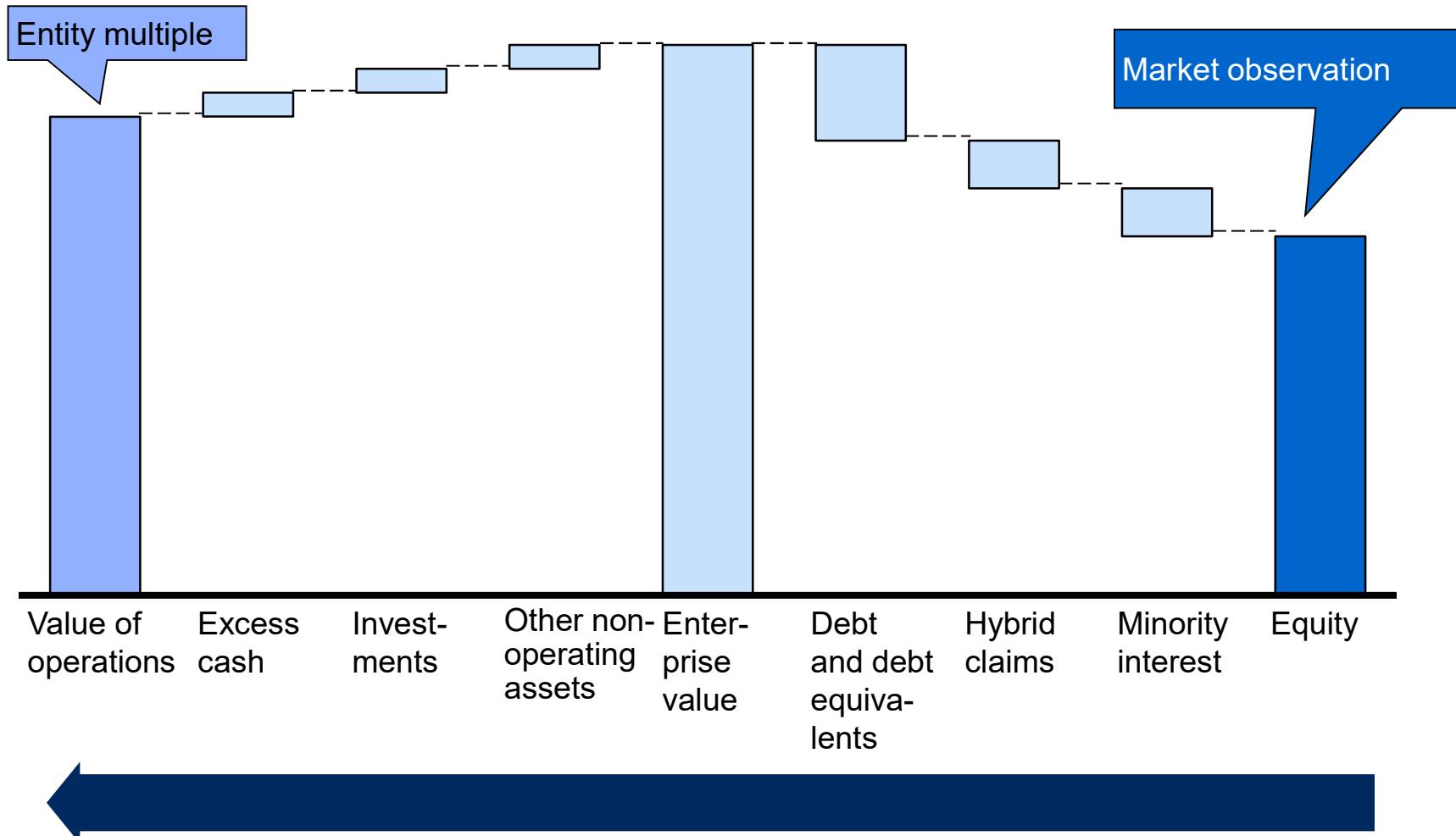
## **1) Another popular Equity based multiple is the P/B or M/B ratio (Price/Book or Market to Book)**

- The price-to-book ratio (P/B) or Market to book, is the market price of the stock divided by the book value of equity (on a per share basis or market Cap/BV equity).
- The following are rationales for its use:
  - Book value is generally positive, even when EPS is negative or zero. Thus, the P/B can usually be used when EPS is negative or zero.
  - Book values are more stable than EPS, so it may be more meaningful than P/E when EPS is particularly high, low, or variable.
  - Book value is a particularly appropriate measure of net asset value for finance, investment, insurance, and banking firms) because book values can be adjusted to market values
  - Book value is appropriate for firms that are not expected to continue as a going concern.
- The following are drawbacks of using the P/B:
  - Book value does not recognize the value of nonphysical assets, such as business reputation and employee skills and knowledge (human capital).
  - P/Bs can be misleading when firms have significant differences in the utilization level of assets (firms which assemble their products as opposed to manufacturing them).
  - Accounting standards may compromise the usefulness of book value.
  - Book value reflects the historical cost of an asset, net of depreciation. Inflation and technological change can make it difficult to compare firms with different ages of assets.
  - Stock repurchases or issuances can distort historical comparisons.

## 1) Adjusting the BV of Equity, common adjustments

- Some analysts use tangible book value, which is the book value of equity less intangible assets, such as goodwill from acquisitions and patents. Although excluding intangibles may not be theoretically warranted, many analysts exclude goodwill from book value because it reflects a premium paid in an acquisition and possible overpayment.
- Firms using first in, first out (FIFO) accounting cannot be accurately compared with those using last in, first out (LIFO) accounting because the latter's book value will be understated in inflationary environments. This firm's book value should be restated using FIFO accounting to make the P/Bs comparable.
- Book values should be adjusted for significant off-balance-sheet assets and liabilities, such as the guarantee to pay another firm's debt.
- Book values may need to be adjusted for the fair value of assets and liabilities. Although many financial assets are recorded at fair value, physical assets are typically recorded at historical cost. In the case of IFRS, asset values may be written down or up to market value, whereas US GAAP allows assets to only be written down to market value via an impairment charge.

## (2) Valuation using Enterprise Value multiples starts from market observation (right to left!!)



## How to calculate multiples, in practice

- The market multiples method assumes that the value of a company can be determined by **using market information** for companies with similar characteristics as the one being valued as a reference.
- This method is based on the determination of ratios of stock market values to certain economic and financial variables in a **selected sample of comparable companies**. Extracted figures might require adjustments
- After making the appropriate adjustments, these multipliers are then applied to the corresponding figures of the company being valued, in order to **estimate a range of values** (unlisted company) or to verify if they are in line with those expressed by the market (listed company)
- The application of the said criteria is carried out according to the phases described thereafter

### A typical multiple valuation process requires 4 steps:

- Defining the reference sample
- Choosing appropriate metrics/multiples
- Calculating standardized metrics
- Applying the resulting multiples

# First step in building an effective multiples analysis is to choose the right peer group

## Define the reference sample

- The **similarity of companies** in the reference sample and the company being valued is fundamental: the valuation is only as good as the sample picked
- Practically, it is impossible to identify companies that are homogeneous (and similar to the target) under every aspect
- Most comparable companies might not be direct competitors of the Target!
- **Determine the most significant elements to compare**
- **Select comparable companies with respect to the specific elements selected**

## Assemble industry peer group based on

- Operational statistics (industry, products, markets, distribution channels)
- Specific characteristics (Location, business model, ownership structure, liquidity...)
- Financial statistics (size, leverage, margins, growth prospects, ROIC)

## Refine analysis of peer group

- Why are multiples different across peers?
- Do certain companies have superior products, better access to customers, recurring revenues or economies of scale?
- How would that translate into value drivers (ROIC and growth)?

## Second step is to choose adequate multiples , preferably Entity based multiples

Define the reference sample

Choose appropriate metrics/multiples

➤ Most common multiples used in company valuation are:

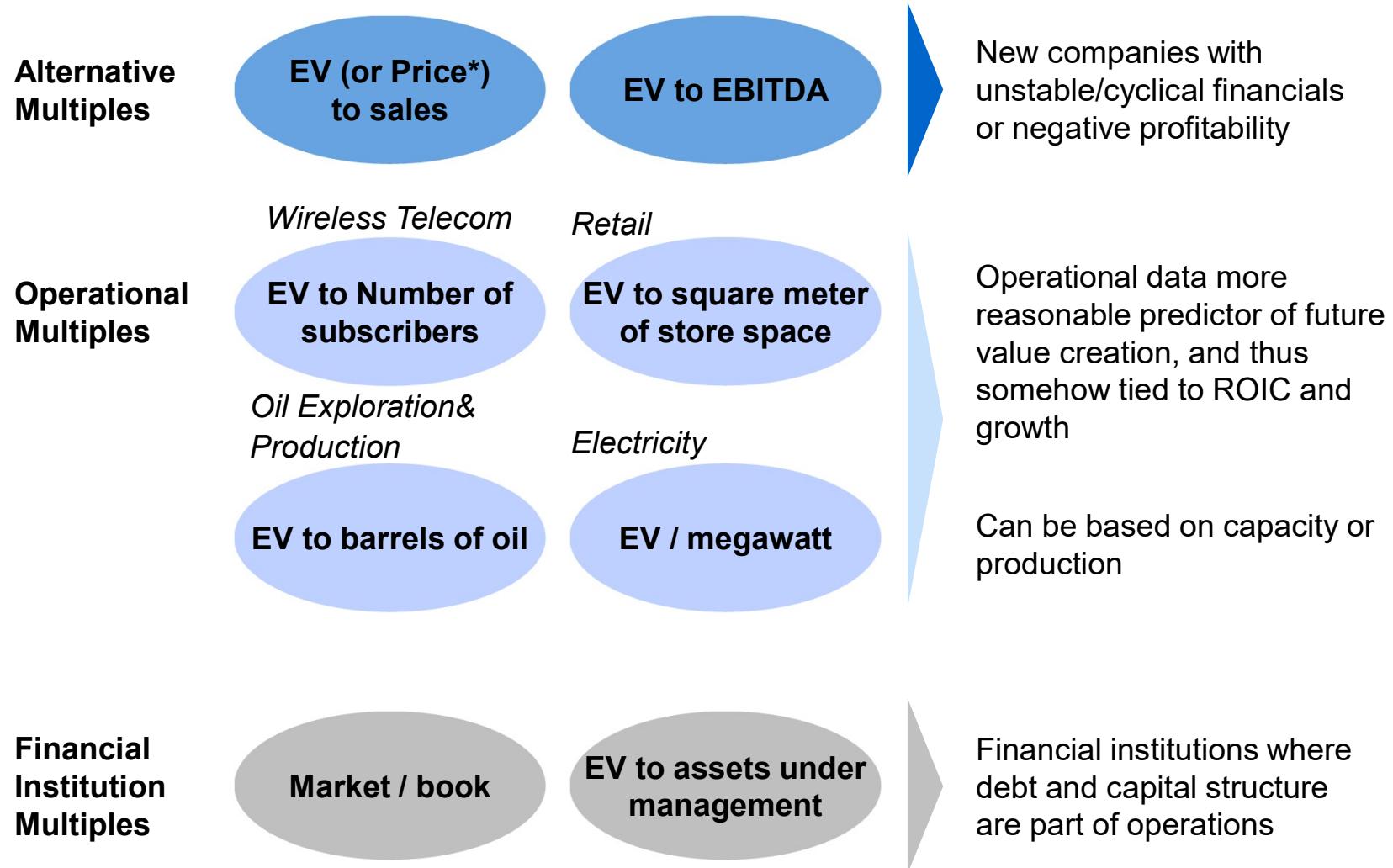
- EV/EBITDA or EV/EBIT
- EV/Sales
- EV/operating Cash Flow
- Price/earnings (P/E)

➤ Prefer Entity Value multiples:  
■ Multiples calculated by using figures influenced by accounting and fiscal policies (net income) are subject to distortion and may cause misleading results  
■ Some ratios are distorted by changes in capital structure (e.g. P/E)

An example to show how taking on debt can increase a company's P/E ratio:

	<i>Company with minimal debt</i>	<i>Company increases debt</i>
EV	1,000	1,000
Total debt	(100)	(500)
Equity	900	500
EBITA	60	60
Net income	35	16
<b>Price/earnings</b>	<b>26x</b>	<b>31x</b>
<b>EV/EBITA</b>	<b>17x</b>	<b>17x</b>

## In special situations, alternative multiples can bring additional insight



\* Price/Sales: wrong in theory but if looking at a start up, it is unlikely to have debt so Equity = EV...

## Third step is to use forward looking multiples rather than historical multiples and “calendarize” figures, if needed

Define the reference sample

Choose appropriate metrics/multiples

Calculate standardized metrics

- 💣 A DCF is based on the present value of **future cash flows**...  
➤ **Use forward looking multiples!** (e.g. next year's EBIT)

- 💣 Not all companies have the same fiscal year end: 2013 FY can mean June 2013 or April 2014...  
➤ **Calendarize to adjust financials** with different year-end dates e.g. use Latest 12 months (LTM) to calculate profit numbers based on quarterly reports

- 💣 Some FY are transition years (not 12 months...):  
➤ **Annualize** profit figures!

### Calculating LTM profits

- A Company reports \$1 million in quarterly revenue in a 10-Q in March 2013, a \$10 million yearly revenue on 31/12/2013, and \$4 million quarterly revenue in March 2014
- The trailing twelve months revenue is calculated as \$13 million as follows.

***Most Recent Quarter(s)  
+ Most Recent Year  
- The Corresponding Quarter(s) 12  
Months Before the Most Recent Quarter(s)***

- e.g.  $\$4m + \$10m - \$1m = \$13m$

## Fourth step is to use the multiples to derive an Entity/Equity valuation...

Define the reference sample

Choose appropriate metrics/multiples

Calculate standardized metrics

Apply multiples

➤ Identify the multiples value range to apply to the company being valued:

- Don't use the mean/median automatically
- Can adjust results based on qualitative and quantitative considerations regarding the comparability of the companies making up the sample but it becomes more subjective...

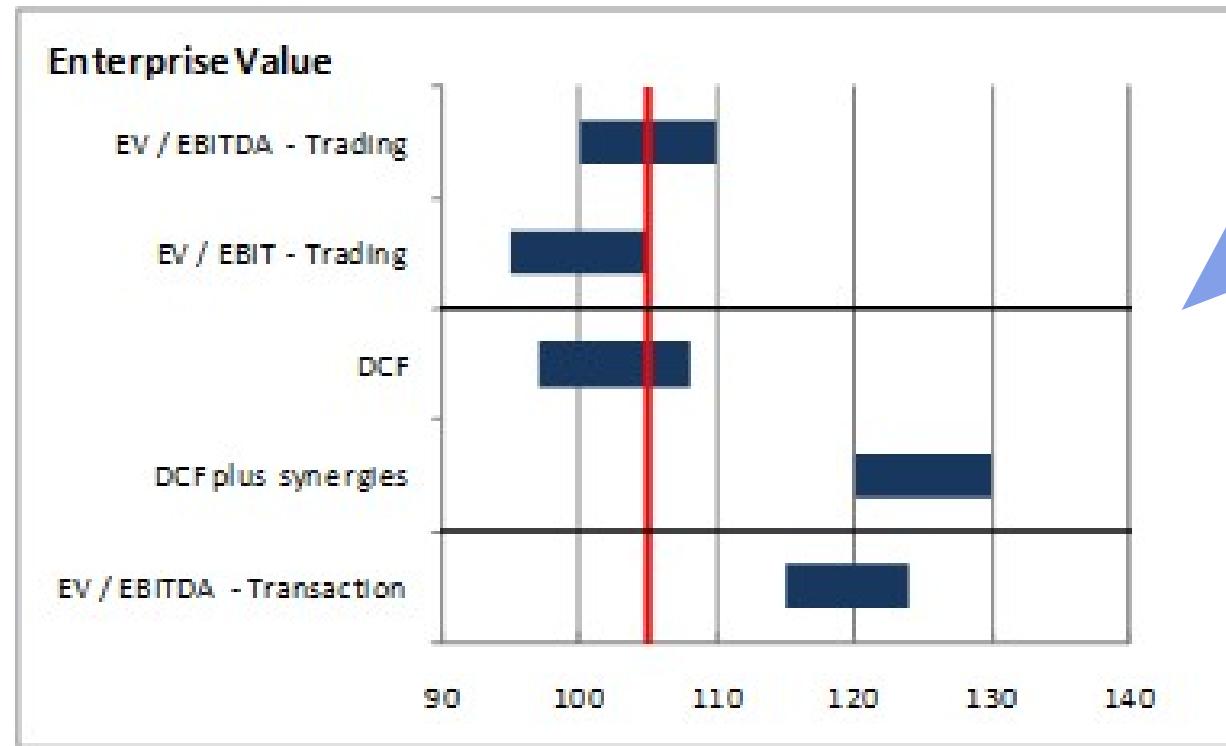
➤ Apply multiples from sample to the economic and financial figures of the company being valued

### Example: Advertising agencies

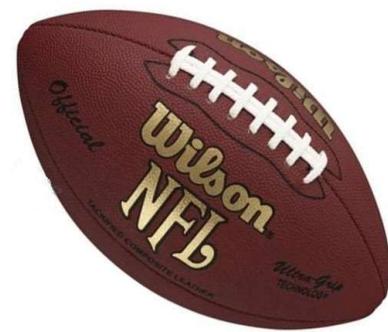
Company	EBITDA		
	2011-A	2012-F	2013-F
publicis Groupe SA	8.7x	7.8x	7.2x
WPP PLC	9.0x	8.0x	7.5x
Omnicom Group	7.7x	7.2x	6.8x
Interpublic GRP of Cies	5.1x	5.8x	5.3x
Aegis Group	15.3x	12.2x	11.2x
Havas SA	5.2x	7.2x	6.9x
PubliGroupe SA	5.0x	3.1x	11.2x
Cello Group plc	7.0x	5.1x	4.8x
MDC Partners Inc	14.2x	6.2x	5.4x
Dentsu Inc	6.2x	6.3x	6.0x
Average	8.3x	6.9x	7.2x
Median	7.3x	6.8x	6.9x

➤ If TargetCo EBITDA is 100, this implies an estimated EV of about 700-800

## The result: a “Football Pitch” according to Investment Bankers...



- Shows a Range
- Can mix approaches:  
Trading and  
Transaction multiples,  
Multiples and DCF or  
NAV valuation, or even  
include different  
valuation scenarios...



## Checking and interpreting your results

**Did you eliminate non recurring items?**

- *E.g. Restructuring charges, Gains/losses on sale of assets?*

**Did you tax effect all adjustments?**

- *Check footnotes for actual tax impact if available. Use marginal rate if tax impact not available*

**Did you double-check your calculations?**

- *"Reality" check on multiples, margins, etc*

**Did you use most recently available financials to check historical data?**

- *Avoid using old financials in case of any restatements...*

**Did you check for common analytical errors?**

- *E.g. Stock splits, dividends, and repurchases,*
- *Differences in fiscal year end (EPS estimates),*
- *Cash (long-term investments)*

## Multiples are sensitive to key value drivers – ROIC and growth

Enterprise value to EBITA<sup>1</sup>

Long-term  
growth rate

	6.0%	5.5%	5.0%	4.5%	4.0%
6.0%	n/a	7.8	14.0	16.3	17.7
5.5%	1.7	7.8	12.7	14.5	15.6
5.0%	2.9	7.8	11.7	13.1	14.0
4.5%	3.9	7.8	10.9	12.1	12.8
4.0%	4.7	7.8	10.3	11.2	11.8

Return on invested capital

6%    9%    15%    20%    25%

Higher growth or higher  
ROIC leads to higher  
multiple (as long as  
ROIC>WACC)

Different combinations  
of growth and ROIC can  
lead to the same  
multiple!

1 Assuming 30% cash tax rate and 9% cost of capital

## Entity value multiples can be derived from the value driver formula 1/2

### Using key value driver (NOPLAT) formula

- ① Start with the key value driver formula.

$$\text{Value} = \frac{\text{NOPLAT} \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g}$$

- ② Divide both terms by Invested Capital

$$\text{Value/IC} = \frac{\text{NOPLAT} \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{IC} (\text{WACC} - g)}$$

- ③ Substitute NOPLAT/IC by ROIC

$$\text{Value/IC} = \frac{\text{ROIC} \left(1 - \frac{g}{\text{ROIC}}\right)}{(\text{WACC} - g)}$$

- ④ Simplify

$$\frac{\text{Value}}{\text{Inv.Capital}} = \frac{\text{ROIC}-g}{\text{WACC}-g}$$

Enterprise value multiple driven by

- (1) Spread between ROIC and WACC  
(2) Growth as “accelerator”



## Entity value multiples can be derived from the value driver formula 2/2

### Using key value driver (NOPLAT) formula

- ① Start with the key value driver formula.

$$\text{Value} = \frac{\text{NOPLAT} \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g}$$

- ② Substitute EBIT(1-T) for NOPLAT

$$\text{Value} = \frac{\text{EBIT}(1 - T) \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g}$$

- ③ Divide both sides by EBIT to develop the enterprise value multiple.

$$\frac{\text{Value}}{\text{EBIT}} = \frac{(1 - T) \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g}$$

#### Enterprise value multiple driven by

- (1) Return on new invested capital
- (2) Growth
- (3) Tax rate
- (4) Weighted average cost of capital



## Conclusion: Multiples should always be used in combination with other valuation methods



- 'Quick and dirty' valuation to have a first idea or a quick estimate of a company's value (e.g. to assess deal feasibility)



- To **check the result of a DCF**: is it in line with market view of comparable companies?



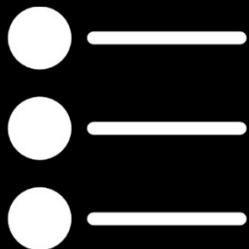
- To **summarize and communicate** on valuation results: easy to grasp...



- As a **main valuation approach**: used by some practitioners, but *DCF is the best valuation approach* (at least you know where the value is coming from...)



- **To estimate Terminal Value**: Used by some practitioners, even in a DCF context, but value driver formula is a better valuation approach (and multiples are not constant over time in most sectors...)

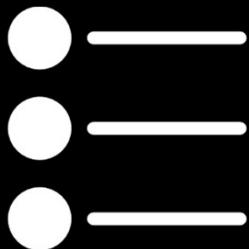


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- **Other valuation models**

## Frameworks for DCF-based valuation

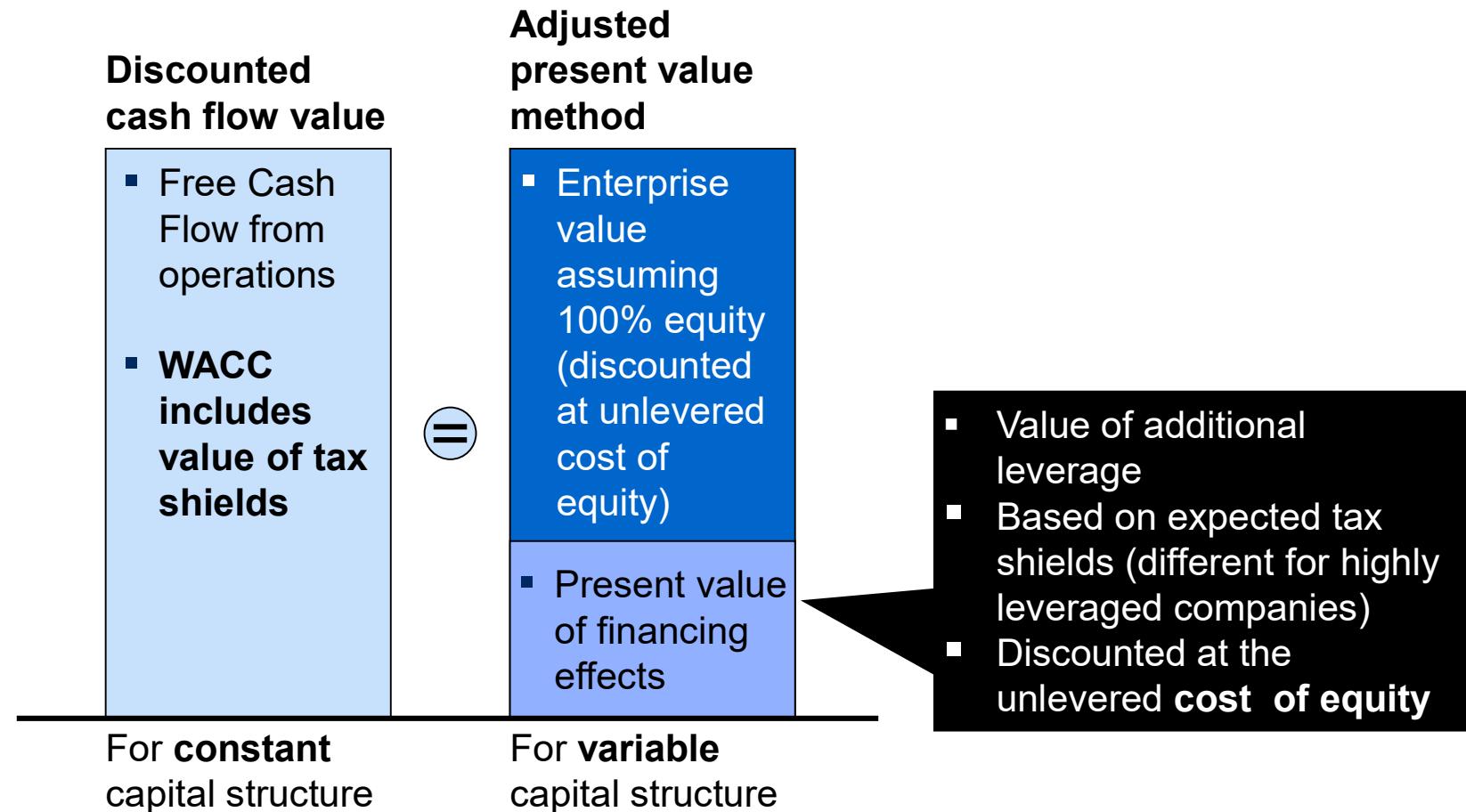
Model	Approach	Comments
Enterprise discounted cash flow	<ul style="list-style-type: none"> <li>▪ Free cash flow based</li> <li>▪ Cash flows discounted at WACC</li> </ul>	<ul style="list-style-type: none"> <li>▪ Works best for companies that manage for a target capital structure</li> <li>▪ Value of tax shield captured in WACC</li> </ul>
Economic profit models	<ul style="list-style-type: none"> <li>▪ Profit based</li> <li>▪ Economic profit discounted at WACC</li> </ul>	<ul style="list-style-type: none"> <li>▪ Explicitly highlights when the company creates value</li> <li>▪ Uses the same inputs as an Enterprise DCF</li> </ul>
Adjusted present value	<ul style="list-style-type: none"> <li>▪ Free cash flow based</li> <li>▪ Cash flows discounted at unlevered cost of equity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Models changing capital structure more easily</li> <li>▪ Value of tax shield modeled separately</li> </ul>
Capital cash flow model	<ul style="list-style-type: none"> <li>▪ Capital cash flow based (free cash flow and interest tax shield in one number)</li> <li>▪ Cash flow discounted at unlevered cost of equity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Tax shield captured in cash flow</li> <li>▪ Never seen it used in practice</li> <li>▪ Reference: R.S. Ruback "Capital Cash Flows a simple approach to valuing risky cash flows", <i>Financial management</i> (summer 2002), 85-103</li> </ul>
Equity cash flow model	<ul style="list-style-type: none"> <li>▪ Cash flow to equity based</li> <li>▪ Cash flows discounted at levered cost of equity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capital structure is embedded throughout the cash flow</li> <li>▪ <b>Best used for financial institutions</b></li> </ul>



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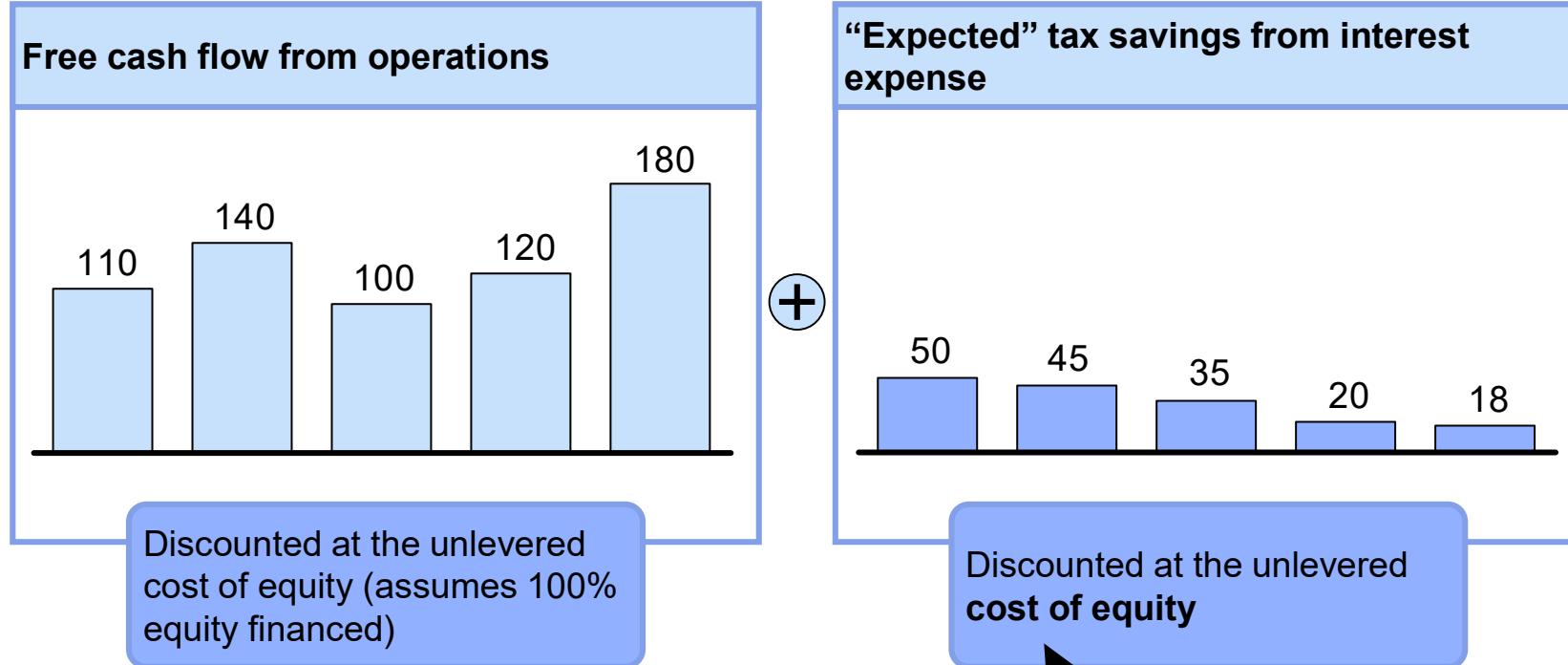
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- **Other valuation models**
  - **Adjusted Present Value**

**Adjusted present value (APV) methodology is a DCF valuation where tax shields are valued separately instead of being included in the WACC**



# Use adjusted present value (APV) when capital structure is changing

## Adjusted Present Value Methodology



**Note:**

This method is equivalent to using a traditional DCF approach, *if* the WACC is adjusted each year for the changing capital structure

We suggest discounting at the unlevered **cost of equity** (others including T.Luerhman) use cost of debt. Rational is Tax shield are risky (=risks closer to equity than debt)

APV is based on M&M's idea that the value of the levered firm is the value of the unlevered firm + value of financing...

## APV: The Fundamental Idea

**Base-case value**

**APV =**

value of the project  
as if it were financed  
entirely with equity

+

**Value of all financing  
side effects**

interest tax shields

costs of financial distress

subsidies

hedges

issue costs

other costs

APV *unbundles* components of value  
and analyzes each one separately.  
In contrast, WACC *bundles* all financing  
side effects into the discount rate.

## Modigliani&Miller (papers from 1958-1963)

Modigliani and Miller (M&M) postulated that the value of a firm's claims must equal the value of its assets:

$$V_u + V_{\text{tax}} = V_{\text{enterprise}} = D + E$$

They also argued that the weighted average risk of a company's financial claims must equal the weighted average:

$$\frac{V_u}{V_{\text{Enterprise}}} k_u + \frac{V_{\text{tax}}}{V_{\text{Enterprise}}} k_{\text{tax}} = \frac{D}{V_{\text{Enterprise}}} k_d + \frac{E}{V_{\text{Enterprise}}} k_e$$

From this equation we can deduct the following formula regarding the cost of equity:

$$k_e = k_u + \frac{D}{E} (k_u - k_d) - \frac{V_{\text{tax}}}{E} (k_u - k_{\text{tax}})$$

↑  
The cost of equity      ↑      A premium for increasing leverage      ↑  
The unlevered cost of equity      A discount for the tax deductibility of interest payments

## The Levered vs Unlevered Cost of Equity

The levered cost of equity ( $k_e$ ) is related to the unlevered cost of equity via the following equation:

$$k_e = k_u + \frac{D}{E} (k_u - k_d) - \frac{V_{\text{tax}}}{E} (k_u - k_{\text{tax}})$$

- Each of the variables can be estimated except the risk of tax shields. **Most practitioners assume  $k_{\text{tax}} = k_u$ .** This is consistent with a constant D/V ratio. When  $k_{\text{tax}} = k_u$ , the final term disappears and the equation simplifies to:

$$k_e = k_u + \frac{D}{E} (k_u - k_d)$$

- **Many academics assume  $k_{\text{tax}} = k_d$ .** This leads to an alternative representation:

$$k_e = k_u + \frac{D - V_{\text{tax}}}{E} (k_u - k_d)$$

## Levered Cost of Equity

The grid below summarizes the formulas that can be used to estimate the levered cost of equity. The top row in the exhibit contains formulas that assume  $k_{tax}$  equals  $k_u$ . The bottom row contains formulas that assume  $k_{tax}$  equals  $k_d$ . The formulas on the left side are flexible enough to handle any future capital structure but require valuing the tax shields separately. The formulas on the right side assume the dollar level of debt is fixed over time.

	Dollar level of debt fluctuates	Dollar level of debt is constant
Tax shields have same risk as operating assets $k_{tax} = k_u$	$k_e = k_u + \frac{D}{E}(k_u - k_d)$	$k_e = k_u + \frac{D}{E}(k_u - k_d)$
Tax shields have same risk as debt $k_{tax} = k_d$	$k_e = k_u + \frac{D - V_{tax}}{E}(k_u - k_d)$	$k_e = k_u + \frac{(1 - T_m)D}{E}(k_u - k_d)$

## Unlevered Cost of Equity

Since the unlevered cost of equity is unobservable, equations on the previous slide must be arranged to solve for the unlevered cost of equity. Depending on risk of tax shields and how the company's debt fluctuates, the formula will vary.

	Dollar level of debt fluctuates	Dollar level of debt is constant
Tax shields have same risk as operating assets $k_{tax} = k_u$	$k_u = \frac{D}{D+E} k_d + \frac{E}{D+E} k_e$	$k_u = \frac{D}{D+E} k_d + \frac{E}{D+E} k_e$
Tax shields have same risk as debt $k_{tax} = k_d$	$k_u = \frac{D - V_{tax}}{D - V_{tax} + E} k_d + \frac{E}{D - V_{tax} + E} k_e$	$k_u = \frac{D(1 - T_m)}{D(1 - T_m) + E} k_d + \frac{E}{D(1 - T_m) + E} k_e$

## An example of APV Valuation: Free Cash Flows

- To value a company using APV, start with a forecast of free cash flow (FCF). APV-based free cash flow is identical to that of enterprise DCF.
- Rather than discount free cash flow at the WACC, discount free cash flow at the unlevered cost of capital, the cost of capital of an all-equity company.

### Home Depot: Unlevered Valuation

Year	Free cash flow (\$ million)	Discount factor (@ 9.3%)	Present value of FCF (\$ million)
2009	5,909	0.915	5,408
2010	2,368	0.838	1,984
2011	1,921	0.767	1,473
2012	2,261	0.702	1,587
2013	2,854	0.642	1,834
2014	3,074	0.588	1,807
2015	3,308	0.538	1,780
2016	3,544	0.493	1,746
2017	3,783	0.451	1,705
2018	4,022	0.413	1,660
Continuing value	78,175	0.413	32,256
Present value			53,240



Discount free cash flow at  
the unlevered cost  
of equity.

For Home Depot, the  
unlevered cost of equity is  
estimated at 9.3 percent.

## An example of APV Valuation: Interest Tax Shields

- Next, compute the present value of financing-related benefits, such as interest tax shields (ITS). Interest tax shields can be discounted at either the unlevered cost of equity or the cost of debt, depending on your perspective of their risk.

### Home Depot: Interest Tax Shield

Forecast year	Prior-year net debt (\$ million)	Expected interest rate (percent)	Interest payment (\$ million)	Marginal tax rate (percent)	Interest tax shield (\$ million)
2009	19,732	6.8	1,337	37.6	502
2010	19,540	6.8	1,324	37.6	498
2011	20,447	6.8	1,386	37.6	521
2012	21,571	6.8	1,462	37.6	549
2013	22,683	6.8	1,537	37.6	578
2014	23,702	✖ 6.8 =	1,606	✖ 37.6 =	604
2015	24,739	6.8	1,676	37.6	630
2016	25,790	6.8	1,748	37.6	657
2017	26,854	6.8	1,820	37.6	684
2018	27,934	6.8	1,893	37.6	711
Continuing-value forecast	29,030	6.8	1,967	37.6	739



To forecast the interest tax shield, first forecast the level of debt.



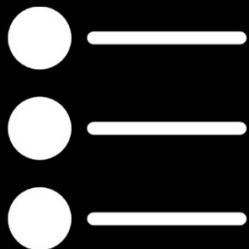
A forecast of the marginal tax rate is also required. Be careful; a company must be profitable to capture tax shields!

## An example of APV Valuation: Putting It All Together

- To conclude the APV-based valuation, sum the present value of free cash flow and the present value of interest tax shields (ITS). This leads to the value of operations.

### Home Depot Valuation (\$ million)

Present value of FCF using unlevered cost of equity	73,557
+ Present value of interest tax shields (ITS)	2,372
= Present value of FCF and ITS	75,928
Midyear adjustment factor	1.041
Value of operations	79,384



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- **Other valuation models**
  - Adjusted Present Value
  - **DDM models (for CFA®)**

## When to use a DDM?

DDMs are most appropriate when:

- 1. the firm has a history of dividend payments.** This provides an analyst with a history from which to extrapolate future dividends. Otherwise, it is difficult to forecast when a non-dividend-paying firm will start paying dividends and how much they will eventually be.
- 2. the firm's dividends have a consistent relationship with the firm's earnings.** Dividends should be related to firm earnings if they are to be a good indicator of future firm and shareholder wealth.
- 3. the valuation perspective is that of a noncontrolling shareholder.** If the perspective is that of a controlling shareholder where firm cash flows can be controlled, a free cash flow model would be more appropriate.

DDMs are usually most applicable to mature, profitable firms with a history of stable dividend payments.

## Basic DDM models

- General formula for DDM model: the value of common stock at time zero ( $V_0$ ) is equal to the discounted stream of future dividends ( $D_t$ ) plus the expected price ( $P$ ) of the stock when sold at time period n. r is the required return on equity
- Assuming that the growth rate in dividends is constant we get the **Gordon growth model**: the value of common stock at Time 0 ( $V_0$ ) is equal to the dividend next period ( $D_1$ ) divided by the required return on equity

$$V_0 = \sum_{t=1}^n \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}$$

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

Both formulae assume that  $r > g$

## Multiperiod DDM models

DDM models can be adjusted to create multistage versions:

1) **General two-stage DDM**: the first stage of rapid growth abruptly transitions to a second stage of constant growth. The model assumes that earnings decline to a long-term rate equal to that of the economy

- Example use: a firm that is expected to have a high rate of growth until patents expire, when a firm has a temporary advantage in the market (first-mover) advantage..

$$V_0 = \sum_{t=1}^n \frac{D_0 (1+g_S)^t}{(1+r)^t} + \frac{D_0 \times (1+g_S)^n \times (1+g_L)}{(1+r)^n \times (r - g_L)}$$

2) **The H-model** assumes an high rate of growth that declines linearly over a specified period until it reaches a normal rate that exists in perpetuity. The formula assumes that the high-growth period lasts  $2 \times H$  years. Stocks with longer high-growth periods and greater high-growth rates will have higher values. *Note that the H-model provides the approximate stock value. It is less accurate when there are very long growth periods (high H) and large differences between  $g_S$  and  $g_L$ .*

- Example use: a firm facing competition that is expected to increase. Growth declines as competitors enter the market and then stabilizes as the industry matures.

$$V_0 = \frac{[D_0 \times (1+g_L)] + [D_0 \times H(g_S - g_L)]}{r - g_L}$$

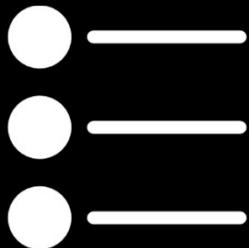
$H$  = half-life (in years) of high-growth period

$g_S$  = short-term growth rate

$g_L$  = long-term growth rate

$r$  = required equity return

3) We can also specify a **three-stage DDM**: e.g. assuming constant growth in the second stage or growth during the second stage that declines linearly to the mature growth rate; the second and third stages of dividend growth can be valued using the H-model.



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  - DDM models (for CFA®)
  - **Economic profit**

## ECONOMIC PROFIT: DEFINITION

- **Economic profit** is a measure of value creation. It refers to the **excess return** (in the economic sense) above the required return (e.g. WACC). It is frequently called EVA®, Economic Value Added (Stern Stewart)
- Economic profit translates size, return on capital, and cost of capital into a single measure (in monetary units, e.g. million USD)
- Economic profit equals the spread between the return on invested capital and the cost of capital times the amount of invested capital:

**Economic Profit = Invested Capital × (ROIC – WACC)**

Where (ROIC – WACC) = Economic profit spread

- The formula for economic profit can be rearranged and defined as after-tax operating profits less a charge for the capital used by the company:

**Economic Profit = NOPLAT – (Invested Capital × WACC)**

## Economic profit example

### Simple example

**Economic Profit =**

**NOPLAT – (Invested Capital \* WACC)**

Invested Capital	1,000
(*) WACC	10%
<b>(=) Capital Charge</b>	100

**(\*) NOPLAT** 150

**(=) Economic Profit** 50

**Economic Profit =**

**Invested Capital \* (ROIC - WACC)**

ROIC	15%
(-) WACC	10%
<b>Economic Spread</b>	5%

**(\*) Invested Capital** 1,000

**(=) Economic Profit** 50

- To perform Economic Profit Valuation:
  - Discount yearly Economic Profit in perpetuity
  - Add current Invested Capital
- Continuing Value Formula:

$$CV_t = \frac{EP_{t+1}}{WACC} + \frac{NOPLAT_{t+1} \left[ \frac{g}{RONIC} \right] (RONIC-WACC)}{WACC (WACC-g)}$$

## Example Economic profit valuation:

### Home Depot: Economic Profit Valuation

---

\$ million

<b>Method 1</b>	Historical			Forecast		
	2006	2007	2008	2009	2010	2011
Return on invested capital	15.9%	9.6%	7.9%	8.0%	9.6%	10.8%
Weighted average cost of capital	8.4%	8.2%	8.3%	8.5%	8.5%	8.5%
Economic spread	7.5%	1.4%	-0.4%	-0.4%	1.1%	2.3%
× Invested capital	39,389	46,543	38,567	37,075	34,137	35,038
<b>Economic profit</b>	<b>2,950</b>	<b>629</b>	<b>(162)</b>	<b>(164)</b>	<b>383</b>	<b>818</b>

### Method 2

---

Invested capital (beginning of year)	39,389	46,543	38,567	37,075	34,137	35,038
× Weighted average cost of capital	8.4%	8.2%	8.3%	8.5%	8.5%	8.5%
Capital charge	3,295	3,827	3,195	3,135	2,886	2,962
NOPLAT	6,245	4,456	3,033	2,971	3,269	3,780
Capital charge	(3,295)	(3,827)	(3,195)	(3,135)	(2,886)	(2,962)
<b>Economic profit</b>	<b>2,950</b>	<b>629</b>	<b>(162)</b>	<b>(164)</b>	<b>383</b>	<b>818</b>

---

## Home Depot: Economic Profit Valuation

Year	Invested capital <sup>1</sup> (\$ million)	ROIC <sup>1</sup> (percent)	WACC (percent)	Economic profit (\$ million)	Discount factor (@ 8.5%)	Present value of economic profit (\$ million)
2009	37,075	8.0	8.5	(164)	0.922	(151)
2010	34,137	9.6	8.5	383	0.850	325
2011	35,038	10.8	8.5	818	0.784	641
2012	36,897	11.6	8.5	1,145	0.723	827
2013	38,900	12.3	8.5	1,487	0.666	991
2014	40,821	12.3	8.5	1,550	0.614	952
2015	42,748	12.2	8.5	1,611	0.567	913
2016	44,665	12.2	8.5	1,671	0.522	873
2017	46,568	12.2	8.5	1,731	0.482	834
2018	48,453	12.1	8.5	1,789	0.444	795
Continuing value				41,922	0.444	18,619
Present value of economic profit						25,619
Invested capital in 2008						37,075
Invested capital plus present value of economic profit						62,694
Midyear adjustment factor						1.041
<b>Value of operations</b>						<b>65,291</b>

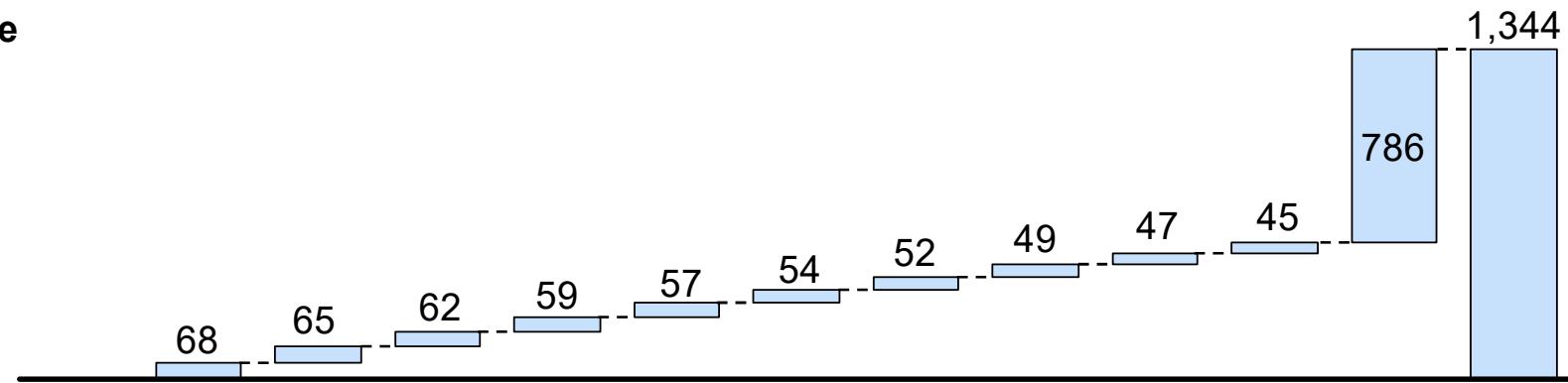
The value of operations equals:  
 the sum of discounted economic profit +  
 current invested capital

<sup>1</sup>Invested capital is measured at the beginning of the year.

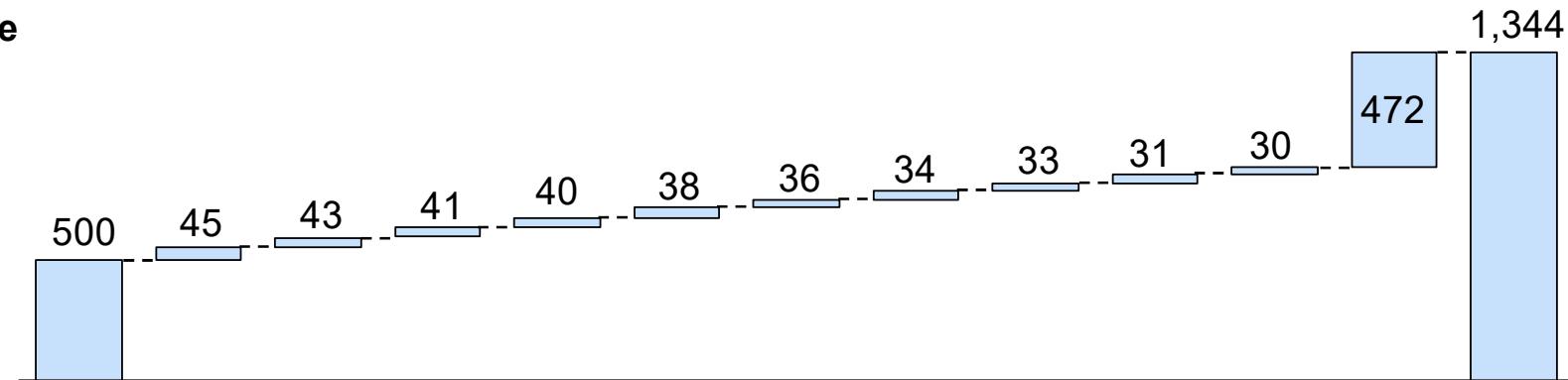
## Equivalence of DCF and economic profit valuation

### Illustration (Value, Inc)

Present value  
of free cash  
flow<sup>1</sup>



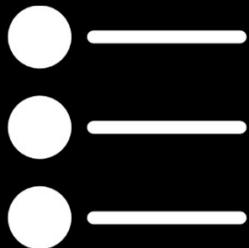
Present value  
of economic  
profit<sup>1</sup>



2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 Con-  
tinuing  
value  
NPV

year  
end  
invested  
capital

1 At year end 2002; WACC = 10%



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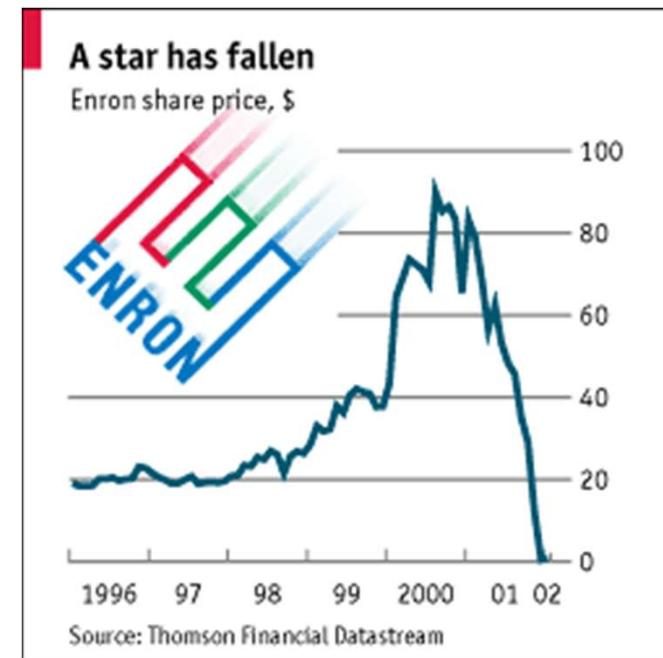
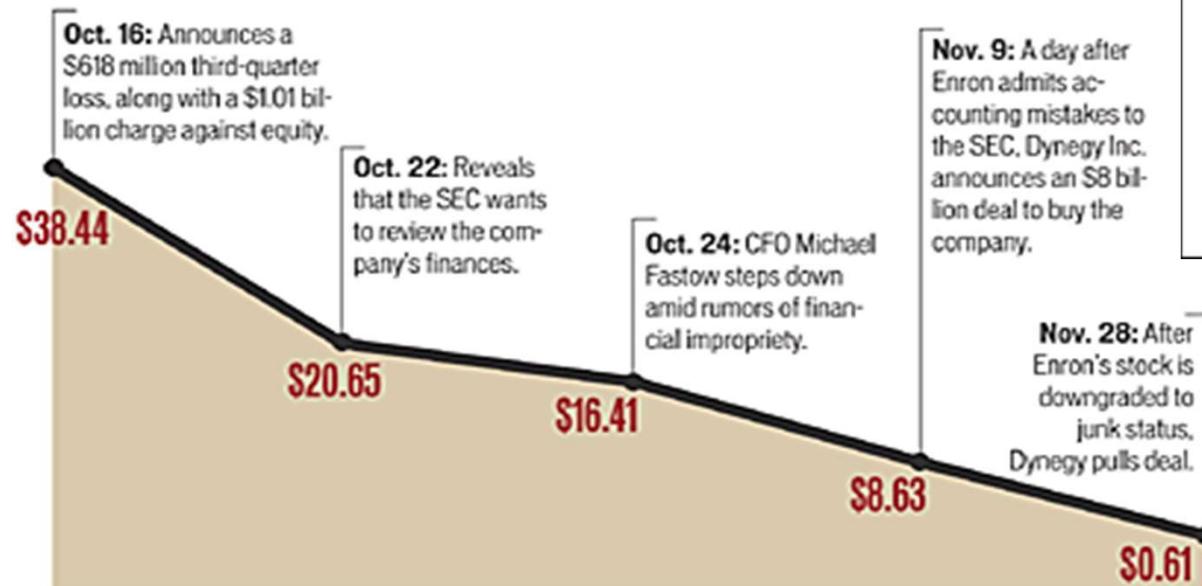
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- Other valuation models
- **Final thoughts**

## « The mistakes are all there, waiting to be made... »

Pitfall	Example
<b>1 Discount rate/ Riskiness of the company</b>	<ul style="list-style-type: none"><li>▪ Wrong Rf: historical instead of current, using a ST rate, real vs nominal</li><li>▪ Wrong Beta: 'strange' results from regression, using acquirer beta, no <math>\beta_d</math></li><li>▪ Wrong treatment of country risk, addition or risk or illiquidity premiums...</li></ul>
<b>2 Expected Cash Flows</b>	<ul style="list-style-type: none"><li>▪ Inconsistent inflation vs WACC</li><li>▪ Wrong CF definition...</li><li>▪ Forecasting errors: being too optimistic...</li></ul>
<b>3 Terminal Value</b>	<ul style="list-style-type: none"><li>▪ CF implying wrong investment rate</li><li>▪ Discounting at time t</li></ul>
<b>4 Inconsistencies</b>	<ul style="list-style-type: none"><li>▪ Discount rate: ECF vs WACC, Real CF vs Nominal rate; or vice versa</li><li>▪ Book Value vs Market Values</li><li>▪ Mixing present value of CFs and liquidation values</li></ul>
<b>5 Interpretation errors</b>	<ul style="list-style-type: none"><li>▪ Value and Price</li><li>▪ Meaning of Goodwill</li></ul>
<b>6 Organizational</b>	<ul style="list-style-type: none"><li>▪ Use forecasts from client or analysts without checking</li><li>▪ Forecasting from a "finance" standpoint instead of a "business" standpoint</li></ul>

## In 2000, ENRON was one of the largest energy companies in the world

- Enron is born from the merger Houston Natural Gas and Internorth of Omaha (July 1985)
- 7<sup>th</sup> market cap in 2000 worldwide
- \$111 billion revenues in 2001
- Went bankrupt on December 2<sup>nd</sup>, 2001. one of the biggest financial scandals ever
- Kenneth Lay and Jeffrey Skilling (Enron founder and CEO) have been convicted for fraud following the scandal



## ...and even Goldman Sachs can get it wrong

Mistake no.1 : not understanding the business

Nearly every sell-side analyst reached the same conclusions about Enron in 2001, right up to the brink of its bankruptcy on Dec. 2. As of Oct. 18, all 15 analysts tracked by Thomson Financial rated Enron a “buy”—12 of the 15 called it a “strong buy.” Even as late as Nov. 8, the date of Enron’s disclosure that nearly five years of earnings would have to be recalculated, 11 of the 15 recommended buying the stock. (There were three “holds” and one “strong sell.”)

The image consists of three main parts. On the left is the Goldman Sachs logo. In the center is a red-bordered box containing the text "Enron Corp. (ENE) Gas & Power Convergence". To the right of this box is a red annotation in a sans-serif font that reads: "Probably not the best call the Goldman Sachs equity research team has made...". A red arrow points from this annotation towards the central text. Below the central text is another red-bordered box containing the text "Still the best of the best. With perceptions far below reality, we see major catalysts in third-quarter results and increased disclosure in coming months. We strongly reiterate our Recommended List rating and our conviction in high and sustained growth prospects, even though we have cut 2002 EPS to \$2.15 and our price target to \$48." At the bottom of the page is a blue-bordered box containing the text "We expect Enron shares to recover dramatically in the coming months". Below this box is a paragraph of text: "We view the current period as an extremely rare opportunity to purchase the shares of a company that remains extremely well positioned to grow at a substantial rate and earn strong returns in the still-very-young and evolving energy convergence space. We strongly".

**Goldman Sachs**

**Enron Corp. (ENE)  
Gas & Power Convergence**

Probably not the  
best call the  
Goldman Sachs  
equity research  
team has made...

**Still the best of the best.** With perceptions far below reality, we see major catalysts in third-quarter results and increased disclosure in coming months. We strongly reiterate our Recommended List rating and our conviction in high and sustained growth prospects, even though we have cut 2002 EPS to \$2.15 and our price target to \$48.

We expect Enron shares to recover dramatically in the coming months

We view the current period as an extremely rare opportunity to purchase the shares of a company that remains extremely well positioned to grow at a substantial rate and earn strong returns in the still-very-young and evolving energy convergence space. We strongly

## TIBCO: even bankers get confused about the share count adjustment!

Mistake no.2 : share count



- In 2014 Vista Equity Partners acquired Tibco software, an enterprise computing company, for \$4.3 billion, making the deal the largest technology buyout of the year
- As it turns out, only paid about \$4.2 billion for Tibco: the \$100 million gap being the result of a mistake made by Goldman Sachs, the financial adviser to Tibco
- According to a filing with the SEC, a mix-up with spreadsheets during the final days of negotiations led **Goldman Sachs to misrepresent to Vista the number of outstanding shares in Tibco: Goldman Sachs double-counted some shares as both common stock and equity awards**. That inflated share count was used to calculate the headline number put out in the press release while in fact Tibco actually had a smaller number of shares outstanding
- Goldman Sachs had to revise its fairness opinion. This led to a Tibco shareholder lawsuit that was settled in 2016. Goldman and Vista agreed to pay \$30 million to the Tibco shareholders as part of the settlement, the Wall Street Journal reported at the time.

SEC filing available here:

<https://www.sec.gov/Archives/edgar/data/1085280/000119312514373284/d802367dprem14a.htm>

## My personal favourite: SNAP's IPO

### Mistake no.3: Cash Flows mistake (EBITDA/taxes)

- In March 2017, **Morgan Stanley** published an equity research note on Snap, the social media company it helped take public, putting a \$28 price target on the stock.
- **Almost a day later, the bank issued a correction, changing a range of important metrics in its financial model but not the \$28 price target!**



- Morgan Stanley overstated the forecasted earnings over a five-year stretch by nearly \$5 billion.

*"We have corrected a tax calculation error in our model that overstated adjusted EBITDA in 2021-2025. We have updated the text and charts in the following note to reflect our estimate changes. Note that our revenue forecast and fundamental top-line drivers (DAUs, ad load, etc.) remain unchanged."*

- Morgan Stanley's revised numbers cut Snap's adjusted EBITDA for 2021 through to 2025. In 2025 alone, the change amounted to a cut of \$1.7 billion in estimated adjusted EBITDA
- In the first note, Morgan Stanley said it saw "companywide adjusted EBITDA margins reaching 40% by 2025." In the second note, it said it expected margins to hit 30% by 2025

# Morgan Stanley/SANP: The model before and after...

Morgan Stanley

Snap DCF Analysis	2014	2015	2016	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	Terminal Year
<b>Discounted Cash Flow Analysis</b>													
Net revenue	0.0	58.7	404.5	943.7	1,934.7	3,254.0	4,901.7	6,907.3	9,188.5	11,635.3	14,130.6	16,568.9	17,148.8
% change Y/Y			589.5%	133.3%	105.0%	68.2%	50.6%	40.9%	33.0%	26.6%	21.4%	17.3%	3.5%
Adjusted EBITDA	(292.9)	(459.4)	(771.9)	(609.5)	(194.6)	362.6	1,474.0	2,616.1	3,887.8	5,222.5	6,573.6		6,803.7
(-) Cash taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	823.3	1,448.4
(+/-) Changes in working capital	(15.5)	(150.5)	(256.6)	(227.5)	(230.5)	(228.4)	(208.9)	(223.8)	(248.1)	(206.9)	(150.6)		
(-) Capex	28.3	67.0	82.6	96.6	109.1	120.1	130.1	140.1	148.1	155.1	161.1		
(-) Stock-based compensation	73.5	31.8	75.0	159.3	202.8	256.5	316.6	421.1	533.3	647.7	759.4		
Free cash flow (for valuation)	(410.2)	(708.8)	(1,186.2)	(1,093.0)	(737.1)	(242.5)	818.4	1,831.1	2,958.2	3,389.6	4,054.2		4,196.1
% of revenue													
EBITDA Margin	-499.3%	-113.6%	-81.8%	-31.5%	-6.0%	7.4%	21.3%	28.5%	33.4%	37.0%	39.7%		39.7%
Incremental EBITDA Margin													
UFCF / EBITDA	140.1%	154.3%	153.7%	179.3%	378.7%	-66.9%	55.5%	70.0%	76.1%	64.9%	61.7%		61.7%
<b>NPV Calculation</b>													
12 Months FV				2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	
Year for 1-year forward value				0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	
Discounted cash flows					(996)	(612)	(184)	564	1,151	1,694	1,769	1,929	

Snap DCF Analysis	2014	2015	2016	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	Terminal Year
<b>Discounted Cash Flow Analysis</b>													
Net revenue	0.0	58.7	404.5	943.7	1,934.7	3,254.0	4,901.7	6,907.3	9,188.5	11,635.3	14,130.6	16,568.9	17,148.8
% change Y/Y			589.5%	133.3%	105.0%	68.2%	50.6%	40.9%	33.0%	26.6%	21.4%	17.3%	3.5%
Adjusted EBITDA	(292.9)	(459.4)	(771.9)	(609.5)	(194.6)	362.6	1,104.9	2,001.7	2,940.4	3,924.4	4,918.4		5,776.5
(-) Cash taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	822.1	1,445.6
(+/-) Changes in working capital	(15.5)	(150.5)	(171.7)	(167.3)	(150.1)	(140.0)	(155.0)	(148.3)	(153.3)	(148.0)	(130.4)		
(-) Capex	28.3	67.0	82.6	96.6	109.1	120.1	130.1	140.1	148.1	155.1	161.1		
(-) Stock-based compensation	73.5	31.8	75.0	159.3	202.8	256.5	316.6	421.1	533.3	647.7	759.4		
Free cash flow (for valuation)	(410.2)	(708.8)	(1,101.2)	(1,032.8)	(656.7)	(154.0)	503.2	1,292.1	2,105.6	2,151.6	2,421.8		2,844.3
% of revenue													
EBITDA Margin	-499.3%	-113.6%	-81.8%	-31.5%	-6.0%	7.4%	16.0%	21.8%	25.3%	27.8%	29.7%		33.7%
Incremental EBITDA Margin													
UFCF / EBITDA	140.1%	154.3%	142.7%	169.4%	337.4%	-42.5%	45.5%	64.6%	71.6%	54.8%	49.2%		49.2%
<b>NPV Calculation</b>													
12 Months FV				2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	
Year for 1-year forward value				0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	
Discounted cash flows					(966)	(563)	(122)	370	878	1,325	1,253	1,306	

## ...but in the end, even with different Cash Flows, the value does not change

### Mistake correction device: the WACC!!

- When Morgan Stanley issued a correction and updated its earnings models, its price target on the shares remained the same, as also they made changes to the WACC they used:

*"We have also corrected our discounted cash flow calculation so that it is consistent and comparable across our US internet coverage. More specifically, we are lowering our **SNAP equity risk premium from 5.59% (an estimated pre-IPO rate) to 4.29%** (consistent with other companies in our group). **This change lowers our WACC to 8% (from 10%).** On an aggregate basis, our price target is unchanged at \$28/share."*

### Morgan Stanley

- The change put Morgan Stanley out of sync with its peers on Wall Street: most banks used a WACC significantly above the 9.7% and 8% figures that Morgan Stanley used:
  - *Credit Suisse*: "We have used a **weighted average cost of capital of 11%** and a terminal growth rate of 3%."
  - *Deutsche Bank*: "We use a **WACC of ~16%** in our DCF which assumes no debt in the capital structure."
  - *Jefferies*: "Our \$30 PT is based on 10-year DCF (**12% WACC**, 3.5% LTGR)."
  - *RBC Capital Markets*: "Our \$31 price target is also supported by a DCF, based on an **11% WACC** and a 5% long-term growth rate."
  - *Atlantic Equities*, a bank that wasn't on the Snap deal, used an **11% WACC** in its model.

## **SNAP epilogue:**

once the IPO is over, maybe the cash flows were not there after all...

**Excerpt from a July 2017 research note on Snap published by Morgan Stanley  
(MS was the lead initial public offering underwriter):**

*"We have been wrong about SNAP's ability to innovate and improve its ad product this year (improving scalability, targeting, measurability, etc.) and user monetization as it works to move beyond 'experimental' ad budgets into larger branded and direct response ad allocations,"*

**Brian Nowak, an analyst at Morgan Stanley, in a note to clients.**



- Morgan Stanley downgraded the company to a neutral (hold) and lowered its price target by 42% to \$16.
- The bank's bear case for the stock was \$7.
- The IPO price was \$17.
- Snap's stock plunged nearly 9% in one day after the downgrade...

## SolarCity / Tesla

### Mistake no.4: EV to equity bridge

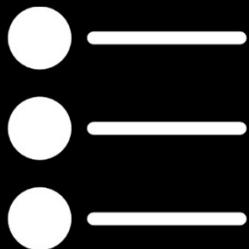
- In 2016, Tesla acquired the solar-services company SolarCity in an all-stock deal for \$2.6 billion. Tesla's CEO Elon Musk — who was both on the board of SolarCity and running Tesla — said it would turn Tesla into a vertically integrated renewable-energy juggernaut (*however, his motivations for the deal might have been different: SolarCity, helmed by Musk's cousin, Lyndon Rive, was going bankrupt and heavily in debt in 2016...*)
- Lazard Ltd who was advising SolarCity made an error in its analysis that discounted the value of the U.S. solar energy company by \$400 million: the indicated equity value between \$14.75 and \$34.00 per share was wrong **because it double-counted some of the company's projected indebtedness**. After becoming aware of the mistake Lazard realized the accurate valuation range was \$18.75 to \$37.75
- This was the result of a computational error “in certain SolarCity spreadsheets setting forth SolarCity’s financial information that Lazard used in its discounted cash flow valuation analyses (*note: the error was not included in the valuation analysis performed by Tesla and its financial adviser, Evercore Partners...*)
- **SolarCity and Tesla agreed however that the error would not change their view of the deal**, the purchase price, to be paid with Tesla stock, was \$25.37 per share.

## More about Solar City / Tesla: strange assumptions (and results) from both Evercore and Lazard (?)

	Tesla Valuation/ Pricing		Solar City Valuation/ Pricing		Implied Exchange Ratio	
	Evercore	Lazard	Evercore	Lazard	Evercore	Lazard
Cash flows used	<b>Instructed by Tesla Board to use</b> 1. Goldman Sachs Equity Research (GSER) forecasts for 2016-2020 2. IBES consensus forecasts		<b>Solar City supplied forecasts of cash flows with</b> 1. Unrestricted access to capital markets (LIQ) 2. Restricted access to capital markets (NOLIQ)		"Fair" ratio is 0.124-0.699 Tesla shares/ Solar City share, making the actual offer of 0.11 Tesla shares a good deal for Tesla shareholders	Using midpoints for Tesla value and SCTY (NOLIQ) value, the fair ratio is 0.0819 Tesla shares/ Solar City share, making the actual offer of 0.11 Tesla shares a good deal for Solar City shareholders
Discount Rate	10-12% (Cost of capital)	12-13% (Cost of capital)	12-15% (Cost of equity), on levered cash flows	9.5-10.5% (Cost of capital) on unlevered cash flows		
Terminal Value	6-8% growth rate in perpetuity	10-18 times EBITDA	3-5% growth rate in perpetuity	1.5-3% growth rate in perpetuity		
Value per share	GSER: \$88.36-\$302.21 IBES: \$132.92-\$451.02	GSER: \$145-\$270 IBES: Not done/reported	LIQ: \$37.51-\$61.53 NOLIQ: \$24.76-\$42.72	LIQ: \$18.75-\$37.75 NOLIQ: \$10.75-\$23.25		
Compensation Received	<b>Evercore:</b> \$1.25 million as opinion fee + \$5.75 million contingent on deal happening <b>Lazard:</b> \$ 2 million + 0.4% of equity value of Solar City contingent on deal happening					

## Key things you should remember

- **Valuation is inherently imprecise:** think about a range of values as opposed to a single “correct” value
- **Look to the future not the past:** the past is relevant only as a guide to the future
- **Working backwards can be valuable:** e.g. “what do you have to believe” to justify a certain DCF value. Is it reasonable?
- **Valuation is not just a numbers game:** You need a real understanding of the business and its environment
- **Triangulate:** look at all your methodologies
- **Think like an investor:** use judgment, use common sense. Think about your answer



## CONTENTS

- Introduction
- A (very) simple valuation model
- A simple DCF model
- Taking into account the timing of the valuation
- The Enterprise to Equity ‘bridge’
- A DCF model based on the value drivers
- Modelling the Competitive Advantage Period
- Modelling the Terminal value
- Modelling in practice: consumer goods example
- Estimating the Weighted Average Cost of Capital
- Using scenarios
- Financial statements modelling
- Valuation Using Multiples
- Other valuation models
- Final thoughts
- **Appendix: additional resources for valuation**

## VIDEO RESOURCES

➤ **Tim Koller video on Value principles:**

Must see if you are interested in Corporate finance

<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/creating-value-an-interactive-tutorial>

➤ **Aswath Damodaran Youtube channel:**

Includes sessions from his valuation classes. A bit lengthy but good reference

<https://www.youtube.com/channel/UCLvnJL8htRR1T9cbSccaoVw/playlists>

➤ **Mergers and Inquisitions YouTube channel:**

*Good for interview preparation. Note: I did not check the technical quality of all videos...*

<https://www.youtube.com/user/financialmodeling/playlists>

# FREE CORPORATE FINANCE RESOURCES

Aswath Damodaran's page : <http://pages.stern.nyu.edu/~adamodar/>

**McKinsey on Finance:**

[http://www.mckinsey.com/client\\_service/corporate\\_finance/latest\\_thinking/mckinsey\\_on\\_finance](http://www.mckinsey.com/client_service/corporate_finance/latest_thinking/mckinsey_on_finance)

**Michael Mauboussin publications:** <https://www.michaelmauboussin.com/>

LEGG MASON: <https://www.lmcm.com/default.asp?P=868060&S=868156>

Credit Suisse papers: look for "**Consilient observer**" in Google

<http://www.expectationsinvesting.com/>

**Free Corporate Finance textbook, for reference:** <http://book.ivo-welch.info/ed2/toc.html>

**French textbook/resources:** [www.vernimmen.net/](http://www.vernimmen.net/)

**Online Finance glossary:** [www.duke.edu/~charvey/Classes/wpg/glossary.htm](http://www.duke.edu/~charvey/Classes/wpg/glossary.htm)

**Various economic/financial data:** <https://fred.stlouisfed.org/>

**Exchange rates:** [www.oanda.com](http://www.oanda.com)

**Tax rates :** type "**KPMG corporate tax survey**" in Google. PDF report published every year

**Deloitte** also has a webpage detailing tax rates

Accounting and Valuation technical articles: <https://www.footnotesanalyst.com/>

## AT THE LIBRARY/BOOKSHOP...

### ***Interesting journals for Corporate finance:***

Journal of Applied Corporate Finance

Financial Analysts Journal

Option finance (French)

### ***Books:***

#### Valuation, Koller/Goedhart/Wessels, Wiley.

Now in its 7th edition. The 6<sup>th</sup> Edition very similar to 7<sup>th</sup>

*Note: TBS library has 6<sup>th</sup> and 7<sup>th</sup> editions*

Edition 4/5 are also OK (don't use the older ones, many recommendations have changed since they were published..)

#### Damodaran: valuation books

#### Analysis for Financial Management, Higgins.

Good to review financial analysis and see the link with Corporate finance (including how to build models)

# BLOOMBERG – USEFUL PAGES

<u>Mnemonic</u>	<u>Description</u>	<u>Mnemonic</u>	<u>Description</u>
<ul style="list-style-type: none"> <li><b>Equity functions</b> <ul style="list-style-type: none"> <li>– DES</li> <li>– FA</li> <li>– CACS</li> <li>– RELS</li> <li>– EE</li> <li>– ANR</li> <li>– PHDC</li> <li>– CF</li> <li>– RV</li> <li>– CN</li> <li>– HP</li> <li>– GP</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Overview security</li> <li>– Financial analysis (ratios, EV, financials)</li> <li>– Company calendar: M&amp;A, capital changes, ...</li> <li>– All Company instruments (bonds, listings,...)</li> <li>– Analyst estimates (Sales, EBIT(DA), EPS...)</li> <li>– Analyst recommendations (Buy/Hold/Sell)</li> <li>– Shareholders search</li> <li>– Company filings (annual reports...)</li> <li>– Relative value (peer search): NA (North America), WE (West. Europe), W (World)</li> <li>– Company news</li> <li>– Historical price and volume</li> <li>– Price Graph</li> </ul>	<ul style="list-style-type: none"> <li><b>Useful indexes</b> <ul style="list-style-type: none"> <li>– MXWO</li> <li>– MSERWI index</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Morgan Stanley world (for Betas)</li> <li>– Morgan Stanley world price index</li> </ul>
<ul style="list-style-type: none"> <li><b>Credit</b> <ul style="list-style-type: none"> <li>– DDIS</li> <li>– CRPR</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Debt repayment schedule</li> <li>– Credit rating</li> </ul>	<ul style="list-style-type: none"> <li><b>Bonds</b> <ul style="list-style-type: none"> <li>– YA</li> <li>– YAS</li> <li>– DES</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Yield analysis</li> <li>– Yield analysis (use this one)</li> <li>– Overview security (menu for prospectus)</li> </ul>
<ul style="list-style-type: none"> <li><b>Risk free rates</b> <ul style="list-style-type: none"> <li>– WB</li> <li>– GGR</li> <li>– GGR [go] HP Y</li> <li>– IM <ul style="list-style-type: none"> <li>- EUSW</li> <li>- USSW</li> <li>- BTMM</li> </ul> </li> <li>– &lt;govt&gt; TK</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Overview main 10yr bonds</li> <li>– Government bonds, other countries</li> <li>– Historical data: select a bond + type “HP Y”</li> <li>– Country pages</li> <li>– European Swap rates</li> <li>– US Swap rates</li> <li>– Swap rates, other countries</li> <li>– Government bonds</li> </ul>	<ul style="list-style-type: none"> <li><b>Other</b> <ul style="list-style-type: none"> <li>– MA</li> <li>– NEWS</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Merger and acquisitions search</li> <li>– Top news</li> </ul>

## MAIN FINANCIAL DATABASES USED BY I-BANKS

Make sure you have know about their existence and if possible, learn how to use them

Financials/Market data:

- **Bloomberg**
- Reuters
- **Eikon**
- **Thomson datastream (accessible via Eikon)**
- **Infront analytics (previously known as Infinancials)**
- Compustat (S&P)
- Capital IQ

M&A:

- Mergermarket
- Refinitiv/SDC platinum
- Thomson One

Bloomberg, CapIQ, Eikon also provide M&A data

Small companies (BVD-Bureau Van dijk):

- Amadeus
- **Orbis**
- **Diane for France**