



Fair Value: Fact or Opinion

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Fair value is in the eyes of the beholder...

- Don't measure fair value by precision: As uncertainty about an asset's cash flows increase, the estimates of fair value made by different analysts will also diverge. Some assets will therefore always have more precise estimates of fair value than others.
- Bias will always permeate fair value estimates: Much as we pay lip service to the notion that we can estimate fair value objectively, bias will find its way into fair value estimates. Honesty about the bias is all that we can demand of analysts. A good estimate of fair value is one where you will be willing to be either buyer or seller with real money.
- Simple models will trump more complex models: More rules and complexity will not always yield better estimates of fair value.

Approaches to estimating fair value

- **Discounted cashflow valuation**, relates the value of an asset to the present value of expected future cashflows on that asset.
- **Relative valuation**, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cashflows, book value or sales.

I. Discounted Cashflow Valuation: The fair value of an asset is...

$$\text{Value of asset} = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} \dots + \frac{CF_n}{(1+r)^n}$$

where CF_t is the expected cash flow in period t , r is the discount rate appropriate given the riskiness of the cash flow and n is the life of the asset.

Proposition 1: The ease of valuing an asset is not a function of how tangible or intangible it is but whether it generates cash flows and how easy it is to estimate those cash flows.

Proposition 2: Assets that are independent and generate cashflows on their own are easier to value than assets that generate intermingled cash flows.

Proposition 3: Assets with finite and specified lives are easier to value than assets with unspecified or infinite lives.

Two Measures of Cash Flows

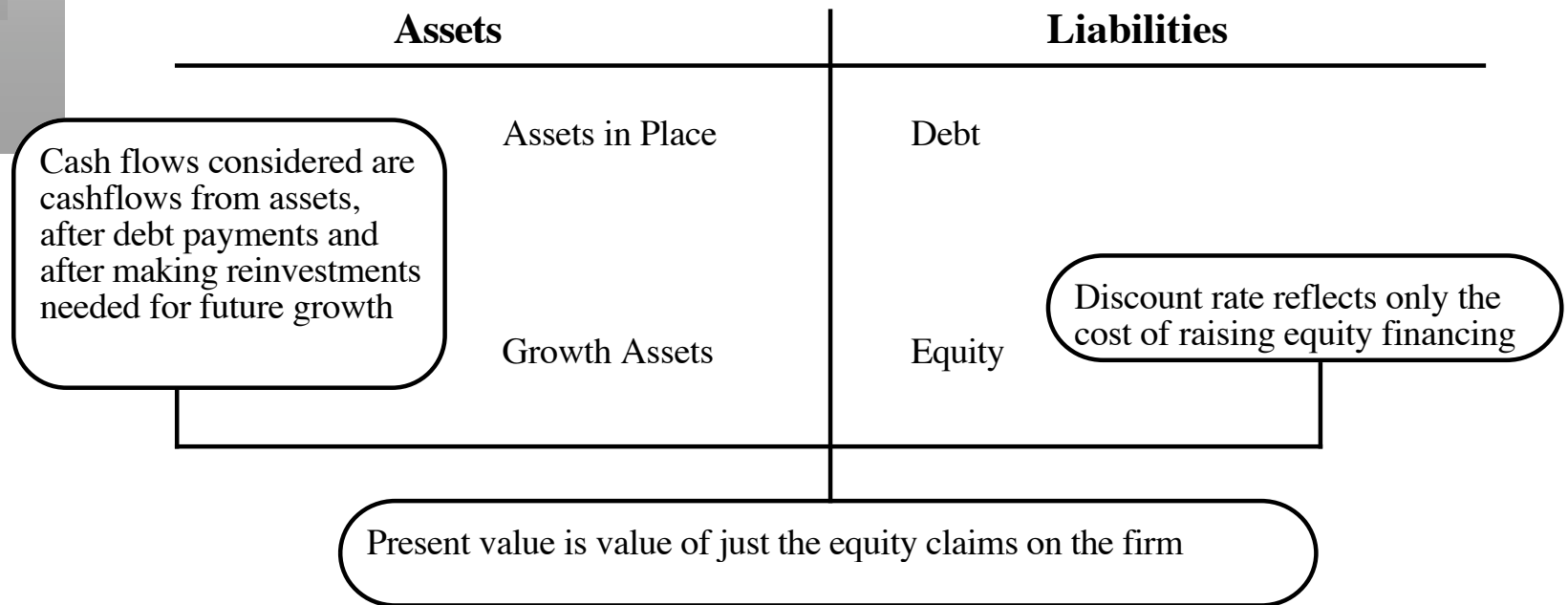
- **Cash flows to Equity:** These are the cash flows generated by the asset after all expenses and taxes, and also after payments due on the debt. This cash flow, which is after debt payments, operating expenses and taxes, is called the **cash flow to equity investors**.
- **Cash flow to Firm:** There is also a broader definition of cash flow that we can use, where we look at not just the equity investor in the asset, but at the total cash flows generated by the asset for both the equity investor and the lender. This cash flow, which is before debt payments but after operating expenses and taxes, is called the **cash flow to the firm**

Two Measures of Discount Rates

- **Cost of Equity:** This is the rate of return required by equity investors on an investment. It will incorporate a premium for equity risk -the greater the risk, the greater the premium.
- **Cost of capital:** This is a composite cost of all of the capital invested in an asset or business. It will be a weighted average of the cost of equity and the after-tax cost of borrowing.

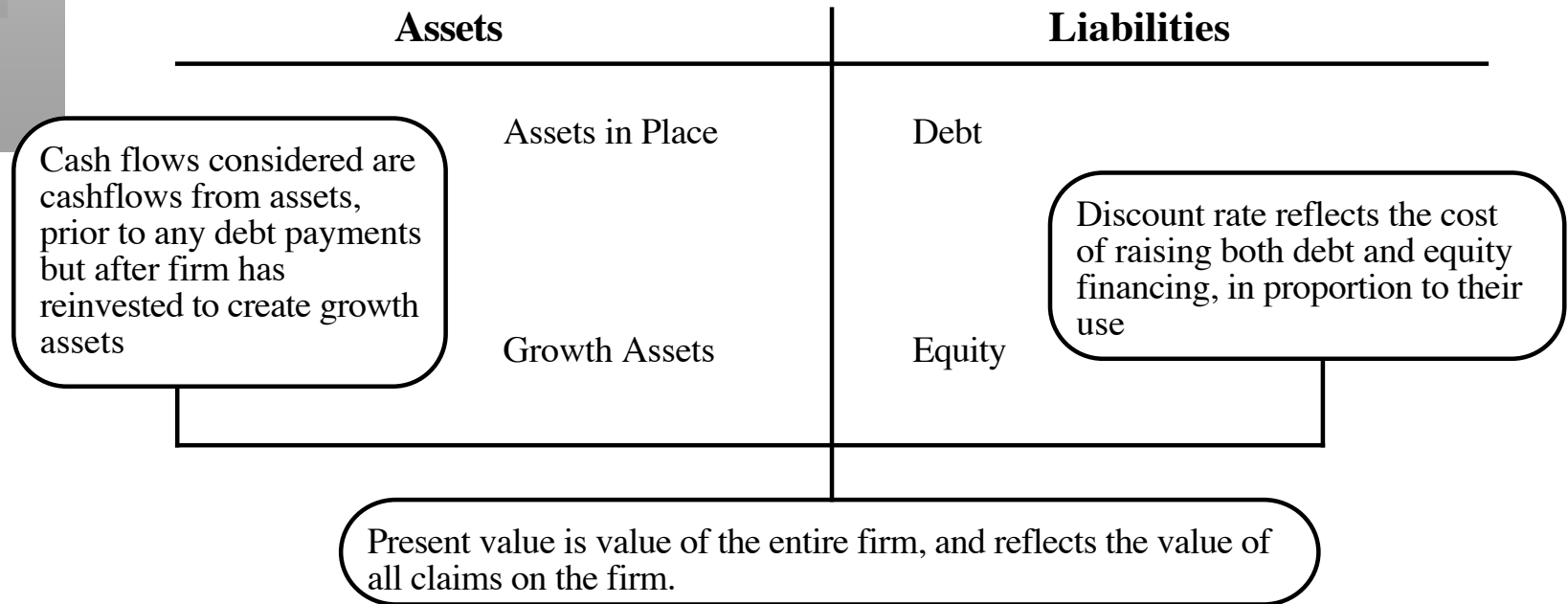
Equity Valuation

Figure 5.5: Equity Valuation



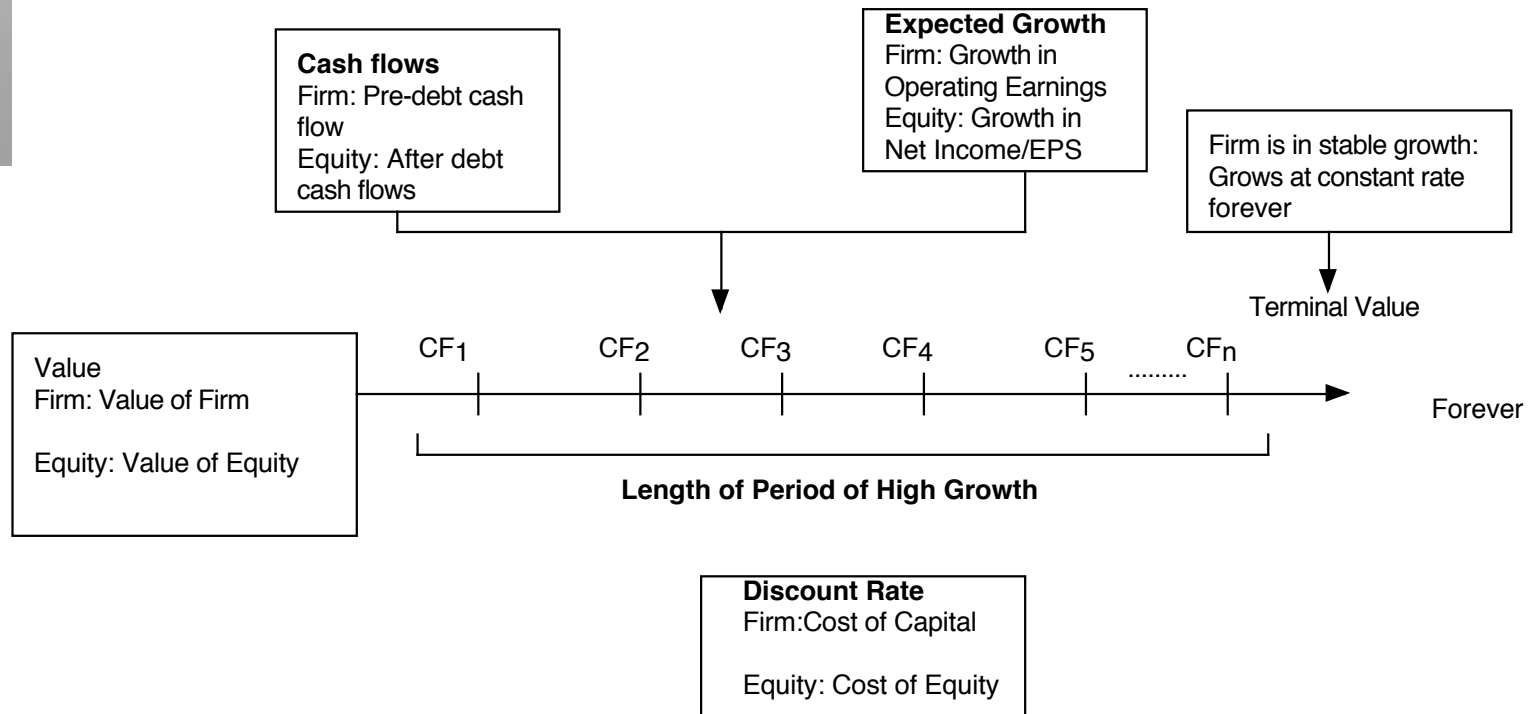
Asset Valuation

Figure 5.6: Firm Valuation

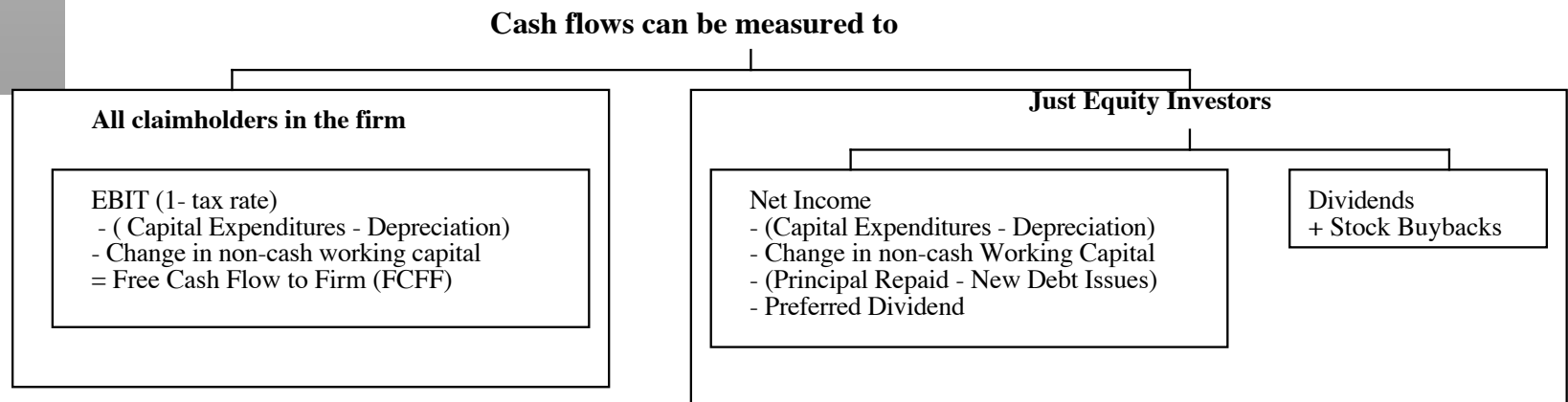


Valuation with Infinite Life

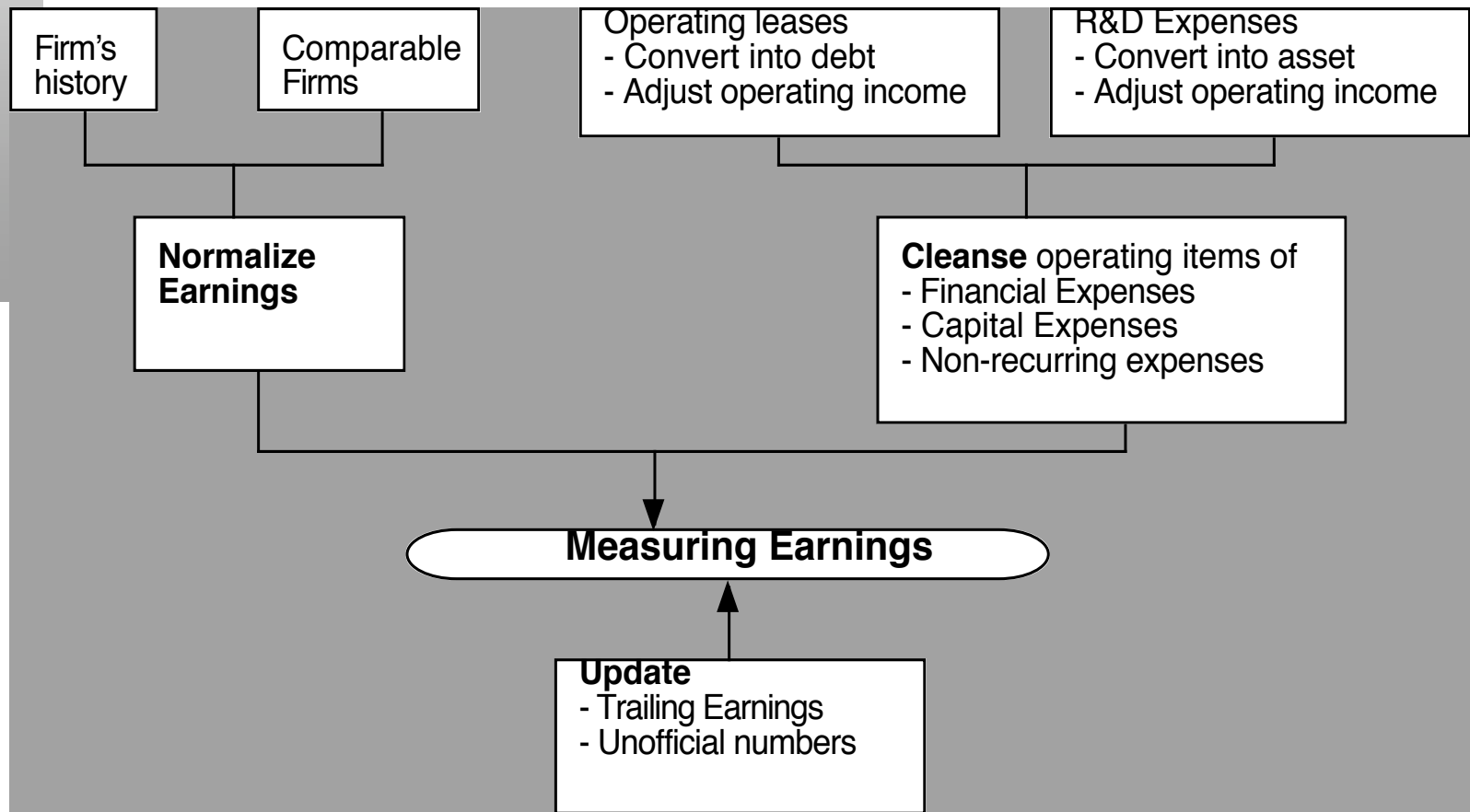
DISCOUNTED CASHFLOW VALUATION



I. Estimating Cash flow from existing assets



All cash flow estimates start with accounting earnings, but...



And require capital expenditures...

- Research and development expenses, once they have been re-categorized as capital expenses. The adjusted net cap ex will be

Adjusted Net Capital Expenditures = Net Capital Expenditures + Current year's R&D expenses - Amortization of Research Asset

- Acquisitions of other firms, since these are like capital expenditures. The adjusted net cap ex will be

Adjusted Net Cap Ex = Net Capital Expenditures + Acquisitions of other firms - Amortization of such acquisitions

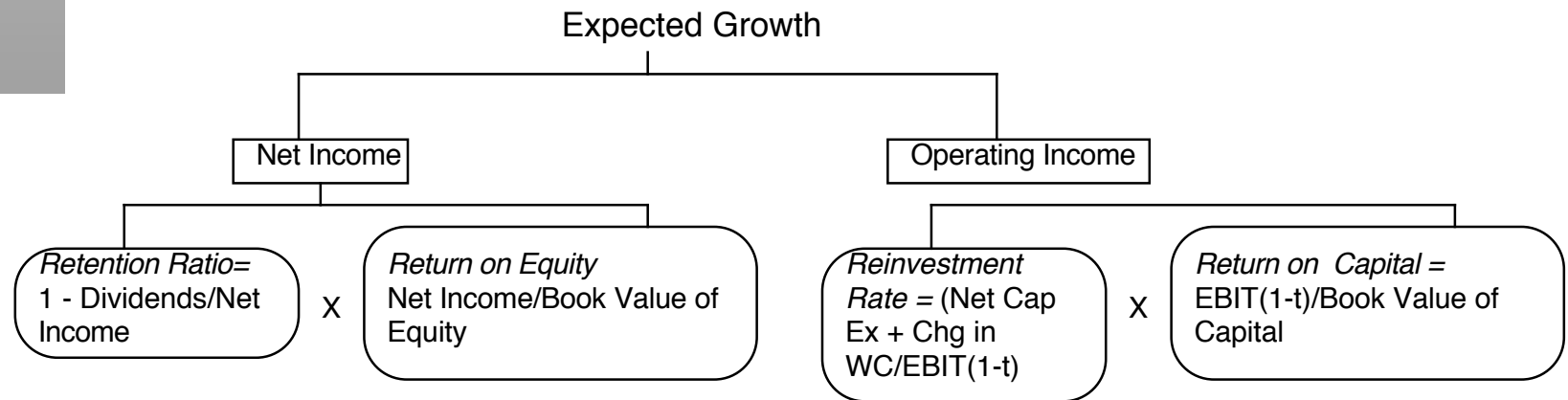
Two caveats:

1. Most firms do not do acquisitions every year. Hence, a normalized measure of acquisitions (looking at an average over time) should be used
2. The best place to find acquisitions is in the statement of cash flows, usually categorized under other investment activities

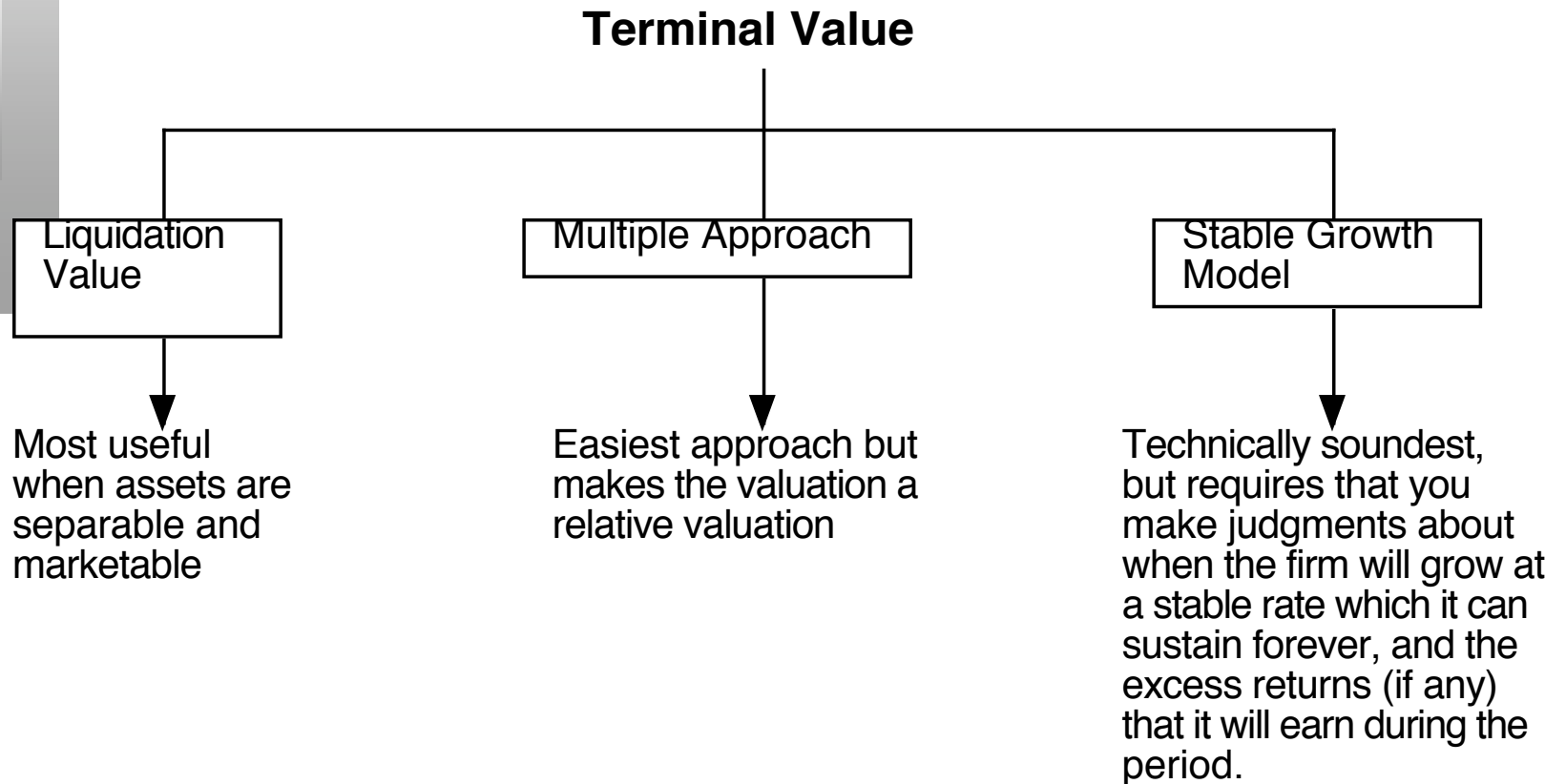
With working capital defined as..

- In accounting terms, the working capital is the difference between current assets (inventory, cash and accounts receivable) and current liabilities (accounts payables, short term debt and debt due within the next year)
- A cleaner definition of working capital from a cash flow perspective is the difference between non-cash current assets (inventory and accounts receivable) and non-debt current liabilities (accounts payable)
- Any investment in this measure of working capital ties up cash. Therefore, any increases (decreases) in working capital will reduce (increase) cash flows in that period.
- When forecasting future growth, it is important to forecast the effects of such growth on working capital needs, and building these effects into the cash flows.

II. The Determinants of High Growth: How investment decisions affect value

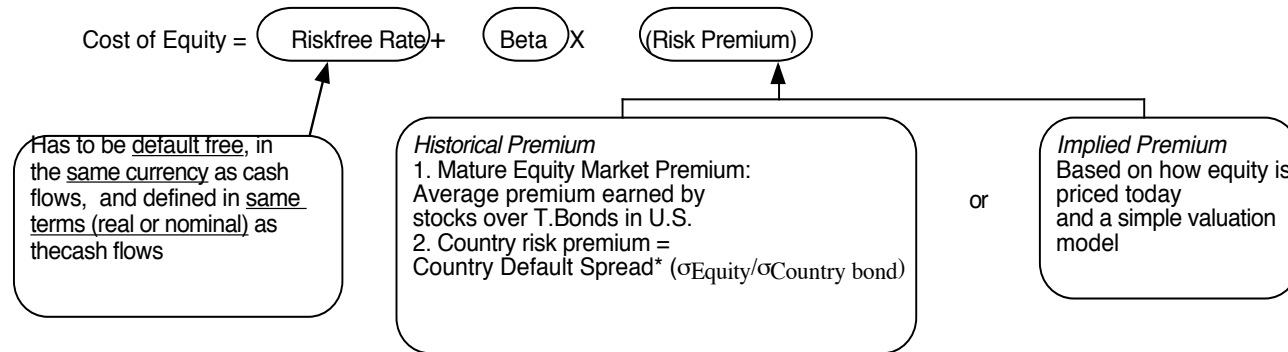


III. Length of High Growth and Terminal Value: Corporate Strategy meets valuation

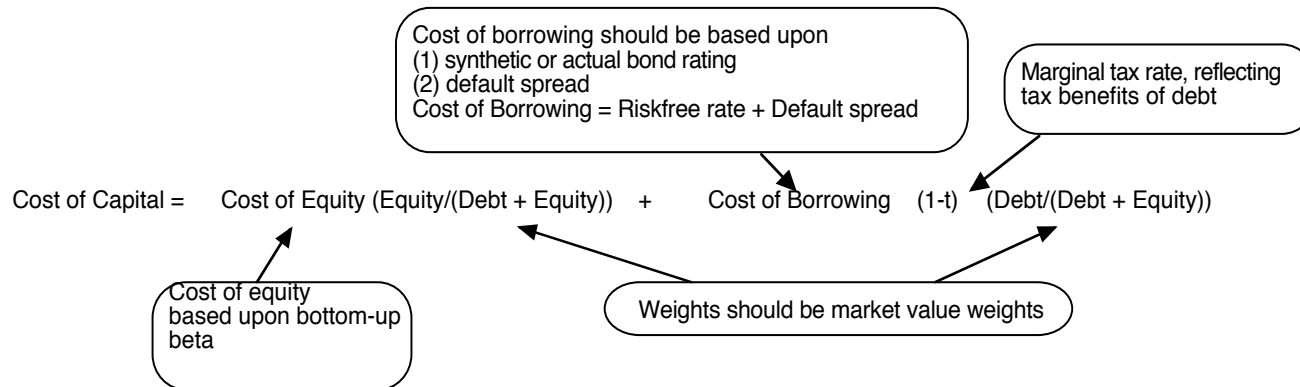


IV. Discount Rates: Business Risk and Capital structure

Cost of Equity: Rate of Return demanded by equity investors



Cost of Capital: Weighted rate of return demanded by all investors



Titan Cements: Status Quo

Avg Reinvestment rate = 28.54%

Current Cashflow to Firm
 EBIT(1-t) : 173
 - Nt CpX 49
 - Chg WC 52
 = FCFF 72
 Reinvestment Rate = 101/173 = 58.5%

Reinvestment Rate 28.54%

Expected Growth in EBIT (1-t)
 $.2854 * .1925 = .0549$
5.49%

Return on Capital 19.25%

Stable Growth
 $g = 3.41\%$; Beta = 1.00;
 Country Premium = 0%
 Cost of capital = 6.57%
 ROC = 6.57%; Tax rate = 33%
 Reinvestment Rate = 51.93%

Terminal Value₅ = $100.9 / (.0657 - .0341) = 3195$

Op. Assets 2,897
 + Cash: 77
 - Debt 414
 - Minor. Int. 46
 = Equity 2,514
 - Options 0
 Value/Share €32.84

Year	1	2	3	4	5
EBIT	€ 244.53	€ 257.96	€ 272.13	€ 287.08	€ 302.85
EBIT(1-t)	€ 182.25	€ 192.26	€ 202.82	€ 213.96	€ 225.7
- Reinvestment	€ 52.01	€ 45.87	€ 57.88	€ 61.06	€ 64.42
= FCFF	€ 130.24	€ 137.39	€ 144.94	€ 152.90	€ 161.30

Term Yr
 313.2
 209.8
 108.9
 100.9

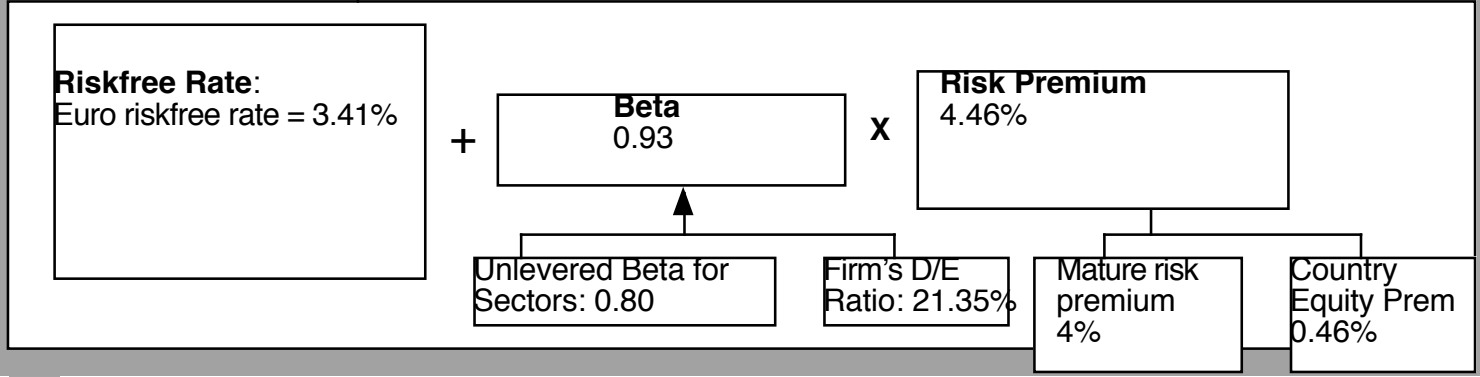
Discount at Cost of Capital (WACC) = 7.56% (.824) + 3.11% (0.176) = 6.78%

Cost of Equity 7.56%

Cost of Debt
 $(3.41\% + .5\% + .26\%)(1 - .2547) = 3.11\%$

Weights
 E = 82.4% D = 17.6%

On April 27, 2005 Titan Cement stock was trading at € 25 a share



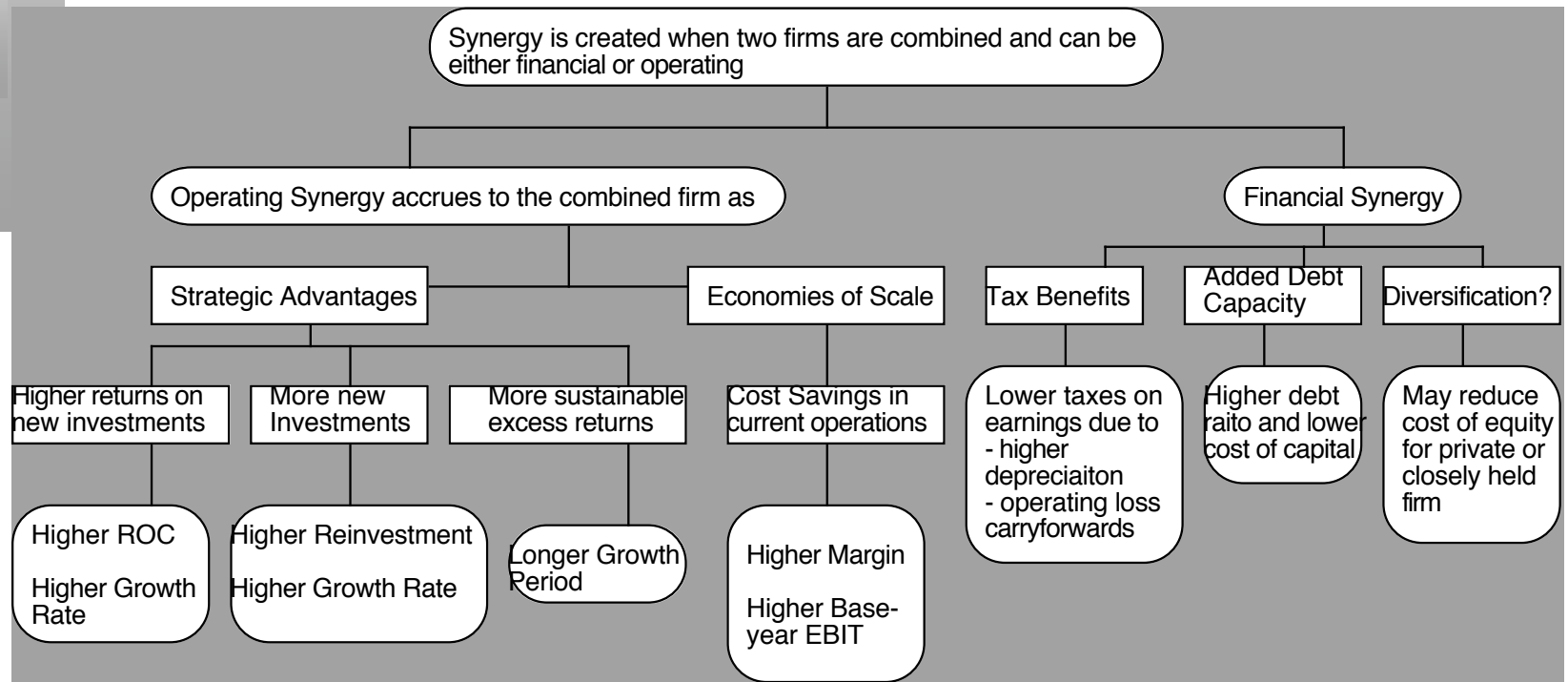
The Paths to Value Creation

- Using the DCF framework, there are four basic ways in which the value of a firm can be enhanced:
 - The cash flows from existing assets to the firm can be increased, by either
 - increasing after-tax earnings from assets in place or
 - reducing reinvestment needs (net capital expenditures or working capital)
 - The expected growth rate in these cash flows can be increased by either
 - Increasing the rate of reinvestment in the firm
 - Improving the return on capital on those reinvestments
 - The length of the high growth period can be extended to allow for more years of high growth.
 - The cost of capital can be reduced by
 - Reducing the operating risk in investments/assets
 - Changing the financial mix
 - Changing the financing composition

Good valuations don't require garnishing...

- It has become established practice in valuation that estimated values are garnished for what analysts like to call the “intangibles”.
 - These include the good intangibles such as synergy, strategic considerations and control
 - And bad intangibles such as illiquidity, marketability and minority holdings
- This is not only a bad practice because the whole point of doing the valuation but because we risk double counting items.

1. We can value synergy...



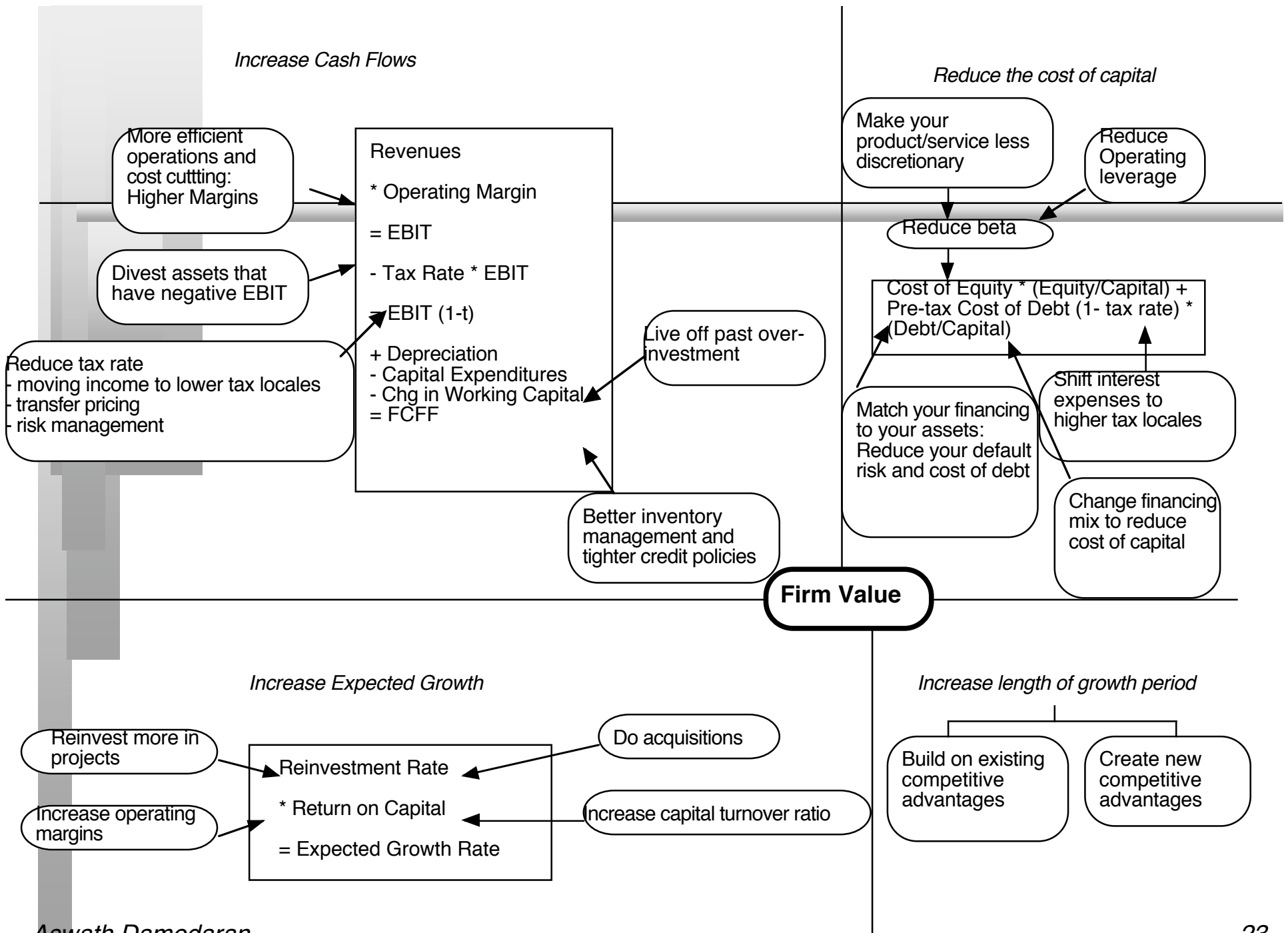
Valuing Synergy: P&G + Gillette

	P&G	Gillette	Piglet: No Synergy	Piglet: Synergy	
Free Cashflow to Equity	\$5,864.74	\$1,547.50	\$7,412.24	\$7,569.73	Annual operating expenses reduced by \$250 million
Growth rate for first 5 years	12%	10%	11.58%	12.50%	Slightly higher growth rate
Growth rate after five years	4%	4%	4.00%	4.00%	
Beta	0.90	0.80	0.88	0.88	
Cost of Equity	7.90%	7.50%	7.81%	7.81%	Value of synergy
Value of Equity	\$221,292	\$59,878	\$281,170	\$298,355	\$17,185

2. And control...

- The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -
 - **Probability that control of firm will change:** This refers to the probability that incumbent management will be replaced. this can be either through acquisition or through existing stockholders exercising their muscle.
 - **Value of Gaining Control of the Company:** The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control

Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control



Titan Cements: Restructured

Reinvest more in slightly less attractive projects

Current Cashflow to Firm

EBIT(1-t) :	173
- Nt CpX	49
- Chg WC	52
= FCFF	72
Reinvestment Rate = 101/173	
=58.5%	

Reinvestment Rate
50%

Expected Growth in EBIT (1-t)
.50*.18=.09
9%

Return on Capital
18%

Stable Growth
g = 3.41%; Beta = 1.00;
Country Premium= 0%
Cost of capital = 5.97%
ROC= 5.97%; Tax rate=33%
Reinvestment Rate=51.9%

Terminal Value₅ = 106.0 / (.0597 - .0341) = 4137

Op. Assets	3,468
+ Cash:	77
- Debt	411
- Minor. Int.	46
=Equity	3,088
-Options	0
Value/Share	\$40.33

Year	1	2	3	4	5
EBIT	€ 252.66	€ 275.40	€ 300.19	€ 327.20	€ 356.65
EBIT(1-t)	€ 188.31	€ 205.26	€ 223.73	€ 243.87	€ 265.81
- Reinvestment	€ 94.15	€ 102.63	€ 111.86	€ 121.93	€ 132.91
= FCFF	€ 94.15	€ 102.63	€ 111.86	€ 121.93	€ 132.91

Term Yr

368.8
247.1
141.1
106.0

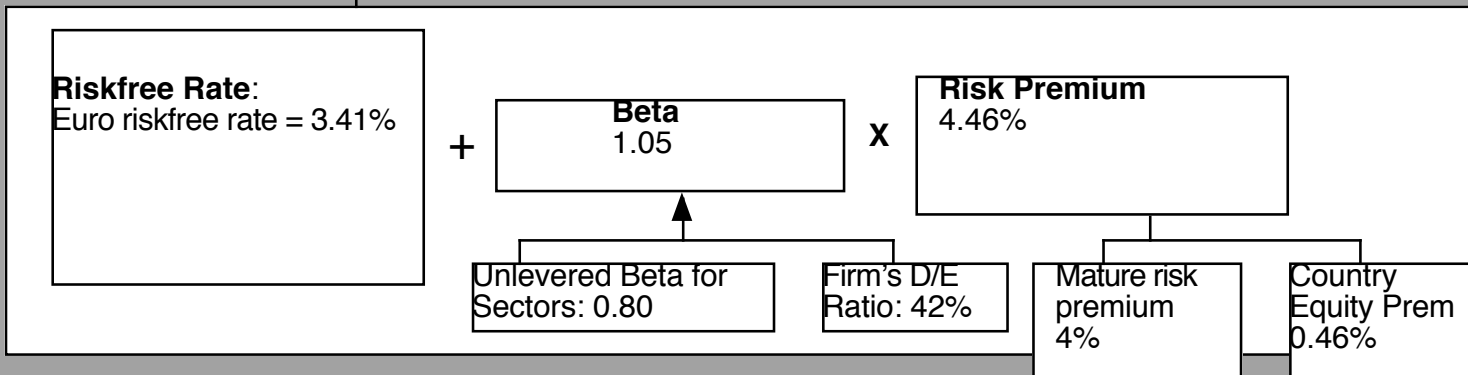
Discount at Cost of Capital (WACC) = 8.11% (.70) + 3.29% (0.30) = 6.6%

Use a higher debt ratio

Cost of Equity
8.11%

Cost of Debt
(3.41%+.74%+.26%)(1-.2547)
= 3.29%

Weights
E = 70% D = 30%



Valuing Brand Name

	Coca Cola	Generic Cola Company
AT Operating Margin	18.56%	7.50%
Sales/BV of Capital	1.67	1.67
ROC	31.02%	12.53%
Reinvestment Rate	65.00% (19.35%)	65.00% (47.90%)
Expected Growth	20.16%	8.15%
Length	10 years	10 yea
Cost of Equity	12.33%	12.33%
E/(D+E)	97.65%	97.65%
AT Cost of Debt	4.16%	4.16%
D/(D+E)	2.35%	2.35%
Cost of Capital	12.13%	12.13%
Value	\$115	\$13

Relative Valuation

- **What is it?:** The value of any asset can be estimated by looking at how the market prices “similar” or ‘comparable” assets.
- **Philosophical Basis:** The intrinsic value of an asset is impossible (or close to impossible) to estimate. The value of an asset is whatever the market is willing to pay for it (based upon its characteristics)
- **Information Needed:** To do a relative valuation, you need
 - an identical asset, or a group of comparable or similar assets
 - a standardized measure of value (in equity, this is obtained by dividing the price by a common variable, such as earnings or book value)
 - and if the assets are not perfectly comparable, variables to control for the differences
- **Market Inefficiency:** Pricing errors made across similar or comparable assets are easier to spot, easier to exploit and are much more quickly corrected.

Step 1: Finding comparable assets

- If life were simple, the value of an asset would be analyzed by looking at how an exactly identical asset - in terms of risk, growth and cash flows - is priced. Identical assets can be found with real assets or even with fixed income assets, but difficult to find with risky assets or businesses.
- In most analyses, however, a comparable firm is defined to be one in the same business as the firm being analyzed.
- If there are enough firms in the sector to allow for it, this list will be pruned further using other criteria; for instance, only firms of similar size may be considered. Implicitly, the assumption being made here is that firms in the same sector have similar risk, growth and cash flow profiles and therefore can be compared with much more legitimacy.

Step 2: Scaling Value - Coming up with a multiple

- Multiples of Earnings
 - Equity earnings multiples: Price earnings ratios and variants
 - Operating earnings multiples: Enterprise value to EBITDA or EBIT
 - Cash earnings multiples
- Multiples of Book Value
 - Equity book multiples: Price to book equity
 - Capital book multiples: Enterprise value to book capital
- Multiples of revenues
 - Price to Sales
 - Enterprise value to Sales

The Fundamentals behind multiples

- Every multiple has embedded in it all of the assumptions that underlie discounted cashflow valuation. In particular, your assumptions about growth, risk and cashflow determine your multiple.
- If you have an equity multiple, you can begin with an equity discounted cash flow model and work out the determinants.
- If you have a firm value multiple, you can begin with a firm valuation model and work out the determinants.

What to control for...

<i>Multiple</i>	<i>Determining Variables</i>
Price/Earnings Ratio	<i>Growth, Payout, Risk</i>
Price/Book Value Ratio	<i>Growth, Payout, Risk, ROE</i>
Price/Sales Ratio	<i>Growth, Payout, Risk, Net Margin</i>
Value/EBIT Value/EBIT (1-t) Value/EBITDA	<i>Growth, Reinvestment Needs, Leverage, Risk</i>
Value/Sales	<i>Growth, Net Capital Expenditure needs, Leverage, Risk, Operating Margin</i>
Value/Book Capital	<i>Growth, Leverage, Risk and ROC</i>

Step 3: How to control for differences..

- Modify the basic multiple to adjust for the effects of the most critical variable determining that multiple. For instance, you could divide the PE ratio by the expected growth rate to arrive at the PEG ratio.

$$\text{PEG} = \text{PE} / \text{Expected Growth rate}$$

- If you want to control for more than one variable, you can draw on more sophisticated statistical techniques.

Example: PEG Ratios

<i>Company</i>	<i>PE</i>	<i>Expected Growth Rate</i>	<i>PE/Expected Growth (PEG)</i>
Acclaim Entertainment	13.70	23.60%	0.58
Activision	75.20	40.00%	1.88
Broderbund	32.30	26.00%	1.24
Davidson Associates	44.30	33.80%	1.31
Edmark	88.70	37.50%	2.37
Electronic Arts	33.50	22.00%	1.52
The Learning Co.	33.50	28.80%	1.16
Maxis	73.20	30.00%	2.44
Minnesota Educational	69.20	28.30%	2.45
Sierra On-Line	43.80	32.00%	1.37

Example: PBV ratios, ROE and Growth

<i>Company Name</i>	<i>P/BV</i>	<i>ROE</i>	<i>Expected Growth</i>
Total ADR B	0.90	4.10	9.50%
Giant Industries	1.10	7.20	7.81%
Royal Dutch Petroleum ADR	1.10	12.30	5.50%
Tesoro Petroleum	1.10	5.20	8.00%
Petrobras	1.15	3.37	15%
YPF ADR	1.60	13.40	12.50%
Ashland	1.70	10.60	7%
Quaker State	1.70	4.40	17%
Coastal	1.80	9.40	12%
Elf Aquitaine ADR	1.90	6.20	12%
Holly	2.00	20.00	4%
Ultramar Diamond Shamrock	2.00	9.90	8%
Witco	2.00	10.40	14%
World Fuel Services	2.00	17.20	10%
Elcor	2.10	10.10	15%
Imperial Oil	2.20	8.60	16%
Repsol ADR	2.20	17.40	14%
Shell Transport & Trading ADR	2.40	10.50	10%
Amoco	2.60	17.30	6%
Phillips Petroleum	2.60	14.70	7.50%
ENI SpA ADR	2.80	18.30	10%
Mapco	2.80	16.20	12%
Texaco	2.90	15.70	12.50%
British Petroleum ADR	3.20	19.60	8%
Tosco	3.50	13.70	14%

Results from Multiple Regression

- We ran a regression of PBV ratios on both variables:

$$\text{PBV} = -0.11 + \underset{(5.79)}{11.22 \text{ (ROE)}} + \underset{(2.83)}{7.87 \text{ (Expected Growth)}} \quad R^2 = 60.88\%$$

- The numbers in brackets are t-statistics and suggest that the relationship between PBV ratios and both variables in the regression are statistically significant. The R-squared indicates the percentage of the differences in PBV ratios that is explained by the independent variables.
- Finally, the regression itself can be used to get predicted PBV ratios for the companies in the list. Thus, the predicted PBV ratio for Repsol would be:

$$\text{Predicted PBV}_{\text{Repsol}} = -0.11 + 11.22 (.1740) + 7.87 (.14) = 2.94$$

Since the actual PBV ratio for Repsol was 2.20, this would suggest that the stock was undervalued by roughly 25%.

Closing Thoughts

- The DCF valuation of an asset may not match the relative valuation of that same asset, no matter how careful you are in your assessments.
- There is no easy way to show that one approach dominates the other. They take philosophically different views of markets and how they work (or do not work).