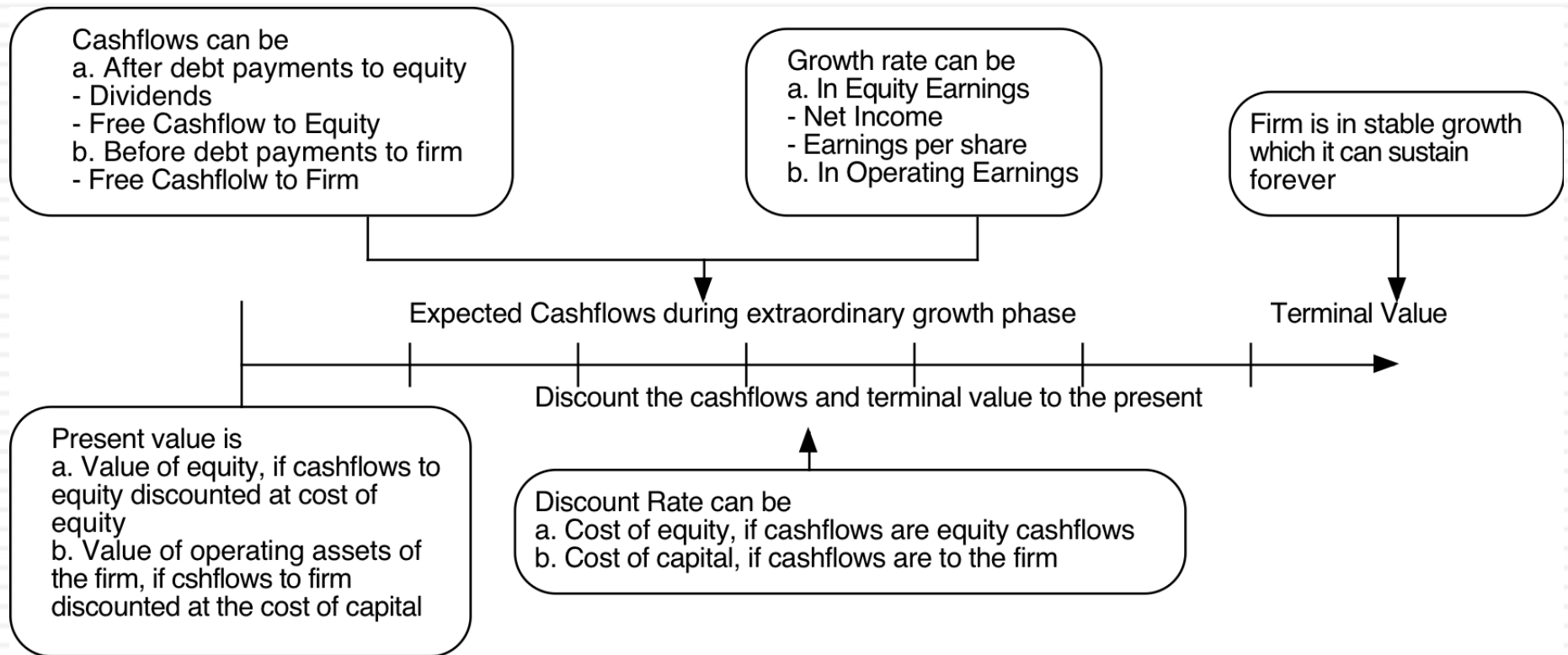


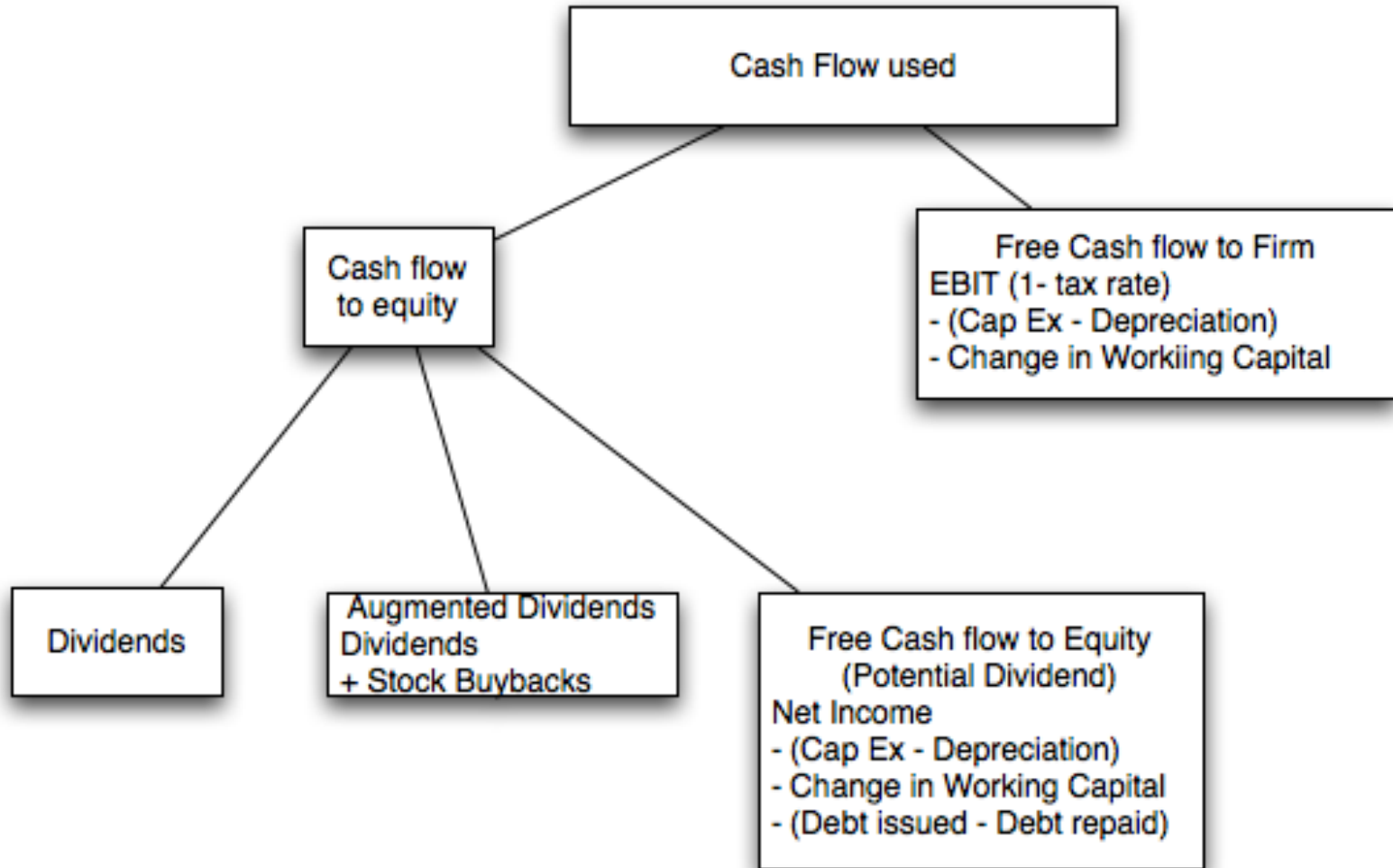
The Ingredients that determine value.

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I. Estimating Cash Flows

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Dividends for Deutsche bank & FCFE for Tata Motors

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- In 2007, Deutsche Bank paid out dividends of 2,146 million Euros on net income of 6,510 million Euros.
 - In my 2008 valuation, I am assuming the dividends are not only reasonable but sustainable.
 - In my 2016 valuation, Deutsche had suspended paying dividends and was losing money.
- For Tata Motors, we can estimate FCFE by looking at its ingredients:

Year	Net Income	Cap Ex	Depreciation	Change in WC	Change in Debt	Equity Reinvestment	Equity Reinvestment Rate
2008-09	-25,053₹	99,708₹	25,072₹	13,441₹	25,789₹	62,288₹	-248.63%
2009-10	29,151₹	84,754₹	39,602₹	-26,009₹	5,605₹	13,538₹	46.44%
2010-11	92,736₹	81,240₹	46,510₹	50,484₹	24,951₹	60,263₹	64.98%
2011-12	135,165₹	138,756₹	56,209₹	22,801₹	30,846₹	74,502₹	55.12%
2012-13	98,926₹	187,570₹	75,648₹	680₹	32,970₹	79,632₹	80.50%
Aggregate	330,925₹	592,028₹	243,041₹	61,397₹	120,160₹	290,224₹	87.70%

Estimating FCFF: Disney

- In the fiscal year ended September 2013, Disney reported the following:
 - ▣ Operating income (adjusted for leases) = \$10,032 million
 - ▣ Effective tax rate = 31.02%
 - ▣ Capital Expenditures (including acquisitions) = \$5,239 million
 - ▣ Depreciation & Amortization = \$2,192 million
 - ▣ Change in non-cash working capital = \$103 million
- The free cash flow to the firm can be computed as follows:

After-tax Operating Income	=	10,032 (1 - .3102)	=	\$6,920
- Net Cap Expenditures	=	\$5,239 - \$2,192	=	\$3,629
- Change in Working Capital	=		=	\$103
= Free Cashflow to Firm (FCFF)	=		=	\$3,188
- The reinvestment and reinvestment rate are as follows:
 - ▣ Reinvestment = \$3,629 + \$103 = \$3,732 million
 - ▣ Reinvestment Rate = \$3,732 / \$6,920 = 53.93%

II. Discount Rates

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- Critical ingredient in discounted cashflow valuation. Errors in estimating the discount rate or mismatching cashflows and discount rates can lead to serious errors in valuation.
- At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cashflow being discounted.
- The cost of equity is the rate at which we discount cash flows to equity (dividends or free cash flows to equity). The cost of capital is the rate at which we discount free cash flows to the firm.

Cost of Equity: Deutsche Bank in 2008 & Tata Motors in 2013

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- In early 2008, we estimated a beta of 1.162 for Deutsche Bank, which used in conjunction with the Euro risk-free rate of 4% (in January 2008) and an equity risk premium of 4.50%, yielded a cost of equity of 9.23%.

$$\begin{aligned}\text{Cost of Equity}_{\text{Jan 2008}} &= \text{Riskfree Rate}_{\text{Jan 2008}} + \text{Beta} * \text{Mature Market Risk Premium} \\ &= 4.00\% + 1.162 (4.5\%) = 9.23\%\end{aligned}$$

- With a nominal rupee risk-free rate of 6.57 percent and an equity risk premium of 7.19% for Tata Motors, we arrive at a cost of equity of 13.50%.

$$\text{Cost of Equity} = 6.57\% + 0.964 (7.19\%) = 13.50\%$$

Current Cost of Capital: Disney

- The beta for Disney's stock in November 2013 was 1.0013. The T. bond rate at that time was 2.75%. Using an estimated equity risk premium of 5.76%, we estimated the cost of equity for Disney to be 8.52%:

$$\text{Cost of Equity} = 2.75\% + 1.0013(5.76\%) = 8.52\%$$

- Disney's bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 3.75%. Using a marginal tax rate of 36.1, the after-tax cost of debt for Disney is 2.40%.

$$\text{After-Tax Cost of Debt} = 3.75\% (1 - 0.361) = 2.40\%$$

- The cost of capital was calculated using these costs and the weights based on market values of equity (121,878) and debt (15,961):

$$\text{Cost of capital} = 8.52\% \frac{121,878}{(15,961+121,878)} + 2.40\% \frac{15,961}{(15,961+121,878)} = 7.81\%$$

But costs of equity and capital can and should change over time...

Year	Beta	Cost of Equity	After-tax Cost of Debt	Debt Ratio	Cost of capital
1	1.0013	8.52%	2.40%	11.50%	7.81%
2	1.0013	8.52%	2.40%	11.50%	7.81%
3	1.0013	8.52%	2.40%	11.50%	7.81%
4	1.0013	8.52%	2.40%	11.50%	7.81%
5	1.0013	8.52%	2.40%	11.50%	7.81%
6	1.0010	8.52%	2.40%	13.20%	7.71%
7	1.0008	8.51%	2.40%	14.90%	7.60%
8	1.0005	8.51%	2.40%	16.60%	7.50%
9	1.0003	8.51%	2.40%	18.30%	7.39%
10	1.0000	8.51%	2.40%	20.00%	7.29%

III. Expected Growth

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- Value is driven by expected future growth, not past growth, and generically there are three approaches to estimating growth:
 - ▣ By looking at the past
 - ▣ Outsourcing: Ask management or look at other analysts
 - ▣ Fundamentals: By looking at how much a firm is reinvesting and how well it is reinvesting.
- For a company with stable margins and returns on equity/capital, the expected growth becomes a product of how much the firm reinvests (as a percent of earnings) and how well it reinvests (a return on equity or capital).

Reinvestment and Return: Measures

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Earnings Measure	Reinvestment Measure	Return Measure
Earnings per share	Retention Ratio = % of net income retained by the company = $1 - \text{Payout ratio}$	Return on Equity = $\text{Net Income} / \text{Book Value of Equity}$
Net Income from non-cash assets	Equity reinvestment Rate = $(\text{Net Cap Ex} + \text{Change in non-cash WC} - \text{Change in Debt}) / (\text{Net Income})$	Non-cash ROE = $\text{Net Income from non-cash assets} / (\text{Book value of equity} - \text{Cash})$
Operating Income	Reinvestment Rate = $(\text{Net Cap Ex} + \text{Change in non-cash WC}) / \text{After-tax Operating Income}$	Return on Capital or ROIC = $\text{After-tax Operating Income} / (\text{Book value of equity} + \text{Book value of debt} - \text{Cash})$

Estimating growth in Equity Earnings: Deutsche Bank in January 2008

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- In 2007, Deutsche Bank reported net income of 6.51 billion Euros on a book value of equity of 33.475 billion Euros at the start of the year (end of 2006), and paid out 2.146 billion Euros as dividends.

$$\text{Return on Equity} = \frac{\text{Net Income}_{2007}}{\text{Book Value of Equity}_{2006}} = \frac{6,510}{33,475} = 19.45\%$$

$$\text{Retention Ratio} = 1 - \frac{\text{Dividends}}{\text{Net Income}} = 1 - \frac{2,146}{6,510} = 67.03\%$$

- If Deutsche Bank maintains the return on equity (ROE) and retention ratio that it delivered in 2007 for the long run:

$$\text{Expected Growth Rate}_{\text{Existing Fundamentals}} = 0.6703 * 0.1945 = 13.04\%$$

- If we replace the net income in 2007 with average net income of \$3,954 million, from 2003 to 2007:

$$\text{Normalized Return on Equity} = \frac{\text{Average Net Income}_{2003-07}}{\text{Book Value of Equity}_{2006}} = \frac{3,954}{33,475} = 11.81\%$$

$$\text{Normalized Retention Ratio} = 1 - \frac{\text{Dividends}}{\text{Net Income}} = 1 - \frac{2,146}{3,954} = 45.72\%$$

$$\text{Expected Growth Rate}_{\text{Normalized Fundamentals}} = 0.4572 * 0.1181 = 5.40\%$$

Estimating growth in Net Income: Tata Motors

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Year	Net Income	Cap Ex	Depreciation	Change in WC	Change in Debt	Equity Reinvestment	Equity Reinvestment Rate
2008-09	-25,053₹	99,708₹	25,072₹	13,441₹	25,789₹	62,288₹	-248.63%
2009-10	29,151₹	84,754₹	39,602₹	-26,009₹	5,605₹	13,538₹	46.44%
2010-11	92,736₹	81,240₹	46,510₹	50,484₹	24,951₹	60,263₹	64.98%
2011-12	135,165₹	138,756₹	56,209₹	22,801₹	30,846₹	74,502₹	55.12%
2012-13	98,926₹	187,570₹	75,648₹	680₹	32,970₹	79,632₹	80.50%
Aggregate	330,925₹	592,028₹	243,041₹	61,397₹	120,160₹	290,224₹	87.70%

Year	Net Income	BV of Equity at start of the year	ROE
2008-09	-25,053₹	91,658₹	-27.33%
2009-10	29,151₹	63,437₹	45.95%
2010-11	92,736₹	84,200₹	110.14%
2011-12	135,165₹	194,181₹	69.61%
2012-13	98,926₹	330,056₹	29.97%
Aggregate	330,925₹	763,532₹	43.34%

	2013 value	Average values: 2008-2013
Reinvestment rate	80.50%	87.70%
ROE	29.97%	43.34%
Expected growth	24.13%	38.01%

ROE and Leverage

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- A high ROE, other things remaining equal, should yield a higher expected growth rate in equity earnings.
- The ROE for a firm is a function of both the quality of its investments and how much debt it uses in funding these investments. In particular

$$\text{ROE} = \text{ROC} + \text{D/E} (\text{ROC} - \text{After-tax cost of Debt})$$

- Consider two firms with the same return on equity, with two different pathways there. Which one would you value more highly

	ROC	D/E	tax cost of	ROE
Company A	20%	0.00%	4.00%	20.0%
Company B	12%	100.00%	4.00%	20.0%

Estimating Growth in EBIT: Disney

- We started with the reinvestment rate that we computed from the 2013 financial statements:

$$\text{Reinvestment rate} = \frac{(3,629 + 103)}{10,032 (1-.3102)} = 53.93\%$$

- We compute the return on capital, using operating income in 2013 and capital invested at the start of the year:

$$\text{Return on Capital}_{2013} = \frac{\text{EBIT} (1-t)}{(\text{BV of Equity} + \text{BV of Debt} - \text{Cash})} = \frac{10,032 (1-.361)}{(41,958 + 16,328 - 3,387)} = 12.61\%$$

- If Disney maintains its 2013 reinvestment rate and return on capital for the next five years, its growth rate will be 6.80 percent.

$$\text{Expected Growth Rate from Existing Fundamentals} = 53.93\% * 12.61\% = 6.8\%$$

When everything is in flux: Changing growth and margins

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- The elegant connection between reinvestment and earnings growth, captured by a sustainable growth rate, when you have a company in transition, and margins are changing over time.
- If that is the case, you have to estimate cash flows in three steps:
 - Forecast revenue growth and revenues in future years, taking into account market potential and competition.
 - Forecast a “target” margin in the future and a pathway from current margins to the target.
 - Estimate reinvestment from revenues, using a sales to capital ratio (measuring the dollars of revenues you get from each dollar of investment).

1. Revenue Growth

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Revenue Growth and Magnitude

Market Size and Growth

1. *Current Market size*: The size of the market for the company's products & services, given geography it is targeting and product type.
2. *Expected Growth in Market*: Growth in total market, as technology and market conditions change.

X

Market Share

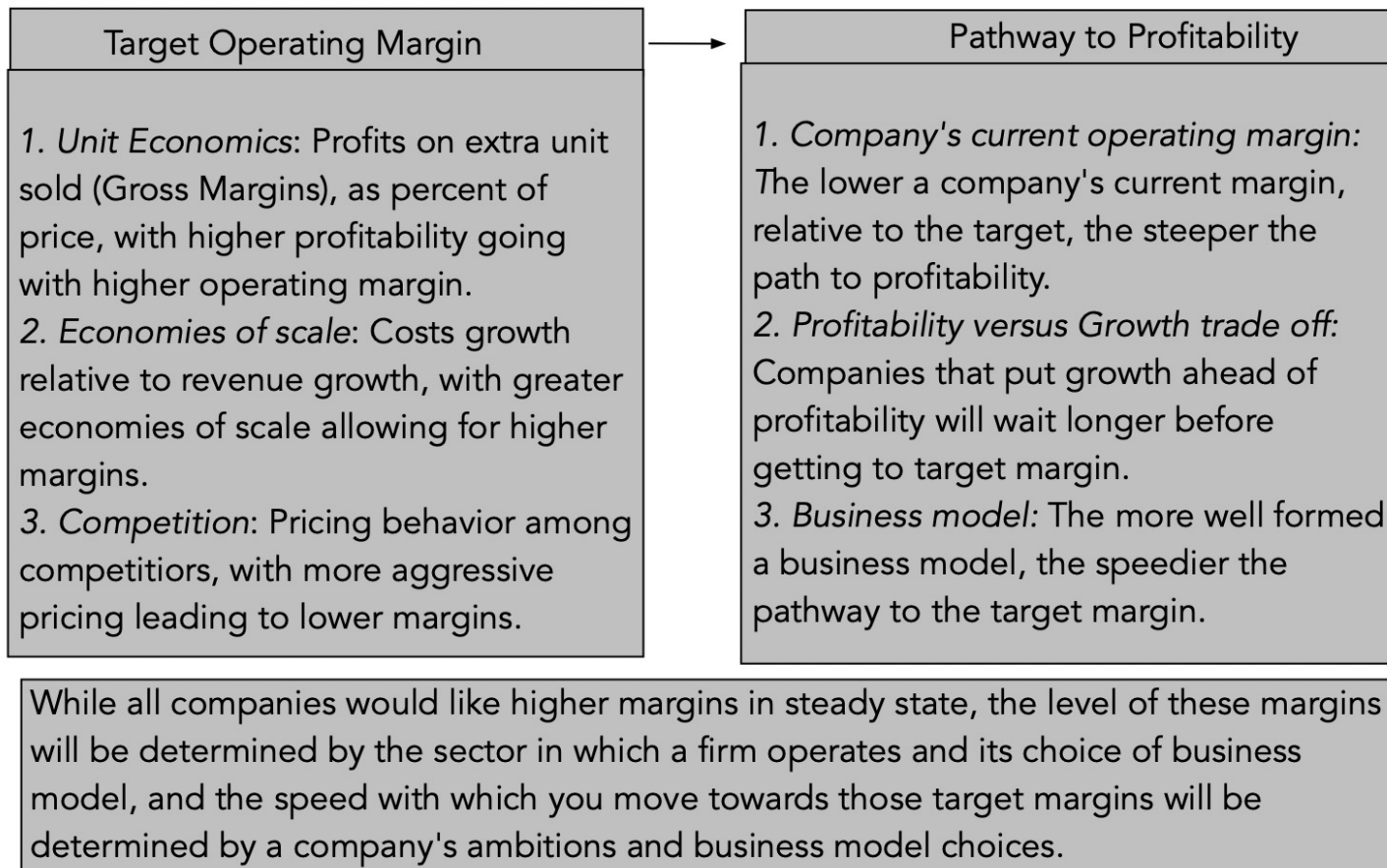
1. *Company's current market share*: If company's current market share is low, potential for growth in market share at expense of competition.
2. *Industry economics*: Nature of the business (a few big winners or splintered competition).
3. *Strength of company's competitive advantages*: Stronger and more sustainable competitive advantages should allow for higher market share.

The potential for revenue growth is greater for companies with small revenues (and market share) in a big and growing market, especially if the company has strong competitive advantages in winner-take-all businesses.

2. Target Margins (and path there)...

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Operating Margin: Target and Pathway



3. Sales to Invested Capital: A Pathway to estimating Reinvestment

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Sales to Invested Capital: Reinvestment

Current (Historical) Sales to Capital

The sales to invested capital ratio relates the revenues of the firm to its invested capital, with the latter defined the same way that you would in the return on invested capital calculation.

Sales to Capital

$$= \text{Revenues} / (\text{Book Equity} + \text{Book Debt} - \text{Cash})$$

The ratio measures the efficiency with which a firm delivers its revenue growth, with higher values indicating more efficiency. You can look at:

1. The company's historical sales to capital ratio
2. The industry average sales to capital ratio



Future Sales to Capital

1. Scaling Effects: As companies get bigger, the sales to invested capital ratio can rise or fall, depending on the sector being analyzed. (Looking at the peer group may give some guidance).

2. Excess Capacity: If a company has excess capacity, created by past investments, it should be able to generate revenue growth with less investment, i.e., with higher sales to capital ratios.

3. Lag between investment and growth: If reinvestment creates growth quickly (or instantaneously), the reinvestment in a year can be estimated based upon revenue change in that year. If there is a lag, the reinvestment may have to be tied to revenue change in a future year.

A company with higher expected growth in revenues will need to reinvest more, though how much will be determined by the businesses that it operates in, with less reinvestment needed if it has excess capacity and a lag between reinvestment and growth.

Here is an example: Baidu's Expected FCFF

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Year	Revenue growth	Revenues	Operating Margin	EBIT	Tax rate	EBIT (1-t)	Chg in Revenues	Sales/Capital	Reinvestment	FCFF
Base year		\$ 28,756	48.72%	\$ 14,009	16.31%	\$ 11,724		2.64		
1	25.00%	\$ 35,945	47.35%	\$ 17,019	16.31%	\$ 14,243	\$ 7,189	2.64	\$ 2,722	\$ 11,521
2	25.00%	\$ 44,931	45.97%	\$ 20,657	16.31%	\$ 17,288	\$ 8,986	2.64	\$ 3,403	\$ 13,885
3	25.00%	\$ 56,164	44.60%	\$ 25,051	16.31%	\$ 20,965	\$ 11,233	2.64	\$ 4,253	\$ 16,712
4	25.00%	\$ 70,205	43.23%	\$ 30,350	16.31%	\$ 25,400	\$ 14,041	2.64	\$ 5,316	\$ 20,084
5	25.00%	\$ 87,756	41.86%	\$ 36,734	16.31%	\$ 30,743	\$ 17,551	2.64	\$ 6,646	\$ 24,097
6	20.70%	\$ 105,922	40.49%	\$ 42,885	18.05%	\$ 35,145	\$ 18,166	2.64	\$ 6,878	\$ 28,267
7	16.40%	\$ 123,293	39.12%	\$ 48,227	19.79%	\$ 38,685	\$ 17,371	2.64	\$ 6,577	\$ 32,107
8	12.10%	\$ 138,212	37.74%	\$ 52,166	21.52%	\$ 40,938	\$ 14,918	2.64	\$ 5,649	\$ 35,289
9	7.80%	\$ 148,992	36.37%	\$ 54,191	23.26%	\$ 41,585	\$ 10,781	2.64	\$ 4,082	\$ 37,503
10	3.50%	\$ 154,207	35.00%	\$ 53,972	25.00%	\$ 40,479	\$ 5,215	2.64	\$ 1,974	\$ 38,505

IV. Getting Closure in Valuation

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- Since we cannot estimate cash flows forever, we estimate cash flows for a “growth period” and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

- When a firm’s cash flows grow at a “constant” rate forever, the present value of those cash flows can be written as:

$$\text{Value} = \text{Expected Cash Flow Next Period} / (r - g)$$

where,

r = Discount rate (Cost of Equity or Cost of Capital)

g = Expected growth rate forever.

- This “constant” growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.

Terminal Value: Myths and Realities

Myth 5.1: The only way to estimate terminal value is to use the perpetual growth model.

Myth 5.2: The perpetual growth model can give you an infinite value.

Myth 5.3: The growth rate is your biggest driver of terminal value.

Myth 5.4: Your growth rate cannot be negative in a perpetual growth model.

Myth 5.5: If your terminal value is a high proportion of your DCF value, it is flawed.

$$\text{Value of an asset with life } > n \text{ years} = \frac{E(CF_1)}{(1+r)^1} + \frac{E(CF_2)}{(1+r)^2} + \dots + \frac{E(CF_n)}{(1+r)^n} + \frac{\text{Terminal Value}_n}{(1+r)^n}$$

Truth 5.1: The terminal value can be based on annuities or a liquidation value.

Truth 5.2: Not if growth forever is capped at the growth rate of the economy.

Truth 5.3: Growth is not free & increasing growth can add or destroy value.

Truth 5.4: Growth can be negative forever & is often more reflective of reality.

Truth 5.5: The terminal value should be a high percent of value today.

Valuing Vale in November 2013 (in US dollars)

Let's start with some history & estimate what a normalized year will look like

Year	Operating Income (\$)	Effective tax rate	BV of Debt	BV of Equity	Cash	Invested capital	Return on capital
2009	\$6,057	27.79%	\$18,168	\$42,556	\$12,639	\$48,085	9.10%
2010	\$23,033	18.67%	\$23,613	\$59,766	\$11,040	\$72,339	25.90%
2011	\$30,206	18.54%	\$27,668	\$70,076	\$9,913	\$87,831	28.01%
2012	\$13,346	18.96%	\$23,116	\$78,721	\$3,538	\$98,299	11.00%
2013 (TTM)	\$15,487	20.65%	\$30,196	\$75,974	\$5,818	\$100,352	12.25%
Normalized	\$17,626	20.92%					17.25%

Estimate the costs of equity & capital for Vale

Business	Sample size	Unlevered beta of business	Revenues	Peer Group EV/Sales	Value of Business	Proportion of Vale
Metals & Min	48	0.86	\$9,013	1.97	\$17,739	16.65%
Iron Ore	78	0.83	\$32,717	2.48	\$81,188	76.20%
Fertilizers	693	0.99	\$3,777	1.52	\$5,741	5.39%
Logistics	223	0.75	\$1,644	1.14	\$1,874	1.76%
Vale Operations		0.8440	\$47,151		\$106,543	100.00%

Market D/E = 54.99%

Marginal tax rate = 34.00% (Brazil)

Levered Beta = 0.844 (1+(1-.34)(.5499)) = 1.15

Cost of equity = 2.75% + 1.15 (7.38%) = 10.87%

	% of revenues	ERP
US & Canada	4.90%	5.50%
Brazil	16.90%	8.50%
Rest of Latin America	1.70%	10.09%
China	37.00%	6.94%
Japan	10.30%	6.70%
Rest of Asia	8.50%	8.61%
Europe	17.20%	6.72%
Rest of World	3.50%	10.06%
Vale ERP	100.00%	7.38%

Vale's rating: A-

Default spread based on rating = 1.30%

Cost of debt (pre-tax) = 2.75% + 1.30% = 4.05%

Cost of capital = 11.23% (.6452) + 4.05% (1-.34) (.3548) = 8.20%

Assume that the company is in stable growth, growing 2% a year in perpetuity

$$\text{Reinvestment Rate} = \frac{g}{ROC} = \frac{2\%}{17.25\%} = 11.59\%$$

$$\text{Value of Operating Assets} = \frac{17,626 (1 - .2092)(1 - .1159)}{(.082 - .02)} = \$202,832$$

Value of operating assets	= \$202,832
+ Cash & Marketable Securities	= \$ 7,133
- Debt	= \$ 42,879
Value of equity	= \$167,086
Value per share	= \$ 32.44
Stock price (11/2013)	= \$ 13.57