IV. Operating Income Growth when Return on Capital is Changing

- When the return on capital is changing, there will be a second component to growth, positive if the return on capital is increasing and negative if the return on capital is decreasing.
- If ROC_t is the return on capital in period t and ROC_{t+1} is the return on capital in period t+1, the expected growth rate in operating income will be:

$$\text{Expected Growth Rate} = ROC_{t+1} * \text{Reinvestment rate} + (ROC_{t+1} - ROC_t) / ROC_t$$

- If the change is over multiple periods, the second component should be spread out over each period.

Motorola's Growth Rate

- Motorola's current return on capital is 12.18% and its reinvestment rate is 52.99%.
- We expect Motorola's return on capital to rise to 17.22% over the next 5 years (which is half way towards the industry average)

  Expected Growth Rate

  = $ROC_{\text{New Investments}}$ * Reinvestment Rate $_{\text{Current}}$ + {[1+($ROC_{\text{In 5 years}}$ - ROC_{Current})/ROC_{Current}]$^{1/5}$ -1}

  = .1722*.5299 +{ [1+(.1722-.1218)/.1218]1/5-1}

  = .1629 or 16.29%
- One way to think about this is to decompose Motorola's expected growth into
  - Growth from new investments: .1722*5299= 9.12%
  - Growth from more efficiently using existing investments: 16.29%-9.12%= 7.17%

Note that I am assuming that the new investments start making 17.22% immediately, while allowing for existing assets to improve returns gradually

The Value of Growth

	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5
Reinvestment Rate	20.00%	100.00%	200.00%	20.00%	0.00%
ROIC on new investment	50.00%	10.00%	5.00%	10.00%	10.00%
ROIC on existing investments before	10.00%	10.00%	10.00%	10.00%	10.00%
ROIC on existing investments after	10.00%	10.00%	10.00%	10.80%	11.00%
Expected growth rate	**10.00%**	**10.00%**	**10.00%**	**10.00%**	**10.00%**

Expected growth = Growth from new investments + Efficiency growth

= Reinv Rate * ROC + $(ROC_t - ROC_{t-1})/ROC_{t-1}$

Assume that your cost of capital is 10%. As an investor, rank these firms in the order of most value growth to least value growth.

Growth IV

Top Down Growth

Estimating Growth when Operating Income is Negative or Margins are changing

- All of the fundamental growth equations assume that the firm has a return on equity or return on capital it can sustain in the long term.
- When operating income is negative or margins are expected to change over time, we use a three step process to estimate growth:
  - Estimate growth rates in revenues over time
    - Determine the total market (given your business model) and estimate the market share that you think your company will earn.
    - Decrease the growth rate as the firm becomes larger
    - Keep track of absolute revenues to make sure that the growth is feasible
  - Estimate expected operating margins each year
    - Set a target margin that the firm will move towards
    - Adjust the current margin towards the target margin
  - Estimate the capital that needs to be invested to generate revenue growth and expected margins
    - Estimate a sales to capital ratio that you will use to generate reinvestment needs each year.

Tesla in July 2015: Growth and Profitability

Year	Revenues	Revenue Growth	Operating Income	Operating Margin
Base year	$2,013.50		$(21.81)	-1.08%
1	$3,322.28	65.00%	$7.48	0.23%
2	$5,481.75	65.00%	$84.06	1.53%
3	$9,044.89	65.00%	$257.03	2.84%
4	$14,924.07	65.00%	$619.36	4.15%
5	$24,624.72	65.00%	$1,344.12	5.46%
6	$37,565.02	52.55%	$2,541.92	6.77%
7	$52,628.59	40.10%	$4,249.78	8.08%
8	$67,180.39	27.65%	$6,303.78	9.38%
9	$77,391.81	15.20%	$8,274.48	10.69%
10	$79,520.08	2.75%	$9,542.41	12.00%

Revenues in year 10 reflect successful "high end auto" company revenues (Volvo, Audi, BMW etc.)

Pre-tax operating margin in year 10 is at the 75th pecentile of high end auto companies.

Tesla: Reinvestment and Profitability

Operating losses carried forward save taxes in years 3 & 4

Sales/Capital measures revenues generated for every dollar of investment

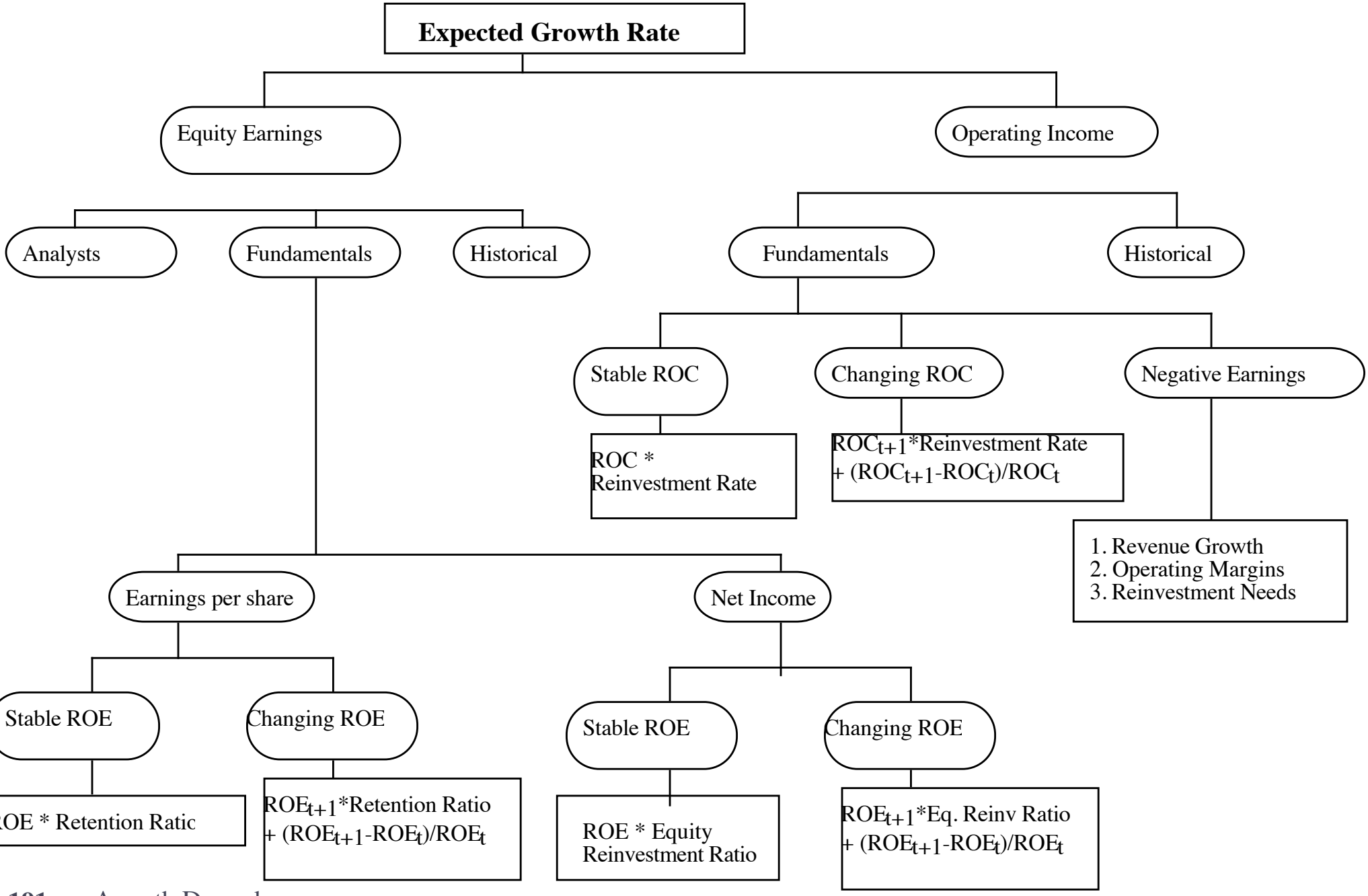
Reinvestment = Change in Revenue/ Sales to capital

Year	Revenues	EBIT	EBIT (1-t)	Change in Revenues	Sales/Capital	Reinvestment	FCFF	Invested Capital	ROIC	Cost of Capital
Base	$ 2,013.50	$ (21.81)	$ (21.81)					$ 1,045.00	-2.09%	8.74%
1	$ 3,322.28	$ 7.48	$ 7.48	$ 1,308.78	1.55	$ 844.37	$ (836.89)	$ 1,889.37	0.40%	8.74%
2	$ 5,481.75	$ 84.06	$ 84.06	$ 2,159.48	1.55	$ 1,393.21	$(1,309.15)	$ 3,282.58	2.56%	8.74%
3	$ 9,044.89	$ 257.03	$ 254.44	$ 3,563.14	1.55	$ 2,298.80	$(2,044.36)	$ 5,581.38	4.56%	8.74%
4	$ 14,924.07	$ 619.36	$ 402.58	$ 5,879.18	1.55	$ 3,793.02	$(3,390.44)	$ 9,374.40	4.29%	8.74%
5	$ 24,624.72	$ 1,344.12	$ 873.68	$ 9,700.65	1.55	$ 6,258.48	$(5,384.81)	$ 15,632.89	5.59%	8.59%
6	$ 37,565.02	$ 2,541.92	$ 1,652.25	$ 12,940.29	1.55	$ 8,348.58	$(6,696.33)	$ 23,981.46	6.89%	8.44%
7	$ 52,628.59	$ 4,249.78	$ 2,762.36	$ 15,063.57	1.55	$ 9,718.43	$(6,956.08)	$ 33,699.89	8.20%	8.29%
8	$ 67,180.39	$ 6,303.78	$ 4,097.46	$ 14,551.80	1.55	$ 9,388.26	$(5,290.81)	$ 43,088.15	9.51%	8.15%
9	$ 77,391.81	$ 8,274.48	$ 5,378.41	$ 10,211.42	1.55	$ 6,588.01	$(1,209.60)	$ 49,676.17	10.83%	8.00%
10	$ 79,520.08	$ 9,542.41	$ 6,202.57	$ 2,128.27	1.55	$ 1,373.08	$ 4,829.49	$ 51,049.25	12.15%	8.00%

Tesla Story: Tesla will be able to grow efficiently (sales to capital ratio) and continue to generate excess returns as it gets bigger.

Invested Capital in year t = Invested Capital in year t-1 + Reinvestment in year t

Cost of capital decreases as company gets larger and more profitable.


Expected Growth Rate
Equity Earnings
Operating Income
Analysts
Fundamentals
Historical
Fundamentals
Historical
Stable ROC
Changing ROC
Negative Earnings
ROC * Reinvestment Rate
ROC$_{t+1}$*Reinvestment Rate + (ROC$_{t+1}$-ROC$_t$)/ROC$_t$
1. Revenue Growth
2. Operating Margins
3. Reinvestment Needs
Earnings per share
Net Income
Stable ROE
Changing ROE
Stable ROE
Changing ROE
ROE * Retention Ratio
ROE$_{t+1}$*Retention Ratio + (ROE$_{t+1}$-ROE$_t$)/ROE$_t$
ROE * Equity Reinvestment Ratio
ROE$_{t+1}$*Eq. Reinv Ratio + (ROE$_{t+1}$-ROE$_t$)/ROE$_t$

CLOSURE IN VALUATION

The Big Enchilada

Getting Closure in Valuation

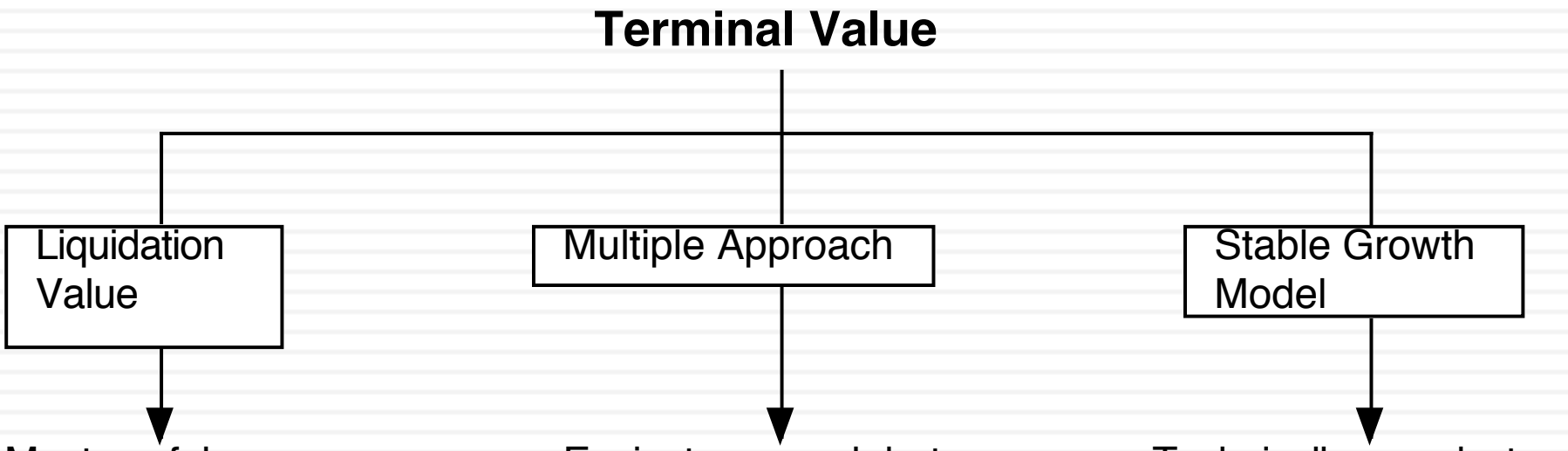
- A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever.

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

- 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:

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

Ways of Estimating Terminal Value



1. Obey the growth cap

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

  Value = Expected Cash Flow Next Period / (r - g)

  where,

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

  g = Expected growth rate

- The stable growth rate cannot exceed the growth rate of the economy but it can be set lower.
  - If you assume that the economy is composed of high growth and stable growth firms, the growth rate of the latter will probably be lower than the growth rate of the economy.
  - The stable growth rate can be negative. The terminal value will be lower and you are assuming that your firm will disappear over time.
  - If you use nominal cashflows and discount rates, the growth rate should be nominal in the currency in which the valuation is denominated.
- One simple proxy for the nominal growth rate of the economy is the riskfree rate.