II. Expected Growth in Net Income from non-cash assets

□ The limitation of the EPS fundamental growth equation is that it focuses on per share earnings and assumes that reinvested earnings are invested in projects earning the return on equity. To the extent that companies retain money in cash balances, the effect on net income can be muted.

□ A more general version of expected growth in earnings can be obtained by substituting in the equity reinvestment into real investments (net capital expenditures and working capital) and modifying the return on equity definition to exclude cash:

- Net Income from non-cash assets = Net income – Interest income from cash (1- t)
- Equity Reinvestment Rate = (Net Capital Expenditures + Change in Working Capital) (1 - Debt Ratio)/ Net Income from non-cash assets
- Non-cash ROE = Net Income from non-cash assets/ (BV of Equity – Cash)
- Expected Growth$_{Net Income}$ = Equity Reinvestment Rate * Non-cash ROE

Aswath Damodaran

Estimating expected growth in net income from non-cash assets: Coca Cola in 2010

- In 2010, Coca Cola reported net income of $11,809 million. It had a total book value of equity of $25,346 million at the end of 2009.
- Coca Cola had a cash balance of $7,021 million at the end of 2009, on which it earned income of $105 million in 2010.
- Coca Cola had capital expenditures of $2,215 million, depreciation of $1,443 million and reported an increase in working capital of $335 million. Coca Cola's total debt increased by $150 million during 2010.
  - Equity Reinvestment = 2215- 1443 + 335-150 = $957 million
  - Non-cash Net Income = $11,809 - $105 = $ 11,704 million
  - Non-cash book equity = $25,346 - $7021 = $18,325 million
  - Reinvestment Rate = $957 million/ $11,704 million= 8.18%
  - Non-cash ROE = $11,704 million/ $18,325 million = 63.87%
  - Expected growth rate = 8.18% * 63.87% = 5.22%

Aswath Damodaran

III. Expected Growth in EBIT And Fundamentals: Stable ROC and Reinvestment Rate

- When looking at growth in operating income, the definitions are
  - Reinvestment Rate = (Net Capital Expenditures + Change in WC)/EBIT(1-t)
  - Return on Investment = ROC = EBIT(1-t)/(BV of Debt + BV of Equity-Cash)

- Reinvestment Rate and Return on Capital

  Expected Growth rate in Operating Income

  = (Net Capital Expenditures + Change in WC)/EBIT(1-t) * ROC

  = Reinvestment Rate * ROC

- Proposition: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.

Aswath Damodaran

Estimating Growth in Operating Income

- Cisco's Fundamentals
  - Reinvestment Rate = 106.81%
  - Return on Capital =34.07%
  - Expected Growth in EBIT =(1.0681)(.3407) = 36.39%
- Motorola's Fundamentals
  - Reinvestment Rate = 52.99%
  - Return on Capital = 12.18%
  - Expected Growth in EBIT = (.5299)(.1218) = 6.45%

Aswath Damodaran

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:

Expected Growth Rate $= ROC_{t+1}$ * 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 $_{\text{Current}}$)/ROC $_{\text{Current}}$]$^{1/5}$-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%**

$$\text{Expected growth} = \text{Growth from new investments} + \text{Efficiency growth}$$
$$= \text{Reinv Rate} * \text{ROC} + (\text{ROC}_t - \text{ROC}_{t-1})/\text{ROC}_{t-1}$$

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.

Aswath Damodaran

V. 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
  - ■ Use historical revenue growth to get estimates of revenue growth in the near future
  - ■ 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.

Aswath Damodaran

Sirius Radio: Revenues and Revenue Growth- June 2006

Year	Revenue Growth	Revenue $	Operating Margin	Operating Income
Current		$187	-419.92%	-$787
1	200.00%	$562	-199.96%	-$1,125
2	100.00%	$1,125	-89.98%	-$1,012
3	80.00%	$2,025	-34.99%	-$708
4	60.00%	$3,239	-7.50%	-$243
5	40.00%	$4,535	6.25%	$284
6	25.00%	$5,669	13.13%	$744
7	20.00%	$6,803	16.56%	$1,127
8	15.00%	$7,823	18.28%	$1,430
9	10.00%	$8,605	19.14%	$1,647
10	5.00%	$9,035	19.57%	$1,768

Target margin based upon Clear Channel

Aswath Damodaran

Sirius: Reinvestment Needs

Year	Revenues	Change in revenue	Sales/Capital Ratio	Reinvestment	Capital Invested	Operating Income (Loss)	Imputed ROC
Current	$187				$ 1,657	-$787	
1	$562	$375	1.50	$250	$ 1,907	-$1,125	-67.87%
2	$1,125	$562	1.50	$375	$ 2,282	-$1,012	-53.08%
3	$2,025	$900	1.50	$600	$ 2,882	-$708	-31.05%
4	$3,239	$1,215	1.50	$810	$ 3,691	-$243	-8.43%
5	$4,535	$1,296	1.50	$864	$ 4,555	$284	7.68%
6	$5,669	$1,134	1.50	$756	$ 5,311	$744	16.33%
7	$6,803	$1,134	1.50	$756	$ 6,067	$1,127	21.21%
8	$7,823	$1,020	1.50	$680	$ 6,747	$1,430	23.57%
9	$8,605	$782	1.50	$522	$ 7,269	$1,647	17.56%
10	$9,035	$430	1.50	$287	$ 7,556	$1,768	15.81%

Capital invested in year t+!=
Capital invested in year t +
Reinvestment in year t+1

Industry average Sales/Cap Ratio

Aswath Damodaran

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
+ $(ROE_{t+1}-ROE_t)/ROE_t$

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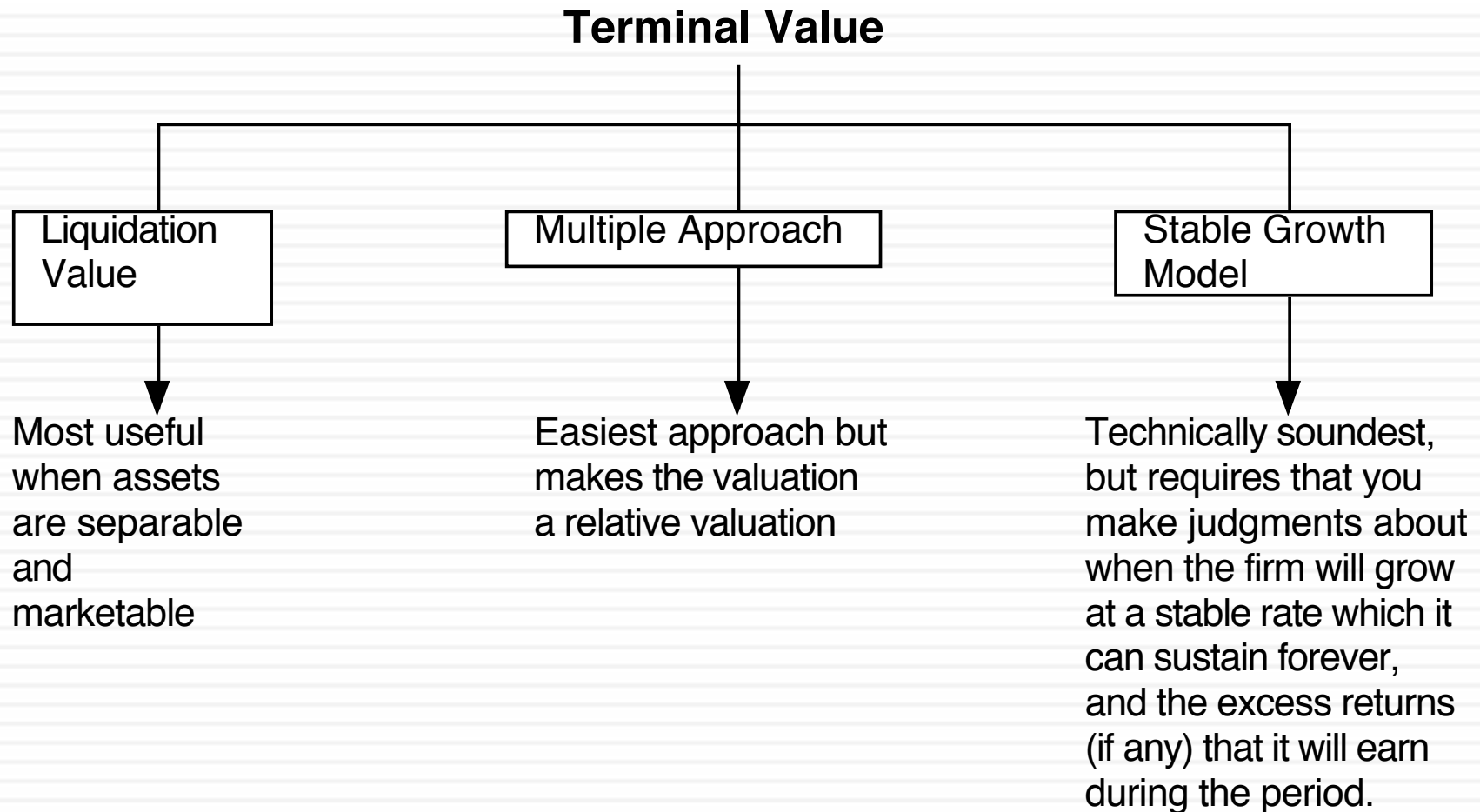
$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+r)^t}$$

□ 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:

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

Aswath Damodaran

Ways of Estimating Terminal Value

Terminal Value

Liquidation Value	Multiple Approach	Stable Growth Model
Most useful when assets are separable and marketable	Easiest approach but makes the valuation a relative valuation	Technically soundest, but requires that you make judgments about when the firm will grow at a stable rate which it can sustain forever, and the excess returns (if any) that it will earn during the period.

Aswath Damodaran

Getting Terminal Value Right
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.

Aswath Damodaran

Getting Terminal Value Right
2. Don't wait too long…

☐ Assume that you are valuing a young, high growth firm with great potential, just after its initial public offering. How long would you set your high growth period?

  a. < 5 years

  b. 5 years

  c. 10 years

  d. >10 years

☐ While analysts routinely assume very long high growth periods (with substantial excess returns during the periods), the evidence suggests that they are much too optimistic. Most growth firms have difficulty sustaining their growth for long periods, especially while earning excess returns.

Aswath Damodaran

And the key determinant of growth periods is the company's competitive advantage…

- Recapping a key lesson about growth, it is not growth per se that creates value but growth with excess returns. For growth firms to continue to generate value creating growth, they have to be able to keep the competition at bay.

- <u>Proposition 1</u>: The stronger and more sustainable the competitive advantages, the longer a growth company can sustain "value creating" growth.

- <u>Proposition 2</u>: Growth companies with strong and sustainable competitive advantages are rare.

Aswath Damodaran

Don't forget that growth has to be earned..
3. Think about what your firm will earn as returns forever..

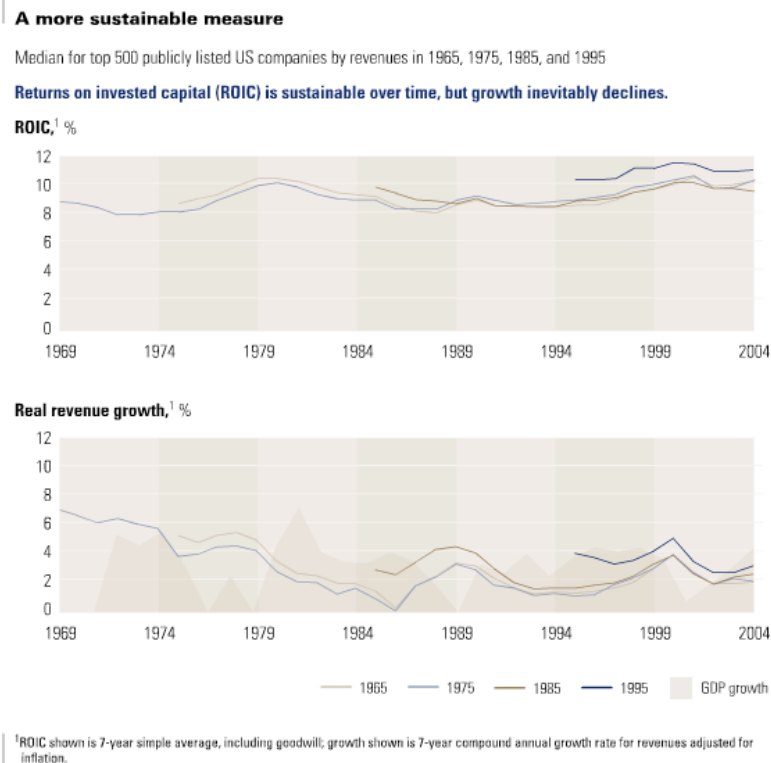- In the section on expected growth, we laid out the fundamental equation for growth:

Growth rate = Reinvestment Rate * Return on invested capital

+ Growth rate from improved efficiency

- In stable growth, you cannot count on efficiency delivering growth (why?) and you have to reinvest to deliver the growth rate that you have forecast. Consequently, your reinvestment rate in stable growth will be a function of your stable growth rate and what you believe the firm will earn as a return on capital in perpetuity:
  - Reinvestment Rate = Stable growth rate/ Stable period Return on capital
- A key issue in valuation is whether it okay to assume that firms can earn more than their cost of capital in perpetuity. There are some (McKinsey, for instance) who argue that the return on capital = cost of capital in stable growth…

Aswath Damodaran

There are some firms that earn excess returns

□ While growth rates seem to fade quickly as firms become larger, well managed firms seem to do much better at sustaining excess returns for longer periods.

A more sustainable measure

Median for top 500 publicly listed US companies by revenues in 1965, 1975, 1985, and 1995

Returns on invested capital (ROIC) is sustainable over time, but growth inevitably declines.

ROIC,[1] %

Real revenue growth,[1] %

—— 1965   —— 1975   —— 1985   —— 1995   GDP growth

[1]ROIC shown is 7-year simple average, including goodwill; growth shown is 7-year compound annual growth rate for revenues adjusted for inflation.

Aswath Damodaran

And don't fall for sleight of hand…

☐ A typical assumption in many DCF valuations, when it comes to stable growth, is that capital expenditures offset depreciation and there are no working capital needs. Stable growth firms, we are told, just have to make maintenance cap ex (replacing existing assets) to deliver growth. If you make this assumption, what expected growth rate can you use in your terminal value computation?

☐ What if the stable growth rate = inflation rate? Is it okay to make this assumption then?

Aswath Damodaran

Getting Terminal Value Right
4. Be internally consistent..

- ☐ Risk and costs of equity and capital: Stable growth firms tend to
  - ◘ Have betas closer to one
  - ◘ Have debt ratios closer to industry averages (or mature company averages)
  - ◘ Country risk premiums (especially in emerging markets should evolve over time)

- ☐ The excess returns at stable growth firms should approach (or become) zero. ROC -> Cost of capital and ROE -> Cost of equity

- ☐ The reinvestment needs and dividend payout ratios should reflect the lower growth and excess returns:
  - ◘ Stable period payout ratio = 1 - g/ ROE
  - ◘ Stable period reinvestment rate = g/ ROC

Aswath Damodaran

V. BEYOND INPUTS: CHOOSING AND USING THE RIGHT MODEL

Choosing the right model