

Estimating Fundamental Growth from new investments: Three variations

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

I. Expected Long Term Growth in EPS

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- When looking at growth in earnings per share, these inputs can be cast as follows:
 - ▣ Reinvestment Rate = Retained Earnings/ Current Earnings = Retention Ratio
 - ▣ Return on Investment = ROE = Net Income/Book Value of Equity
- In the special case where the current ROE is expected to remain unchanged

$$\begin{aligned}g_{\text{EPS}} &= \text{Retained Earnings}_{t-1} / \text{NI}_{t-1} * \text{ROE} \\ &= \text{Retention Ratio} * \text{ROE} \\ &= b * \text{ROE}\end{aligned}$$

- In 2008, using this approach on Wells Fargo:
 - Return on equity (based on 2008 earnings)= 17.56%
 - Retention Ratio (based on 2008 earnings and dividends) = 45.37%
 - Expected growth rate in earnings per share for Wells Fargo, if it can maintain these numbers.

$$\text{Expected Growth Rate} = 0.4537 (17.56\%) = 7.97\%$$

One way to pump up ROE: Use more debt

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Return on Equity = Return on capital + D/E (ROC - i (1-tax rate))

where

Return on capital = $EBIT_t (1 - \text{tax rate}) / \text{Book value of Capital}_{t-1}$

D/E = BV of Debt / BV of Equity

i = Interest Expense on Debt / BV of Debt

- In 1998, Brahma (now Ambev) had an extremely high return on equity, partly because it borrowed money at a rate well below its return on capital
 - ▣ Return on Capital = 19.91%
 - ▣ Debt/Equity Ratio = 77%
 - ▣ After-tax Cost of Debt = 5.61%
 - ▣ Return on Equity = $ROC + D/E (ROC - i(1-t))$
 $= 19.91\% + 0.77 (19.91\% - 5.61\%) = 30.92\%$

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

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- 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
- The equity reinvestment rate, unlike the retention ratio, can be higher than 100%, and if it is, the expected growth rate in net income can exceed the return on equity.

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

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- 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.
 - ▣ Non-cash Net Income = $\$11,809 - \$105 = \$11,704$ million
 - ▣ Non-cash book equity = $\$25,346 - \$7,021 = \$18,325$ million
 - ▣ Non-cash ROE = $\$11,704 \text{ million} / \$18,325 \text{ million} = \mathbf{63.87\%}$
- 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
 - ▣ Reinvestment Rate = $\$957 \text{ million} / \$11,704 \text{ million} = \mathbf{8.18\%}$
- Expected growth rate in non-cash Net Income = $8.18\% * 63.87\% = 5.22\%$

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

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- When looking at growth in operating income, the definitions are
 - $\text{Reinvestment Rate} = (\text{Net Capital Expenditures} + \text{Change in WC}) / \text{EBIT}(1-t)$
 - $\text{Return on Investment} = \text{ROC} = \text{EBIT}(1-t) / (\text{BV of Debt} + \text{BV of Equity-Cash})$
- Reinvestment Rate and Return on Capital
Expected Growth rate in Operating Income
 $= (\text{Net Capital Expenditures} + \text{Change in WC}) / \text{EBIT}(1-t) * \text{ROC}$
 $= \text{Reinvestment Rate} * \text{ROC}$
- *Proposition: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.*

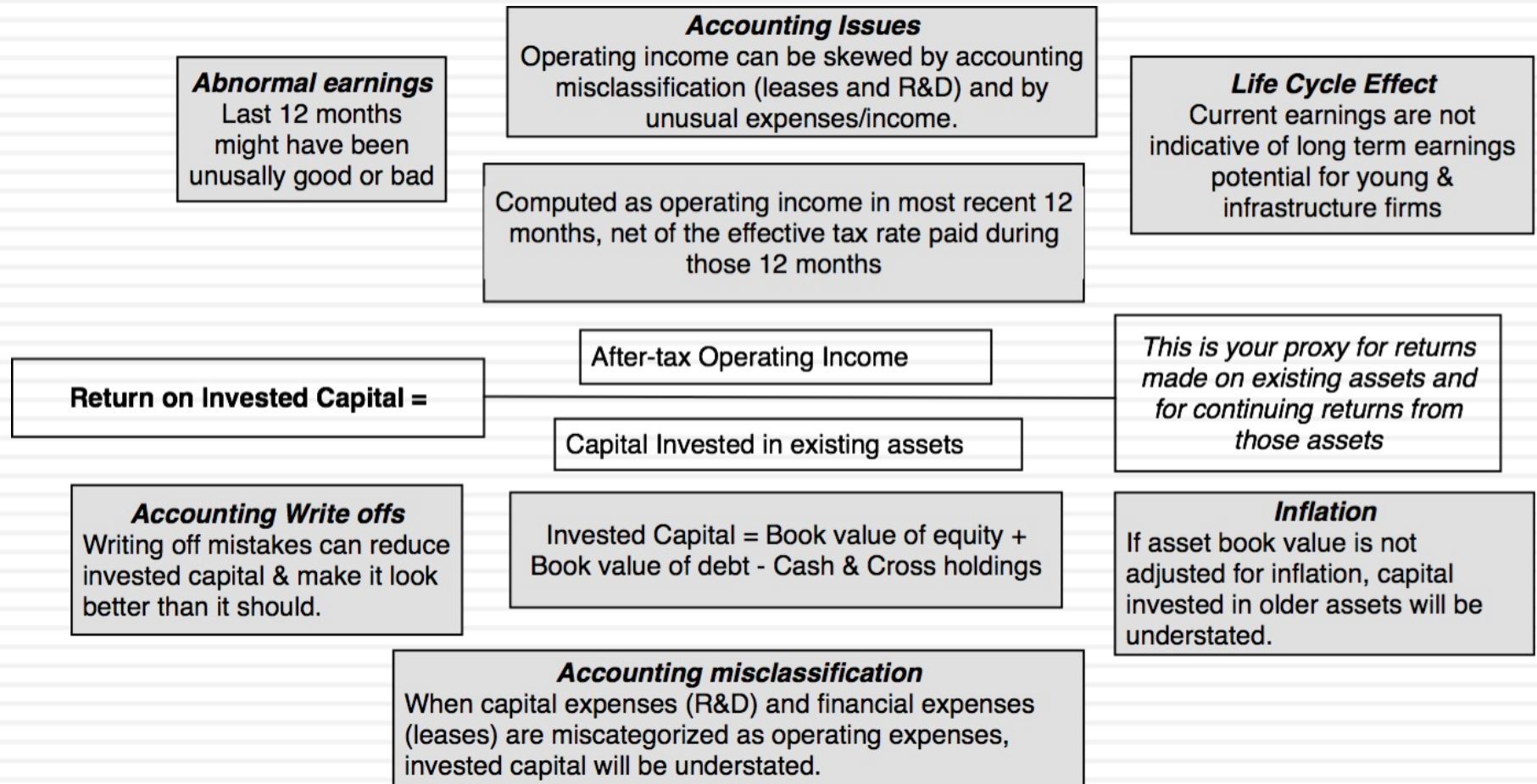
Estimating Growth in Operating Income, if fundamentals stay locked in...

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- In 1999, Cisco's fundamentals were as follows:
 - ▣ Reinvestment Rate = 106.81%
 - ▣ Return on Capital = 34.07%
 - ▣ Expected Growth in EBIT = $(1.0681)(.3407) = 36.39\%$
- As a potential investor in Cisco, what would worry you the most about this forecast?
 - a. That Cisco's return on capital may be overstated (why?)
 - b. That Cisco's reinvestment comes mostly from acquisitions (why?)
 - c. That Cisco is getting bigger as a firm (why?)
 - d. That Cisco is viewed as a star (why?)
 - e. All of the above

The Magical Number: ROIC (or any accounting return) and its limits

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IV. Operating Income Growth when Return on Capital is Changing

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- 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:

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

- **In general, if return on capital and margins are changing and/or expected to change at a company, you are better off not using any of the sustainable growth equations to estimate growth.**

The Value of Growth

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	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%

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

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.

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Growth IV

Top Down Growth

Estimating Growth when Operating Income is Negative or Margins are changing

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- 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.

1. Revenue Growth

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.



Market Share

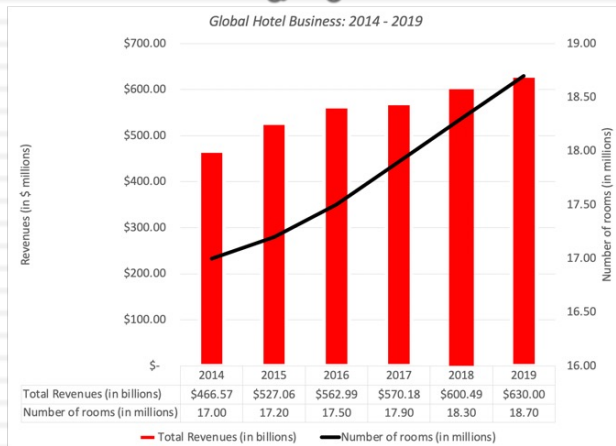
1. *Company's current market share*: If company's current market share is low, potential for growth in market share at expense of competition.
2. *Industry economics*: Nature of the business (a few big winners or splintered competition).
3. *Strength of company's competitive advantages*: Stronger and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

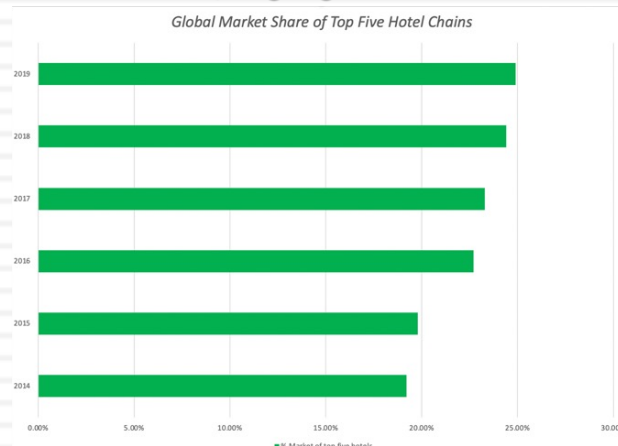
Airbnb: Total Market

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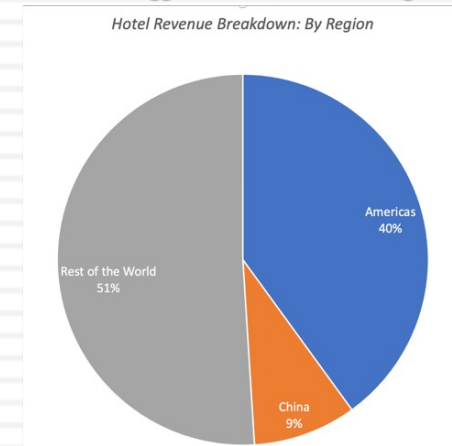
The market is big, but growth has slowed



It is concentrated, and getting more so...



The US is the biggest market, but China is growing.

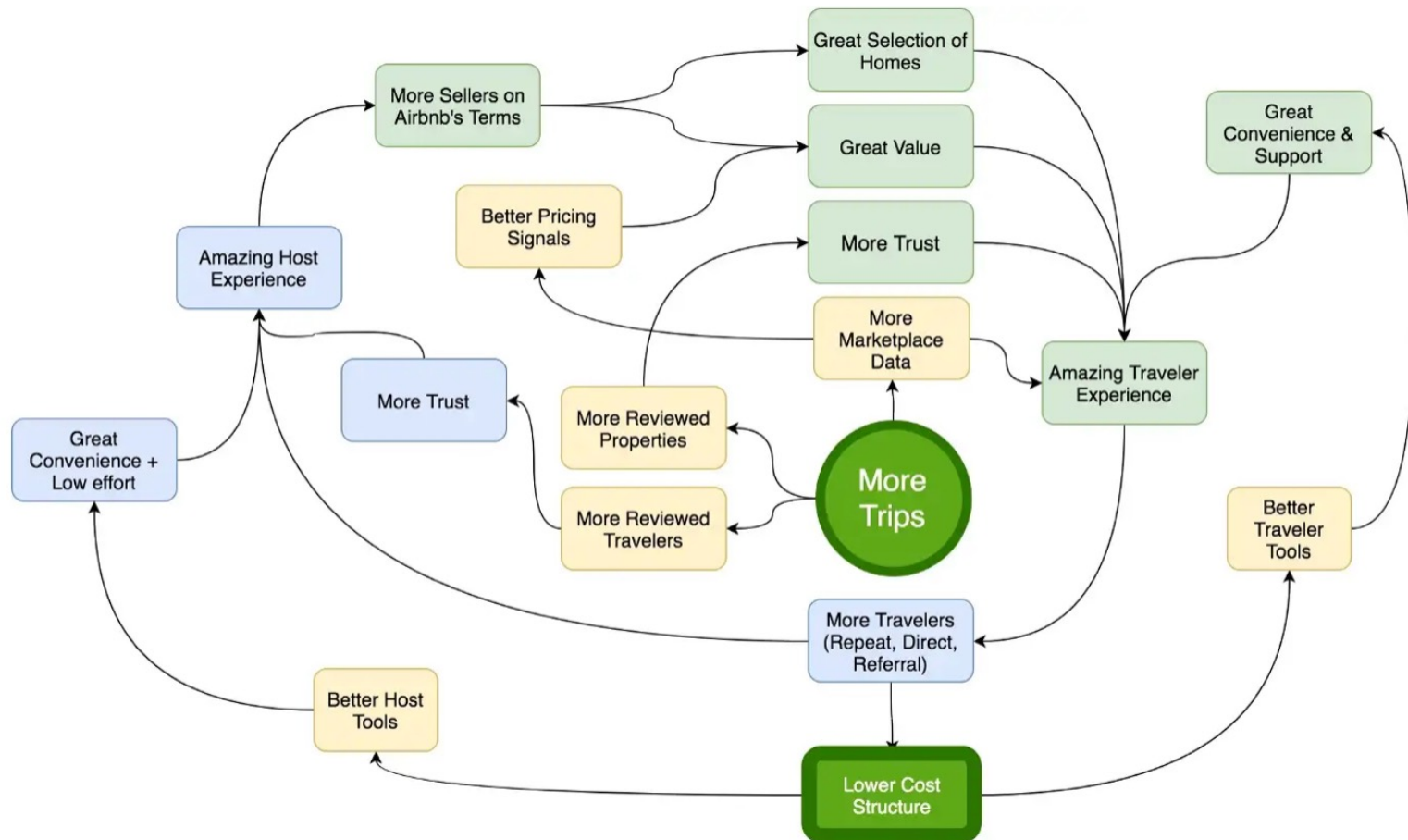


In its prospectus, Airbnb has expanded its estimate of market potential to \$3.4 trillion, as evidenced in this excerpt from the prospectus:

We have a substantial market opportunity in the growing travel market and experience economy. We estimate our serviceable addressable market (“SAM”) today to be \$1.5 trillion, including \$1.2 trillion for short-term stays and \$239 billion for experiences. We estimate our total addressable market (“TAM”) to be \$3.4 trillion, including \$1.8 trillion for short-term stays, \$210 billion for long-term stays, and \$1.4 trillion for experiences.

Airbnb: Market Share

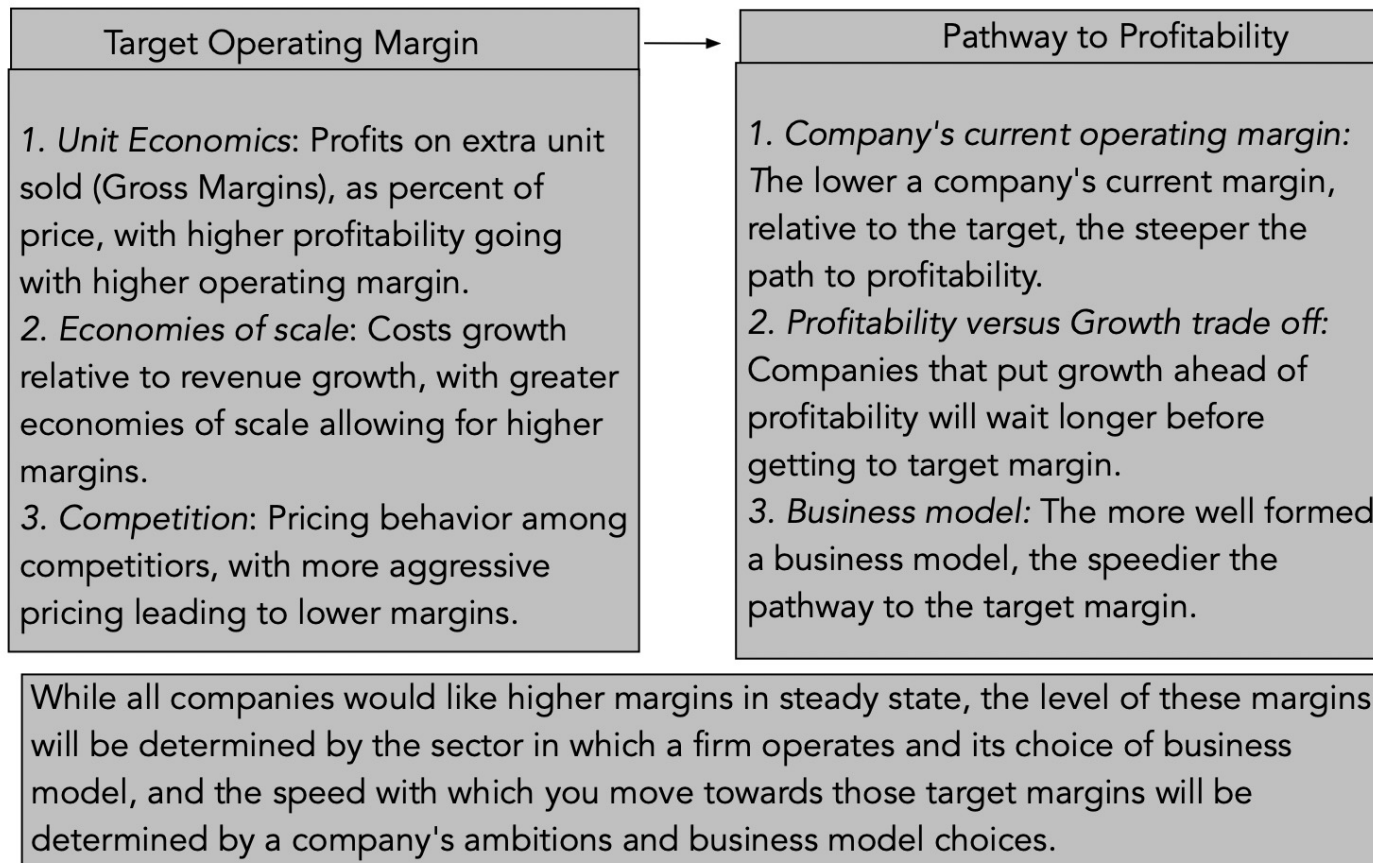
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2. Target Margins (and path there)...

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Operating Margin: Target and Pathway



Airbnb in November 2020: Growth and Profitability

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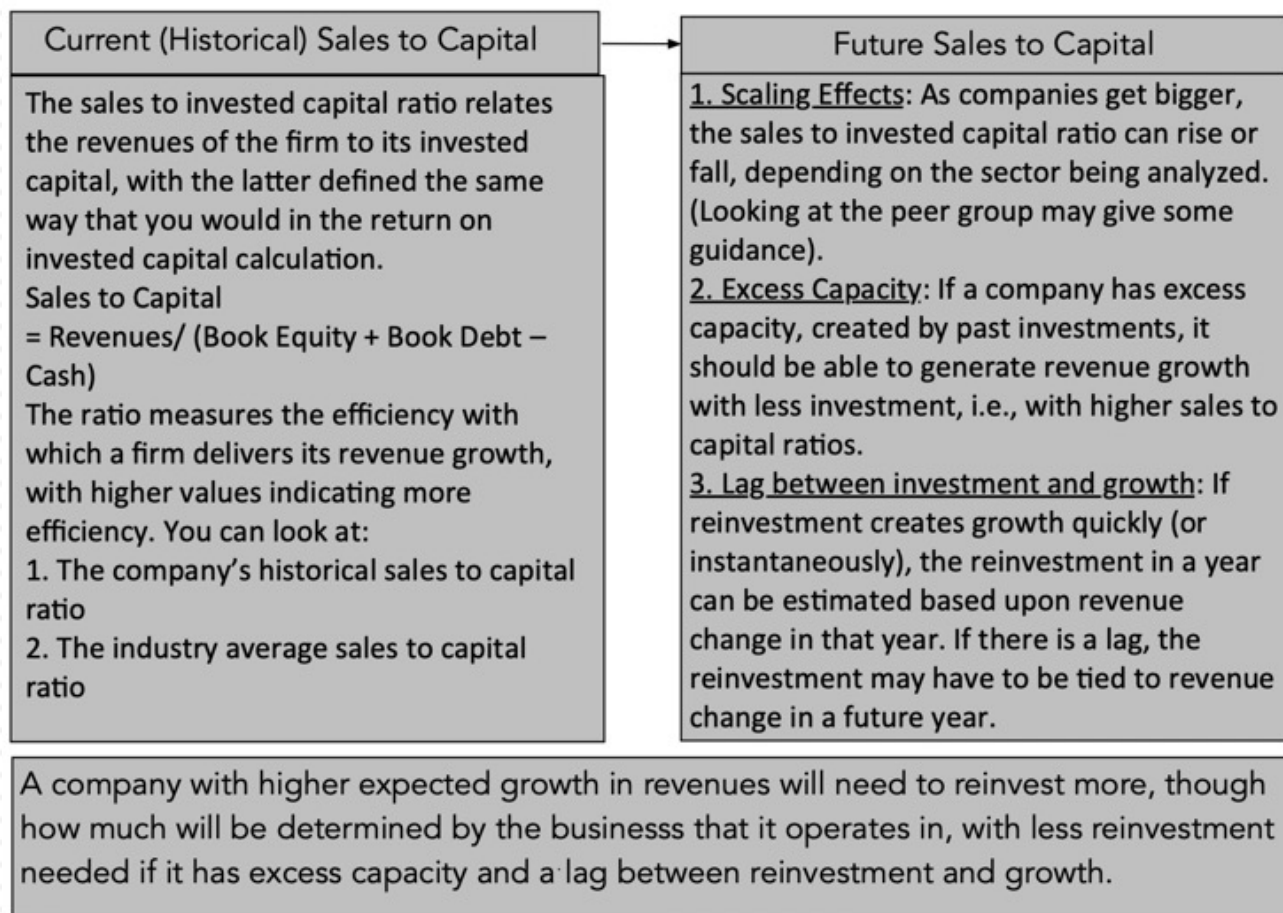
	<i>Gross Bookings</i>	<i>Revenues</i>	<i>Revenue Growth</i>	<i>Operating Margin</i>
<i>LTM</i>	\$ 26,491,803.00	\$ 3,625,731		
1	\$ 37,088,524.20	\$ 4,691,698	40.00%	-10.00%
2	\$ 46,360,655.25	\$ 5,989,797	25.00%	-3.00%
3	\$ 57,950,819.06	\$ 7,565,479	25.00%	0.50%
4	\$ 72,438,523.83	\$ 9,554,641	25.00%	4.00%
5	\$ 90,548,154.79	\$ 12,065,542	25.00%	7.50%
6	\$ 109,019,978.36	\$ 14,674,089	20.40%	9.52%
7	\$ 126,245,134.94	\$ 17,163,026	15.80%	13.39%
8	\$ 140,384,590.06	\$ 19,274,804	11.20%	17.26%
9	\$ 149,649,973.00	\$ 20,748,969	6.60%	21.13%
10	\$ 152,642,972.46	\$ 21,370,016	2.00%	25.00%
Terminal year	\$ 155,695,831.91	\$ 21,797,416	2.00%	25.00%

	Expedia			Booking.com		
	2019	LTM	% Change (Annualized)	2019	LTM	% Change (Annualized)
Gross Bookings	\$ 107,870.00	\$ 52,470.00	-61.75%	\$ 96,400.00	\$ 48,752.00	-59.71%
Revenues	\$ 12,067.00	\$ 7,026.00	-51.38%	\$ 15,066.00	\$ 8,897.00	-50.46%
Operating Income	\$ 961.00	\$ (892.00)	NA	\$ 5,345.00	\$ 1,831.00	-76.03%
Revenues/Gross Bookings	11.19%	13.39%		15.63%	18.25%	
Operating Margin	7.96%	-12.70%		35.48%	20.58%	

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

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Sales to Invested Capital: Reinvestment



Airbnb: Reinvestment and Profitability

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Taxes
 Note that losses are carried forward and the company starts paying taxes only in year 5. Target tax rate is 25%.

Reinvestment
 $Reinvestment = Net\ Cap\ Ex + Acquisitions + Capitalized\ R\&D + Chg\ in\ Working\ Capital)$
 To estimate the reinvestment, I divide the change in sales in that year by the sales to invested capital ratio.

Year	Revenues	Operating Margin	EBIT	EBIT (1-t)	Change in Sales	Sales to Capital	Reinvestment	FCFF	Invested Capital	ROIC
	\$ 3,625,731	-13.69%	\$ (496,542)	\$ (496,542)		1.92			\$ 1,370,158	-36.24%
1	\$ 4,691,698	-10.00%	\$ (469,170)	\$ (469,170)	\$ 1,065,967	2.00	\$ 532,984	\$ (1,002,153)	\$ 1,903,142	-24.65%
2	\$ 5,989,797	-3.00%	\$ (179,694)	\$ (179,694)	\$ 1,298,098	2.00	\$ 649,049	\$ (828,743)	\$ 2,552,191	-7.04%
3	\$ 7,565,479	0.50%	\$ 37,827	\$ 37,827	\$ 1,575,683	2.00	\$ 787,841	\$ (750,014)	\$ 3,340,033	1.13%
4	\$ 9,554,641	4.00%	\$ 382,186	\$ 382,186	\$ 1,989,162	2.00	\$ 994,581	\$ (612,395)	\$ 4,334,613	8.82%
5	\$ 12,065,542	7.50%	\$ 904,916	\$ 777,799	\$ 2,510,900	2.00	\$ 1,255,450	\$ (477,651)	\$ 5,590,064	13.91%
6	\$ 14,674,089	9.52%	\$ 1,397,269	\$ 1,047,952	\$ 2,608,547	2.00	\$ 1,304,274	\$ (256,322)	\$ 6,894,337	15.20%
7	\$ 17,163,026	13.39%	\$ 2,298,389	\$ 1,723,792	\$ 2,488,937	2.00	\$ 1,244,469	\$ 479,323	\$ 8,138,806	21.18%
8	\$ 19,274,804	17.26%	\$ 3,327,026	\$ 2,495,269	\$ 2,111,778	2.00	\$ 1,055,889	\$ 1,439,380	\$ 9,194,695	27.14%
9	\$ 20,748,969	21.13%	\$ 4,384,362	\$ 3,288,271	\$ 1,474,165	2.00	\$ 737,082	\$ 2,551,189	\$ 9,931,777	33.11%
10	\$ 21,370,016	25.00%	\$ 5,342,504	\$ 4,006,878	\$ 621,047	2.00	\$ 310,524	\$ 3,696,354	\$ 10,242,301	39.12%

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

Investment Returns
 $ROIC = EBIT\ (1-t) / Invested\ Capital\ in\ year\ t$

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Closure in Valuation

The Big Enchilada

Getting Closure in Valuation

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- 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

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Approach	Inputs and Value	Types of business
Liquidation Value	Liquidation value of assets held by the firm in the terminal year.	Businesses built around a key person or a time-limited competitive advantage (license or patent)
Going Concern (Perpetuity)	TV in year n = $CF_{n+1} / (r - g)$, where g = growth rate forever	Going concerns with long lives (>40 years)
Going Concern (Finite)	TV in year n = PV of CF in years n+1 to n+ k, where k is finite	Going concerns with shorter lives
Pricing	Terminal Year Operating Metric * Estimated Multiple of Metric	Never appropriate in an intrinsic valuation.

1. With perpetual growth, obey the growth cap

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

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

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 lower.
 - If the economy is composed of **high growth and stable growth firms**, the growth rate of the latter will be lower than the growth rate of the economy.
 - **The stable growth rate can be negative**, for companies in declining businesses.
 - If you use **nominal cashflows and discount rates**, the growth rate should be nominal in the currency in which the valuation is denominated.

Risk free Rates and Nominal GDP Growth

- **Risk free Rate** = Expected Inflation + Expected Real Interest Rate
- The real interest rate is what borrowers agree to return to lenders in real goods/services.
- **Nominal GDP Growth** = Expected Inflation + Expected Real Growth
- The real growth rate in the economy measures the expected growth in the production of goods and services.

The argument for Risk free rate = Nominal GDP growth

1. In the long term, the real growth rate cannot be lower than the real interest rate, since the growth in goods/services has to be enough to cover the promised rate.
2. In the long term, the real growth rate can be higher than the real interest rate, to compensate risk taking. However, as economies mature, the difference should get smaller and since there will be growth companies in the economy, it is prudent to assume that the extra growth comes from these companies.

Time Period	Ten-year T.Bond rate	Inflation rate	Real GDP growth	Nominal GDP Growth Rate
1954-2021	5.59%	3.55%	2.94%	6.50%
1954-1980	5.83%	4.49%	3.50%	7.98%
1981-2008	6.88%	3.26%	3.04%	6.30%
2011-2021	2.25%	1.76%	1.70%	3.46%

A Practical Reason for using the Risk free Rate Cap – Preserve Consistency

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- You are implicitly making assumptions about nominal growth in the economy, with your risk free rate. Thus, with a low risk free rate, you are assuming low nominal growth in the economy (with low inflation and low real growth) and with a high risk free rate, a high nominal growth rate in the economy.
- If you make an explicit assumption about nominal growth in cash flows that is at odds with your implicit growth assumption in the denominator, you are being inconsistent and bias your valuations:
 - If you assume high nominal growth in the economy, with a low risk free rate, you will over value businesses.
 - If you assume low nominal growth rate in the economy, with a high risk free rate, you will under value businesses.