



Valuation: Lecture Note Packet 1

Intrinsic Valuation

The essence of intrinsic value

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- In intrinsic valuation, you value an asset based upon its fundamentals (or intrinsic characteristics).
- For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows.
 - Discounted cash flow (DCF) valuation is a tool for estimating intrinsic value, where the expected value of an asset is written as the present value of the expected cash flows on the asset, with either the cash flows or the discount rate adjusted to reflect the risk.
 - Intrinsic valuation models predate the modern DCF model, since investors through the ages have found ways to weight in expected cash flows into value.

The two faces of discounted cash flow valuation

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- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

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

where the asset has an n-year life, $E(CF_t)$ is the expected cash flow in period t and r is a discount rate that reflects the risk of the cash flows.

- Alternatively, we can replace the expected cash flows with the guaranteed cash flows we would have accepted as an alternative (certainty equivalents) and discount these at the riskfree rate:

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

where $CE(CF_t)$ is the certainty equivalent of $E(CF_t)$ and r_f is the riskfree rate.

Risk Adjusted Value: Two Basic Propositions

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- The value of an asset is the risk-adjusted present value of the cash flows:

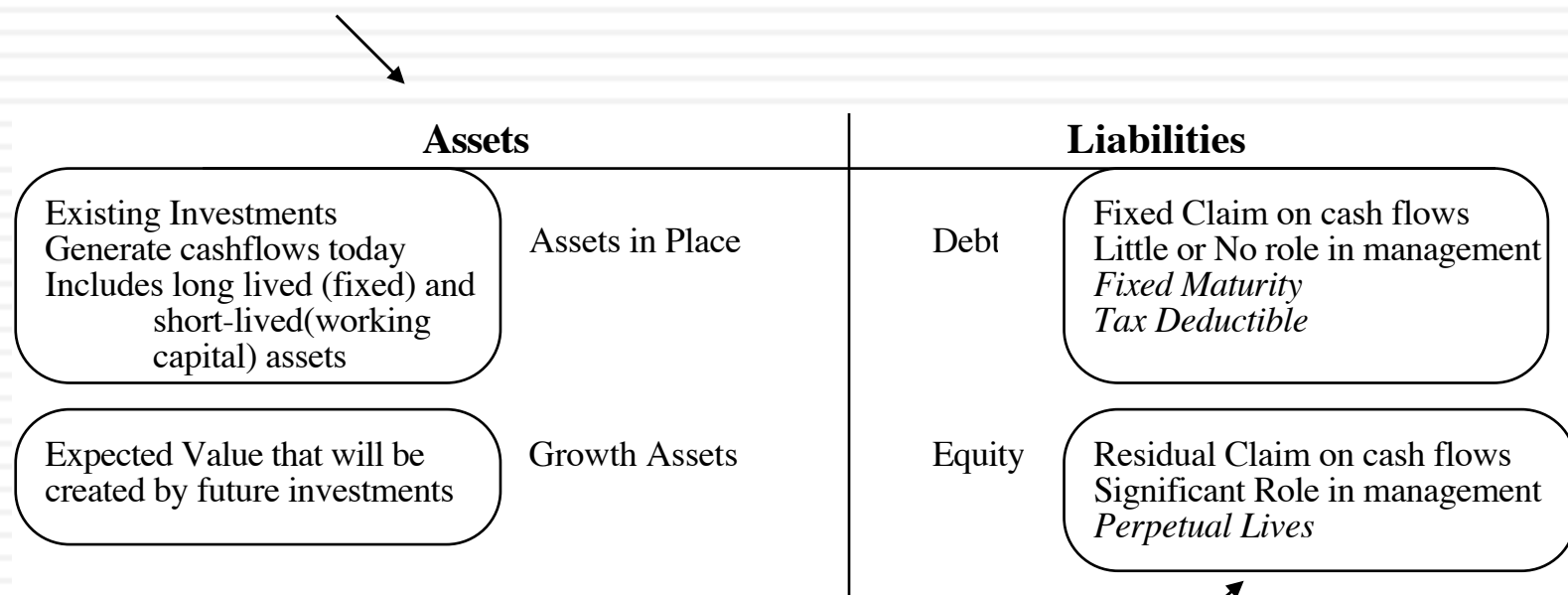
$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \dots + \frac{E(CF_n)}{(1+r)^n}$$

1. The “IT” proposition: If IT does not affect the expected cash flows or the riskiness of the cash flows, IT cannot affect value.
2. The “DON’T BE A WUSS” proposition: Valuation requires that you make estimates of expected cash flows in the future, not that you be right about those cashflows. So, uncertainty is not an excuse for not making estimates.
3. The “DUH” proposition: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
4. The “DON’T FREAK OUT” proposition: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.

DCF Choices: Equity Valuation versus Firm Valuation

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Firm Valuation: Value the entire business

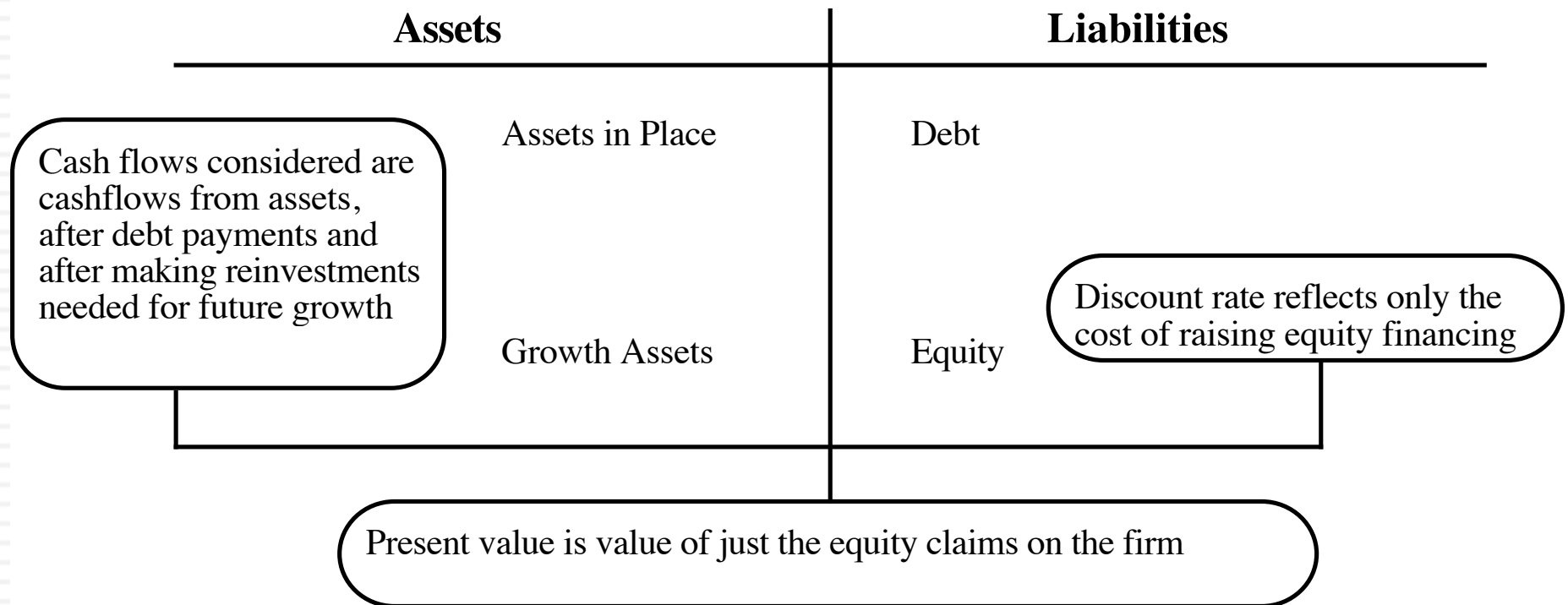


Equity valuation: Value just the equity claim in the business

1. Equity Valuation

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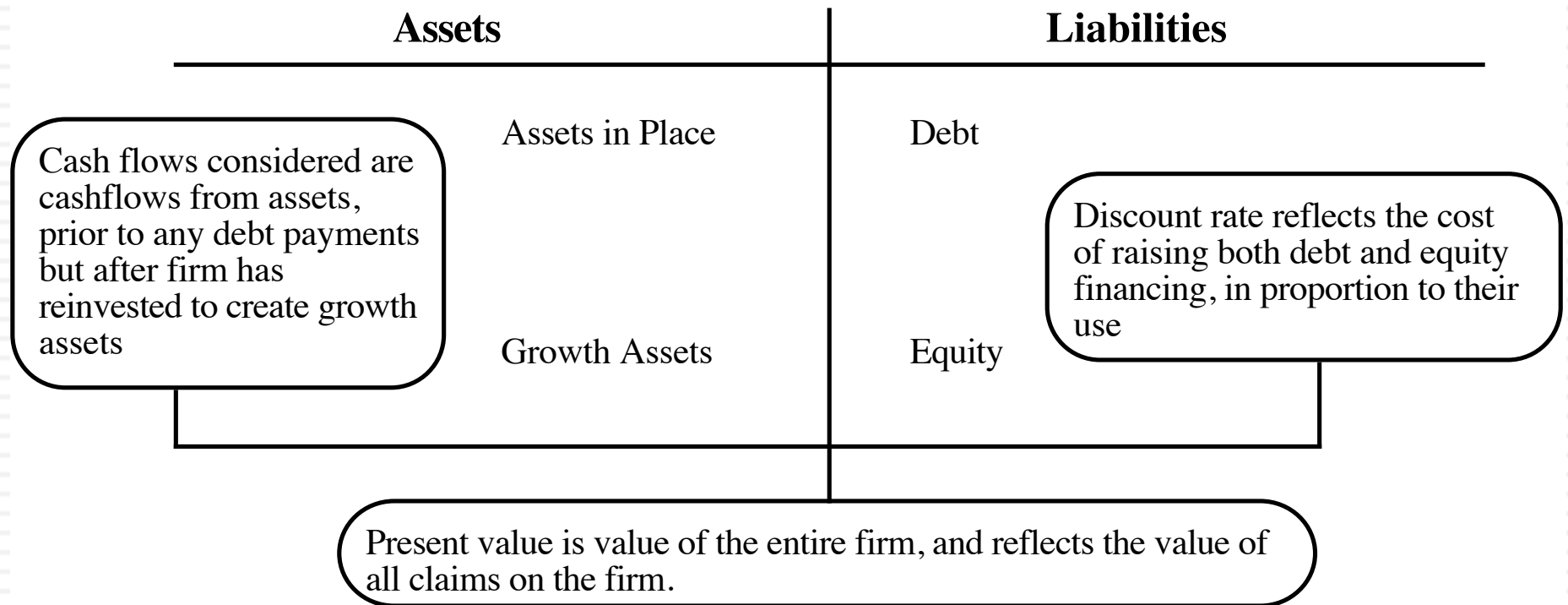
Figure 5.5: Equity Valuation



2. Firm or Business Valuation

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Figure 5.6: Firm Valuation



Firm Value and Equity Value

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- To get from firm value to equity value, which of the following would you need to do?
 - a. Subtract out the value of long-term debt
 - b. Subtract out the value of all debt
 - c. Subtract the value of any debt that was included in the cost of capital calculation
 - d. Subtract out the value of all liabilities in the firm
- Doing so, will give you a value for the equity which is
 - a. greater than the value you would have got in an equity valuation
 - b. lesser than the value you would have got in an equity valuation
 - c. equal to the value you would have got in an equity valuation

Cash Flows and Discount Rates

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- Assume that you are analyzing a company with the following cashflows for the next five years.

Year	CF to Equity	Interest Expense (1-t)	CF to Firm
1	\$ 50	\$ 40	\$ 90
2	\$ 60	\$ 40	\$ 100
3	\$ 68	\$ 40	\$ 108
4	\$ 76.2	\$ 40	\$ 116.2
5	\$ 83.49	\$ 40	\$ 123.49
Terminal Value \$ 1603.0			\$ 2363.008

- Assume also that the cost of equity is 13.625% and the firm can borrow long term at 10%. (The tax rate for the firm is 50%.)
- The current market value of equity is \$1,073 and the value of debt outstanding is \$800.

Equity versus Firm Valuation

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- Method 1: Discount CF to Equity at Cost of Equity to get value of equity
 - Cost of Equity = 13.625%
 - Value of Equity = $50/1.13625 + 60/1.13625^2 + 68/1.13625^3 + 76.2/1.13625^4 + (83.49+1603)/1.13625^5 = \mathbf{\$1073}$
- Method 2: Discount CF to Firm at Cost of Capital to get value of firm
 - Cost of Debt = Pre-tax rate (1- tax rate) = 10% (1-.5) = 5%
 - Cost of Capital = 13.625% (1073/1873) + 5% (800/1873) = 9.94%
 - PV of Firm = $90/1.0994 + 100/1.0994^2 + 108/1.0994^3 + 116.2/1.0994^4 + (123.49+2363)/1.0994^5 = \1873
 - Value of Equity = Value of Firm - Market Value of Debt
 $= \$1873 - \$800 = \mathbf{\$1073}$

First Principle of Valuation

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- Discounting Consistency Principle: Never mix and match cash flows and discount rates.
- The Mismatch Effect: Mismatching cash flows to discount rates is deadly.
 - Discounting cashflows after debt cash flows (equity cash flows) at the weighted average cost of capital will lead to an upwardly biased estimate of the value of equity
 - Discounting pre-debt cashflows (cash flows to the firm) at the cost of equity will yield a downward biased estimate of the value of the firm.

The Effects of Mismatching Cash Flows and Discount Rates

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- Error 1: Discount CF to Equity at Cost of Capital to get equity value
 - ▣ $PV \text{ of Equity} = 50/1.0994 + 60/1.0994^2 + 68/1.0994^3 + 76.2/1.0994^4 + (83.49+1603)/1.0994^5 = \1248
 - ▣ Value of equity is **overstated by \$175.**
- Error 2: Discount CF to Firm at Cost of Equity to get firm value
 - ▣ $PV \text{ of Firm} = 90/1.13625 + 100/1.13625^2 + 108/1.13625^3 + 116.2/1.13625^4 + (123.49+2363)/1.13625^5 = \1613
 - ▣ $PV \text{ of Equity} = \$1612.86 - \$800 = \$813$
 - ▣ Value of Equity is **understated by \$ 260.**
- Error 3: Discount CF to Firm at Cost of Equity, forget to subtract out debt, and get too high a value for equity
 - ▣ Value of Equity = \$ 1613
 - ▣ Value of Equity is **overstated by \$ 540**

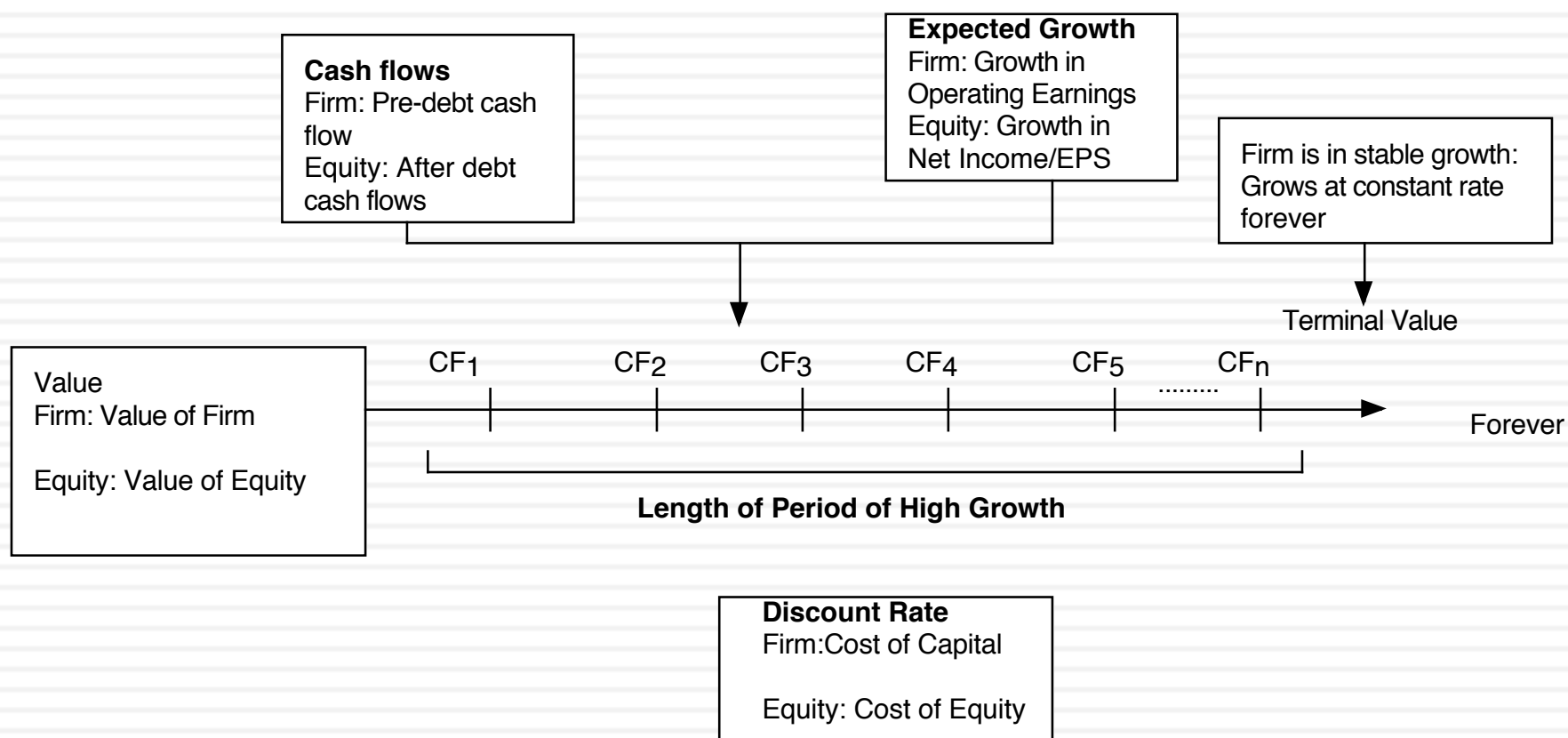
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DCF: First Steps

Generic DCF Valuation Model

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DISCOUNTED CASHFLOW VALUATION



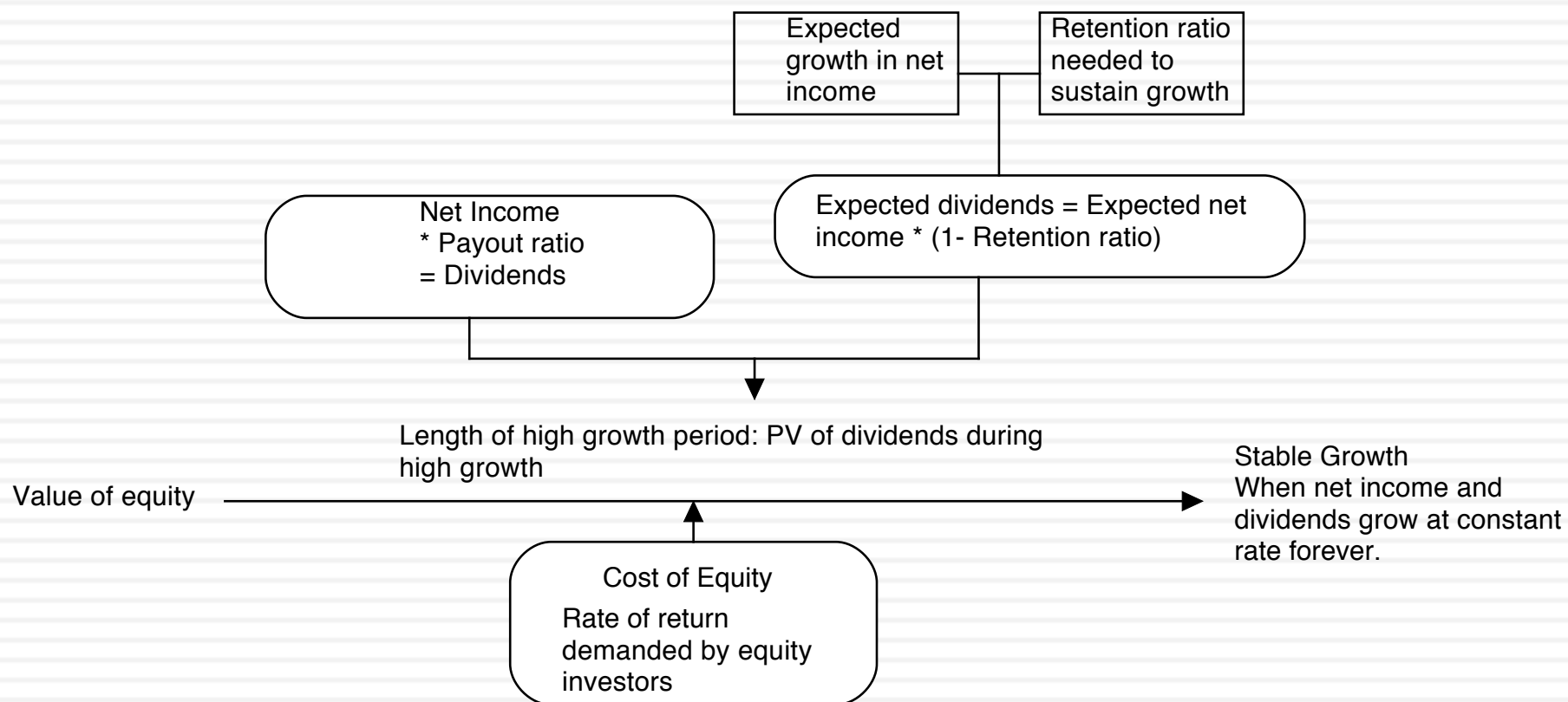
Same ingredients, different approaches...

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Input	Dividend Discount Model	FCFE (Potential dividend) discount model	FCFF (firm) valuation model
Cash flow	Dividend	Potential dividends = FCFE = Cash flows after taxes, reinvestment needs and debt cash flows	FCFF = Cash flows before debt payments but after reinvestment needs and taxes.
Expected growth	In equity income and dividends	In equity income and FCFE	In operating income and FCFF
Discount rate	Cost of equity	Cost of equity	Cost of capital
Steady state	When dividends grow at constant rate forever	When FCFE grow at constant rate forever	When FCFF grow at constant rate forever

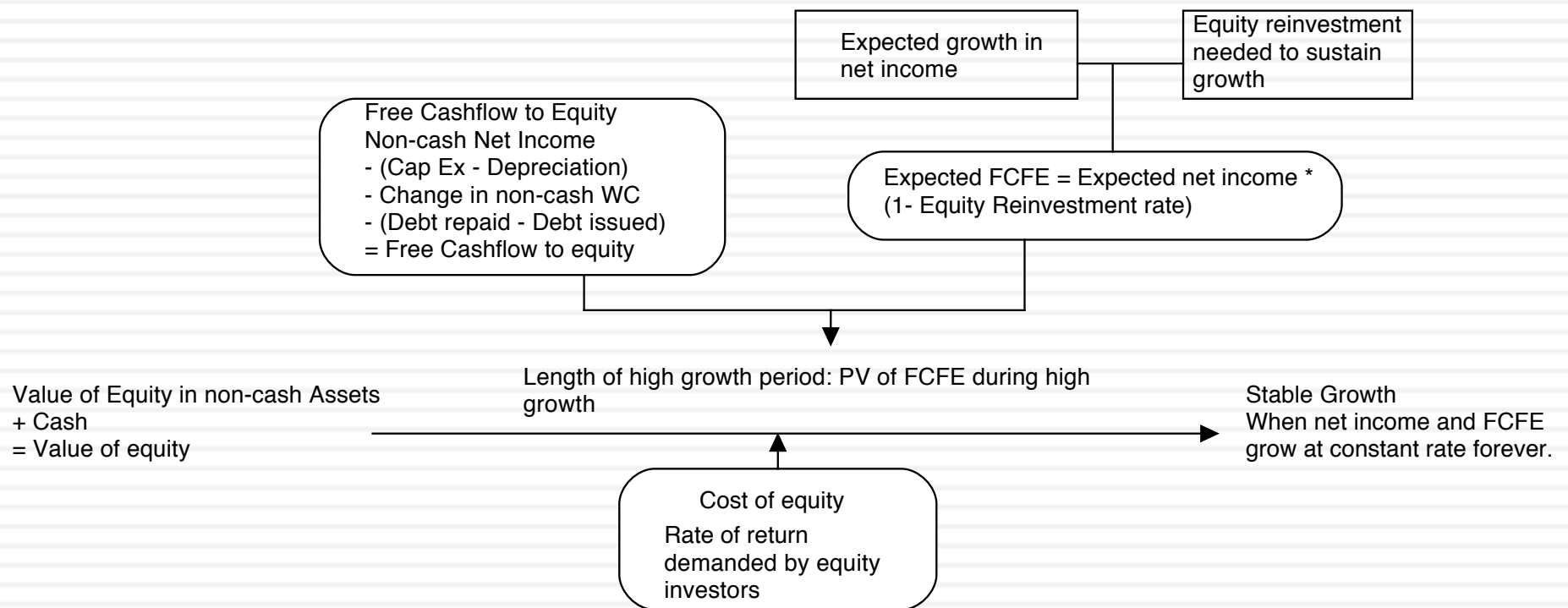
Start easy: The Dividend Discount Model

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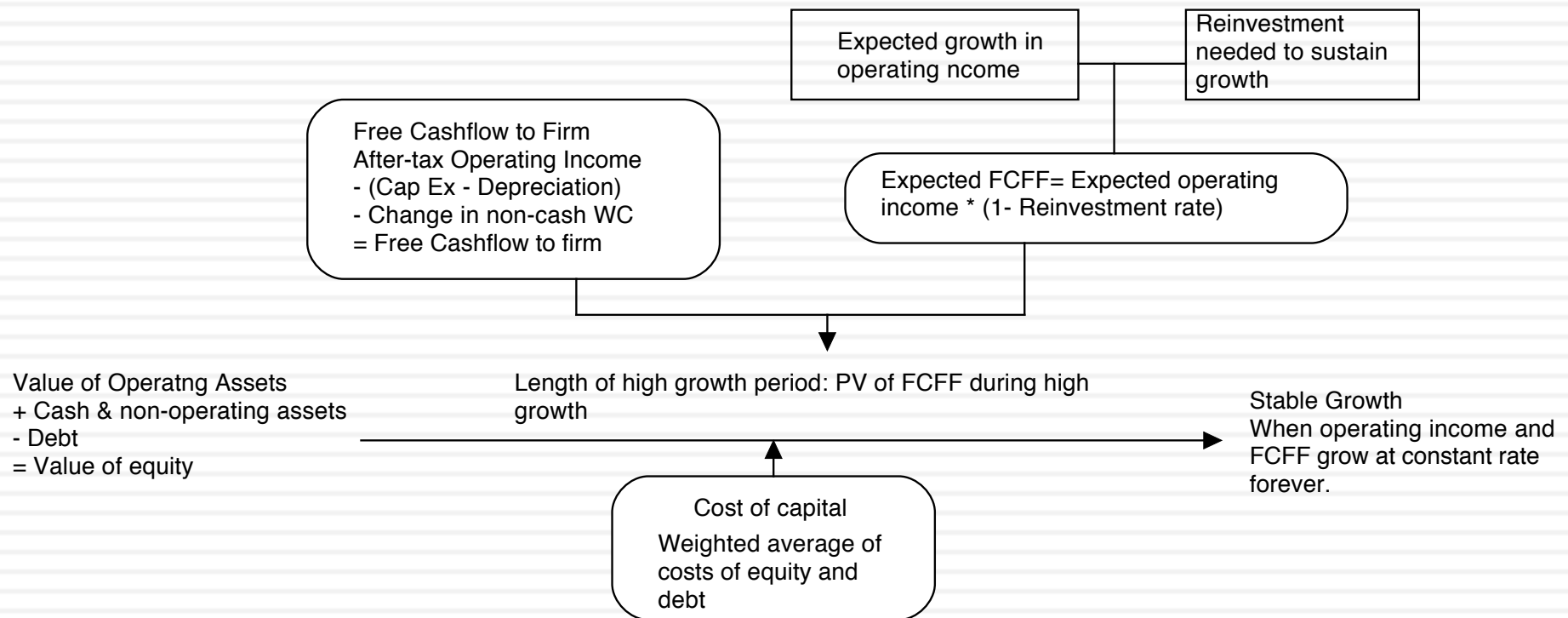
Moving on up: The “potential dividends” or FCFE model

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To valuing the entire business: The FCFF model

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DCF: The Process

Start with the past

Cash flow to Firm

Revenues * Operating Margin
= Operating Income

* (1 - tax rate) *Tax Effect*

- (Cap Ex - Depreciation) *Reinvestment*
- Change in non-cash WC
= Free Cash flow to Firm

* How quickly is the firm growing?
* How efficiently is it growing?
* How profitable is the firm?

Value of Operating Assets
+ Cash
+ Non-operating Assets
- Debt
= Value of Equity

Adjust for risk of failure

= Probability of failure *
Value of Equity in failure

Forecast future cashflows

If margins & returns are stable

Expected growth in operating income = Reinvestment
Rate * Return on Invested Capital
 $FCFF = \text{After-tax Oper. Income} (1 - \text{Reinvestment Rate})$

If margins & returns are changing

1. Estimate revenue growth & future revenues
2. Estimate operating margins over time
3. Estimate reinvestment based on revenues
 $FCFF = \text{After tax Operating Income} - \text{Reinvestment}$

Apply Closure

Firm is mature

Cashflow/Earnings
grow at constant rate
forever (g_n)

Terminal Value = $FCFF_{n+1} / (r - g_n)$

FCFF₁ FCFF₂ FCFF₃ FCFF₄
Year n

Discount back at Cost of Capital, which can change over time..

Cost of Equity

Cost of Debt

Proportions of
Debt & Equity

Long term rate at which you can borrow money, today
(Riskfree Rate + Default Spread) (1 - tax rate)

Return required by "marginal" investors, given perceived risk in equity investment

Riskfree Rate

- Default free & long term
- In same currency and in
same terms as cash flows

+

Relative Risk Measure (Beta)

X

Equity Risk Premium

Business Mix

Financial Leverage

Operating Locations

Adjust for operating risk in cashflows

The Sequence

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1. Get a handle on the past and the cross-section: While the past is the past (and should have little relevance in determining value), you can get clues about the future by looking at what your firm has done in the past, and what other companies in the business are doing now.
2. Risk and Discount Rates: Traditional financial theory (unfortunately) has put too much of a focus on risk and discount rates, but they do remain ingredients in valuing a company.
3. Estimate growth and future cash flows: This is where the rubber meets the road in valuation. Estimating future cash flows is never easy, should not be mechanical and should be built around your story.
4. Apply Closure to cash flows: Since you cannot estimate cash flows forever, you need to find a way to bring your valuation to closure.
5. Tie up loose ends: Check to see what else in your business needs to be valued or adjusted for to get to value per share.

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Discount Rates

The D in the DCF..

Estimating Inputs: Discount Rates

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- While discount rates obviously matter in DCF valuation, they don't matter as much as most analysts think they do.
- At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cashflow being discounted.
 - Equity versus Firm: If the cash flows being discounted are cash flows to equity, the appropriate discount rate is a cost of equity. If the cash flows are cash flows to the firm, the appropriate discount rate is the cost of capital.
 - Currency: The currency in which the cash flows are estimated should also be the currency in which the discount rate is estimated.
 - Nominal versus Real: If the cash flows being discounted are nominal cash flows (i.e., reflect expected inflation), the discount rate should be nominal

Risk in the DCF Model

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Expectation of cash flows across all scenarios, good and bad. Incorporates all risks that affect the asset / business.

Expected Cash Flows

Risk Adjusted Discount Rate

Discount rate should reflect the risk perceived by the marginal investor in the company

$$\boxed{\text{Risk Adjusted Cost of equity}} = \boxed{\text{Risk free rate in the currency of analysis}} + \boxed{\text{Relative risk of company/equity in question}} \times \boxed{\text{Equity Risk Premium required for average risk equity}}$$

Not all risk is created equal...

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- Estimation versus Economic uncertainty
 - ▣ Estimation uncertainty reflects the possibility that you could have the “wrong model” or estimated inputs incorrectly within this model.
 - ▣ Economic uncertainty comes from the fact that markets and economies can change over time and that even the best models will fail to capture these unexpected changes.
- Micro uncertainty versus Macro uncertainty
 - ▣ Micro uncertainty refers to uncertainty about the potential market for a firm’s products, the competition it will face and the quality of its management team.
 - ▣ Macro uncertainty reflects the reality that your firm’s fortunes can be affected by changes in the macro economic environment.
- Discrete versus continuous uncertainty
 - ▣ Discrete risk: Risks that lie dormant for periods but show up at points in time. (Examples: A drug working its way through the FDA pipeline may fail at some stage of the approval process or a company in Venezuela may be nationalized)
 - ▣ Continuous risk: Risks changes in interest rates or economic growth occur continuously and affect value as they happen.

Risk and Cost of Equity: The role of the marginal investor

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- Not all risk counts: While the notion that the cost of equity should be higher for riskier investments and lower for safer investments is intuitive, what risk should be built into the cost of equity is the question.
- Risk through whose eyes? While risk is usually defined in terms of the variance of actual returns around an expected return, risk and return models in finance assume that the risk that should be rewarded (and thus built into the discount rate) in valuation should be the risk perceived by the marginal investor in the investment
- The diversification effect: Most risk and return models in finance also assume that the marginal investor is well diversified, and that the only risk that he or she perceives in an investment is risk that cannot be diversified away (i.e, market or non-diversifiable risk). In effect, it is primarily economic, macro, continuous risk that should be incorporated into the cost of equity.

The Cost of Equity: Competing “Market Risk” Models

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Model	Expected Return	Inputs Needed
CAPM	$E(R) = R_f + \beta (R_m - R_f)$	Riskfree Rate Beta relative to market portfolio Market Risk Premium
APM	$E(R) = R_f + \sum \beta_j (R_j - R_f)$	Riskfree Rate; # of Factors; Betas relative to each factor Factor risk premiums
Multi factor	$E(R) = R_f + \sum \beta_j (R_j - R_f)$	Riskfree Rate; Macro factors Betas relative to macro factors Macro economic risk premiums
Proxy	$E(R) = a + \sum \beta_j Y_j$	Proxies Regression coefficients

Classic Risk & Return: Cost of Equity

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- In the CAPM, the cost of equity:
$$\text{Cost of Equity} = \text{Riskfree Rate} + \text{Equity Beta} * (\text{Equity Risk Premium})$$
- In APM or Multi-factor models, you still need a risk free rate, as well as betas and risk premiums to go with each factor.
- To use any risk and return model, you need
 - A risk free rate as a base
 - A single equity risk premium (in the CAPM) or factor risk premiums, in the the multi-factor models
 - A beta (in the CAPM) or betas (in multi-factor models)

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Discount Rates I

The Riskfree Rate

The Risk Free Rate: Laying the Foundations

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- On a riskfree investment, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
 - ▣ No default risk
 - ▣ No reinvestment risk
- It follows then that if asked to estimate a risk free rate:
 1. Time horizon matters: Thus, the riskfree rates in valuation will depend upon when the cash flow is expected to occur and will vary across time.
 2. Currencies matter: A risk free rate is currency-specific and can be very different for different currencies.
 3. Not all government securities are riskfree: Some governments face default risk and the rates on bonds issued by them will not be riskfree.

Test 1: A riskfree rate in US dollars!

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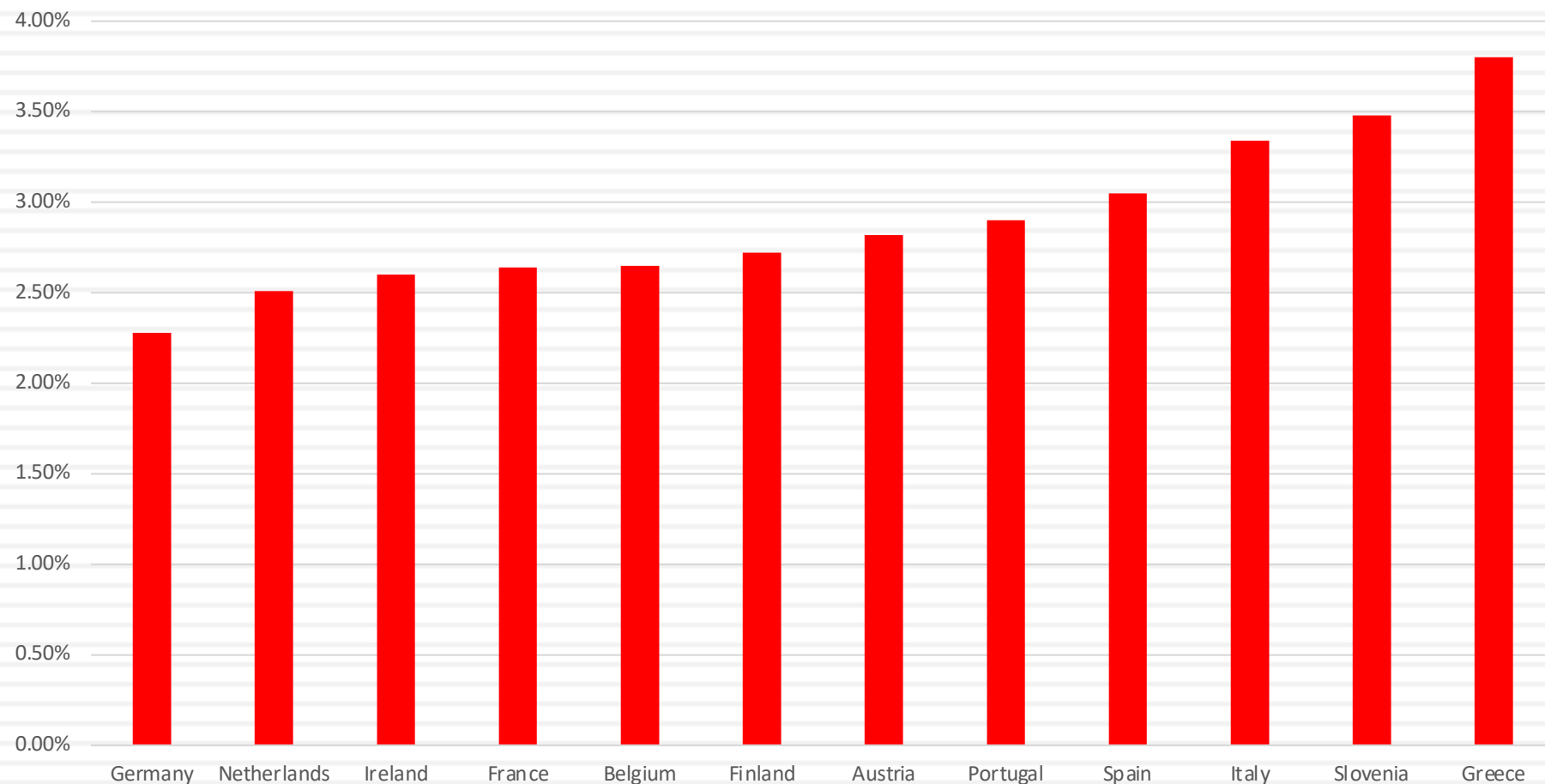
- In valuation, we estimate cash flows forever (or at least for very long time periods). The right risk free rate to use in valuing a company in US dollars would be
 - a. A three-month Treasury bill rate (4.42%)
 - b. A ten-year Treasury bond rate (3.88%)
 - c. A thirty-year Treasury bond rate (3.97%)
 - d. A TIPs (inflation-indexed treasury) rate (1.53%)
 - e. The highest of these numbers
 - f. The lowest of these numbers
 - g. Other (Specify)

What are we implicitly assuming about the US treasury when we use any of the treasury numbers?

Test 2: A Riskfree Rate in Euros?

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Government Bond Rates: 10-year Euro bonds



Test 3: A Riskfree Rate in Indian Rupees

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- The Indian government had 10-year Rupee bonds outstanding, with a yield to maturity of about 7.18% on January 1, 2024.
- In January 2024, the Indian government had a local currency sovereign rating of Baa3. The typical default spread (over a default free rate) for Baa3 rated country bonds in early 2024 was 2.39%. The risk free rate in Indian Rupees is
 - a. The yield to maturity on the 10-year bond (7.18%)
 - b. The yield to maturity on the 10-year bond + Default spread (9.57%)
 - c. The yield to maturity on the 10-year bond – Default spread (4.78%)
 - d. None of the above

Sovereign Default Spread: Three paths to the same destination...

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- Sovereign dollar or euro denominated bonds: Find sovereign bonds denominated in US dollars, issued by an emerging sovereign.
 - ▣ Default spread = Emerging Govt Bond Rate (in US \$) – US Treasury Bond rate with same maturity.
- CDS spreads: Obtain the traded value for a sovereign Credit Default Swap (CDS) for the emerging government.
 - ▣ Default spread = Sovereign CDS spread (with perhaps an adjustment for CDS market frictions).
- Sovereign-rating based spread: For countries which don't issue dollar denominated bonds or have a CDS spread, you have to use the average spread for other countries with the same sovereign rating.

Approach 1: Default spread from Government Bonds

Country	\$ Bond Rate	Riskfree Rate	Default Spread
	\$ Bonds		
Peru	5.36%	3.88%	1.48%
Brazil	5.75%	3.88%	1.87%
Colombia	5.25%	3.88%	1.37%
Poland	4.39%	3.88%	0.51%
Turkey	7.10%	3.88%	3.22%
Mexico	4.75%	3.88%	0.87%
Russia	11.55%	3.88%	7.67%
	Euro Bonds		
Bulgaria	3.50%	2.03%	1.47%

Approach 2: CDS Spreads – January 2024

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Country	12/31/23	CDS Spread net of US	Country	12/31/23	CDS Spread net of US	Country	12/31/23	CDS Spread net of US
Abu Dhabi	0.75%	0.17%	Greece	1.28%	0.70%	Panama	2.31%	1.73%
Algeria	1.70%	1.12%	Guatemala	2.68%	2.10%	Peru	1.37%	0.79%
Angola	7.82%	7.24%	Hong Kong	0.60%	0.02%	Philippines	1.18%	0.60%
Argentina	46.19%	45.61%	Hungary	1.95%	1.37%	Poland	1.06%	0.48%
Australia	0.26%	0.00%	Iceland	0.88%	0.30%	Portugal	0.75%	0.17%
Austria	0.27%	0.00%	India	0.99%	0.41%	Qatar	0.83%	0.25%
Bahrain	2.74%	2.16%	Indonesia	1.32%	0.74%	Romania	2.31%	1.73%
Belgium	0.33%	0.00%	Iraq	5.14%	4.56%	Russia	NA	NA
Brazil	2.39%	1.81%	Ireland	0.41%	0.00%	Rwanda	5.53%	4.95%
Bulgaria	1.47%	0.89%	Israel	1.57%	0.99%	Saudi Arabia	0.85%	0.27%
Cameroon	9.14%	8.56%	Italy	1.34%	0.76%	Senegal	6.89%	6.31%
Canada	0.44%	0.00%	Japan	0.43%	0.00%	Serbia	2.86%	2.28%
Chile	1.15%	0.57%	Kazakhstan	1.76%	1.18%	Slovakia	0.60%	0.02%
China	0.99%	0.41%	Kenya	7.04%	6.46%	Slovenia	0.76%	0.18%
Colombia	2.74%	2.16%	Korea	0.37%	0.00%	South Africa	3.16%	2.58%
Costa Rica	3.11%	2.53%	Kuwait	0.83%	0.25%	Spain	0.78%	0.20%
Croatia	1.34%	0.76%	Latvia	0.94%	0.36%	Sri Lanka	59.36%	NA
Cyprus	1.11%	0.53%	Lebanon	NA	NA	Sweden	0.28%	0.00%
Czech Republic	0.56%	0.00%	Lithuania	0.90%	0.32%	Switzerland	0.22%	0.00%
Denmark	0.24%	0.00%	Malaysia	0.86%	0.28%	Thailand	0.65%	0.07%
Dubai	1.10%	0.52%	Mexico	1.68%	1.10%	Tunisia	9.78%	9.20%
Ecuador	52.74%	52.16%	Mongolia	4.02%	3.44%	Turkey	3.86%	3.28%
Egypt	10.13%	9.55%	Morocco	1.90%	1.32%	Ukraine	NA	NA
El Salvador	8.40%	7.82%	Namibia	2.10%	1.52%	United Kingdom	0.51%	0.00%
Estonia	0.60%	0.02%	Netherlands	0.24%	0.00%	United States	0.58%	0.00%
Ethiopia	32.31%	31.73%	New Zealand	0.29%	0.00%	Uruguay	1.14%	0.56%
Finland	0.34%	0.00%	Nicaragua	4.89%	4.31%	Venezuela	11.25%	10.67%
France	0.43%	0.00%	Nigeria	6.44%	5.86%	Vietnam	1.84%	1.26%
Gabon	6.85%	6.27%	Norway	0.24%	0.00%			
Germany	0.29%	0.00%	Oman	1.92%	1.34%			

Approach 3: Typical Default Spreads: January 2024

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S&P Sovereign Rating	Moody's Sovereign Rating	Default Spread
AAA	Aaa	0.00%
AA+	Aa1	0.44%
AA	Aa2	0.54%
AA-	Aa3	0.65%
A+	A1	0.77%
A	A2	0.92%
A-	A3	1.31%
BBB+	Baa1	1.74%
BBB	Baa2	2.07%
BBB-	Baa3	2.39%
BB+	Ba1	2.73%
BB	Ba2	3.28%
BB	Ba3	3.92%
B+	B1	4.90%
B	B2	5.99%
B-	B3	7.08%
CCC+	Caa1	8.17%
CCC	Caa2	9.81%
CCC-	Caa3	10.90%
CC+	Ca1	12.25%
CC	Ca2	14.00%
CC-	Ca3	15.00%
C+	C1	15.75%
C	C2	16.75%
C-	C3	18.00%

Asw

Getting to a risk free rate in Brazilian Reais on January 1, 2024

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- The Brazilian government bond rate in nominal reais on January 1, 2024, was 10.35%. To get to a riskfree rate in nominal reais, we can use one of three approaches.
 - Approach 1: Government Bond spread
 - Default Spread = Brazil \$ Bond Rate – US T.Bond Rate = 5.75% - 3.88% = 1.87%
 - Riskfree rate in \$R = 10.35% - 1.87% = 8.48%
 - Approach 2: The CDS Spread
 - The CDS spread for Brazil, adjusted for the US CDS spread was 1.81%.
 - Riskfree rate in \$R = 10.35% - 1.81% = 8.54%
 - Approach 3: The Rating based spread
 - Brazil has a Ba2 local currency rating from Moody's. The default spread for that rating is 3.28%
 - Riskfree rate in \$R = 10.35% - 3.28% = 7.07%

Test 4: A Real Riskfree Rate

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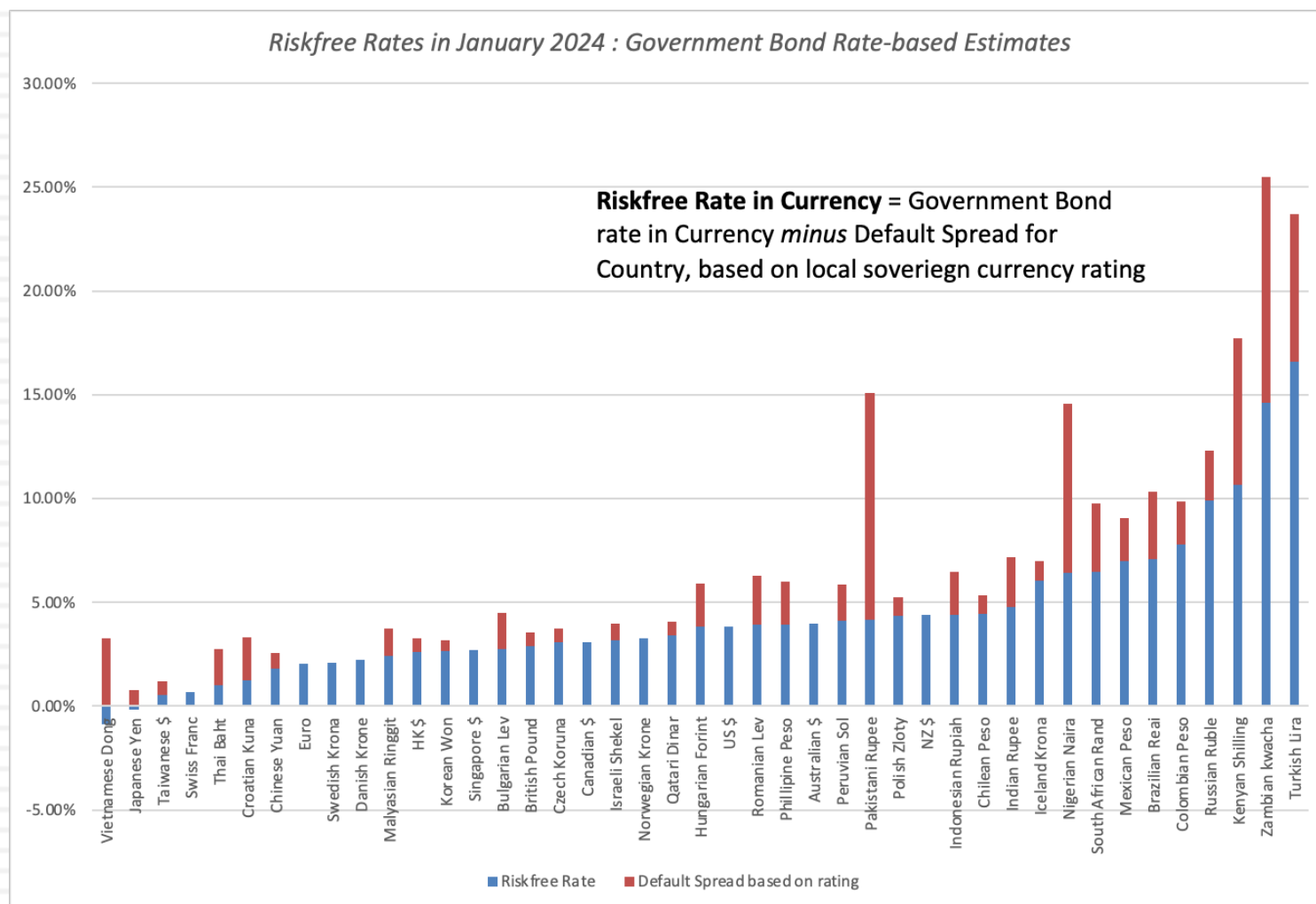
- In some cases, you may want a riskfree rate in real terms (in real terms) rather than nominal terms.
- To get a real riskfree rate, you would like a security with no default risk and a guaranteed real return. Treasury indexed securities offer this combination.
- In January 2024, the yield on a 10-year indexed treasury bond was 1.80%. Which of the following statements would you subscribe to?
 - a. This (1.80%) is the real riskfree rate to use, if you are valuing US companies in real terms.
 - b. This (1.80%) is the real riskfree rate to use, anywhere in the world

Explain.

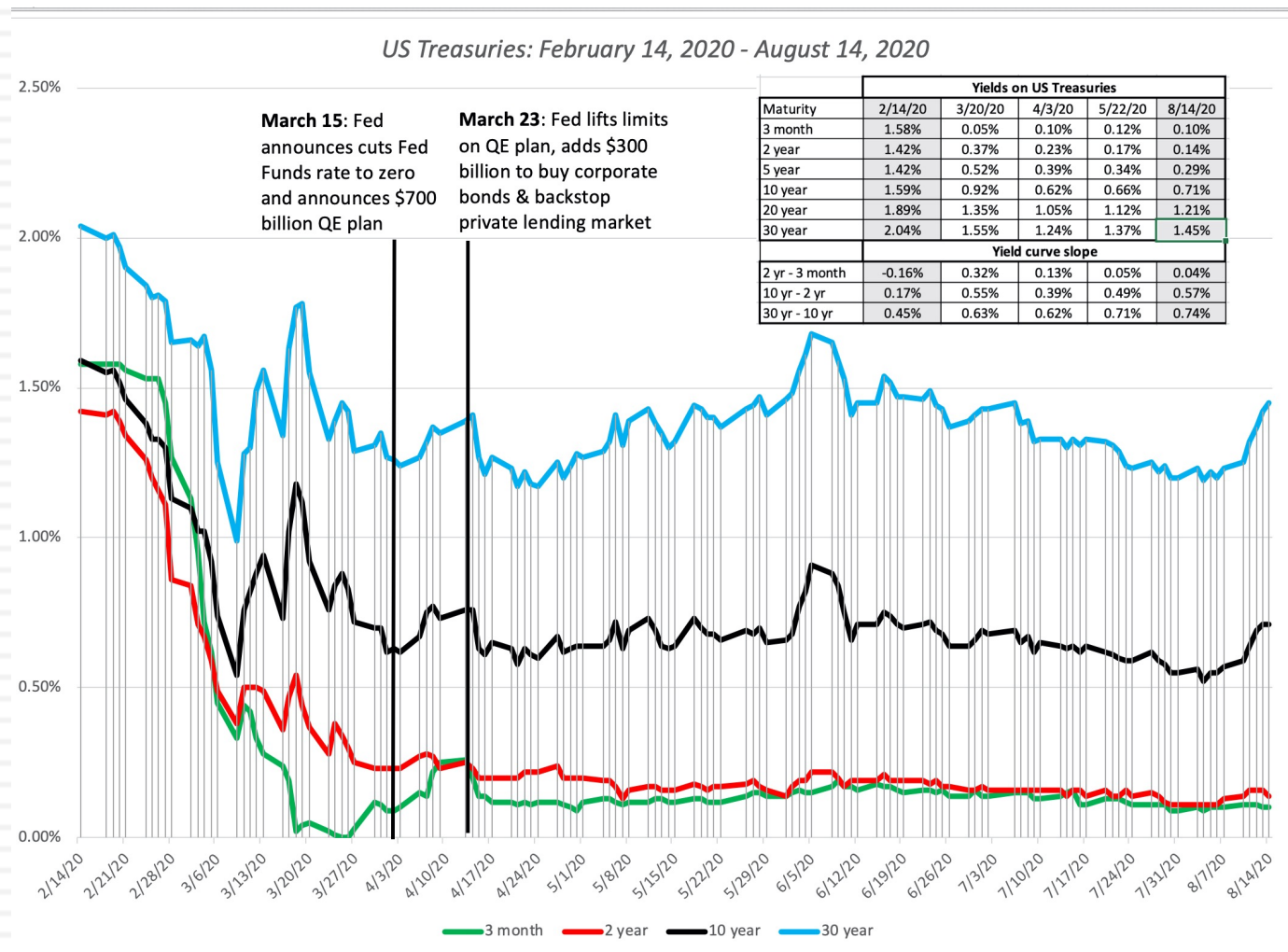
Why do risk free rates vary across currencies?

January 2024 Risk free rates

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Or across time...



Risk free Rate: Don't have or don't trust the government bond rate?

- You can scale up the riskfree rate in a base currency (\$, Euros) by the differential inflation between the base currency and the currency in question. In US \$:

$$\text{Risk free rate}_{\text{Currency}} = (1 + \text{Riskfree rate}_{\text{US \$}}) \frac{(1 + \text{Expected Inflation}_{\text{Foreign Currency}})}{(1 + \text{Expected Inflation}_{\text{US \$}})} - 1$$

- Thus, if the US \$ risk free rate is 2.00%, the inflation rate in Egyptian pounds is 15% and the inflation rate in US \$ is 1.5%, the foreign currency risk free rate is as follows:

$$\text{Risk free rate} = (1.02) \frac{(1.15)}{(1.015)} - 1 = 15.57\%$$

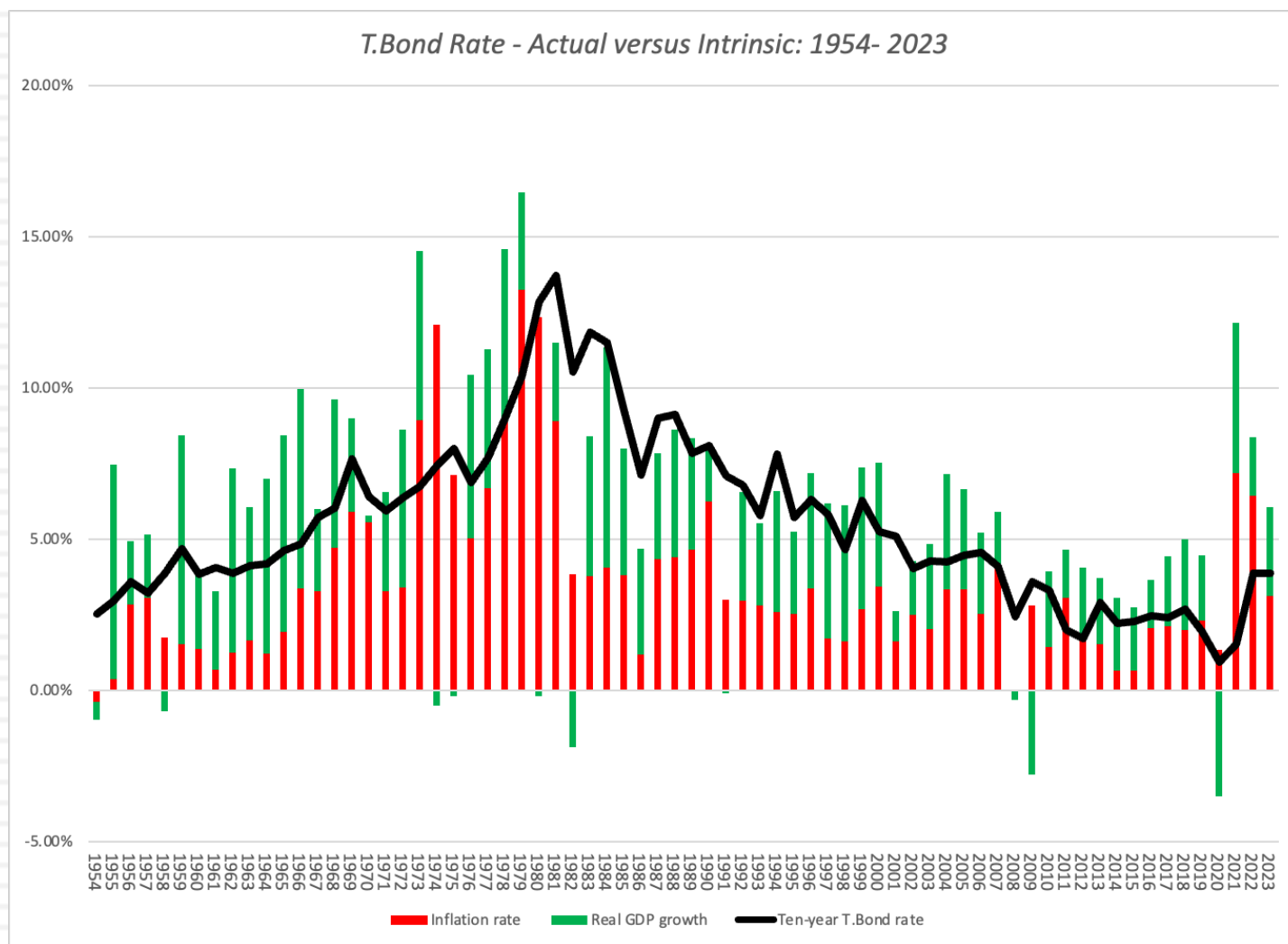
One more test on riskfree rates...

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- On January 1, 2022, the 10-year treasury bond rate in the United States was 1.51%, low by historic standards. Assume that you are valuing a company in US dollars then but are wary about the riskfree rate being too low. Which of the following should you do?
 - a. Replace the current 10-year bond rate with a more reasonable normalized riskfree rate (the average 10-year bond rate over the last 30 years has been about 5-6%)
 - b. Use the current 10-year bond rate as your riskfree rate but make sure that your other assumptions (about growth and inflation) are consistent with the riskfree rate.
 - c. Something else...

Some perspective on risk free rates

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Negative Interest Rates?

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- In 2022, there were at least three currencies (Swiss Franc, Japanese Yen, Euro) with negative interest rates. Using the fundamentals (inflation and real growth) approach, how would you explain negative interest rates?
 - ▣ How negative can rates get? (Is there a bound?)
 - ▣ Would you use these negative interest rates as risk free rates?
 - If no, why not and what would you do instead?
 - If yes, what else would you have to do in your valuation to be internally consistent?

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Discount Rates: II

The Equity Risk Premium

II. The Equity Risk Premium

The ubiquitous historical risk premium

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- The historical premium is the premium that stocks have historically earned over riskless securities.
- While the users of historical risk premiums act as if it is a fact (rather than an estimate), it is sensitive to
 - ▣ How far back you go in history...
 - ▣ Whether you use T.bill rates or T.Bond rates
 - ▣ Whether you use geometric or arithmetic averages.
- For instance, looking at the US:

	<i>Arithmetic Average</i>		<i>Geometric Average</i>	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2023	8.32%	6.80%	6.50%	5.23%
Std Error	2.03%	2.14%		
1974-2023	8.18%	5.95%	6.79%	4.97%
Std Error	2.45%	2.73%		
2014-2023	11.70%	11.17%	10.63%	10.44%
Std Error	4.97%	3.86%		

The perils of trusting the past.....

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- Noisy estimates: Even with long time periods of history, the risk premium that you derive will have substantial standard error. For instance, if you go back to 1928 (about 90 years of history) and you assume a standard deviation of 20% in annual stock returns, you arrive at a standard error of greater than 2%:

$$\text{Standard Error in Premium} = 20\% / \sqrt{90} = 2.1\%$$

- Survivorship Bias: Using historical data from the U.S. equity markets over the twentieth century does create a sampling bias. After all, the US economy and equity markets were among the most successful of the global economies that you could have invested in early in the century.

The simplest way of estimating an additional country risk premium: The country default spread

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- Default spread for country: In this approach, the country equity risk premium is set equal to the default spread for the country, estimated in one of three ways:
 - The default spread on a dollar denominated bond issued by the country. (In January 2024, that spread was % for the Brazilian \$ bond) was 1.817%.
 - The sovereign CDS spread for the country. In January 2024, the ten-year CDS spread for Brazil, adjusted for the US CDS, was 1.81%.
 - The default spread based on the local currency rating for the country. Brazil's sovereign local currency rating is Ba2 and the default spread for a Ba2 rated sovereign was about 3.28% in January 2024.
- Add the default spread to a “mature” market premium: This default spread is added on to the mature market premium to arrive at the total equity risk premium for Brazil, assuming a mature market premium of 4.60%.
 - Country Risk Premium for Brazil = 3.28%
 - Total ERP for Brazil = 4.60% + 3.28% = 7.88%

An equity volatility based approach to estimating the country total ERP

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- This approach draws on the standard deviation of two equity markets, the emerging market in question and a base market (usually the US). The total equity risk premium for the emerging market is then written as:
 - ▣ Total equity risk premium = Risk Premium_{US} * $\sigma_{\text{Country Equity}} / \sigma_{\text{US Equity}}$
- The country equity risk premium is based upon the volatility of the market in question relative to U.S market.
 - ▣ Assume that the equity risk premium for the US is 5.94%.
 - ▣ Assume that the standard deviation in the Bovespa (Brazilian equity) is 30% and that the standard deviation for the S&P 500 (US equity) is 18%.
 - ▣ Total Equity Risk Premium for Brazil = 4.60% (30%/18%) = 7.67%
 - ▣ Country equity risk premium for Brazil = 7.67% - 4.60% = 3.07%

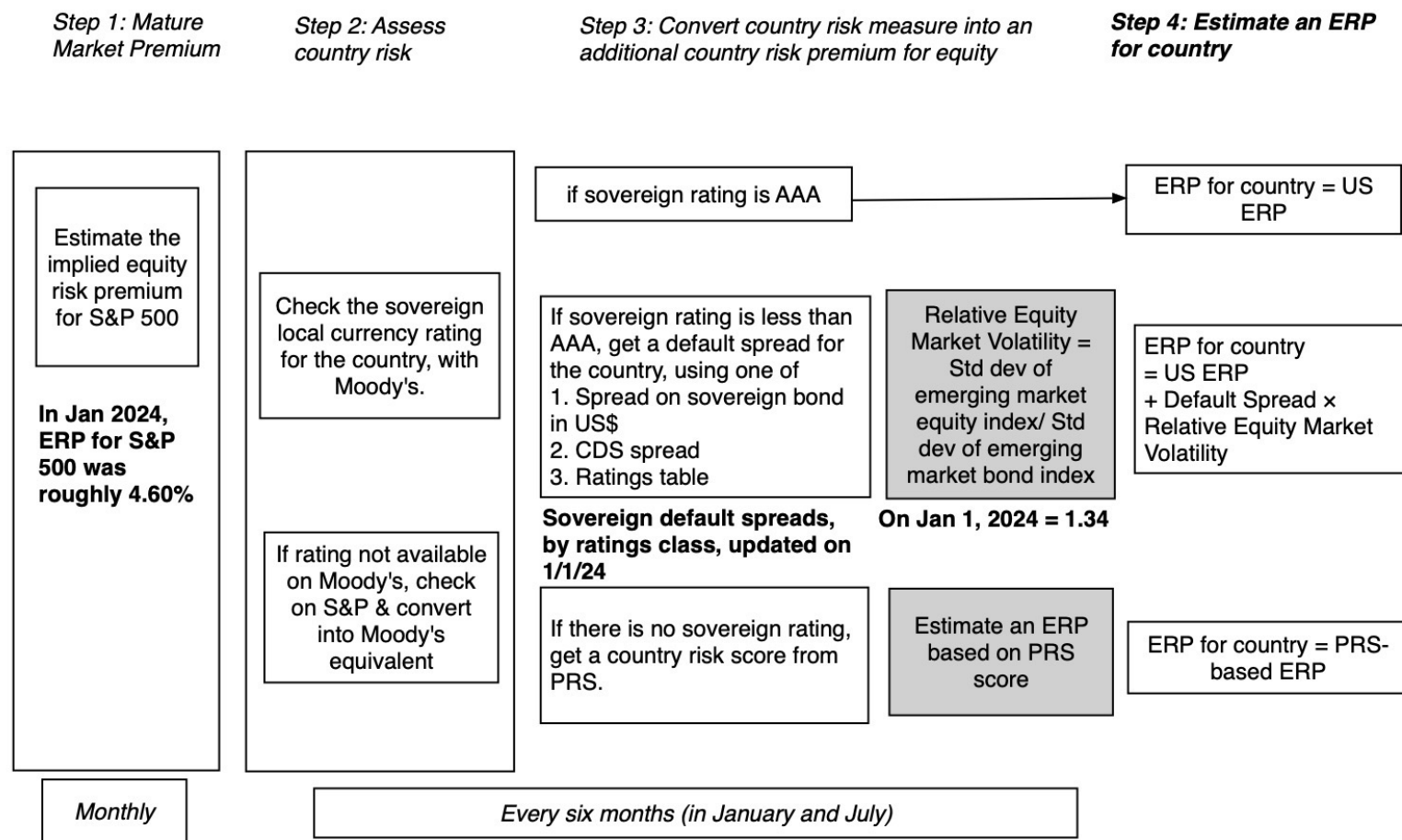
A melded approach to estimating the additional country risk premium

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- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads.
- Another is to multiply the bond default spread by the relative volatility of stock and bond prices in that market. Using this approach for Brazil in January 2024, you would get:
 - Country Equity risk premium = Default spread on country bond * $\frac{\sigma_{\text{Country Equity}}}{\sigma_{\text{Country Bond}}}$
 - Standard Deviation in Bovespa (Equity) = 30%
 - Standard Deviation in Brazil government bond = 20%
 - Default spread for Brazil = 3.28%
 - Brazil Country Risk Premium = 3.28% (30%/20%) = 4.92%
 - Brazil Total ERP = Mature Market Premium + CRP = 4.60% + 4.92% = 9.52%

A Template for Estimating the ERP

ERP Estimation Procedure



Andorra	Baa2	2.78%	7.38%	Italy	Baa3	3.21%	7.81%
Austria	Aa1	0.58%	5.18%	Jersey (States of)	Aa3	0.88%	5.48%
Belgium	Aa3	0.88%	5.48%	Liechtenstein	Aaa	0.00%	4.60%
Cyprus	Baa2	2.78%	7.38%	Luxembourg	Aaa	0.00%	4.60%
Denmark	Aaa	0.00%	4.60%	Malta	A2	1.24%	5.84%
Finland	Aa1	0.58%	5.18%	Netherlands	Aaa	0.00%	4.60%
France	Aa2	0.72%	5.32%	Norway	Aaa	0.00%	4.60%
Germany	Aaa	0.00%	4.60%	Portugal	A3	1.75%	6.35%
Greece	Ba1	3.66%	8.26%	Spain	Baa1	2.34%	6.94%
Guernsey (States of)	A1	1.03%	5.63%	Sweden	Aaa	0.00%	4.60%
Iceland	A2	1.24%	5.84%	Switzerland	Aaa	0.00%	4.60%
Ireland	Aa3	0.88%	5.48%	Turkey	B3	9.51%	14.11%
Isle of Man	Aa3	0.88%	5.48%	United Kingdom	Aa3	0.88%	5.48%
				EU & Environs		1.29%	5.89%

Canada	Aaa	0.00%	4.60%
United States	Aaa	0.00%	4.60%
North America		0.00%	4.60%

Caribbean		14.15%	18.75%
------------------	--	---------------	---------------

Argentina	Ca	17.55%	22.15%
Belize	Caa2	13.17%	17.77%
Bolivia	Caa1	10.97%	15.57%
Brazil	Ba2	4.40%	9.00%
Chile	A2	1.24%	5.84%
Colombia	Baa2	2.78%	7.38%
Costa Rica	B1	6.58%	11.18%
Ecuador	Caa3	14.63%	19.23%
El Salvador	Caa3	14.63%	19.23%
Guatemala	Ba1	3.66%	8.26%
Honduras	B1	6.58%	11.18%
Mexico	Baa2	2.78%	7.38%
Nicaragua	B3	9.51%	14.11%
Panama	Baa2	2.78%	7.38%
Paraguay	Ba1	3.66%	8.26%
Peru	Baa1	2.34%	6.94%
Suriname	Caa3	14.63%	19.23%
Uruguay	Baa2	2.78%	7.38%
Venezuela	C	23.49%	28.09%
Latin America		5.76%	10.36%

Country	Rating	CRP	ERP
Angola	B3	9.51%	14.11%
Benin	B1	6.58%	11.18%
Botswana	A3	1.75%	6.35%
Burkina Faso	Caa1	10.97%	15.57%
Cameroon	Caa1	10.97%	15.57%
Cape Verde	B3	9.51%	14.11%
Congo (DR)	B3	9.51%	14.11%
Congo (Rep of)	Caa2	13.17%	17.77%
Côte d'Ivoire	Ba3	5.26%	9.86%
Egypt	Caa1	10.97%	15.57%
Ethiopia	Caa2	13.17%	17.77%
Gabon	Caa1	10.97%	15.57%
Ghana	Caa3	14.63%	19.23%
Kenya	B3	9.51%	14.11%
Mali	Caa2	13.17%	17.77%
Mauritius	Baa3	3.21%	7.81%
Morocco	Ba1	3.66%	8.26%
Mozambique	Caa2	13.17%	17.77%
Namibia	B1	6.58%	11.18%
Niger	Caa2	13.17%	17.77%
Nigeria	Caa1	10.97%	15.57%
Rwanda	B2	8.04%	12.64%
Senegal	Ba3	5.26%	9.86%
South Africa	Ba2	4.40%	9.00%
Swaziland	B3	9.51%	14.11%
Tanzania	B2	8.04%	12.64%
Togo	B3	9.51%	14.11%
Tunisia	Caa2	13.17%	17.77%
Uganda	B2	8.04%	12.64%
Zambia	Caa3	14.63%	19.23%
Africa		9.16%	13.76%

Albania	B1	6.58%	11.18%
Armenia	Ba3	5.26%	9.86%
Azerbaijan	Ba1	3.66%	8.26%
Belarus	C	23.49%	28.09%
Bosnia and Herzego	B3	9.51%	14.11%
Bulgaria	Baa1	2.34%	6.94%
Croatia	Baa2	2.78%	7.38%
Czech Republic	Aa3	0.88%	5.48%
Estonia	A1	1.03%	5.63%
Georgia	Ba2	4.40%	9.00%
Hungary	Baa2	2.78%	7.38%
Kazakhstan	Baa2	2.78%	7.38%
Kyrgyzstan	B3	9.51%	14.11%
Latvia	A3	1.75%	6.35%
Lithuania	A2	1.24%	5.84%
Macedonia	Ba3	5.26%	9.86%
Moldova	B3	9.51%	14.11%
Montenegro	B1	6.58%	11.18%
Poland	A2	1.24%	5.84%
Romania	Baa3	3.21%	7.81%
Russia	NA	6.58%	11.18%
Serbia	Ba2	4.40%	9.00%
Slovakia	A2	1.24%	5.84%
Slovenia	A3	1.75%	6.35%
Tajikistan	B3	9.51%	14.11%
Ukraine	Ca	17.55%	22.15%
Uzbekistan	Ba3	5.26%	9.86%
E. Europe & Russia		5.06%	9.66%

Abu Dhabi	Aa2	0.72%	5.32%
Bahrain	B2	8.04%	12.64%
Iraq	Caa1	10.97%	15.57%
Israel	A1	1.03%	5.63%
Jordan	B1	6.58%	11.18%
Kuwait	A1	1.03%	5.63%
Lebanon	C	23.49%	28.09%
Oman	Ba1	3.66%	8.26%
Qatar	Aa3	0.88%	5.48%
Ras Al Khaimah	A3	1.75%	6.35%
Saudi Arabia	A1	1.03%	5.63%
Sharjah	Ba1	3.66%	8.26%
United Arab Emirates	Aa2	0.72%	5.32%
Middle East		2.16%	6.76%

Country	PRS	CRP	ERP
Algeria	67.75	6.58%	11.18%
Brunei	81.5	0.88%	5.48%
Gambia	66.75	6.58%	11.18%
Guinea	60	13.17%	17.77%
Guinea-Bissau	65.25	8.04%	12.64%
Guyana	75.25	2.34%	6.94%
Haiti	56.5	14.63%	19.23%
Iran	63	9.51%	14.11%
Korea, D.P.R.	49.25	23.49%	28.09%
Liberia	55	17.55%	22.15%
Libya	73.75	2.78%	7.38%
Madagascar	62.75	9.51%	14.11%
Malawi	52.75	17.55%	22.15%
Myanmar	57	14.63%	19.23%
Russia	66.75	6.58%	11.18%
Sierra Leone	56.25	14.63%	19.23%
Somalia	51.75	17.55%	22.15%
Sudan	44.75	23.49%	28.09%
Syria	45	23.49%	28.09%
Yemen, Republic	55.75	14.63%	19.23%
Zimbabwe	57.5	13.17%	17.77%

Bangladesh	B1	6.58%	11.18%
Cambodia	B2	8.04%	12.64%
China	A1	1.03%	5.63%
Fiji	B1	6.58%	11.18%
Hong Kong	Aa3	0.88%	5.48%
India	Baa3	3.21%	7.81%
Indonesia	Baa2	2.78%	7.38%
Japan	A1	1.03%	5.63%
Korea	Aa2	0.72%	5.32%
Laos	Caa3	14.63%	19.23%
Macao	Aa3	0.88%	5.48%
Malaysia	A3	1.75%	6.35%
Maldives	Caa1	10.97%	15.57%
Mongolia	B3	9.51%	14.11%
Pakistan	Caa3	14.63%	19.23%
Papua New Guinea	B2	8.04%	12.64%
Philippines	Baa2	2.78%	7.38%
Singapore	Aaa	0.00%	4.60%
Solomon Islands	Caa1	10.97%	15.57%
Sri Lanka	Ca	17.55%	22.15%
Taiwan	Aa3	0.88%	5.48%
Thailand	Baa1	2.34%	6.94%
Vietnam	Ba2	4.40%	9.00%
Asia		1.68%	6.28%

Australia	Aaa	0.00%	4.60%
Cook Islands	B1	6.58%	11.18%
New Zealand	Aaa	0.00%	4.60%
Australia & NZ		0.00%	4.60%

Blue: Moody's Rating
Red: Added Country Risk
Green #: Total ERP

From Country Equity Risk Premiums to Corporate Equity Risk premiums

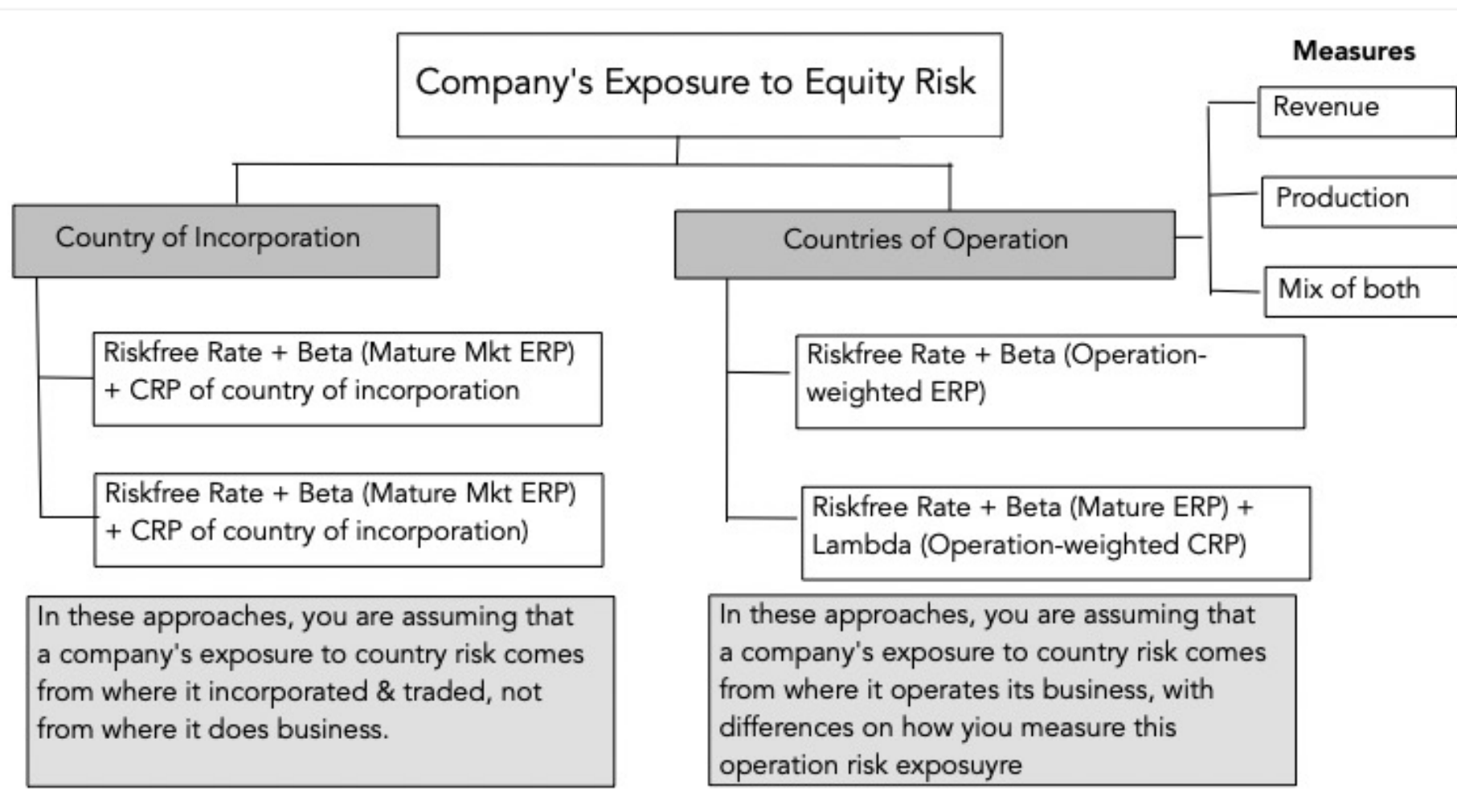
54

- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,
 - ▣ $E(\text{Return}) = \text{Riskfree Rate} + \text{CRP} + \text{Beta (Mature ERP)}$
 - Approach 2: Assume that a company's exposure to country risk is similar to its exposure to other market risk.
 - ▣ $E(\text{Return}) = \text{Riskfree Rate} + \text{Beta (Mature ERP} + \text{CRP)}$
 - Approach 3: Treat country risk as a separate risk factor and allow firms to have different exposures to country risk (perhaps based upon the proportion of their revenues come from non-domestic sales)
 - ▣ $E(\text{Return}) = \text{Riskfree Rate} + \beta (\text{Mature ERP}) + \lambda (\text{CRP})$
- Mature ERP = Mature market Equity Risk Premium
CRP = Additional country risk premium

Estimating country risk premium exposure_

Vaiants

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Operation based CRP: Single versus Multiple Emerging Markets

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- Single emerging market: Embraer, in 2004, reported that it derived 3% of its revenues in Brazil and the balance from mature markets. The mature market ERP in 2004 was 5% and Brazil's CRP was 7.89%.

	Revenues	Total ERP	CRP
US and other mature markets	97%	5.00%	0.00%
Brazil	3%	12.89%	8%
Embraer		5.24%	0.24%

- Multiple emerging markets: Ambev, the Brazilian-based beverage company, reported revenues from the following countries during 2011.

	Revenues	%	Total ERP	CRP
Argentina	19	9.31%	15.00%	9.00%
Bolivia	4	1.96%	10.88%	4.88%
Brazil	130	63.73%	8.63%	2.63%
Canada	23	11.27%	6.00%	0.00%
Chile	7	3.43%	7.05%	1.05%
Ecuador	6	2.94%	12.75%	6.75%
Paraguay	3	1.47%	12.00%	6.00%
Peru	12	5.88%	9.00%	3.00%
Ambev	204		9.11%	3.11%

Extending to a multinational: Regional breakdown

Coca Cola's revenue breakdown and ERP in 2012

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<i>Region</i>	<i>Revenues</i>	<i>Total ERP</i>	<i>CRP</i>
Western Europe	19%	6.67%	0.67%
Eastern Europe & Russia	5%	8.60%	2.60%
Asia	15%	7.63%	1.63%
Latin America	15%	9.42%	3.42%
Australia	4%	6.00%	0.00%
Africa	4%	9.82%	3.82%
North America	40%	6.00%	0.00%
Coca Cola	100%	7.14%	1.14%

Things to watch out for

1. Aggregation across regions. For instance, the Pacific region often includes Australia & NZ with Asia
2. Obscure aggregations including Eurasia and Oceania

Two problems with these approaches..

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- Focus just on revenues: To the extent that revenues are the only variable that you consider, when weighting risk exposure across markets, you may be missing other exposures to country risk. For instance, an emerging market company that gets the bulk of its revenues outside the country (in a developed market) may still have all of its production facilities in the emerging market.
- Exposure not adjusted or based upon beta: To the extent that the country risk premium is multiplied by a beta, we are assuming that beta in addition to measuring exposure to all other macro economic risk also measures exposure to country risk.

A Production-based ERP: Royal Dutch Shell in 2015

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<i>Country</i>	<i>Oil & Gas Production</i>	<i>% of Total</i>	<i>ERP</i>
Denmark	17396	3.83%	6.20%
Italy	11179	2.46%	9.14%
Norway	14337	3.16%	6.20%
UK	20762	4.57%	6.81%
<i>Rest of Europe</i>	<i>874</i>	<i>0.19%</i>	<i>7.40%</i>
Brunei	823	0.18%	9.04%
Iraq	20009	4.40%	11.37%
Malaysia	22980	5.06%	8.05%
Oman	78404	17.26%	7.29%
Russia	22016	4.85%	10.06%
<i>Rest of Asia & ME</i>	<i>24480</i>	<i>5.39%</i>	<i>7.74%</i>
<i>Oceania</i>	<i>7858</i>	<i>1.73%</i>	<i>6.20%</i>
Gabon	12472	2.75%	11.76%
Nigeria	67832	14.93%	11.76%
Rest of Africa	6159	1.36%	12.17%
USA	104263	22.95%	6.20%
Canada	8599	1.89%	6.20%
Brazil	13307	2.93%	9.60%
<i>Rest of Latin America</i>	<i>576</i>	<i>0.13%</i>	<i>10.78%</i>
Royal Dutch Shell	454326	100.00%	8.26%

Estimate a lambda for country risk

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- Country risk exposure is affected by where you get your revenues and where your production happens, but there are a host of other variables that also affect this exposure, including:
 - ▣ Use of risk management products: Companies can use both options/futures markets and insurance to hedge some or a significant portion of country risk.
 - ▣ Government “national” interests: There are sectors that are viewed as vital to the national interests, and governments often play a key role in these companies, either officially or unofficially. These sectors are more exposed to country risk.
- It is conceivable that there is a richer measure of country risk that incorporates all of the variables that drive country risk in one measure. That way my rationale when I devised “lambda” as my measure of country risk exposure.

A Revenue-based Lambda

- The factor “ λ ” measures the relative exposure of a firm to country risk. One simplistic solution would be to do the following:

$$\lambda = \% \text{ of revenues domestically}_{\text{firm}} / \% \text{ of revenues domestically}_{\text{average firm}}$$

- Consider two firms – Tata Motors and Tata Consulting Services, both Indian companies. In 2008-09, Tata Motors got about 91.37% of its revenues in India and TCS got 7.62%. The average Indian firm gets about 80% of its revenues in India:

$$\lambda_{\text{Tata Motors}} = 91\% / 80\% = 1.14$$

$$\lambda_{\text{TCS}} = 7.62\% / 80\% = 0.09$$

- There are two implications
 - A company's risk exposure is determined by where it does business and not by where it is incorporated.
 - Firms might be able to actively manage their country risk exposures

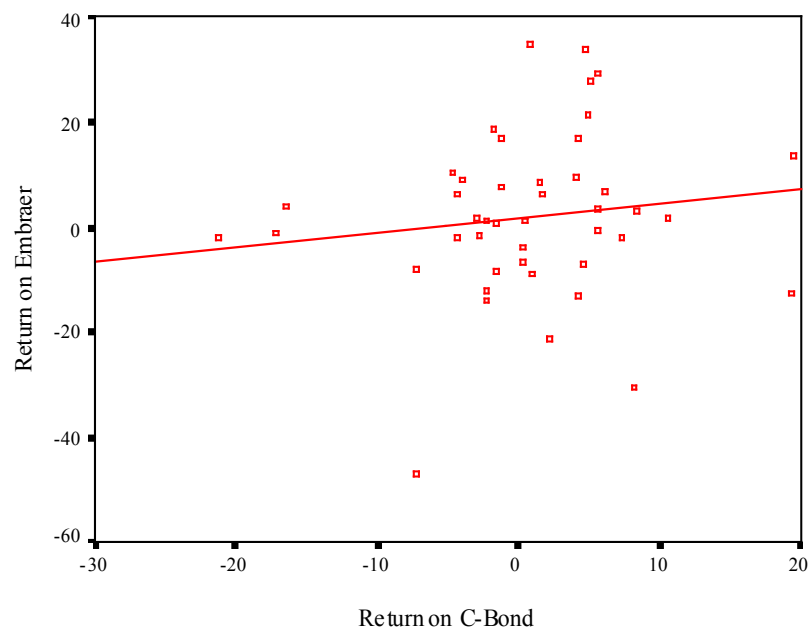
A Price/Return based Lambda

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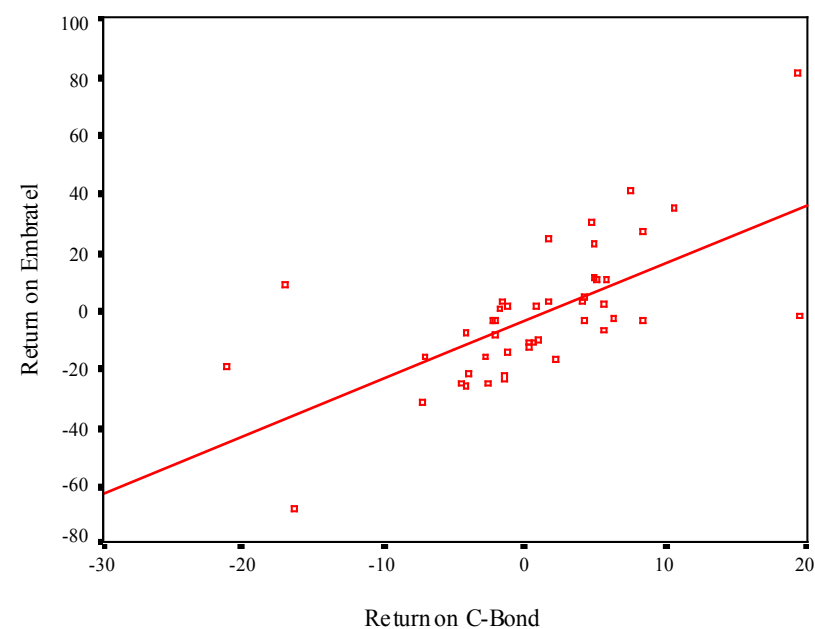
$$\text{Return}_{\text{Embraer}} = 0.0195 + \mathbf{0.2681} \text{ Return}_{\text{C Bond}}$$

$$\text{Return}_{\text{Embratel}} = -0.0308 + \mathbf{2.0030} \text{ Return}_{\text{C Bond}}$$

Embraer versus C Bond: 2000-2003



Embratel versus C Bond: 2000-2003



Estimating a US Dollar Cost of Equity for Embraer - September 2004

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- Assume that the beta for Embraer is 1.07, and that the US \$ riskfree rate used is 4%. Also assume that the risk premium for the US is 5% and the country risk premium for Brazil is 7.89%. Finally, assume that Embraer gets 3% of its revenues in Brazil & the rest in the US.
- There are five estimates of \$ cost of equity for Embraer:
 - ▣ Approach 1: Constant exposure to CRP, Location CRP
 - $E(\text{Return}) = 4\% + 1.07 (5\%) + 7.89\% = 17.24\%$
 - ▣ Approach 2: Constant exposure to CRP, Operation CRP
 - $E(\text{Return}) = 4\% + 1.07 (5\%) + (0.03 \cdot 7.89\% + 0.97 \cdot 0\%) = 9.59\%$
 - ▣ Approach 3: Beta exposure to CRP, Location CRP
 - $E(\text{Return}) = 4\% + 1.07 (5\% + 7.89\%) = 17.79\%$
 - ▣ Approach 4: Beta exposure to CRP, Operation CRP
 - $E(\text{Return}) = 4\% + 1.07 (5\% + (0.03 \cdot 7.89\% + 0.97 \cdot 0\%)) = 9.60\%$
 - ▣ Approach 5: Lambda exposure to CRP
 - $E(\text{Return}) = 4\% + 1.07 (5\%) + 0.27(7.89\%) = 11.48\%$

Valuing Emerging Market Companies with significant exposure in developed markets

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- The conventional practice in investment banking is to add the country equity risk premium on to the cost of equity for every emerging market company, notwithstanding its exposure to emerging market risk. Thus, in 2004, Embraer would have been valued with a cost of equity of 17-18% even though it gets only 3% of its revenues in Brazil. As an investor, which of the following consequences do you see from this approach?
 - a. Emerging market companies with substantial exposure in developed markets will be significantly over valued by analysts
 - b. Emerging market companies with substantial exposure in developed markets will be significantly under valued by analysts

Can you construct an investment strategy to take advantage of the mis-valuation? What would need to happen for you to make money of this strategy?

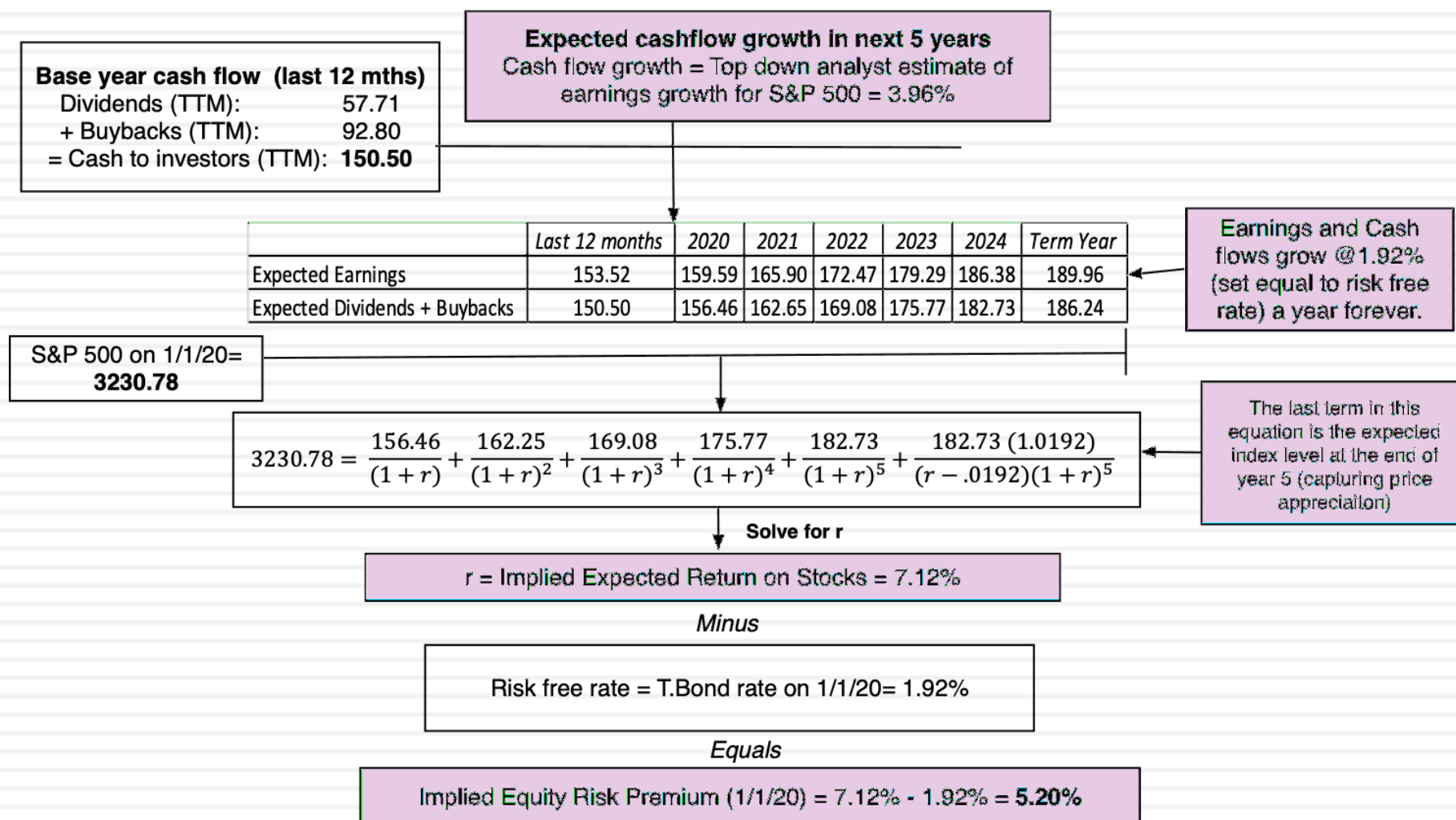
Implied Equity Premiums

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- For a start: If you know the price paid for an asset and have estimates of the expected cash flows on the asset, you can estimate the IRR of these cash flows. If you paid the price, this is your expected return.
- Stock Price & Risk: If you assume that stocks are correctly priced in the aggregate and you can estimate the expected cashflows from buying stocks, you can estimate the expected rate of return on stocks by finding that discount rate that makes the present value equal to the price paid.
- Implied ERP: Subtracting out the riskfree rate should yield an implied equity risk premium. This implied equity premium is a forward-looking number and can be updated as often as you want (every minute of every day, if you are so inclined).

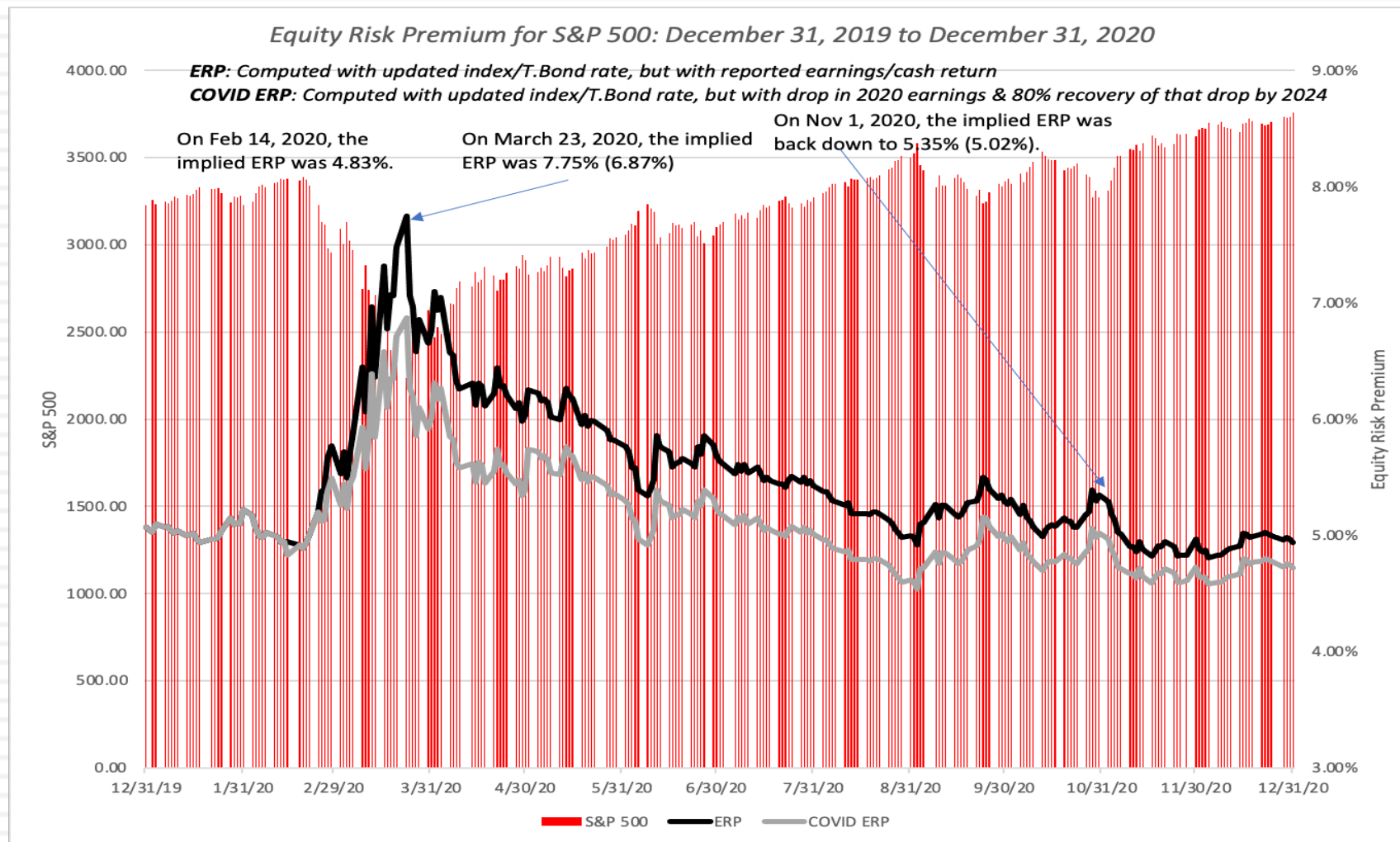
Equity Risk Premium: January 2020

66



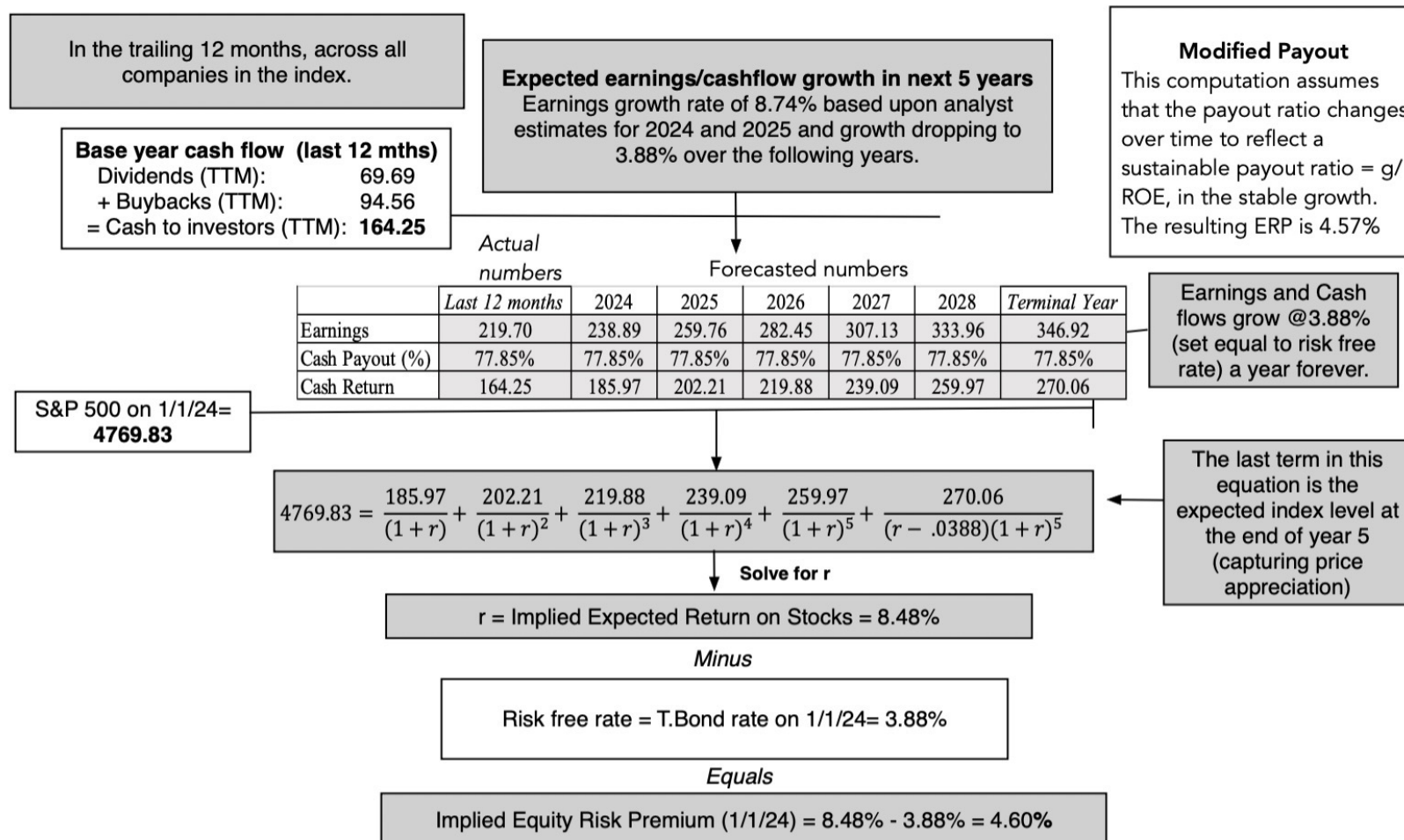
And in 2020.. COVID effects

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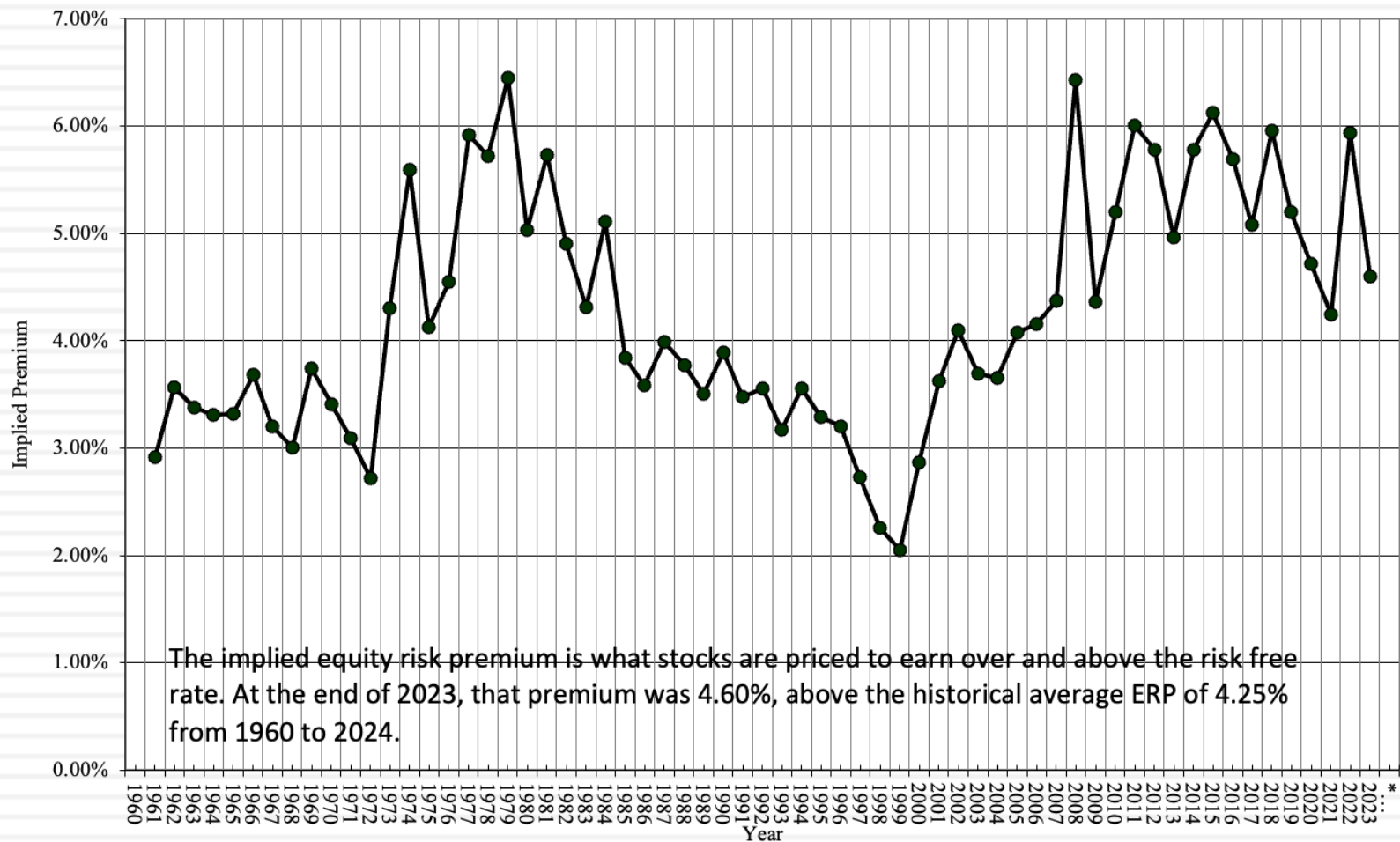
An Updated Estimate: ERP in 2024

68



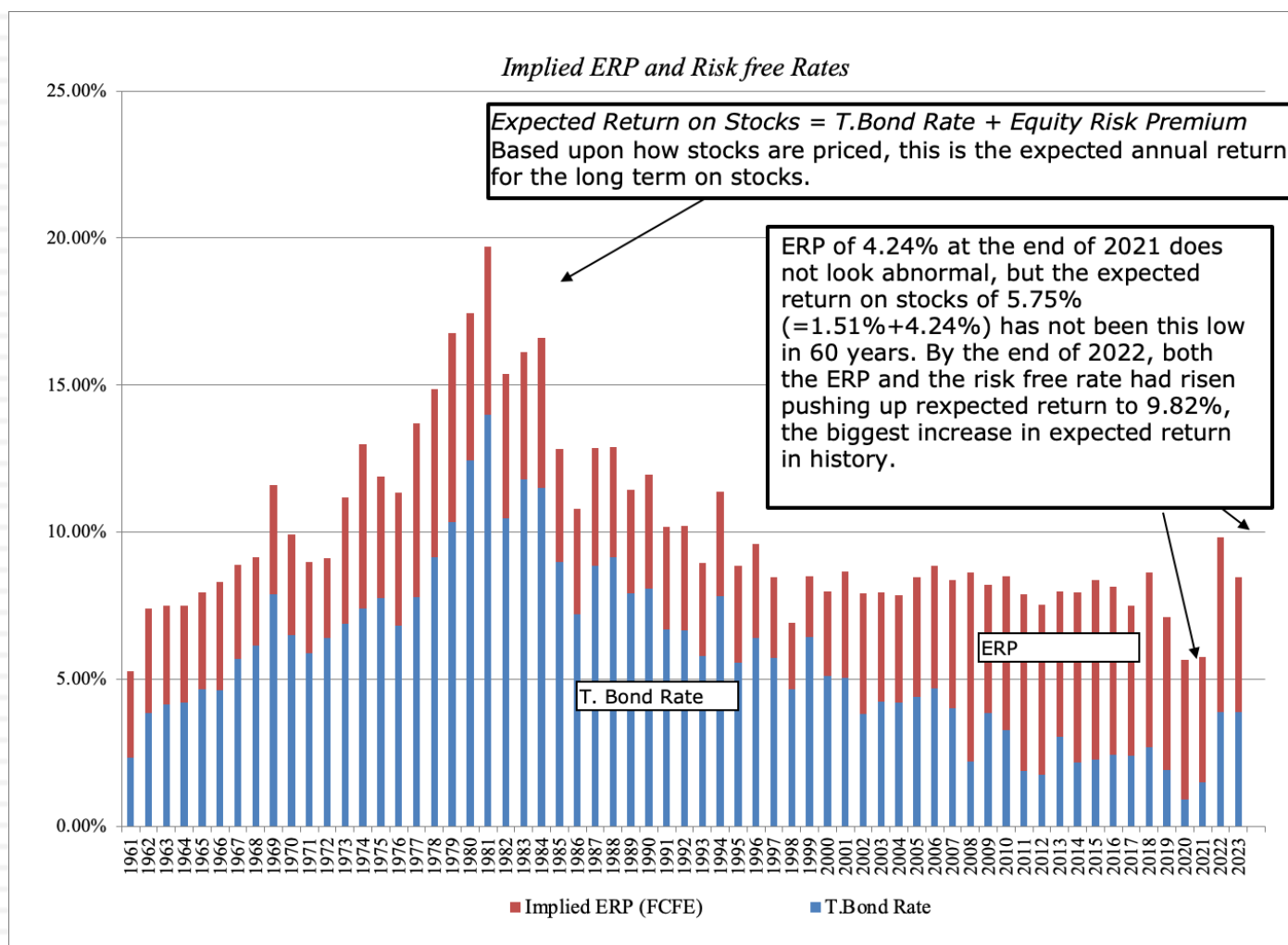
Implied Premiums in the US: 1960-2023

Implied Equity Risk Premium for US Equity Market: 1960-2023



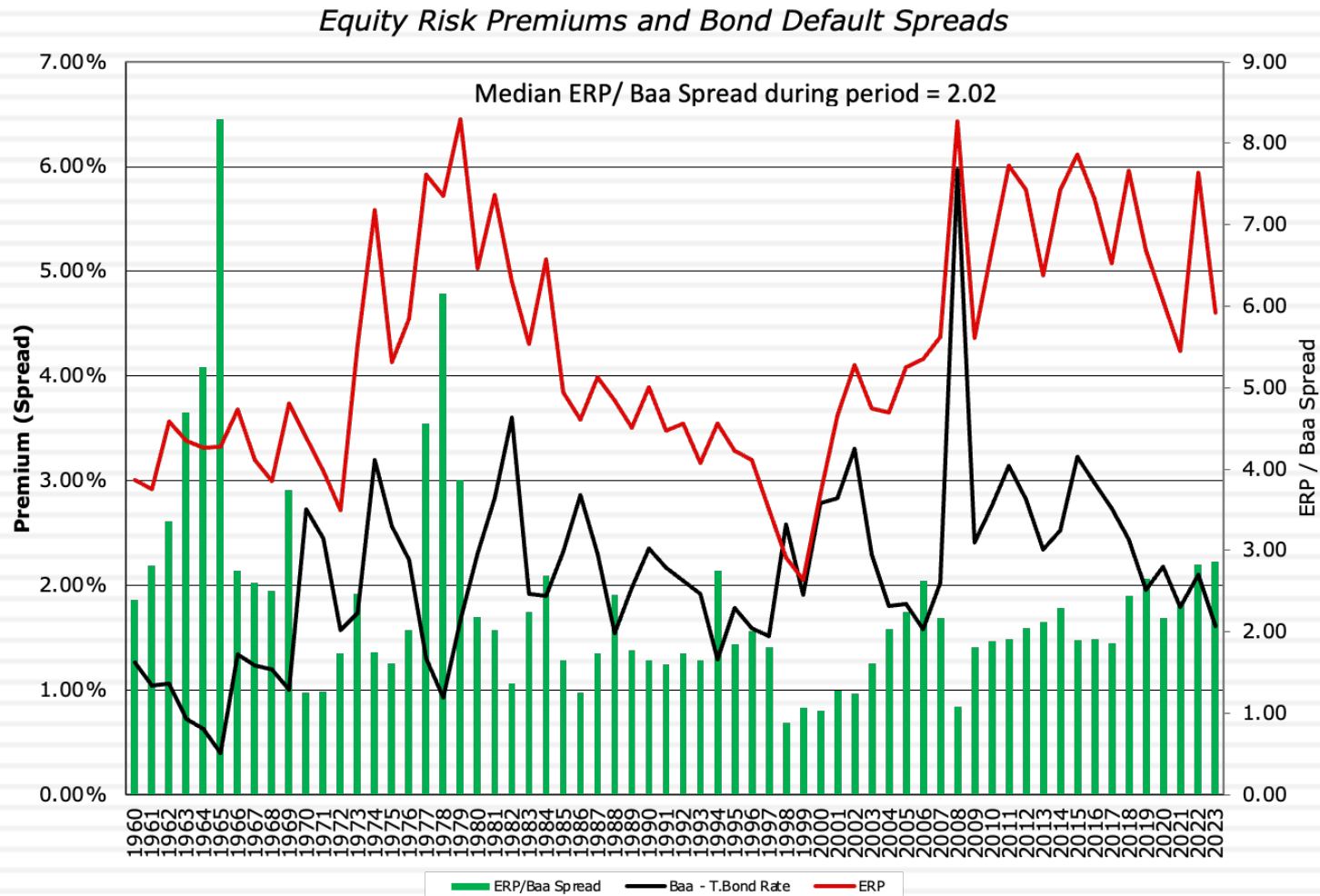
Implied Premium versus Risk Free Rate

70



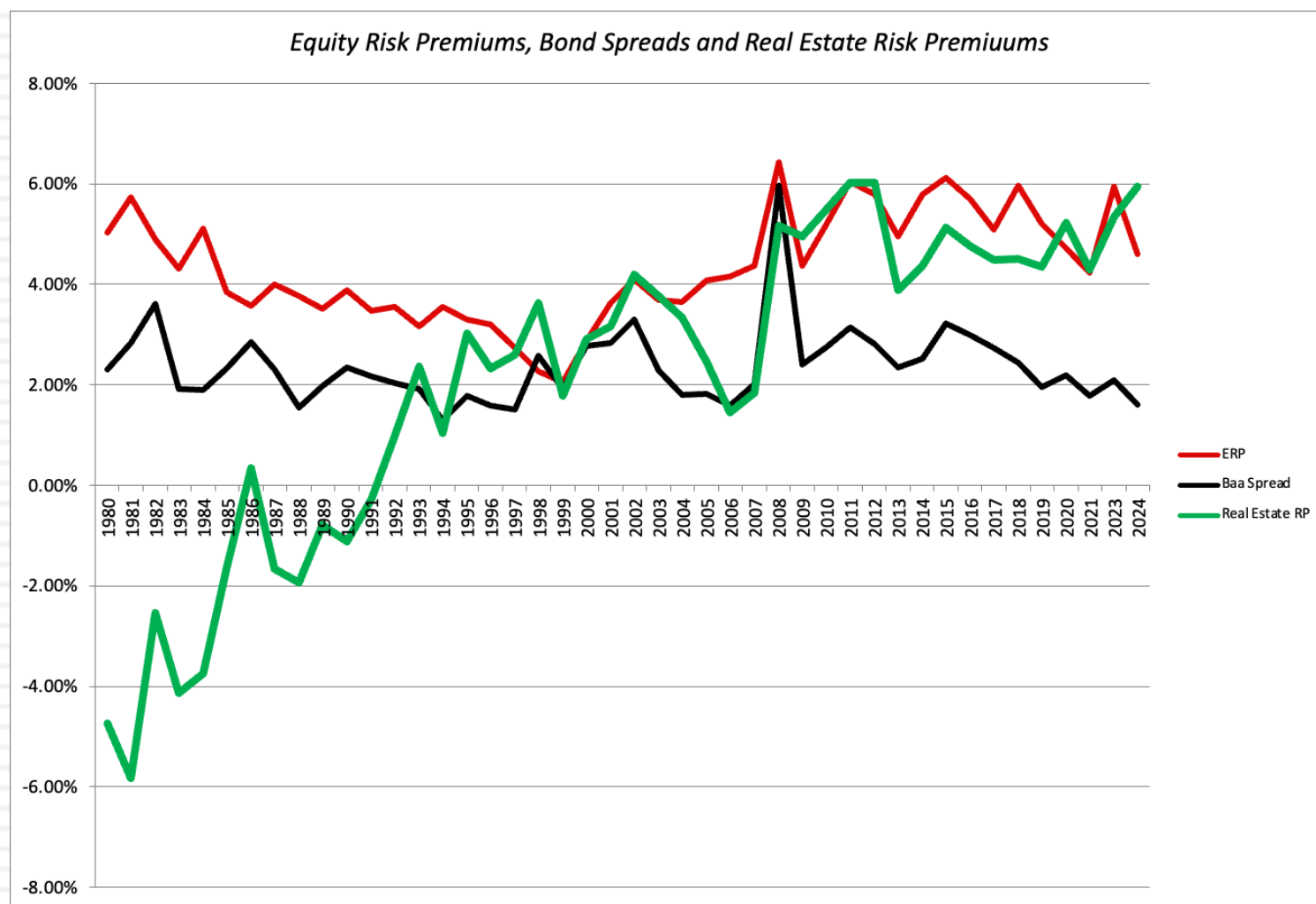
Equity Risk Premiums and Bond Default Spreads

71



Equity Risk Premiums and Cap Rates (Real Estate)

72



Why implied premiums matter?

73

- In many investment banks, it is common practice (especially in corporate finance departments) to use historical risk premiums (and arithmetic averages at that) as risk premiums to compute cost of equity.
- If all analysts in a group used the arithmetic average premium (for stocks over T.Bills) for 1928-2023 of 8.32% to value stocks in January 2022, given the implied premium of 4.60%, what are they likely to find?
 - a. The values they obtain will be too low (most stocks will look overvalued)
 - b. The values they obtain will be too high (most stocks will look under valued)
 - c. There should be no systematic bias as long as they use the same premium to value all stocks.

Which equity risk premium should you use?

74

If you assume this

Premiums revert back to historical norms and your time period yields these norms

Market is correct in the aggregate or that your valuation should be market neutral

Market makes mistakes even in the aggregate but is correct over time

Premium to use

Historical risk premium

Current implied equity risk premium

Average implied equity risk premium over time.

Predictor	Correlation with implied premium next year	Correlation with actual return- next 5 years	Correlation with actual return – next 10 years
Current implied premium	0.763	0.427	0.500
Average implied premium: Last 5 years	0.718	0.326	0.450
Historical Premium	-0.497	-0.437	-0.454
Default Spread based premium	0.047	0.143	0.160

An ERP for the Sensex

75

- Inputs for the computation
 - ▣ Sensex on 9/5/07 = 15446
 - ▣ Dividend yield on index = 3.05%
 - ▣ Expected growth rate - next 5 years = 14%
 - ▣ Growth rate beyond year 5 = 6.76% (set equal to riskfree rate)
- Solving for the expected return:

$$15446 = \frac{537.06}{(1+r)} + \frac{612.25}{(1+r)^2} + \frac{697.86}{(1+r)^3} + \frac{795.67}{(1+r)^4} + \frac{907.07}{(1+r)^5} + \frac{907.07(1.0676)}{(r - .0676)(1+r)^5}$$

- Expected return on stocks = 11.18%
- Implied equity risk premium for India = 11.18% - 6.76% = 4.42%

The evolution of Emerging Market Risk

76

Start of year	PBV (Developed)	PBV (Emerging)	ROE (Developed)	ROE (Emerging)	US T.Bond Rate	Growth Rate (Developed)	Growth Rate (Emerging)	Cost of Equity (Developed)	Cost of Equity (Emerging)	Differential
2004	2.00	1.19	10.81%	11.65%	4.25%	3.75%	4.75%	7.28%	10.55%	3.27%
2005	2.09	1.27	11.12%	11.93%	4.22%	3.72%	4.72%	7.26%	10.40%	3.14%
2006	2.03	1.44	11.32%	12.18%	4.39%	3.89%	4.89%	7.55%	9.95%	2.40%
2007	1.67	1.67	10.87%	12.88%	4.70%	4.20%	5.20%	8.19%	9.80%	1.60%
2008	0.87	0.83	9.42%	11.12%	4.02%	3.52%	4.52%	10.30%	12.47%	2.17%
2009	1.20	1.34	8.48%	11.02%	2.21%	1.71%	2.71%	7.35%	8.91%	1.56%
2010	1.39	1.43	9.14%	11.22%	3.84%	3.34%	4.34%	7.51%	9.15%	1.64%
2011	1.12	1.08	9.21%	10.04%	3.29%	2.79%	3.79%	8.52%	9.58%	1.05%
2012	1.17	1.18	9.10%	9.33%	1.88%	1.38%	2.38%	7.98%	8.27%	0.29%
2013	1.56	1.63	8.67%	10.48%	1.76%	1.26%	2.26%	6.01%	7.30%	1.29%
2014	1.95	1.50	9.27%	9.64%	3.04%	2.54%	3.54%	5.99%	7.61%	1.62%
2015	1.88	1.56	9.69%	9.75%	2.17%	1.67%	2.67%	5.94%	7.21%	1.27%
2016	1.99	1.59	9.24%	10.16%	2.27%	1.77%	2.77%	5.52%	7.42%	1.89%
2017	1.76	1.48	8.71%	9.53%	2.68%	2.18%	3.18%	5.89%	7.47%	1.58%
2018	1.98	1.66	11.23%	11.36%	2.68%	2.18%	3.18%	6.75%	8.11%	1.36%
2019	1.64	1.31	12.09%	11.35%	2.68%	2.18%	3.18%	8.22%	9.42%	1.19%
2020	2.26	1.64	10.41%	9.10%	1.92%	1.42%	2.42%	5.40%	6.49%	1.10%
2021	2.21	1.77	6.30%	7.31%	0.93%	0.43%	1.43%	3.09%	4.75%	1.67%
2022	2.31	1.67	13.22%	11.99%	1.51%	1.01%	2.01%	6.30%	7.99%	1.69%
2023	2.28	1.44	12.90%	10.93%	3.88%	3.38%	4.38%	7.56%	8.93%	1.37%

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Discount Rates: III

Relative Risk Measures

The CAPM Beta: The Most Used (and Misused) Risk Measure

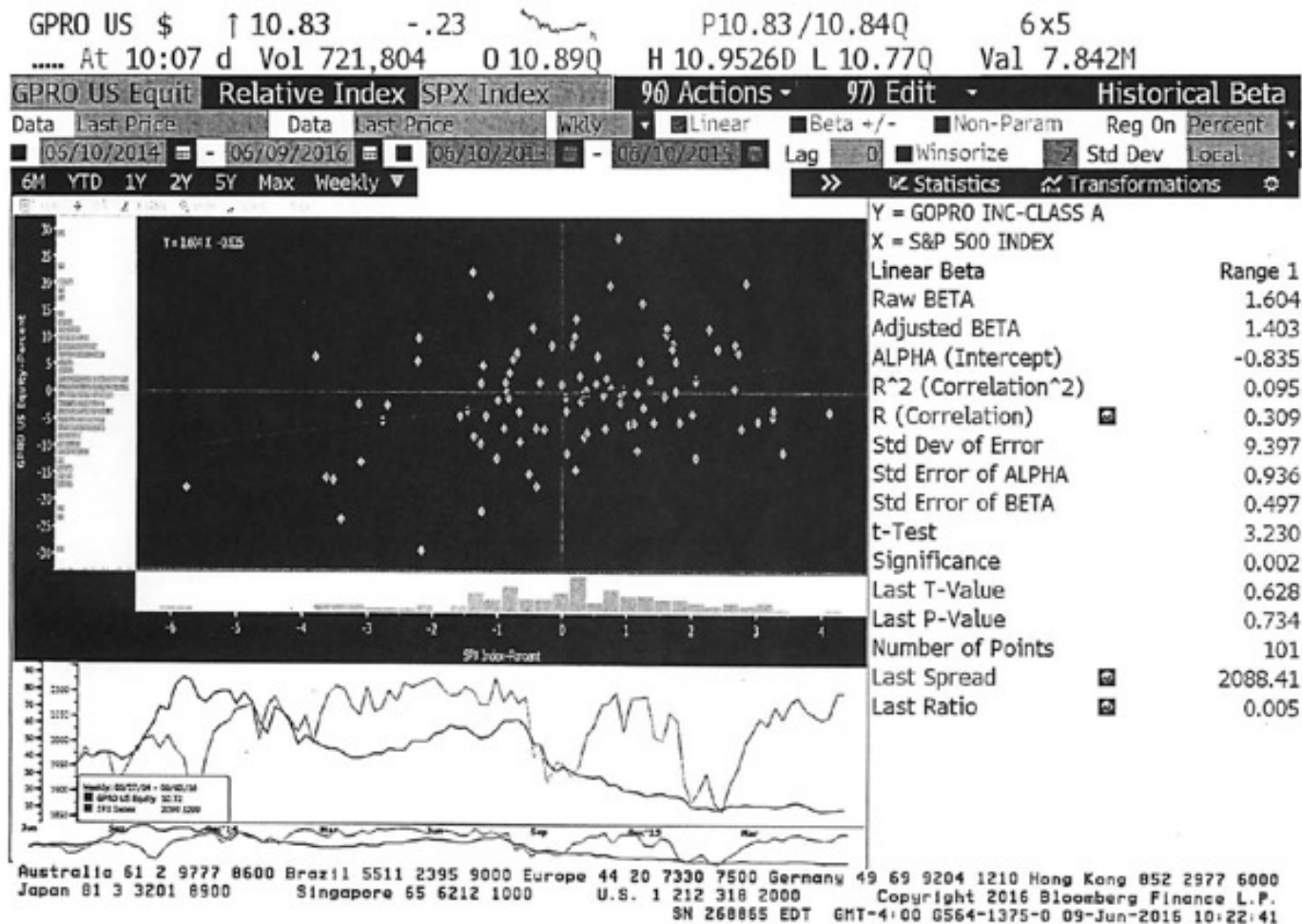
78

- The standard procedure for estimating betas is to regress stock returns (R_j) against market returns (R_m) -
$$R_j = a + b R_m$$

where a is the intercept and b is the slope of the regression.
- The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.
- This beta has three problems:
 - It has high standard error
 - It reflects the firm's business mix over the period of the regression, not the current mix
 - It reflects the firm's average financial leverage over the period rather than the current leverage.

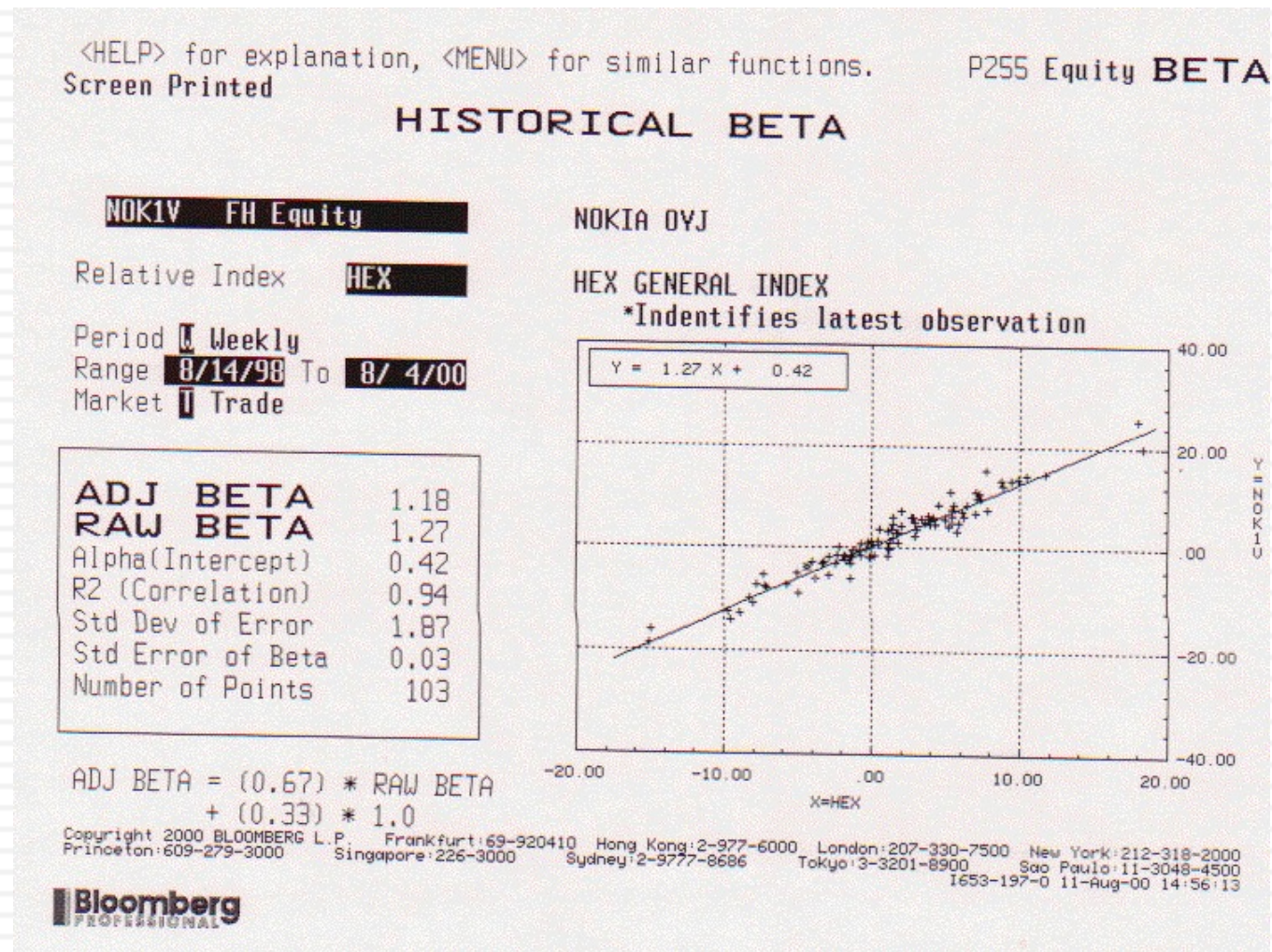
Unreliable, when it looks bad..

79



Or when it looks good..

80



One slice of history..

81

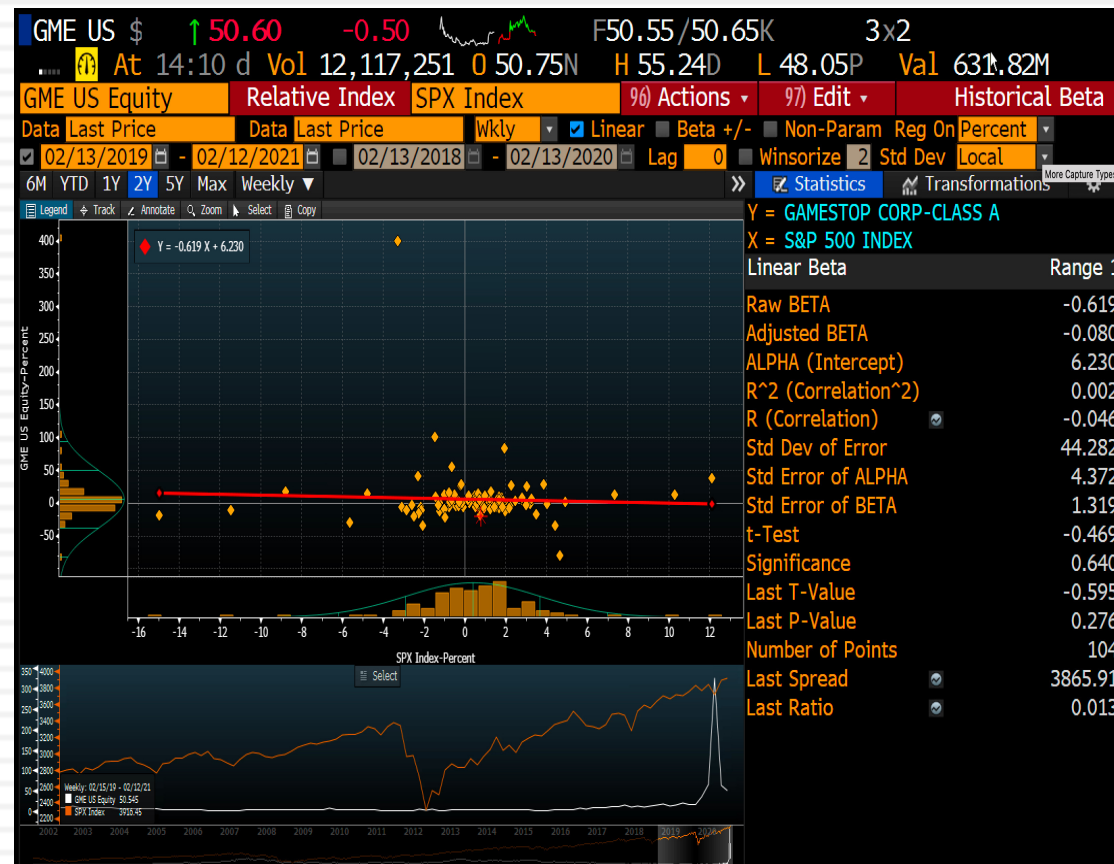
Market Summary > GameStop Corp.
NYSE: GME

+ Follow

50.99 USD -0.11 (0.22%) ↓

Feb 12, 2:44 PM EST · Disclaimer

1 day 5 days 1 month 6 months YTD 1 year 5 years Max

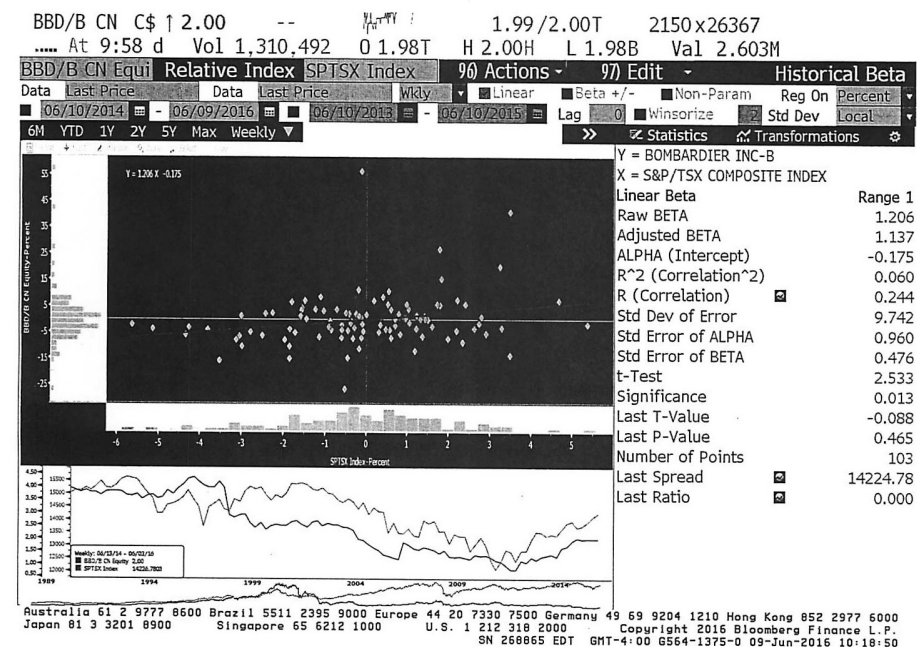
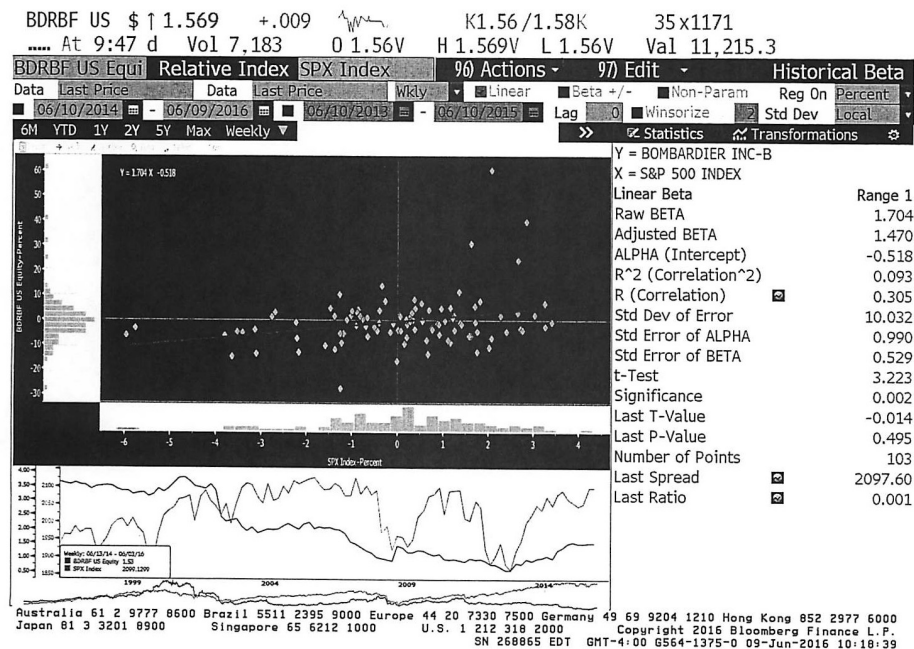


During 2019 and 2020, GME was an extraordinarily volatile stock, as short sellers and long only investors fought out a battle.

Aswath Damodaran

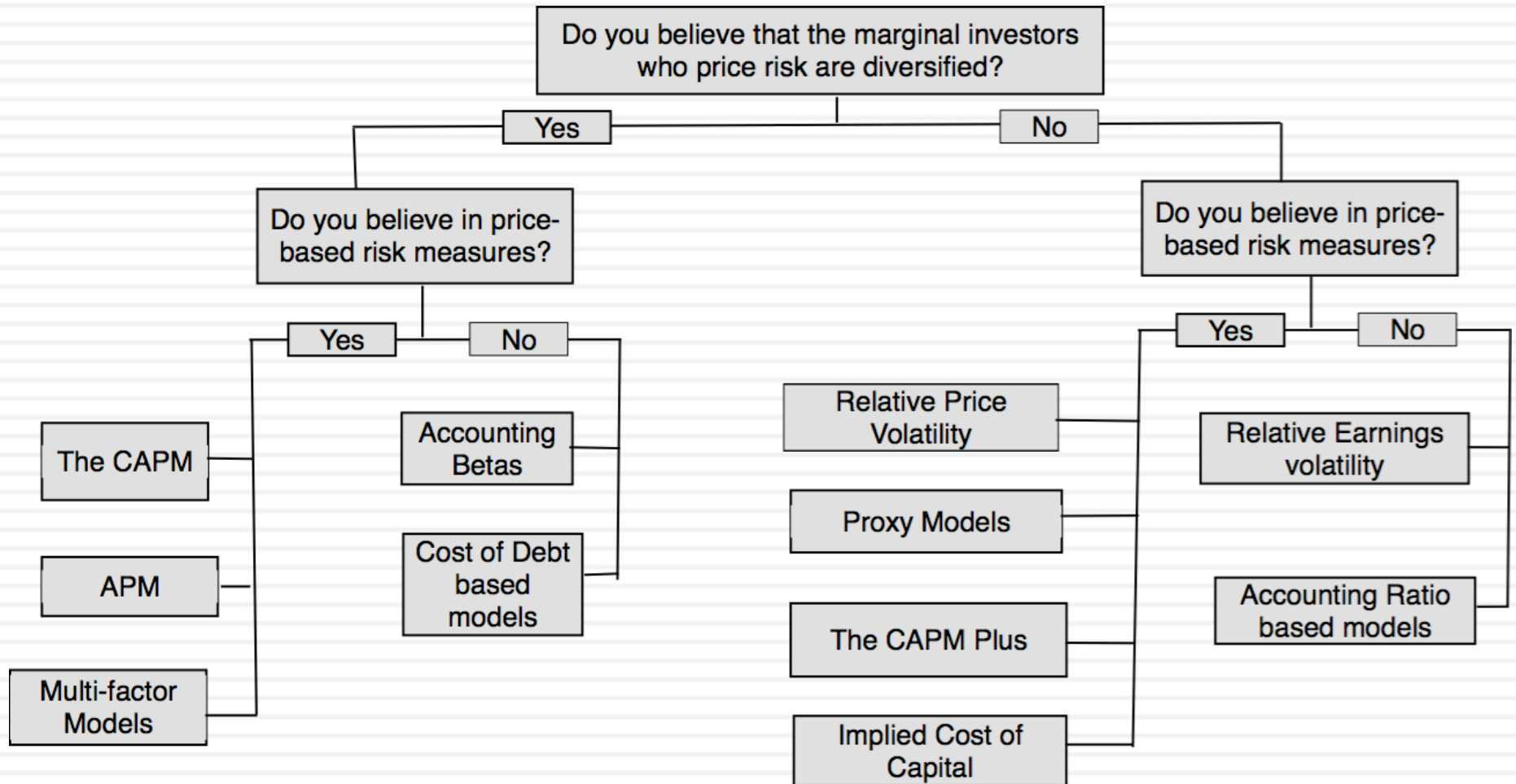
And subject to game playing

82



Measuring Relative Risk: You don't like betas or modern portfolio theory? No problem.

83



Don't like the diversified investor focus, but okay with price-based measures

84

1. Relative Standard Deviation

- Relative Volatility = Std dev of Stock/ Average Std dev across all stocks
- Captures all risk, rather than just market risk

2. Proxy Models

- Look at historical returns on all stocks and look for variables that explain differences in returns.
- You are, in effect, running multiple regressions with returns on individual stocks as the dependent variable and fundamentals about these stocks as independent variables.
- This approach started with market cap (the small cap effect) and over the last two decades has added other variables (momentum, liquidity etc.)

3. CAPM Plus Models

- Start with the traditional CAPM ($R_f + \text{Beta} (\text{ERP})$) and then add other premiums for proxies.

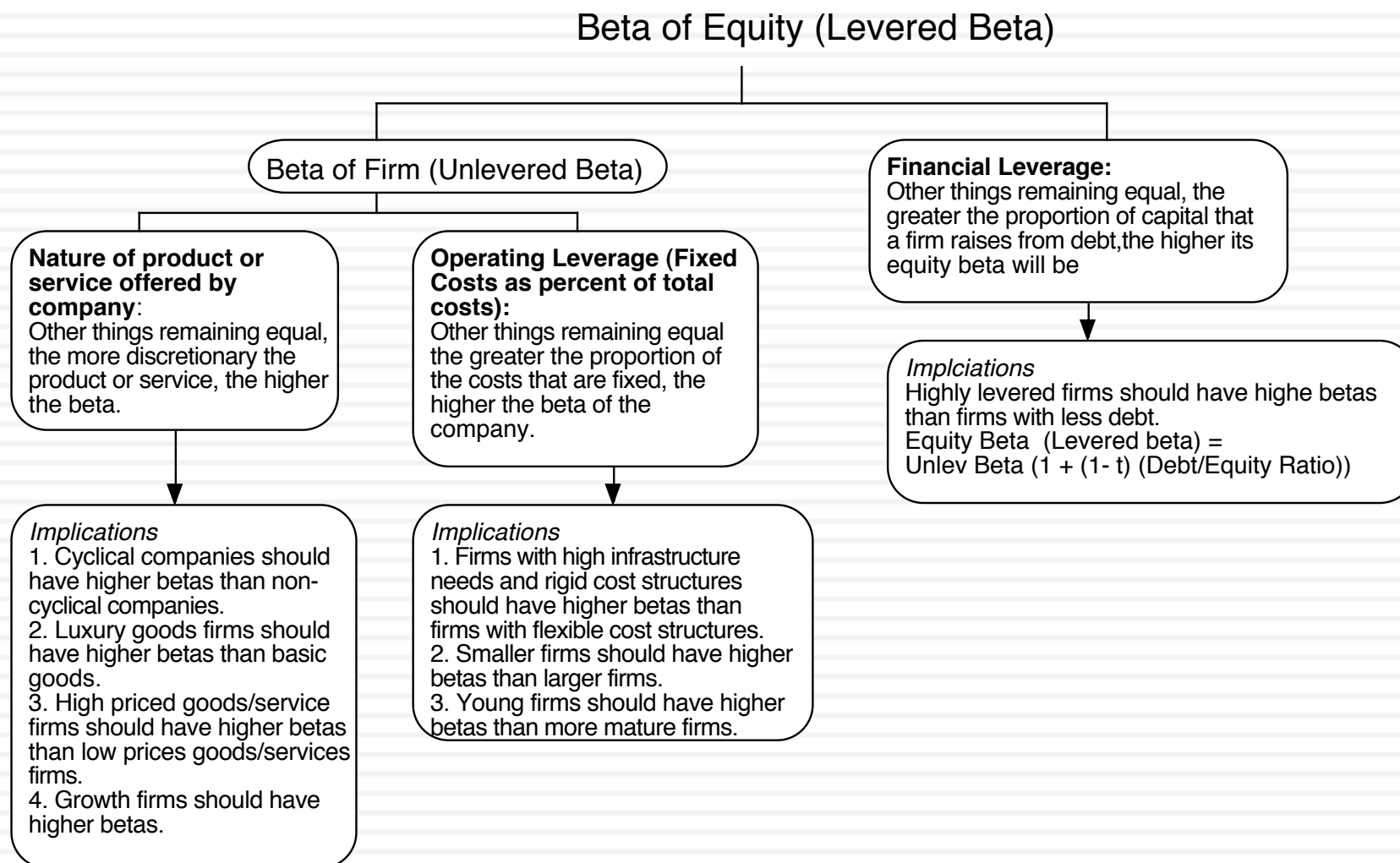
Don't like the price-based approach..

85

1. Accounting risk measures: To the extent that you don't trust market-priced based measures of risk, you could compute relative risk measures based on
 - Accounting earnings volatility: Compute an accounting beta or relative volatility
 - Balance sheet ratios: You could compute a risk score based upon accounting ratios like debt ratios or cash holdings (akin to default risk scores like the Z score)
2. Qualitative Risk Models: In these models, risk assessments are based at least partially on qualitative factors (quality of management).
3. Debt based measures: You can estimate a cost of equity, based upon an observable costs of debt for the company.
 - $\text{Cost of equity} = \text{Cost of debt} * \text{Scaling factor}$
 - The scaling factor can be computed from implied volatilities.

Determinants of Betas & Relative Risk

86



In a perfect world... we would estimate the beta of a firm by doing the following

87

Start with the beta of the business that the firm is in

Adjust the business beta for the operating leverage of the firm to arrive at the unlevered beta for the firm.

Use the financial leverage of the firm to estimate the equity beta for the firm
$$\text{Levered Beta} = \text{Unlevered Beta} (1 + (1 - \text{tax rate}) (\text{Debt/Equity}))$$

Adjusting for operating leverage...

88

- Within any business, firms with lower fixed costs (as a percentage of total costs) should have lower unlevered betas. If you can compute fixed and variable costs for each firm in a sector, you can break down the unlevered beta into business and operating leverage components.
 - ▣ $\text{Unlevered beta} = \text{Pure business beta} * (1 + (\text{Fixed costs} / \text{Variable costs}))$
- The biggest problem with doing this is informational. It is difficult to get information on fixed and variable costs for individual firms.
- In practice, we tend to assume that the operating leverage of firms within a business are similar and use the same unlevered beta for every firm.

Adjusting for financial leverage...

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- Conventional approach: If we assume that debt carries no market risk (has a beta of zero), the beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio

$$\beta_L = \beta_u (1 + ((1-t)D/E))$$

In some versions, the tax effect is ignored and there is no $(1-t)$ in the equation.

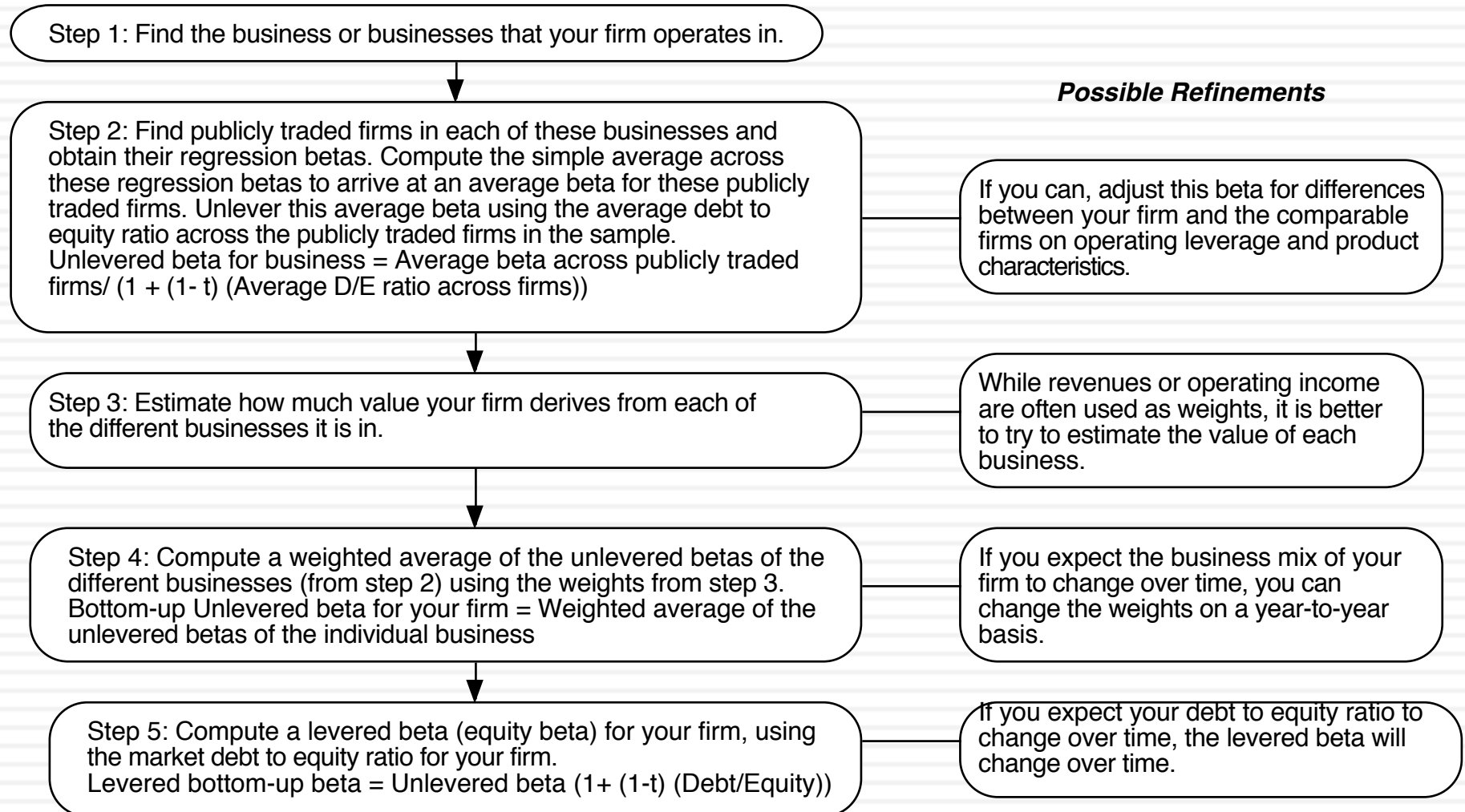
- Debt Adjusted Approach: If beta carries market risk and you can estimate the beta of debt, you can estimate the levered beta as follows:

$$\beta_L = \beta_u (1 + ((1-t)D/E)) - \beta_{\text{debt}} (1-t) (D/E)$$

While the latter is more realistic, estimating betas for debt can be difficult to do.

Bottom-up Betas

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Why bottom-up betas?

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- Less Noisy: The standard error in a bottom-up beta will be significantly lower than the standard error in a single regression beta. Roughly speaking, the standard error of a bottom-up beta estimate can be written as follows:
Std error of bottom-up beta =
$$\frac{\text{Average Std Error across Betas}}{\sqrt{\text{Number of firms in sample}}}$$
- Updated: The bottom-up beta can be adjusted to reflect changes in the firm's business mix and financial leverage. Regression betas reflect the past.
- Don't need prices: You can estimate bottom-up betas even when you do not have historical stock prices. This is the case with initial public offerings, private businesses or divisions of companies.

Estimating Bottom Up Betas & Costs of Equity: Vale

<i>Business</i>	<i>Sample</i>	<i>Sample size</i>	<i>Unlevered beta of business</i>	<i>Revenues</i>	<i>Peer Group EV/Sales</i>	<i>Value of Business</i>	<i>Proportion of Vale</i>
Metals & Mining	Global firms in metals & mining, Market cap>\$1 billion	48	0.86	\$9,013	1.97	\$17,739	16.65%
Iron Ore	Global firms in iron ore	78	0.83	\$32,717	2.48	\$81,188	76.20%
Fertilizers	Global specialty chemical firms	693	0.99	\$3,777	1.52	\$5,741	5.39%
Logistics	Global transportation firms	223	0.75	\$1,644	1.14	\$1,874	1.76%
<i>Vale Operations</i>			<i>0.8440</i>	<i>\$47,151</i>		<i>\$106,543</i>	<i>100.00%</i>

Business	Unlevered beta	D/E ratio	Levered beta	Risk free rate	ERP	Cost of Equity
Metals & Mining	0.86	54.99%	1.1657	2.75%	7.38%	11.35%
Iron Ore	0.83	54.99%	1.1358	2.75%	7.38%	11.13%
Fertilizers	0.99	54.99%	1.3493	2.75%	7.38%	12.70%
Logistics	0.75	54.99%	1.0222	2.75%	7.38%	10.29%
Vale Operations	0.84	54.99%	1.1503	2.75%	7.38%	11.23%

Embraer's Bottom-up Beta

93

Business	Unlevered Beta	D/E Ratio	Levered beta
Aerospace	0.95	18.95%	1.07

□ Levered Beta = Unlevered Beta (1 + (1- tax rate) (D/E Ratio))
= 0.95 (1 + (1-.34) (.1895)) = 1.07

□ Can an unlevered beta estimated using U.S. and European aerospace companies be used to estimate the beta for a Brazilian aerospace company?

a. Yes

b. No

What concerns would you have in making this assumption?

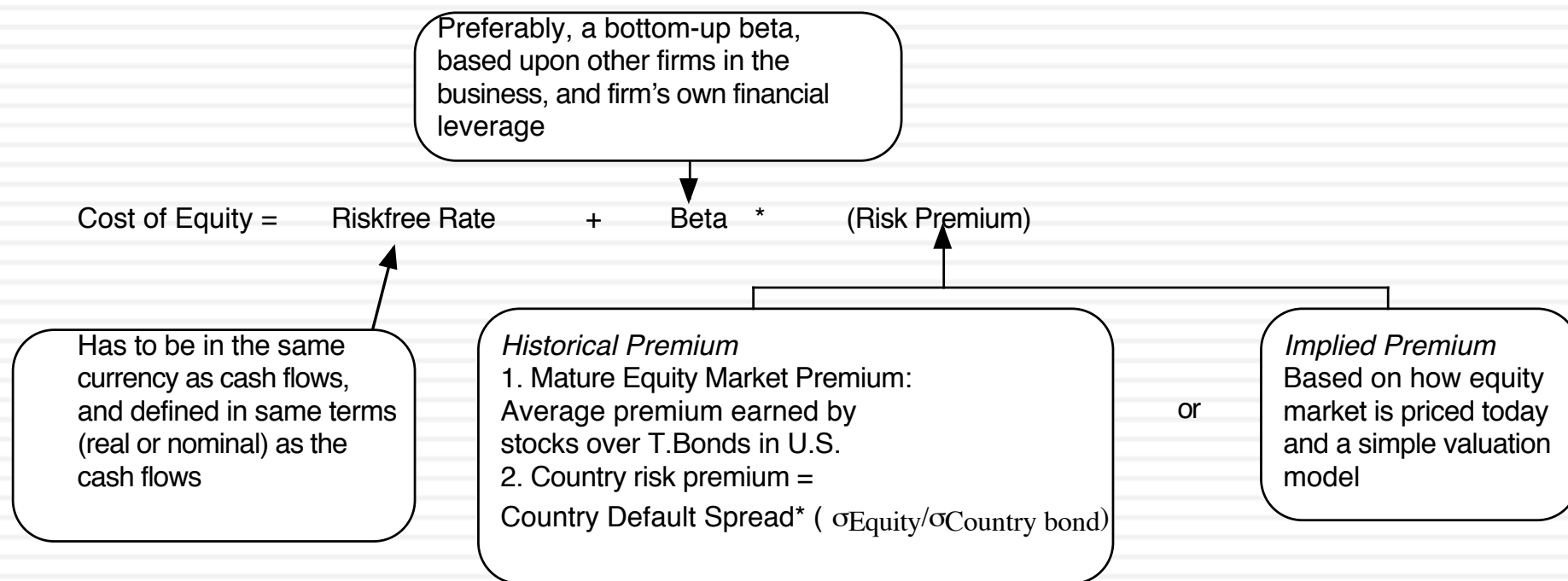
Gross Debt versus Net Debt Approaches

94

- Analysts in Europe and Latin America often take the difference between debt and cash (net debt) when computing debt ratios and arrive at very different values.
- For Embraer, using the gross debt ratio
 - ▣ Gross D/E Ratio for Embraer = $1953/11,042 = 18.95\%$
 - ▣ Levered Beta using Gross Debt ratio = 1.07
- Using the net debt ratio, we get
 - ▣ Net Debt Ratio for Embraer = $(\text{Debt} - \text{Cash}) / \text{Market value of Equity}$
 $= (1953 - 2320) / 11,042 = -3.32\%$
 - ▣ Levered Beta using Net Debt Ratio = $0.95 (1 + (1 - .34) (-.0332)) = 0.93$
- The cost of Equity using net debt levered beta for Embraer will be much lower than with the gross debt approach. The cost of capital for Embraer will even out since the debt ratio used in the cost of capital equation will now be a net debt ratio rather than a gross debt ratio.

The Cost of Equity: A Recap

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Discount Rates: IV

Mopping up

Estimating the Cost of Debt

97

- The cost of debt is the rate at which you can borrow at currently, It will reflect not only your default risk but also the level of interest rates in the market.
- The two most widely used approaches to estimating cost of debt are:
 - Looking up the yield to maturity on a straight bond outstanding from the firm. The limitation of this approach is that very few firms have long term straight bonds that are liquid and widely traded
 - Looking up the rating for the firm and estimating a default spread based upon the rating. While this approach is more robust, different bonds from the same firm can have different ratings. You have to use a median rating for the firm
- When in trouble (either because you have no ratings or multiple ratings for a firm), estimate a synthetic rating for your firm and the cost of debt based upon that rating.

Estimating Synthetic Ratings

98

- The rating for a firm can be estimated using the financial characteristics of the firm. In its simplest form, the rating can be estimated from the interest coverage ratio

$$\text{Interest Coverage Ratio} = \text{EBIT} / \text{Interest Expenses}$$

- For Embraer's interest coverage ratio, we used the interest expenses from 2003 and the average EBIT from 2001 to 2003. (The aircraft business was badly affected by 9/11 and its aftermath. In 2002 and 2003, Embraer reported significant drops in operating income)

$$\text{Interest Coverage Ratio} = 462.1 / 129.70 = 3.56$$

Interest Coverage Ratios, Ratings and Default Spreads: 2004

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If Interest Coverage Ratio is		Estimated Bond Rating	Default Spread(2004)
> 8.50	(>12.50)	AAA	0.35%
6.50 - 8.50	(9.5-12.5)	AA	0.50%
5.50 - 6.50	(7.5-9.5)	A+	0.70%
4.25 - 5.50	(6-7.5)	A	0.85%
3.00 - 4.25	(4.5-6)	A-	1.00%
2.50 - 3.00	(4-4.5)	BBB	1.50%
2.25 - 2.50	(3.5-4)	BB+	2.00%
2.00 - 2.25	((3-3.5)	BB	2.50%
1.75 - 2.00	(2.5-3)	B+	3.25%
1.50 - 1.75	(2-2.5)	B	4.00%
1.25 - 1.50	(1.5-2)	B -	6.00%
0.80 - 1.25	(1.25-1.5)	CCC	8.00%
0.65 - 0.80	(0.8-1.25)	CC	10.00%
0.20 - 0.65	(0.5-0.8)	C	12.00%
< 0.20 (<0.5)	D		20.00%

Cost of Debt computations

100

- Based on the interest coverage ratio of 3.56, the synthetic rating for Embraer is A-, giving it a default spread of 1.00%
- Companies in countries with low bond ratings and high default risk might bear the burden of country default risk, especially if they are smaller or have all of their revenues within the country.
 - If I assume that Embraer bears all of the country risk burden, I would add on the country default spread for Brazil in 2004 of 6.01%.
 - Larger companies that derive a significant portion of their revenues in global markets may be less exposed to country default risk. I am going to add only two thirds of the Brazilian country risk (based upon traded bond spreads of other large Brazilian companies in 2004)

Cost of debt

= Riskfree rate + 2/3(Brazil country default spread) + Company default spread = 4.29% + 2/3 (6.01%) + 1.00% = 9.29%

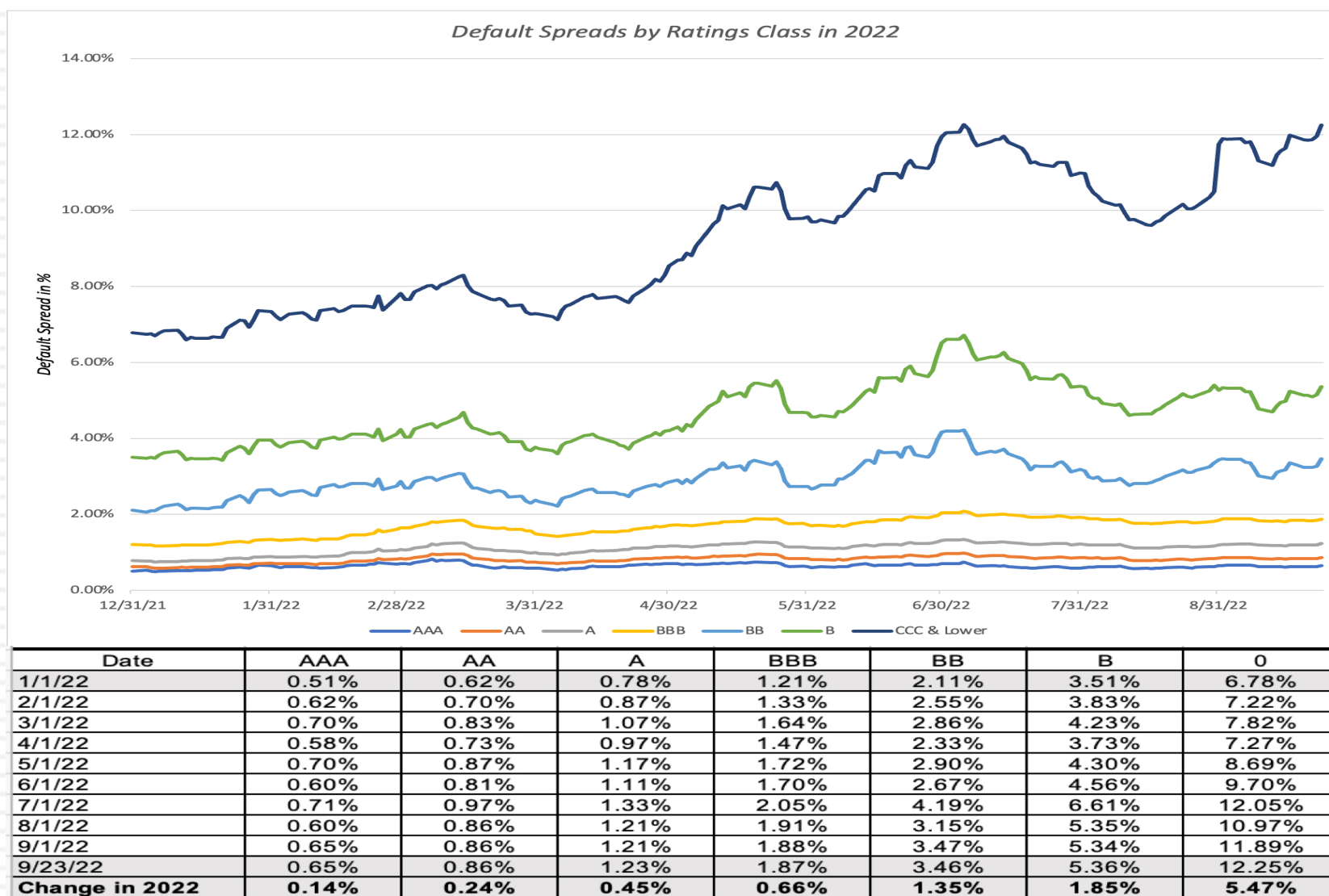
Synthetic Ratings: Some Caveats

101

- The relationship between interest coverage ratios and ratings, developed using US companies, tends to travel well, as long as we are analyzing large manufacturing firms in markets with interest rates close to the US interest rate
- They are more problematic when looking at smaller companies in markets with higher interest rates than the US. One way to adjust for this difference is modify the interest coverage ratio table to reflect interest rate differences (For instances, if interest rates in an emerging market are twice as high as rates in the US, halve the interest coverage ratio).

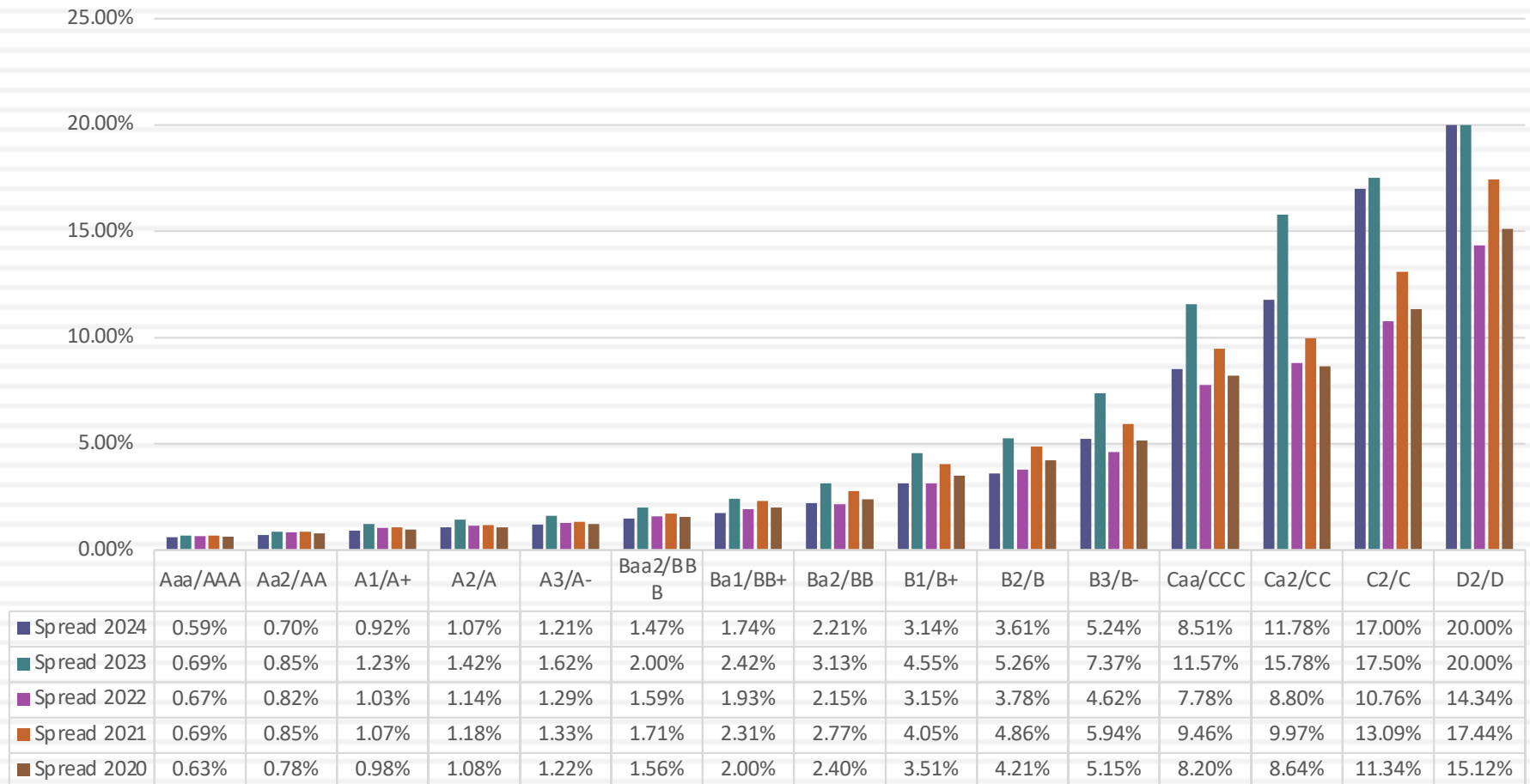
Default Spreads: Change is a constant

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Default Spreads – January 2024

Corporate Bond Default Spreads



Subsidized Debt: What should we do?

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- Assume that the Brazilian government lends money to Embraer at a subsidized interest rate (say 6% in dollar terms). In computing the cost of capital to value Embraer, should we use the cost of debt based upon default risk or the subsidized cost of debt?
 - a. The subsidized cost of debt (6%). That is what the company is paying.
 - b. The fair cost of debt (9.25%). That is what the company should require its projects to cover.
 - c. A number in the middle.

Weights for the Cost of Capital Computation

105

- In computing the cost of capital for a publicly traded firm, the general rule for computing weights for debt and equity is that you use market value weights (and not book value weights). Why?
 - a. Because the market is usually right
 - b. Because market values are easy to obtain
 - c. Because book values of debt and equity are meaningless
 - d. None of the above

Estimating Cost of Capital: Embraer in 2004

106

□ Equity

- Cost of Equity = $4.29\% + 1.07 (4\%) + 0.27 (7.89\%) = 10.70\%$
- Market Value of Equity = 11,042 million BR (\$ 3,781 million)

□ Debt

- Cost of debt = $4.29\% + 4.00\% + 1.00\% = 9.29\%$
- Market Value of Debt = 2,083 million BR (\$713 million)

□ Cost of Capital = $10.70\% (.84) + 9.29\% (1 - .34) (0.16) = 9.97\%$

- The book value of equity at Embraer is 3,350 million BR.
- The book value of debt at Embraer is 1,953 million BR; Interest expense is 222 mil BR; Average maturity of debt = 4 years
- Estimated market value of debt = $222 \text{ million (PV of annuity, 4 years, 9.29\%)} + \$1,953 \text{ million} / 1.0929^4 = 2,083 \text{ million BR}$

If you had to do it....Converting a Dollar Cost of Capital to a Nominal Real Cost of Capital

107

- Approach 1: Use a BR riskfree rate in all of the calculations above. For instance, if the BR riskfree rate was 12%, the cost of capital would be computed as follows:
 - Cost of Equity = 12% + 1.07(4%) + 0.27 (7.89%) = 18.41%
 - Cost of Debt = 12% + 1% = 13%
 - (This assumes the riskfree rate has no country risk premium embedded in it.)
- Approach 2: Use the differential inflation rate to estimate the cost of capital. For instance, if the inflation rate in BR is 8% and the inflation rate in the U.S. is 2%

$$\text{Cost of capital} = (1 + \text{Cost of Capital}_{\$}) \left[\frac{1 + \text{Inflation}_{\text{BR}}}{1 + \text{Inflation}_{\$}} \right]$$

$$= 1.0997 (1.08/1.02) - 1 = 0.1644 \text{ or } 16.44\%$$

Dealing with Hybrids and Preferred Stock

108

- When dealing with hybrids (convertible bonds, for instance), break the security down into debt and equity and allocate the amounts accordingly. Thus, if a firm has \$ 125 million in convertible debt outstanding, break the \$125 million into straight debt and conversion option components. The conversion option is equity.
- When dealing with preferred stock, it is better to keep it as a separate component. The cost of preferred stock is the preferred dividend yield. (As a rule of thumb, if the preferred stock is less than 5% of the outstanding market value of the firm, lumping it in with debt will make no significant impact on your valuation).

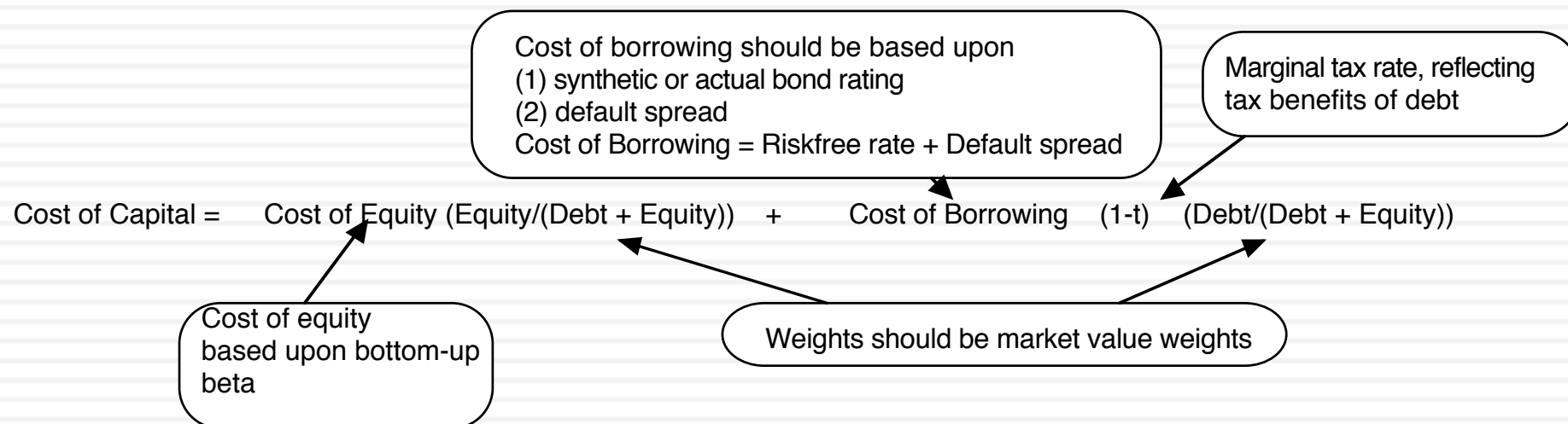
Decomposing a convertible bond...

109

- Assume that the firm that you are analyzing has \$125 million in face value of convertible debt with a stated interest rate of 4%, a 10 year maturity and a market value of \$140 million. If the firm has a bond rating of A and the interest rate on A-rated straight bond is 8%, you can break down the value of the convertible bond into straight debt and equity portions.
 - $\text{Straight debt} = (4\% \text{ of } \$125 \text{ million}) (\text{PV of annuity, 10 years, 8\%}) + 125 \text{ million} / 1.08^{10} = \91.45 million
 - $\text{Equity portion} = \$140 \text{ million} - \$91.45 \text{ million} = \48.55 million
- The debt portion (\$91.45 million) gets added to debt and the option portion (\$48.55 million) gets added to the market capitalization to get to the debt and equity weights in the cost of capital.

Recapping the Cost of Capital

110



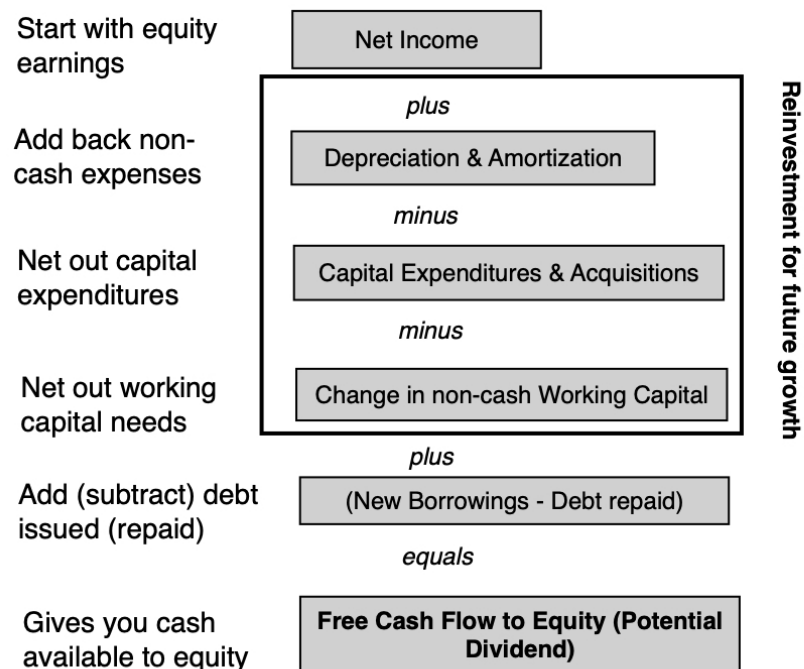
Estimating Cash Flows

Cash is king...

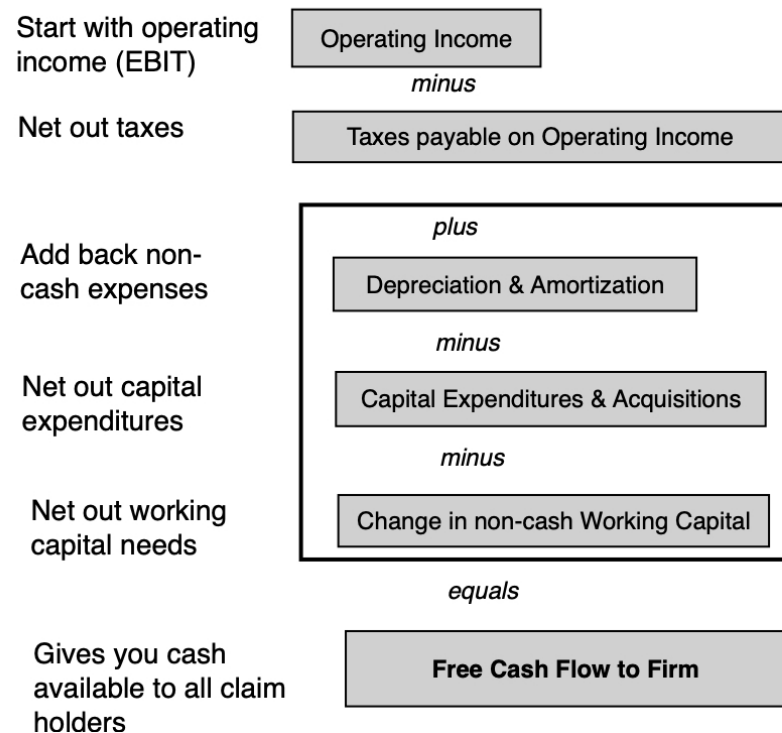
Free Cash Flow: FCFE and FCFF

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Free Cash Flow to Equity



Free Cash Flow to Firm



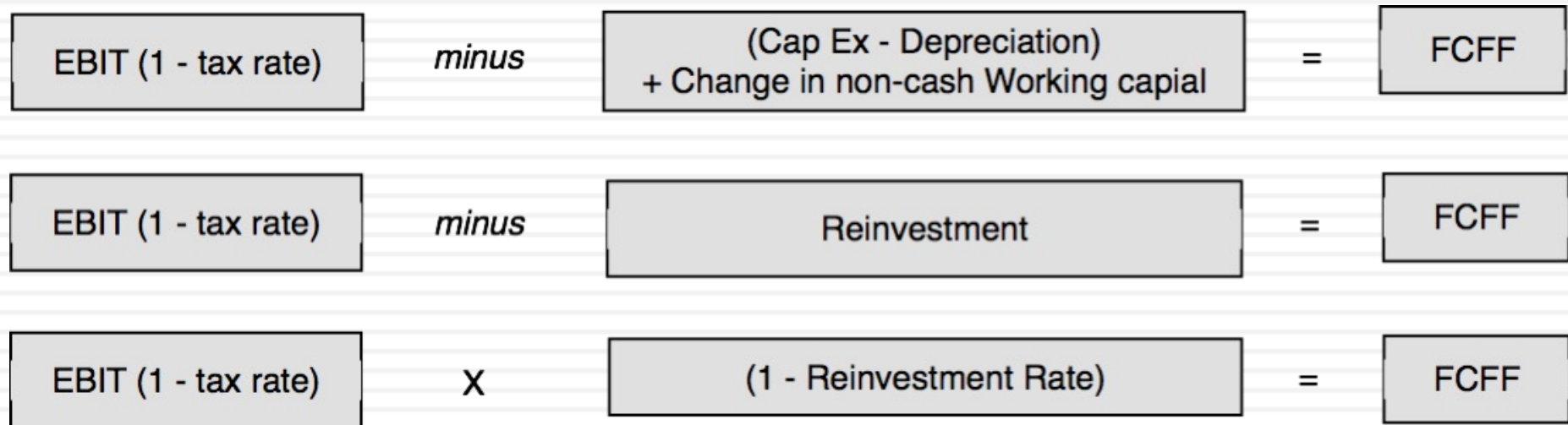
Steps in Cash Flow Estimation

113

- Estimate the current earnings of the firm
 - If looking at cash flows to equity, look at earnings after interest expenses - i.e. net income
 - If looking at cash flows to the firm, look at operating earnings after taxes
- Consider how much the firm invested to create future growth
 - If the investment is not expensed, it will be categorized as capital expenditures. To the extent that depreciation provides a cash flow, it will cover some of these expenditures.
 - Increasing working capital needs are also investments for future growth
- If looking at cash flows to equity, consider the cash flows from net debt issues (debt issued - debt repaid)

Measuring Free Cash Flow to the Firm: Three pathways to the same end game

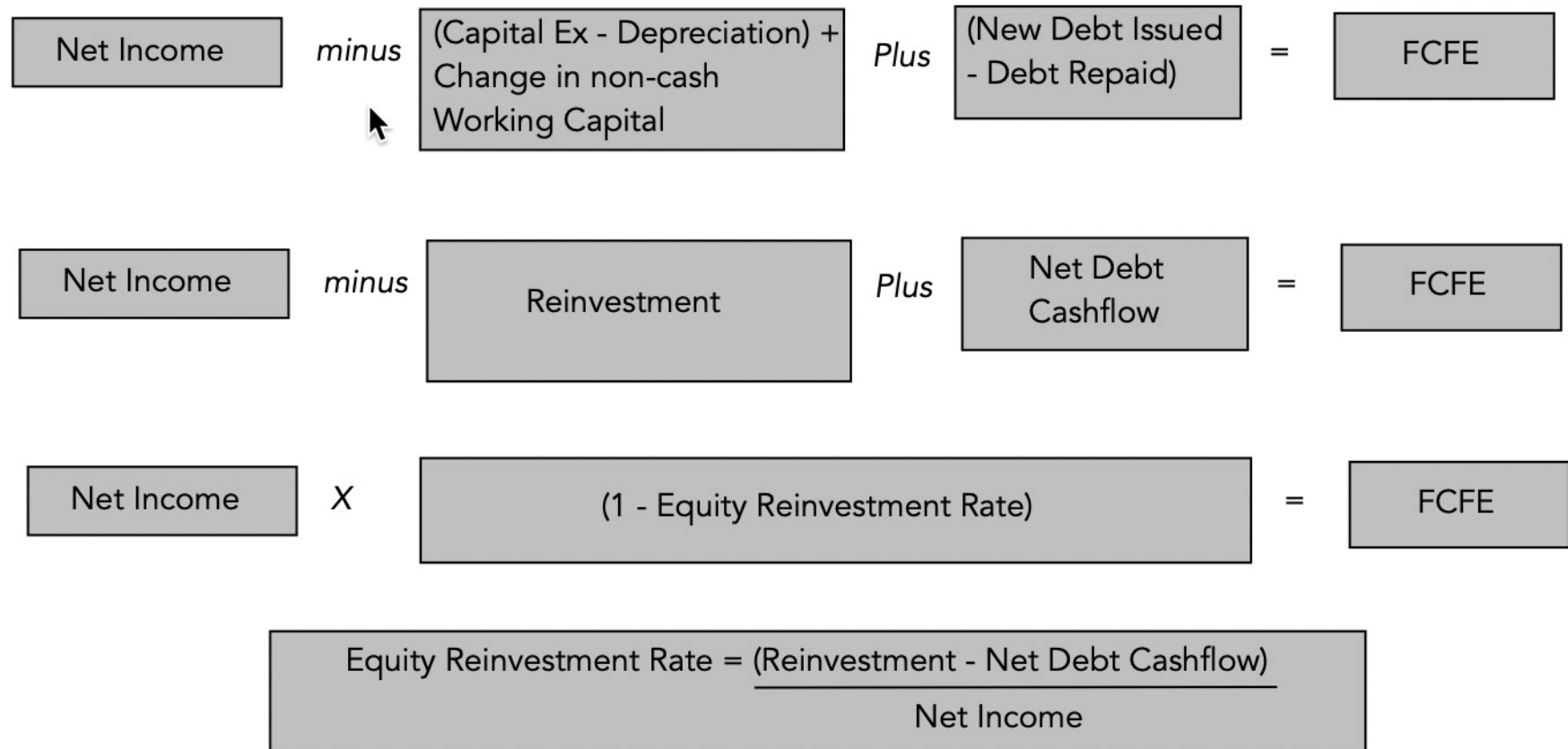
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Where are the tax savings from interest expenses?

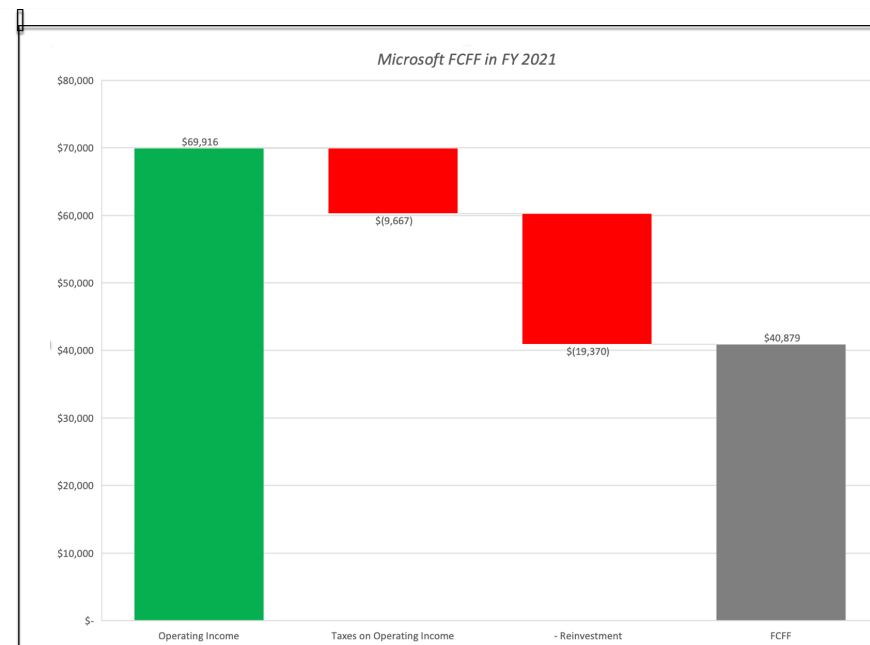
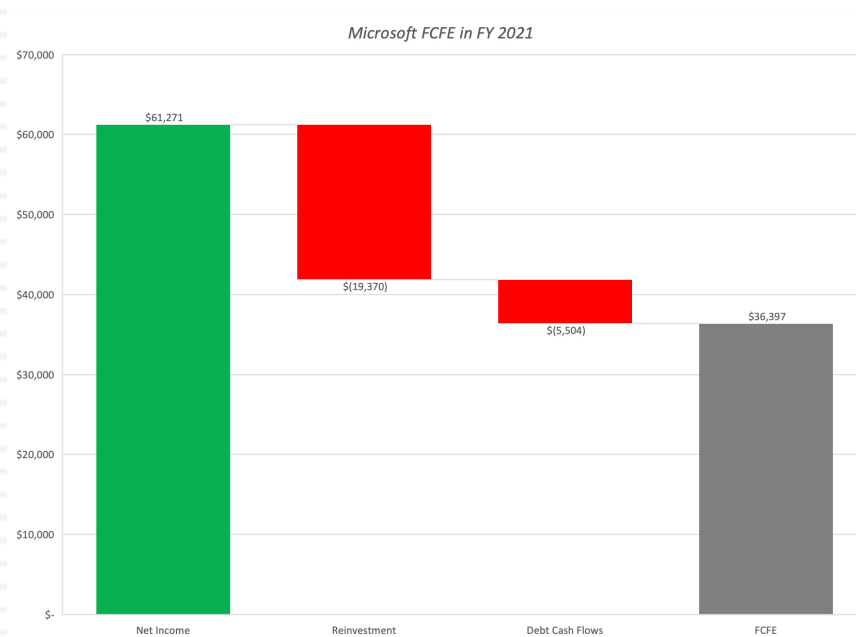
Measuring Free Cash Flow to Equity: Alternative Pathways

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Microsoft in 2021: FCFE and FCFF

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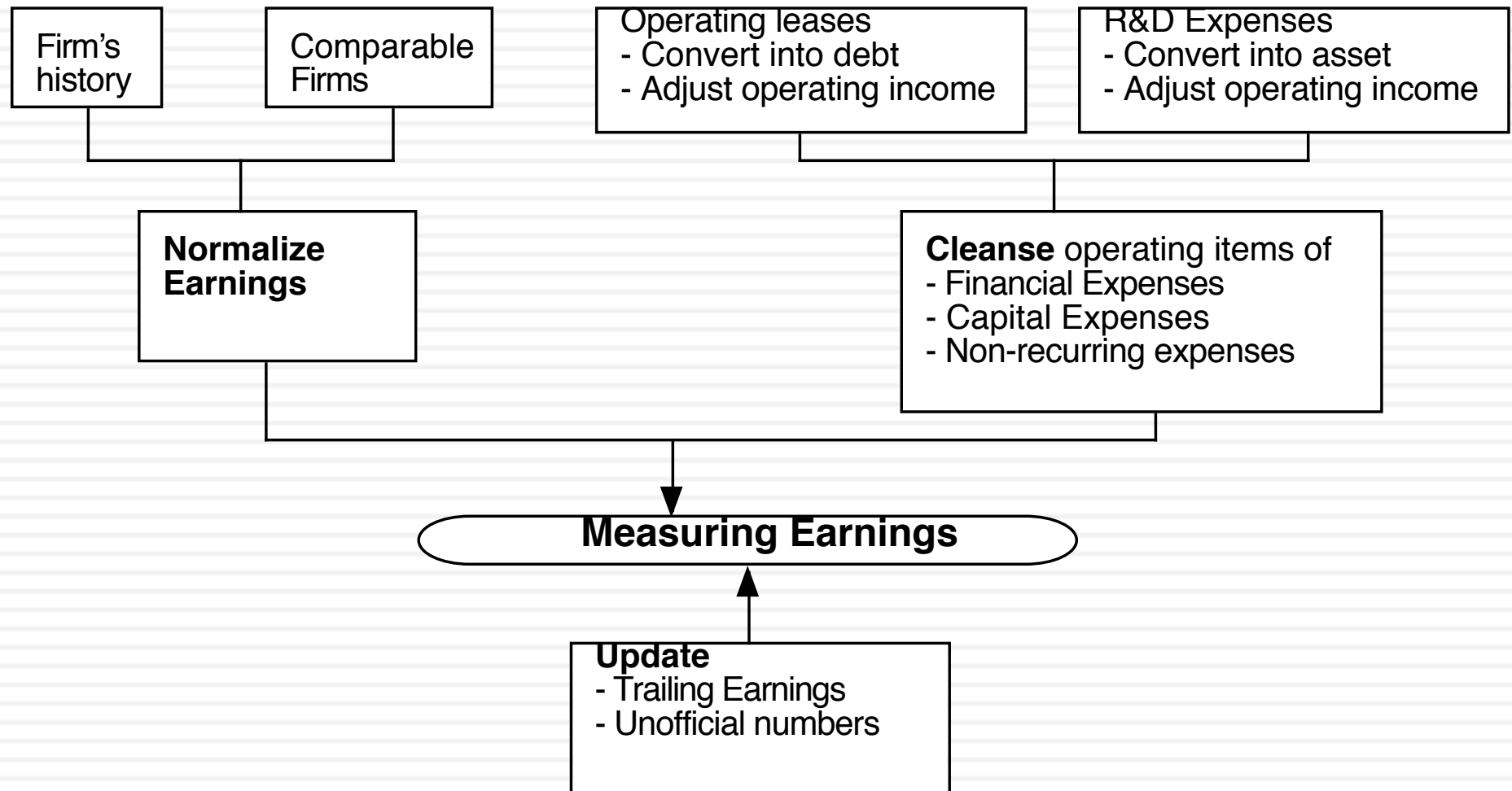
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Cash Flows I

Accounting Earnings, Flawed but Important

From Reported to Actual Earnings

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1. Updating Earnings

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- When valuing companies, we often depend upon financial statements for inputs on earnings and assets. Annual reports are often outdated and can be updated by using-
 - ▣ Trailing 12-month data, constructed from quarterly earnings reports.
 - ▣ Informal and unofficial news reports, if quarterly reports are unavailable.
- Updating makes the most difference for smaller and more volatile firms, as well as for firms that have undergone significant restructuring.
- Time saver: To get a trailing 12-month number, all you need is one 10K and one 10Q (example third quarter). For example, to get trailing revenues from a third quarter 10Q:
 - ▣ $\text{Trailing 12-month Revenue} = \text{Revenues (in last 10K)} - \text{Revenues from first 3 quarters of last year} + \text{Revenues from first 3 quarters of this year.}$

2. Correcting Accounting Earnings

120

- Make sure that there are no financial expenses mixed in with operating expenses
 - ▣ Financial expense: Any commitment that is tax deductible that you have to meet no matter what your operating results: Failure to meet it leads to loss of control of the business.
 - ▣ Until 2019, accounting convention treated operating leases as operating expenses, skewing income statements & balance sheets.
- Make sure that there are no capital expenses mixed in with the operating expenses
 - ▣ Capital expense: Any expense that is expected to generate benefits over multiple periods.
 - ▣ There are a whole host of expenses (like R&D) that meet this description that accountants treat as operating expenses.

A. The Magnitude of Operating Leases

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<i>Highest</i>		<i>Lowest</i>	
<i>Industry Name</i>	<i>Lease Expense/ Sales</i>	<i>Industry Name</i>	<i>Lease Expense/ Sales</i>
Air Transport	12.69%	Homebuilding	0.24%
Trucking	7.33%	Green & Renewable Energy	0.26%
Restaurant/Dining	5.95%	Insurance (Life)	0.34%
Telecom (Wireless)	5.75%	Steel	0.39%
Apparel	5.48%	Auto & Truck	0.41%
Real Estate (Operations & Services)	5.41%	Food Wholesalers	0.45%
Retail (Special Lines)	4.86%	Insurance (Prop/Cas.)	0.46%

Dealing with Operating Lease Expenses

122

- Since they give rise to contractual commitments, operating lease expenses should be treated as financing expenses, with the following adjustments to earnings and capital:
 - **Debt Value of Operating Leases** = Present value of Operating Lease Commitments at the pre-tax cost of debt
 - **Lease Asset:** When you convert operating leases into debt, you also create an asset to counter it of exactly the same value.
 - **Adjusted Operating Earnings** = Operating Earnings + Operating Lease Expenses - Depreciation on Leased Asset

As an approximation, this works:

- **Adjusted Operating Earnings** = Operating Earnings + Pre-tax cost of Debt * PV of Operating Leases.

Operating Leases at The Gap in 2003

123

- The Gap has conventional debt of about \$ 1.97 billion on its balance sheet and its pre-tax cost of debt is about 6%. Its operating lease payments in the 2003 were \$978 million and its commitments for the future are below:

<i>Year</i>	<i>Commitment (millions)</i>	<i>Present Value (at 6%)</i>
1	\$899.00	\$848.11
2	\$846.00	\$752.94
3	\$738.00	\$619.64
4	\$598.00	\$473.67
5	\$477.00	\$356.44
6&7	\$982.50 each year	\$1,346.04

- Debt Value of leases = \$4,396.85 (Also value of leased asset)
- Debt outstanding at The Gap = \$1,970 m + \$4,397 m = \$6,367 m
- Adjusted Operating Income = Stated OI + OL exp this year - Deprec' n
= \$1,012 m + 978 m - 4397 m /7 = \$1,362 million (7-year life for assets)
- Approximate OI = \$1,012 m + \$ 4397 m (.06) = \$1,276 m

The Collateral Effects of Treating Operating Leases as Debt

124

<i>Conventional Accounting</i>	<i>Operating Leases Treated as Debt</i>				
<p><i>Income Statement</i></p> <p>EBIT& Leases = 1,990</p> <p>- Op Leases = 978</p> <p>EBIT = 1,012</p>	<p><i>Income Statement</i></p> <p>EBIT& Leases = 1,990</p> <p>- Deprecn: OL= 628</p> <p>EBIT = 1,362</p> <p>Interest expense will rise to reflect the conversion of operating leases as debt. Net income should not change.</p>				
<p><i>Balance Sheet</i></p> <p>Off balance sheet (Not shown as debt or as an asset). Only the conventional debt of \$1,970 million shows up on balance sheet</p>	<p><i>Balance Sheet</i></p> <table> <tr> <td>Asset</td><td>Liability</td></tr> <tr> <td>OL Asset 4397</td><td>OL Debt 4397</td></tr> </table> <p>Total debt = 4397 + 1970 = \$6,367 million</p>	Asset	Liability	OL Asset 4397	OL Debt 4397
Asset	Liability				
OL Asset 4397	OL Debt 4397				
<p>Cost of capital = $8.20\%(7350/9320) + 4\%(1970/9320) = 7.31\%$</p> <p>Cost of equity for The Gap = 8.20%</p> <p>After-tax cost of debt = 4%</p> <p>Market value of equity = 7350</p>	<p>Cost of capital = $8.20\%(7350/13717) + 4\%(6367/13717) = 6.25\%$</p>				
<p>Return on capital = $1012 (1-.35)/(3130+1970) = 12.90\%$</p>	<p>Return on capital = $1362 (1-.35)/(3130+6367) = 9.30\%$</p>				

Miscategorized Financing Expenses as Operating Expenses

To correct the accounting mistake

To correct operating (net) income: Stated Operating income + Current year's Lease expense - Amortization of Lease Asset

To correct financial expenses: Stated interest expense + imputed interest expense on lease debt

Amortize the lease asset over the commitment lifetime.

To correct debt & assets: Take the present value of future financing commitments, using the cost of debt as your discount and show as both an asset (lease asset) and debt (lease debt).

Income Statement

	Item	Explanation
Start with	Revenues	Accountant's estimate of the revenues/sales generated by any transactions made the business during the period.
Net out	Cost of Goods Sold	Estimated costs that are directly associated with producing the product/service sold by the company.
To get	Gross Profit	Unit profitability, before covering other indirect costs and financial expenses
Net out	Operating Expenses	Include all expenses associated with operations this year, with no benefits spilling over into future years.
To get	Operating Profit	Profitability of business/ operations
Net out	Financial Expenses	Expenses associated with non-equity financing (debt, for instance)
Add in	Financial Income	Income earned on cash balance and on financial investments (in companies and securities)
To get	Pretax Profit	Income to equity investors, prior to taxes
Net out	Taxes	Taxes, based upon taxable income. (May not equate to cash taxes paid)
To get	Net Profit	Income to equity investors, after taxes

When accountants treat a financing expense (like lease payment) as an operating expense.

Operating income will be misstated, with financing expenses showing up as operating expenses. Net income will be unaffected.

Balance Sheet

Assets		Liabilities	
Long Lived Physical Assets	Fixed Assets	Current Liabilities	Short term obligations
Short Lived Assets	Current Assets	Debt	Long term debt
Investments in Securities & other business	Financial Assets	Other Liabilities	Other long term obligations
Assets which are not physical	Intangible Assets	Equity	Shareholders' Equity

Book debt and assets will be understated, as you miss the present value of commitments associated with the financing on both sides of the balance sheet.

Effects on Ratios/Statistics

Ratio/Statistic	Before correction	After correction	Effect of correction
Operating Margin	Operating income/Sales	Corrected Operating income/Sales	Increase
Net Margin	Net Income/Sales	Net Income/Sales	No change
Return on invested capital	Operating income/ (Book value of equity + Book value of debt - cash)	Corrected Operating income/ (Book value of equity + Book value of debt + Lease debt - cash)	Decrease
Return on equity	Net Income/Book Equity	Net Income/ Book Equity	No change
Debt Ratio (Book)	Book Debt/(Book Debt + Book Equity)	(Book Debt + Lease Debt)/ (Book Debt + Lease Debt + Equity)	Increase
Debt Ratio (Market)	Mkt Debt/(Mkt Debt + Mkt Equity)	(Mkt Debt + Lease Debt)/ (Mkt Debt + Lease Debt + Mkt Equity)	Increase

Accounting comes to its senses on operating leases

126

- In 2019, both IFRS and GAAP made a major shift on operating leases, requiring companies to capitalize leases and show the resulting debt (and counter asset) on the balance sheets.
- That said, the accounting rules for capitalizing leases are far more complex than the simple calculations that I have used, for two reasons:
 - ▣ Accounting has to balance its desire to do the right thing with maintaining some connection to its legacy rules.
 - ▣ Companies have lobbied to modify rules in their sectors to cushion the impact.

Checking on Accountants.... My lease estimate vs Accountants' Estimate

127

Region	My Estimate	Accounting	Accounting as % of my estimate
Australia, NZ & Canada	\$ 13,578.86	\$ 8,412.39	61.95%
United States	\$ 1,152,869.85	\$ 947,989.30	82.23%
Europe	\$ 52,172.26	\$ 24,336.94	46.65%
Emerging Markets	\$ 109,415.47	\$ 18,426.24	16.84%
Japan	\$ 156,071.83	\$ 1,719.90	1.10%
Global	\$ 1,484,108.27	\$ 1,000,884.77	67.44%

B. The Magnitude of R&D Expenses

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<i>Highest R&D spenders</i>			<i>Lowest R&D spenders</i>		
<i>Industry Name</i>	<i>R&D - LTM (in \$ millions)</i>	<i>Current R&D as % of Revenue</i>	<i>Industry Name</i>	<i>R&D - LTM (in \$ millions)</i>	<i>Current R&D as % of Revenue</i>
Drugs (Biotechnology)	\$ 75,091.63	39.62%	Beverage (Alcoholic)	\$	0.00%
Drugs (Pharmaceutical)	\$ 80,658.49	23.08%	Food Wholesalers	\$ 0.88	0.00%
Software (Internet)	\$ 4,177.58	18.98%	Homebuilding		0.00%
Semiconductor	\$ 50,321.60	17.40%	Hospitals/Healthcare Facilities	\$ 9.72	0.00%
Software (System & Applica	\$ 72,267.59	16.70%	Insurance (Life)		0.00%
Software (Entertainment)	\$ 58,245.69	15.15%	Insurance (Prop/Cas.)		0.00%
Telecom. Equipment	\$ 13,613.55	13.27%	Oil/Gas Distribution		0.00%
Retail (Online)	\$ 54,214.00	10.09%	Real Estate (Development)	\$ -	0.00%
Semiconductor Equip	\$ 6,707.74	9.38%	Real Estate (General/Diversified)		0.00%
Healthcare Products	\$ 14,934.42	8.01%	Restaurant/Dining	\$ 8.82	0.00%

R&D Expenses: Operating or Capital Expenses

129

- Accounting standards require us to consider R&D as an operating expense even though it is designed to generate future growth. It is more logical to treat it as capital expenditures.
- To capitalize R&D,
 - Specify an amortizable life for R&D (2 - 10 years)
 - Collect past R&D expenses for as long as the amortizable life
 - Sum up the unamortized R&D over the period. (Thus, if the amortizable life is 5 years, the research asset can be obtained by adding up 1/5th of the R&D expense from five years ago, 2/5th of the R&D expense from four years ago....:

Capitalizing R&D Expenses: SAP

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- R & D was assumed to have a 5-year life.

Year	R&D Expense	Unamortized	Amortization this year	
Current	1020.02	1.00	1020.02	
-1	993.99	0.80	795.19	€ 198.80
-2	909.39	0.60	545.63	€ 181.88
-3	898.25	0.40	359.30	€ 179.65
-4	969.38	0.20	193.88	€ 193.88
-5	744.67	0.00	0.00	€ 148.93

Value of research asset = € 2,914 million

Amortization of research asset in 2004 = € 903 million

Increase in Operating Income = $1020 - 903 =$ € 117 million

The Effect of Capitalizing R&D at SAP

131

<i>Conventional Accounting</i>	<i>R&D treated as capital expenditure</i>				
<i>Income Statement</i> EBIT& R&D = 3045 - R&D = 1020 EBIT = 2025 EBIT (1-t) = 1285 m	<i>Income Statement</i> EBIT& R&D = 3045 - Amort: R&D = 903 EBIT = 2142 (Increase of 117 m) EBIT (1-t) = 1359 m Ignored tax benefit = $(1020-903)(.3654) = 43$ Adjusted EBIT (1-t) = $1359+43 = 1402$ m (Increase of 117 million) Net Income will also increase by 117 million				
<i>Balance Sheet</i> Off balance sheet asset. Book value of equity at 3,768 million Euros is understated because biggest asset is off the books.	<i>Balance Sheet</i> <table> <tr> <td>Asset</td> <td>Liability</td> </tr> <tr> <td>R&D Asset 2914</td> <td>Book Equity +2914</td> </tr> </table> Total Book Equity = $3768+2914 = 6782$ mil	Asset	Liability	R&D Asset 2914	Book Equity +2914
Asset	Liability				
R&D Asset 2914	Book Equity +2914				
<i>Capital Expenditures</i> Conventional net cap ex of 2 million Euros	<i>Capital Expenditures</i> Net Cap ex = $2 + 1020 - 903 = 119$ mil				
<i>Cash Flows</i> EBIT (1-t) = 1285 - Net Cap Ex = 2 FCFF = 1283	<i>Cash Flows</i> EBIT (1-t) = 1402 - Net Cap Ex = 119 FCFF = 1283 m				
Return on capital = $1285/(3768+530)$	Return on capital = $1402/(6782+530)$				

Miscategorized Capital Expenses as Operating Expenses

Income Statement

	Item	Explanation
Start with	Revenues	Accountant's estimate of the revenues/sales generated by any transactions made the business during the period.
Net out	Cost of Goods Sold	Estimated costs that are directly associated with producing the product/service sold by the company.
To get	Gross Profit	Unit profitability, before covering other indirect costs and financial expenses
Net out	Operating Expenses	Include all expenses associated with operations this year, with no benefits spilling over into future years.
To get	Operating Profit	Profitability of business/ operations
Net out	Financial Expenses	Expenses associated with non-equity financing (debt, for instance)
Add in	Financial Income	Income earned on cash balance and on financial investments (in companies and securities)
To get	Pretax Profit	Income to equity investors, prior to taxes
Net out	Taxes	Taxes, based upon taxable income. (May not equate to cash taxes paid)
To get	Net Profit	Income to equity investors, after taxes

When accountants treat a capital expenditure (like R&D) as an operating expense.

Operating income and net income will be misstated and will be too low (high) for companies with growing (declining) R&D expenses.

To correct the accounting mistake

To correct operating (net) income: Stated Operating (Net) income + Current year's R&D expense - Amortization of R&D Asset

Amortize the R&D asset over amortizable life.

To correct debt & assets: Capitalize past R&D expenses and incorporate that amount into assets (as an R&D asset) and increase book equity by an equal amount.

Balance Sheet

Assets		Liabilities	
Long Lived Physical Assets	Fixed Assets	Current Liabilities	Short term obligations
Short Lived Assets	Current Assets	Debt	Long term debt
Investments in Securities & other business	Financial Assets	Other Liabilities	Other long term obligations
Assets which are not physical	Intangible Assets	Equity	Shareholders' Equity

Book equity and assets will be understated, as you miss the capitalized effects of past R&D expenses in both items.

Effects on Ratios/Statistics

Ratio/Statistic	Before correction	After correction	Effect of correction
Operating Margin	Operating income/Sales	Corrected Operating income/Sales	Increase (decrease) for companies with rising R&D expenses.
Net Margin	Net Income/Sales	Corrected Net Income/Sales	Increase (decrease) for companies with rising R&D expenses.
Return on invested capital	Operating income/ (Book value of equity + Book value of debt - cash)	Corrected Operating income/ (Book value of equity + R&D asset + Book value of debt - cash)	Decrease
Return on equity	Net Income/Book Equity	Corrected Net Income/ (Book Equity + R&D asset)	Decrease
Debt Ratio (Book)	Book Debt/(Book Debt + Book Equity)	Book Debt / (Book Debt + Equity + R&D asset)	Decrease
Debt Ratio (Market)	Mkt Debt/(Mkt Debt + Mkt Equity)	Mkt Debt/(Mkt Debt + Mkt Equity)	No change (The market value already incorporates R&D)

3. One-Time and Non-recurring Charges

133

- Assume that you are valuing a firm that is reporting a loss of \$ 500 million, due to a one-time charge of \$ 1 billion. What is the earnings you would use in your valuation?
 - a. A loss of \$ 500 million
 - b. A profit of \$ 500 million
- Would your answer be any different if the firm had reported one-time losses like these once every five years?
 - a. Yes
 - b. No

4. Accounting Malfeasance....

134

- Though all firms may be governed by the same accounting standards, the fidelity that they show to these standards can vary. More aggressive firms will show higher earnings than more conservative firms.
- While you will not be able to catch outright fraud, you should look for warning signals in financial statements and correct for them:
 - Income from unspecified sources - holdings in other businesses that are not revealed or from special purpose entities.
 - Income from asset sales or financial transactions (for a non-financial firm)
 - Sudden changes in standard expense items - a big drop in S,G &A or R&D expenses as a percent of revenues, for instance.
 - Frequent accounting restatements
 - Accrual earnings that run ahead of cash earnings consistently
 - Big differences between tax income and reported income

5. Dealing with Negative or Abnormally Low Earnings

135

	Reason for losses/low earnings	Valuation Response
Quick fixes	One-time or extraordinary charge	Add back the one-time expense to get corrected earnings
	Macro factor (commodity price drop or recession)	Use earnings across the commodity or economic cycle as normalized earnings.
Long term fixes	Young company working on business model	Estimate the profit margin that mature companies in the business earn and target that margin in the long term.
	Structural problems at company	Use an industry average margin as a target and move towards that margin over time, as structural problems are fixed.

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Cash Flows II

Taxes and Reinvestment

1. What tax rate?

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- The tax rate that you should use in computing the after-tax operating income should be
 - a. The effective tax rate in the financial statements (taxes paid/Taxable income)
 - b. The tax rate based upon taxes paid and EBIT (taxes paid/EBIT)
 - c. The marginal tax rate for the country in which the company operates
 - d. The weighted average marginal tax rate across the countries in which the company operates
 - e. None of the above
 - f. Any of the above, as long as you compute your after-tax cost of debt using the same tax rate.

The Right Tax Rate to Use

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- The free cash flow to the firm starts with after-tax operating income, where:
 - After-tax Operating Income = Operating Income (1- tax rate)
- In computing free cash flow to the firm, the choice really is between the effective and the marginal tax rate.
 - By using the marginal tax rate, we tend to understate the after-tax operating income in the earlier years, but the after-tax tax operating income is more accurate in later years.
 - By using the effective tax rate, we tend to overstate the after-tax operating income in the later years, as effective tax rates move toward the marginal tax rate.
- You can have your cake and eat it too, by starting with the effective tax rate, and adjusting towards the marginal tax rate over time.

A Tax Rate for a Money Losing Firm

139

- Assume that you are trying to estimate the after-tax operating income for a firm **with \$ 1 billion in net operating losses** carried forward.
- This firm is **expected to have operating income of \$ 500 million each year for the next 3 years**, and the marginal tax rate on income for all firms that make money is 40%. Estimate the after-tax operating income each year for the next 3 years.

	Year 1	Year 2	Year 3
EBIT	500	500	500
Taxes			
EBIT (1-t)			
Tax rate			

2. Net Capital Expenditures

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- Net capital expenditures represent the difference between capital expenditures and depreciation.
Net Cap Ex = Capital Expenditures - Depreciation
Depreciation is a cash inflow that pays for some or a lot (or sometimes all of) the capital expenditures.
- In general, the net capital expenditures will be a function of how fast a firm is growing or expecting to grow.
 - High growth firms will usually have much higher net capital expenditures than low growth firms.
 - Assumptions about net capital expenditures can therefore never be made independently of assumptions about growth in the future.

Capital expenditures should include

141

- Research and development expenses, once they have been re-categorized as capital expenses. The adjusted net cap ex will be
 - ▣ $\text{Adjusted Net Capital Expenditures} = \text{Net Capital Expenditures} + \text{Current year's R\&D expenses} - \text{Amortization of Research Asset}$
- Acquisitions of other firms, since these are like capital expenditures. The adjusted net cap ex will be
 - ▣ $\text{Adjusted Net Cap Ex} = \text{Net Capital Expenditures} + \text{Acquisitions of other firms} - \text{Amortization of such acquisitions}$
- 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

Cisco's Acquisitions: 1999

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Acquired	Method of Acquisition	Price Paid
GeoTel	Pooling	\$1,344
Fibex	Pooling	\$318
Sentient	Pooling	\$103
American Internet	Purchase	\$58
Summa Four	Purchase	\$129
Clarity Wireless	Purchase	\$153
Selsius Systems	Purchase	\$134
PipeLinks	Purchase	\$118
Amteva Tech	Purchase	\$159
		\$2,516

Cisco's Net Capital Expenditures in 1999

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Cap Expenditures (from statement of CF)	= \$ 584 mil
- Depreciation (from statement of CF)	= \$ 486 mil
Net Cap Ex (from statement of CF)	= \$ 98 mil
+ R & D expense	= \$ 1,594 mil
- Amortization of R&D	= \$ 485 mil
+ Acquisitions	= \$ 2,516 mil
Adjusted Net Capital Expenditures	= \$3,723 mil

□ (Amortization was included in the depreciation number)

3. Working Capital Investments

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- **Accounting definition:** 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).
- **Valuation definition:** 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).

Working Capital: General Propositions

145

1. Working Capital Detail: While some analysts break down working capital into detail, it is a pointless exercise unless you feel that you can bring some specific information that lets you forecast the details.
2. Working Capital Volatility: Changes in non-cash working capital from year to year tend to be volatile. It is better to either estimate the change based on working capital as a percent of sales, while keeping an eye on industry averages.
3. Negative Working Capital: Some firms have negative non-cash working capital. Assuming that this will continue into the future will generate positive cash flows for the firm and will get more positive as growth increases.

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Cash Flows III

From the firm to equity

Dividends and Cash Flows to Equity

147

- In the strictest sense, the only cash flow from an equity investment in a publicly traded firm is the **dividend that will be paid on the stock**.
- Actual dividends, however, are set by the managers of the firm and may be much lower than **the potential dividends (that could have been paid out)**
 - ▣ managers are conservative and try to smooth out dividends
 - ▣ managers like to hold on to cash to meet unforeseen future contingencies and investment opportunities
- When actual dividends are less (more) than potential dividends, using a model that focuses only on dividends will under (over) state the true value of the equity in a firm.

Measuring Potential Dividends

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- Some analysts assume that the earnings of a firm represent its potential dividends. This cannot be true for several reasons:
 - Earnings are not cash flows, since there are both non-cash revenues and expenses in the earnings calculation
 - Even if earnings were cash flows, a firm that paid its earnings out as dividends would not be investing in new assets and thus could not grow
 - Valuation models, where earnings are discounted back to the present, will over estimate the value of the equity in the firm
- The potential dividends of a firm are the cash flows left over after the firm has made any “investments” it needs to make to create future growth and net debt repayments (debt repayments - new debt issues)
 - The common categorization of capital expenditures into discretionary and non-discretionary loses its basis when there is future growth built into the valuation.

Estimating Cash Flows: FCFE

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□ Cash flows to Equity for a Levered Firm

Net Income

- (Capital Expenditures - Depreciation)

- Changes in non-cash Working Capital

+ (New Debt Issues – Debt Repaid)

= Free Cash flow to Equity

□ Cash flows to equity represent residual cash flows for equity investors, i.e., cash flows left over after every conceivable need has been met.

□ That cash flow can be paid out without damaging the operating business of the company and its growth potential. It is thus a potential dividend.

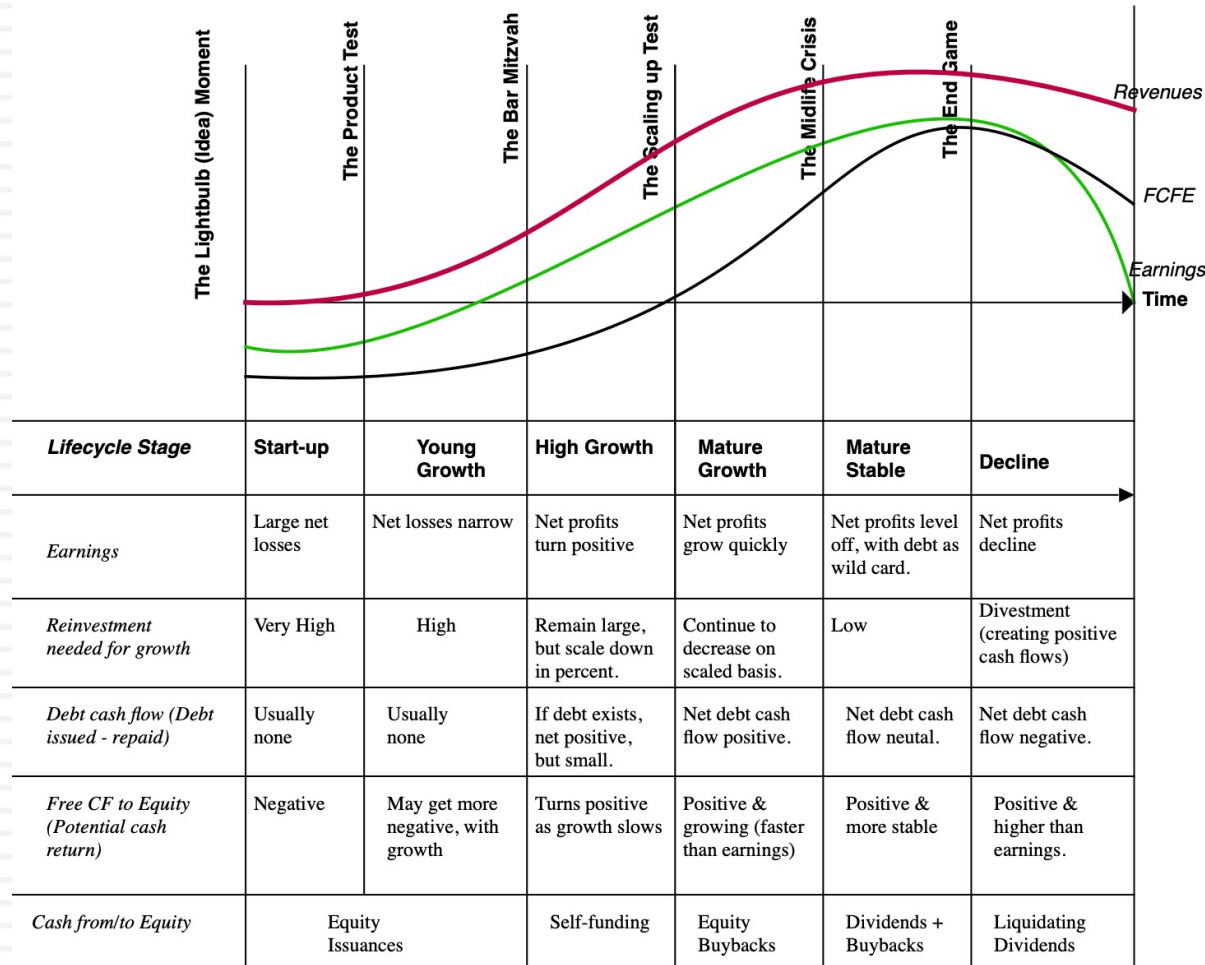
FCFE from the statement of cash flows

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- The statement of cash flows can be used to back into a FCFE, if you are willing to navigate your way through it and not trust it fully.
- FCFE
 - = Cashflow from Operations
 - Capital Expenditures (from the cash flow from investments)
 - Cash Acquisitions (from the cash flow from investments)
 - (Debt Repaid – Debt Issued) (from financing cash flows)
 - = FCFE
- Alternatively, you can also do the following:
 - ▣ $FCFE - Dividends + Stock\ Buybacks - Stock\ Issuances + Change\ in\ Cash\ Balance$

FCFE across the life cycle

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FCFE over time: Tesla

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Dividends versus FCFE: Across the globe

<i>Sub Group</i>	Number of firms	Net Income	FCFE	Dividends	Buybacks	% from Buybacks	Dividends + Buybacks
Africa and Middle East	2,423	\$307,736.16	\$230,376.04	\$178,945	\$13,131	6.84%	\$192,076
Australia & NZ	1,798	\$82,148.86	\$22,464.54	\$65,050	\$9,704	12.98%	\$74,754
Canada	2,791	\$129,021.51	-\$11,327.54	\$74,629	\$47,476	38.88%	\$122,105
China	7,504	\$798,823.69	-\$75,419.80	\$504,087	\$72,049	12.51%	\$576,136
EU & Environs	5,925	\$967,493.21	\$596,696.13	\$424,707	\$161,188	27.51%	\$585,896
Eastern Europe & Russia	325	\$13,064.78	\$7,204.94	\$6,426	\$410	6.00%	\$6,836
India	4,446	\$163,984.70	\$111,933.10	\$50,643	\$6,095	10.74%	\$56,738
Japan	4,020	\$371,873.39	\$16,137.31	\$115,135	\$63,865	35.68%	\$178,999
Latin America & Caribbean	984	\$135,544.59	\$33,386.50	\$67,145	\$16,117	19.36%	\$83,262
Small Asia	9,876	\$331,541.42	-\$42,424.57	\$188,287	\$15,484	7.60%	\$203,772
UK	1,125	\$245,010.10	\$178,627.76	\$114,706	\$61,037	34.73%	\$175,742
United States	6,481	\$1,785,480.61	\$563,221.99	\$700,711	\$928,104	56.98%	\$1,628,816
Global	47,698	\$5,331,723.03	\$1,630,876.38	\$2,490,471	\$1,394,660	35.90%	\$3,885,131

Estimating FCFE when Leverage is Stable

154

Net Income

- (1- DR) (Capital Expenditures - Depreciation)
- (1- DR) Working Capital Needs
- = Free Cash flow to Equity

DR = Debt/Capital Ratio

For this firm,

- Proceeds from new debt issues = Principal Repayments + \square (Capital Expenditures - Depreciation + Working Capital Needs)
- In computing FCFE, the book value debt to capital ratio should be used when looking back in time but can be replaced with the market value debt to capital ratio, looking forward.

Estimating FCFE: Disney

155

- Net Income=\$ 1533 Million
- Capital spending = \$ 1,746 Million
- Depreciation per Share = \$ 1,134 Million
- Increase in non-cash working capital = \$ 477 Million
- Debt to Capital Ratio (DR) = 23.83%
- Estimating FCFE (1997):

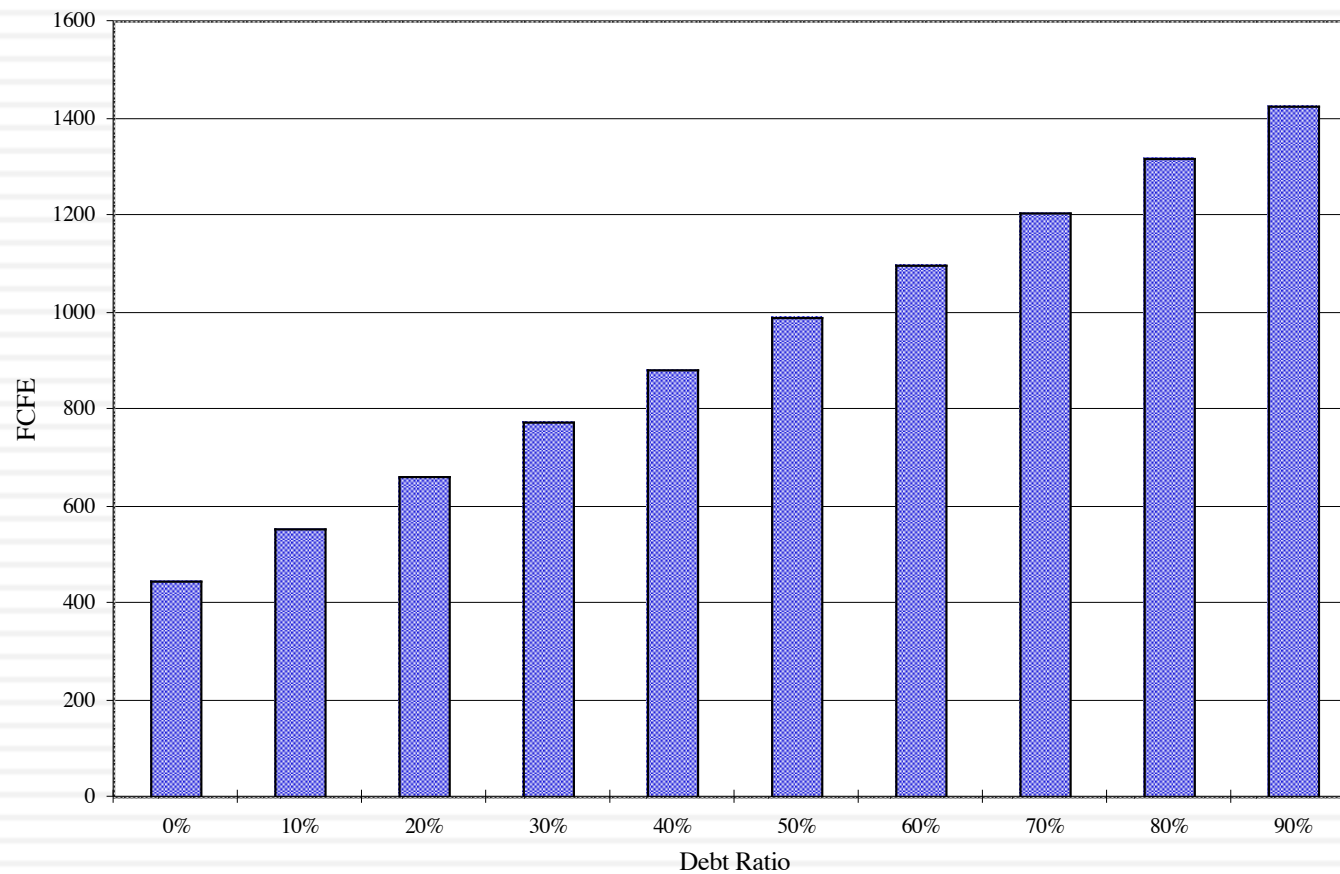
Net Income	\$1,533 Mil
- (Cap. Exp - Depr)*(1-DR)	\$465.90 [(1746-1134)(1-.2383)]
Chg. Working Capital*(1-DR)	\$363.33 [477(1-.2383)]
= Free CF to Equity	\$ 704 Million

Dividends Paid	\$ 345 Million
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FCFE and Leverage: Is this a free lunch?

156

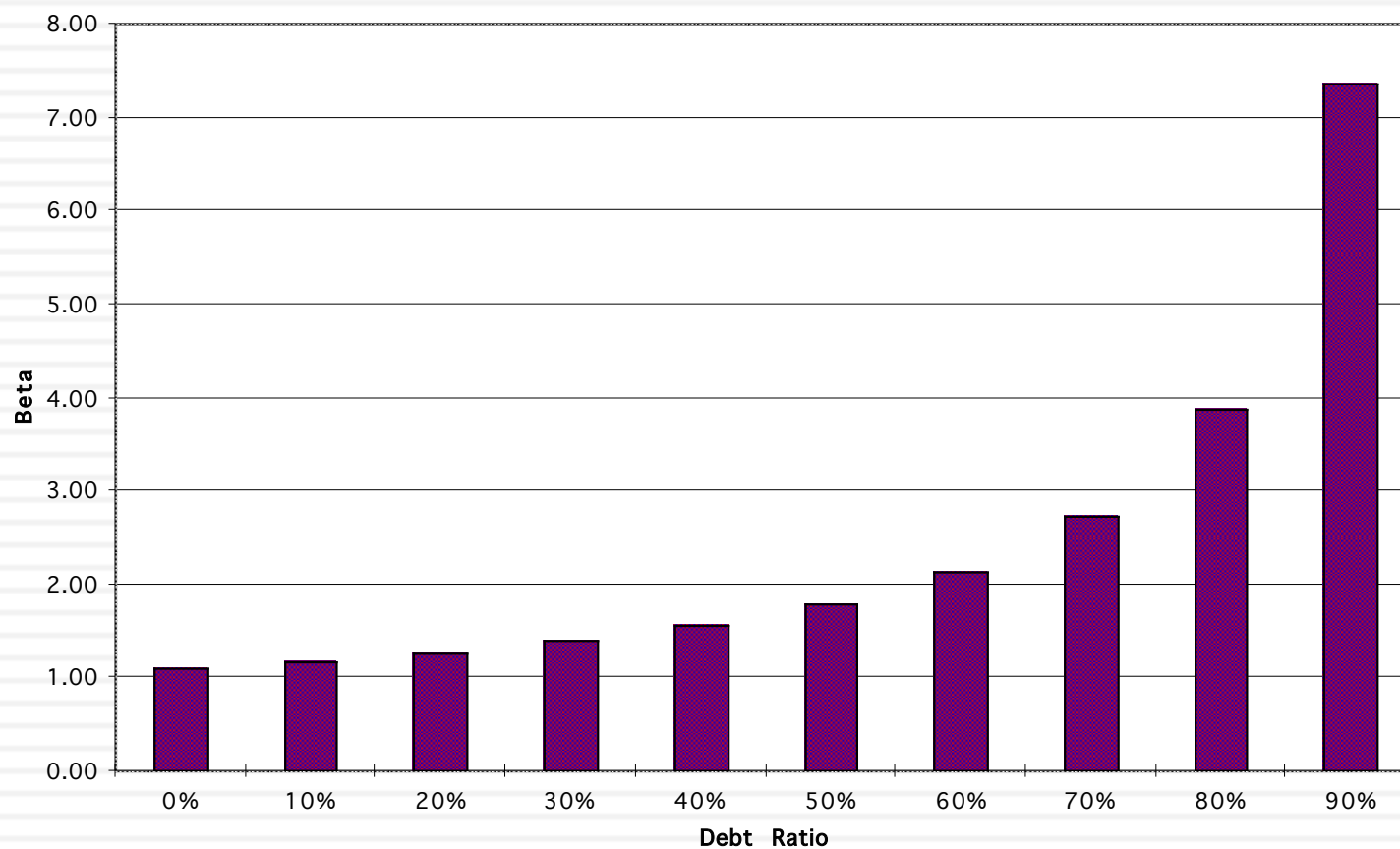
Debt Ratio and FCFE: Disney



FCFE and Leverage: The Other Shoe Drops

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Debt Ratio and Beta



Leverage, FCFE and Value

158

- In a discounted cash flow model, increasing the debt/equity ratio will generally increase the expected free cash flows to equity investors over future time periods and also the cost of equity applied in discounting these cash flows. Which of the following statements relating leverage to value would you subscribe to?
 - a. Increasing leverage will increase value because the cash flow effects will dominate the discount rate effects
 - b. Increasing leverage will decrease value because the risk effect will be greater than the cash flow effects
 - c. Increasing leverage will not affect value because the risk effect will exactly offset the cash flow effect
 - d. Any of the above, depending upon what company you are looking at and where it is in terms of current leverage

Estimating Growth

Growth can be good, bad or neutral...

The Value of Growth

160

- When valuing a company, it is easy to get caught up in the details of estimating growth and start viewing growth as a “good”, i.e., that higher growth translates into higher value.
- Growth, though, is a double-edged sword.
 - The good side of growth is that it pushes up revenues and operating income, perhaps at different rates (depending on how margins evolve over time).
 - The bad side of growth is that you have to set aside money to reinvest to create that growth.
 - The net effect of growth is whether the good outweighs the bad.

Ways of Estimating Growth in Earnings

161

- Look at the past
 - ▣ The historical growth in earnings per share is usually a good starting point for growth estimation
- Look at what others are estimating
 - ▣ Analysts estimate growth in earnings per share for many firms. It is useful to know what their estimates are.
- Look at fundamentals
 - ▣ With stable margins, operating income growth can be tied to how much a firm reinvests, and the returns it earns.
 - ▣ With changing margins, you have to start with revenue growth, forecast margins and estimate reinvestment.

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Growth I

Historical Growth

Historical Growth

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- Historical growth rates can be estimated in a number of different ways
 - ▣ Arithmetic versus Geometric Averages
 - ▣ Simple versus Regression Models
- Historical growth rates can be sensitive to
 - ▣ The period used in the estimation (starting and ending points)
 - ▣ The metric that the growth is estimated in..
- In using historical growth rates, you have to wrestle with the following:
 - ▣ How to deal with negative earnings
 - ▣ The effects of scaling up

Motorola: Arithmetic versus Geometric Growth Rates

164

	Revenues	% Change	EBITDA	% Change	EBIT	% Change
1994	\$ 22,245		\$ 4,151		\$ 2,604	
1995	\$ 27,037	21.54%	\$ 4,850	16.84%	\$ 2,931	12.56%
1996	\$ 27,973	3.46%	\$ 4,268	-12.00%	\$ 1,960	-33.13%
1997	\$ 29,794	6.51%	\$ 4,276	0.19%	\$ 1,947	-0.66%
1998	\$ 29,398	-1.33%	\$ 3,019	-29.40%	\$ 822	-57.78%
1999	\$ 30,931	5.21%	\$ 5,398	78.80%	\$ 3,216	291.24%
Arithmetic Average		7.08%		10.89%		42.45%
Geometric Average		6.82%		5.39%		4.31%
Standard deviation		8.61%		41.56%		141.78%

A Test

165

- You are trying to estimate the growth rate in earnings per share at Time Warner from 1996 to 1997. In 1996, the earnings per share was a deficit of \$0.05. In 1997, the expected earnings per share is \$0.25. What is the growth rate?
 - a. -600%
 - b. +600%
 - c. +120%
 - d. Cannot be estimated

Dealing with Negative Earnings

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- When the earnings in the starting period are negative, the growth rate cannot be estimated. ($0.30/-0.05 = -600\%$)
- There are three solutions:
 - Use the higher of the two numbers as the denominator ($0.30/0.25 = 120\%$)
 - Use the absolute value of earnings in the starting period as the denominator ($0.30/0.05=600\%$)
 - Use a linear regression model and divide the coefficient by the average earnings.
- When earnings are negative, the growth rate is meaningless. Thus, while the growth rate can be estimated, it does not tell you much about the future.

The Effect of Size on Growth: Callaway Golf

167

Year	Net Profit	Growth Rate
1990	1.80	
1991	6.40	255.56%
1992	19.30	201.56%
1993	41.20	113.47%
1994	78.00	89.32%
1995	97.70	25.26%
1996	122.30	25.18%

□ Geometric Average Growth Rate = 102%

Extrapolation and its Dangers

168

Year	Net Profit
1996	\$ 122.30
1997	\$ 247.05
1998	\$ 499.03
1999	\$ 1,008.05
2000	\$ 2,036.25
2001	\$ 4,113.23

- If net profit continues to grow at the same rate as it has in the past 6 years, the expected net income in 5 years will be \$ 4.113 billion.

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Growth II

Analyst Estimates

Analyst Forecasts of Growth

170

- While the job of an analyst is to find under and over valued stocks in the sectors that they follow, a significant proportion of an analyst's time (outside of selling) is spent forecasting earnings per share.
 - ▣ Most of this time, in turn, is spent forecasting earnings per share in the next earnings report
 - ▣ While many analysts forecast expected growth in earnings per share over the next 5 years, the analysis and information (generally) that goes into this estimate is far more limited.
- Analyst forecasts of earnings per share and expected growth are widely disseminated by services such as Zacks and IBES, at least for U.S companies.

How good are analysts at forecasting growth?

171

- Analysts forecasts of EPS tend to be closer to the actual EPS than simple time series models, but the differences tend to be small

Study	Group tested	Analyst Error	Time Series Model Error
Collins & Hopwood	Value Line Forecasts	31.7%	34.1%
Brown & Rozeff	Value Line Forecasts	28.4%	32.2%
Fried & Givoly	Earnings Forecaster	16.4%	19.8%

- The advantage that analysts have over time series models
 - tends to decrease with the forecast period (next quarter versus 5 years)
 - tends to be greater for larger firms than for smaller firms
 - tends to be greater at the industry level than at the company level
- Forecasts of growth (and revisions thereof) tend to be highly correlated across analysts.

Are some analysts more equal than others?

172

- A study of All-America Analysts (chosen by Institutional Investor) found that
 - There is no evidence that analysts who are chosen for the All-America Analyst team were chosen because they were better forecasters of earnings. (Their median forecast error in the quarter prior to being chosen was 30%; the median forecast error of other analysts was 28%)
 - However, in the calendar year following being chosen as All-America analysts, these analysts become slightly better forecasters than their less fortunate brethren. (The median forecast error for All-America analysts is 2% lower than the median forecast error for other analysts)
 - Earnings revisions made by All-America analysts tend to have a much greater impact on the stock price than revisions from other analysts
 - The recommendations made by the All America analysts have a greater impact on stock prices (3% on buys; 4.7% on sells). For these recommendations the price changes are sustained, and they continue to rise in the following period (2.4% for buys; 13.8% for the sells).

The Five Deadly Sins of an Analyst

173

- ❑ Tunnel Vision: Becoming so focused on the sector and valuations within the sector that you lose sight of the bigger picture.
- ❑ Lemmingitis: Strong urge felt to change recommendations & revise earnings estimates when other analysts do the same.
- ❑ Stockholm Syndrome: Refers to analysts who start identifying with the managers of the firms that they are supposed to follow.
- ❑ Factophobia (generally is coupled with delusions of being a famous story teller): Tendency to base a recommendation on a “story” coupled with a refusal to face the facts.
- ❑ Dr. Jekyll/Mr. Hyde: Analyst who thinks his primary job is to bring in investment banking business to the firm.

Propositions about Analyst Growth Rates

174

- Proposition 1: There is far less private information and far more public information in most analyst forecasts than is generally claimed.
- Proposition 2: The biggest source of private information for analysts remains the company itself which might explain
 - why there are more buy recommendations than sell recommendations (information bias and the need to preserve sources)
 - why there is such a high correlation across analysts forecasts and revisions
 - why All-America analysts become better forecasters than other analysts after they are chosen to be part of the team.
- Proposition 3: There is value to knowing what analysts are forecasting as earnings growth for a firm. There is, however, danger when they agree too much (lemmingitis) and when they agree to little (in which case the information that they have is so noisy as to be useless).

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Growth III

Sustainable growth and Fundamentals

Fundamental Growth Rates

176

$$\begin{array}{|c|} \hline \text{Investment} \\ \text{in Existing} \\ \text{Projects} \\ \$ 1000 \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Current Return on} \\ \text{Investment on} \\ \text{Projects} \\ 12\% \\ \hline \end{array} = \begin{array}{c} \text{Current} \\ \text{Earnings} \\ \$120 \end{array}$$

$$\begin{array}{|c|} \hline \text{Investment} \\ \text{in Existing} \\ \text{Projects} \\ \$1000 \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Next Period's} \\ \text{Return on} \\ \text{Investment} \\ 12\% \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Investment} \\ \text{in New} \\ \text{Projects} \\ \$100 \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Return on} \\ \text{Investment on} \\ \text{New Projects} \\ 12\% \\ \hline \end{array} = \begin{array}{c} \text{Next} \\ \text{Period's} \\ \text{Earnings} \\ 132 \end{array}$$

$$\begin{array}{|c|} \hline \text{Investment} \\ \text{in Existing} \\ \text{Projects} \\ \$1000 \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Change in} \\ \text{ROI from} \\ \text{current to next} \\ \text{period: } 0\% \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Investment} \\ \text{in New} \\ \text{Projects} \\ \$100 \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Return on} \\ \text{Investment on} \\ \text{New Projects} \\ 12\% \\ \hline \end{array} = \begin{array}{c} \text{Change in Earnings} \\ = \$ 12 \end{array}$$

Growth Rate Derivations

177

In the special case where ROI on existing projects remains unchanged and is equal to the ROI on new projects

$$\frac{\text{Investment in New Projects}}{\text{Current Earnings}} \times \text{Return on Investment} = \frac{\text{Change in Earnings}}{\text{Current Earnings}}$$

$$\frac{100}{120} \times 12\% = \frac{\$12}{\$120}$$

$$\text{Reinvestment Rate} \times \text{Return on Investment} = \text{Growth Rate in Earnings}$$

$$83.33\% \times 12\% = 10\%$$

in the more general case where ROI can change from period to period, this can be expanded as follows:

$$\frac{\text{Investment in Existing Projects} \times (\text{Change in ROI}) + \text{New Projects (ROI)}}{\text{Investment in Existing Projects} \times \text{Current ROI}} = \frac{\text{Change in Earnings}}{\text{Current Earnings}}$$

For instance, if the ROI increases from 12% to 13%, the expected growth rate can be written as follows:

$$\frac{\$1,000 \times (.13 - .12) + 100 (13\%)}{\$1000 \times .12} = \frac{\$23}{\$120} = 19.17\%$$

Estimating Fundamental Growth from new investments: Three variations

178

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 = $\text{After-tax Operating Income} / (\text{Book value of equity} + \text{Book value of debt} - \text{Cash})$

I. Expected Long Term Growth in EPS

179

- 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

180

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

181

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

182

- 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

183

- When looking at growth in operating income, the definitions are
 - ▣ Reinvestment Rate = $(\text{Net Capital Expenditures} + \text{Change in WC}) / \text{EBIT}(1-t)$
 - ▣ Return on Investment = 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.*

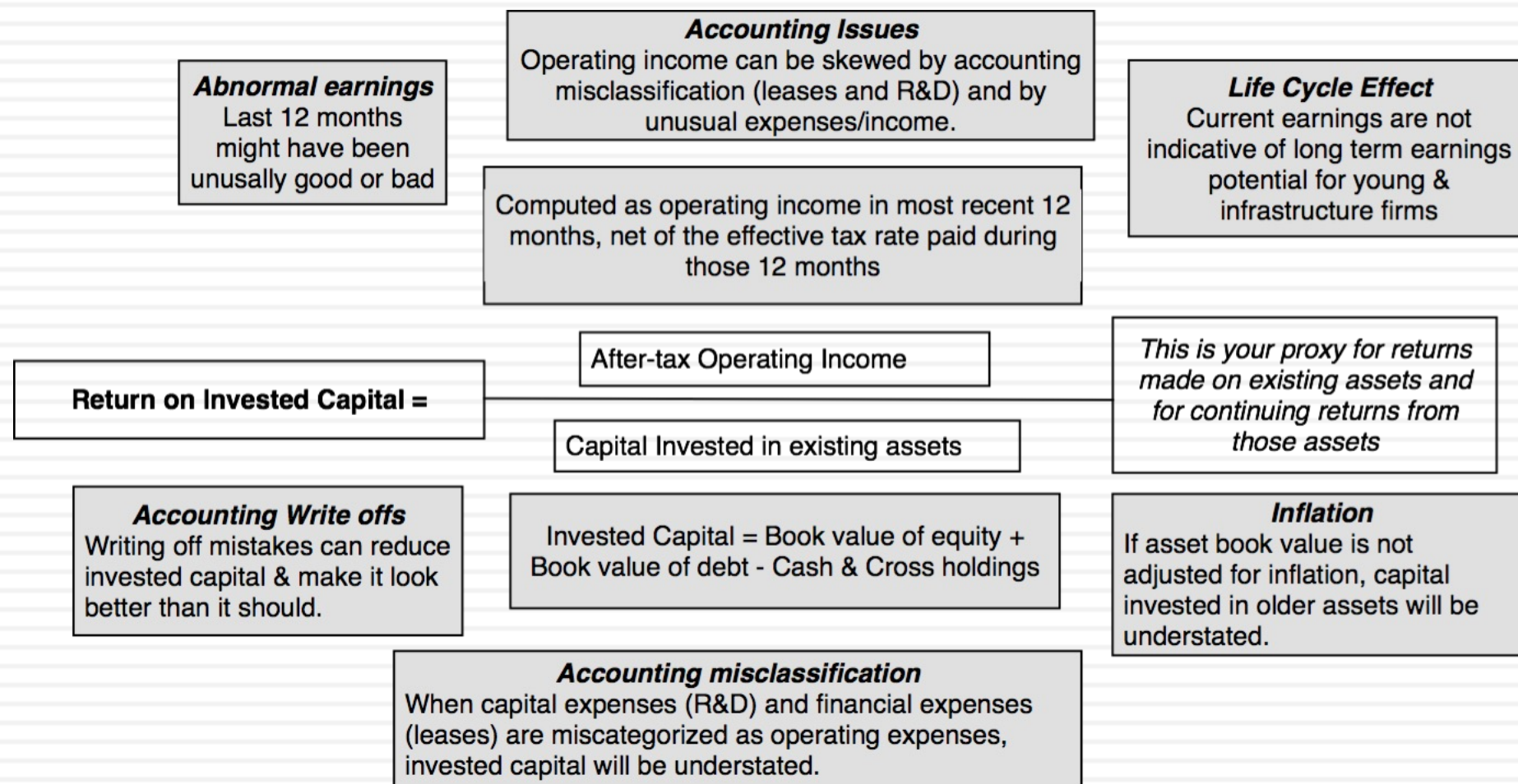
Estimating Growth in Operating Income, if fundamentals stay locked in...

184

- 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

186

- 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

189

- 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

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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

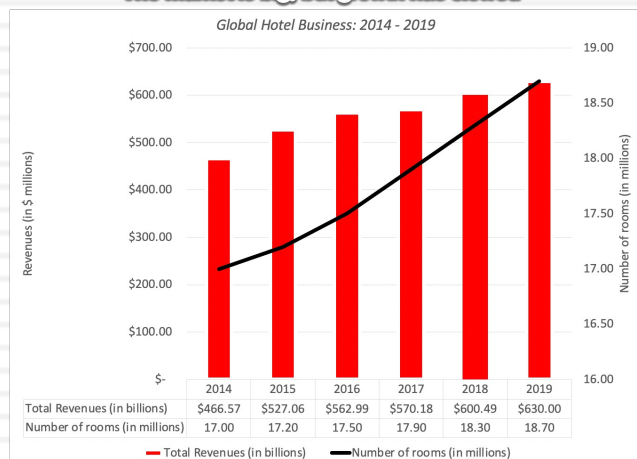
1. *Company's current market share*: If company's current market share is low, potential for growth in market share at expense of competition.
2. *Industry economics*: Nature of the business (a few big winners or splintered competition).
3. *Strength of company's competitive advantages*: Stronger and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

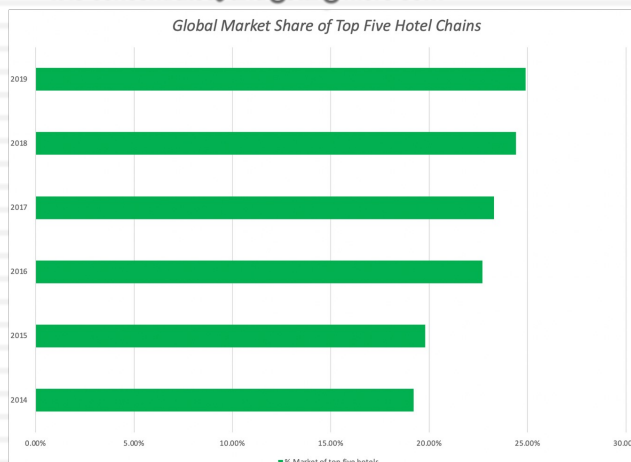
Airbnb: Total Market

191

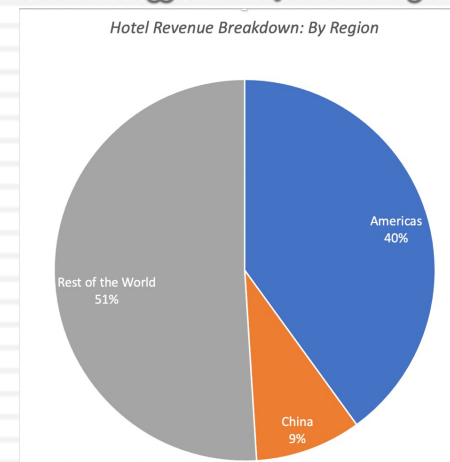
The market is big, but growth has slowed



It is concentrated, and getting more so...



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

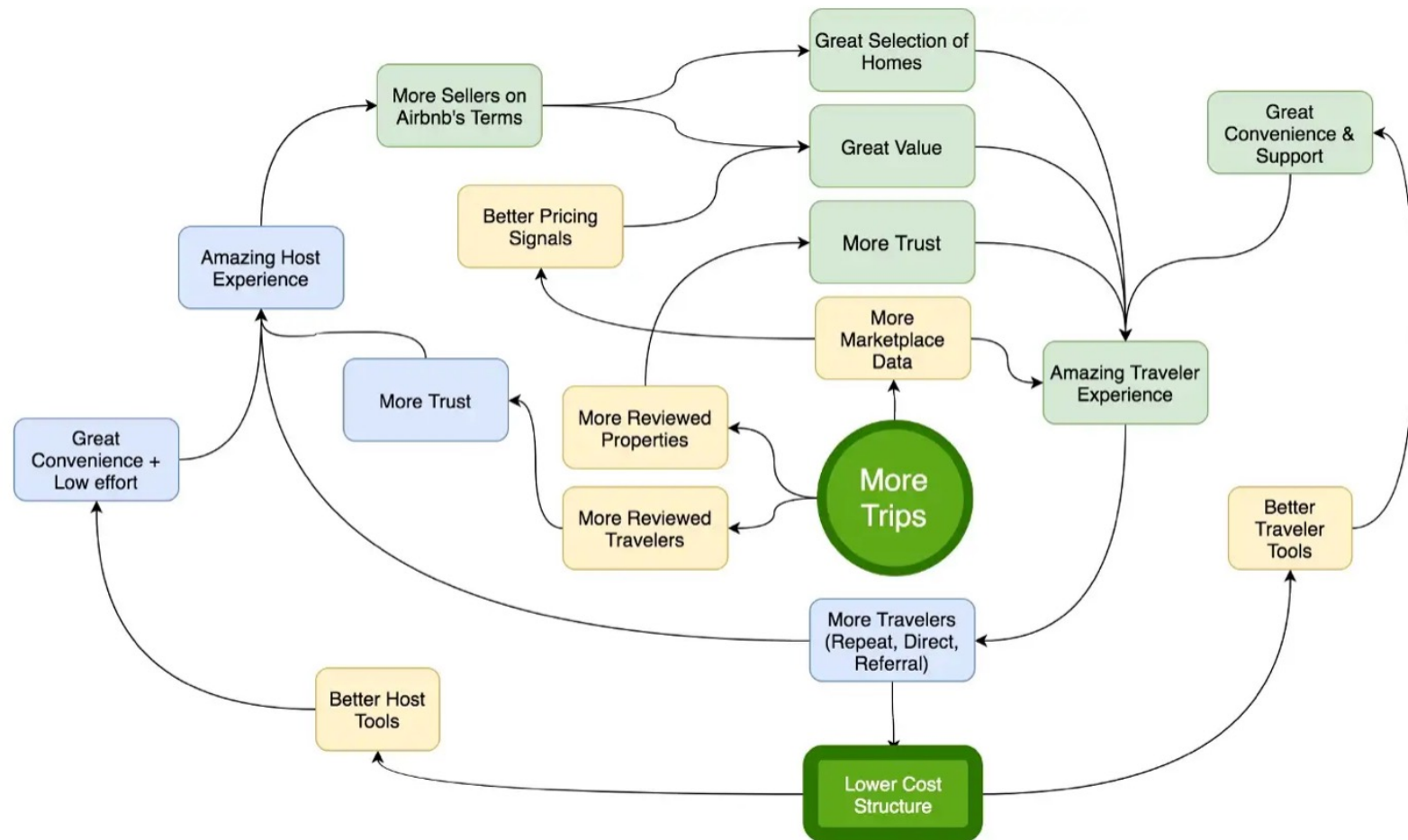


In its prospectus, Airbnb has expanded its estimate of market potential to \$3.4 trillion, as evidenced in this excerpt from the prospectus:

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

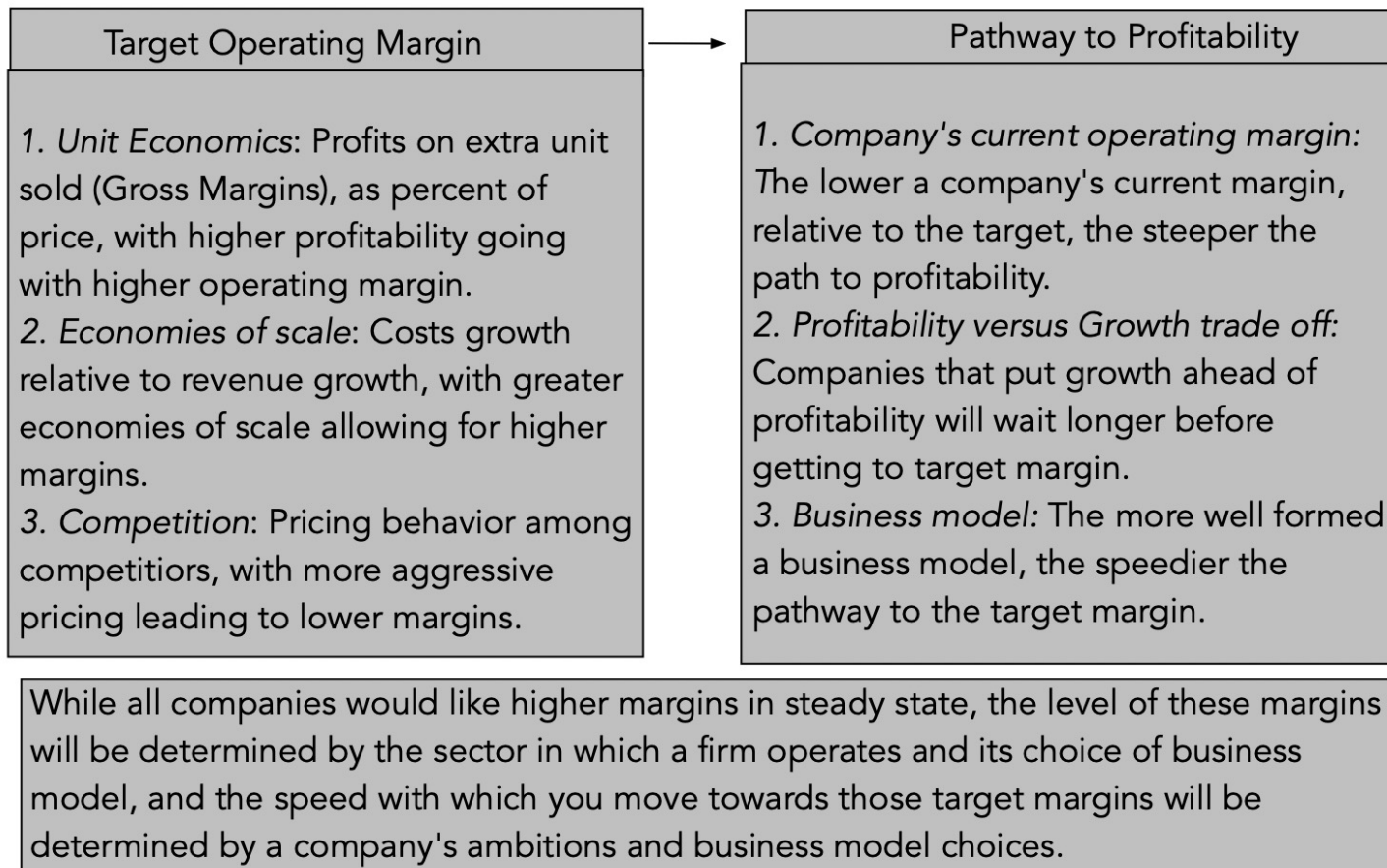
192



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

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Operating Margin: Target and Pathway



Airbnb in November 2020: Growth and Profitability

194

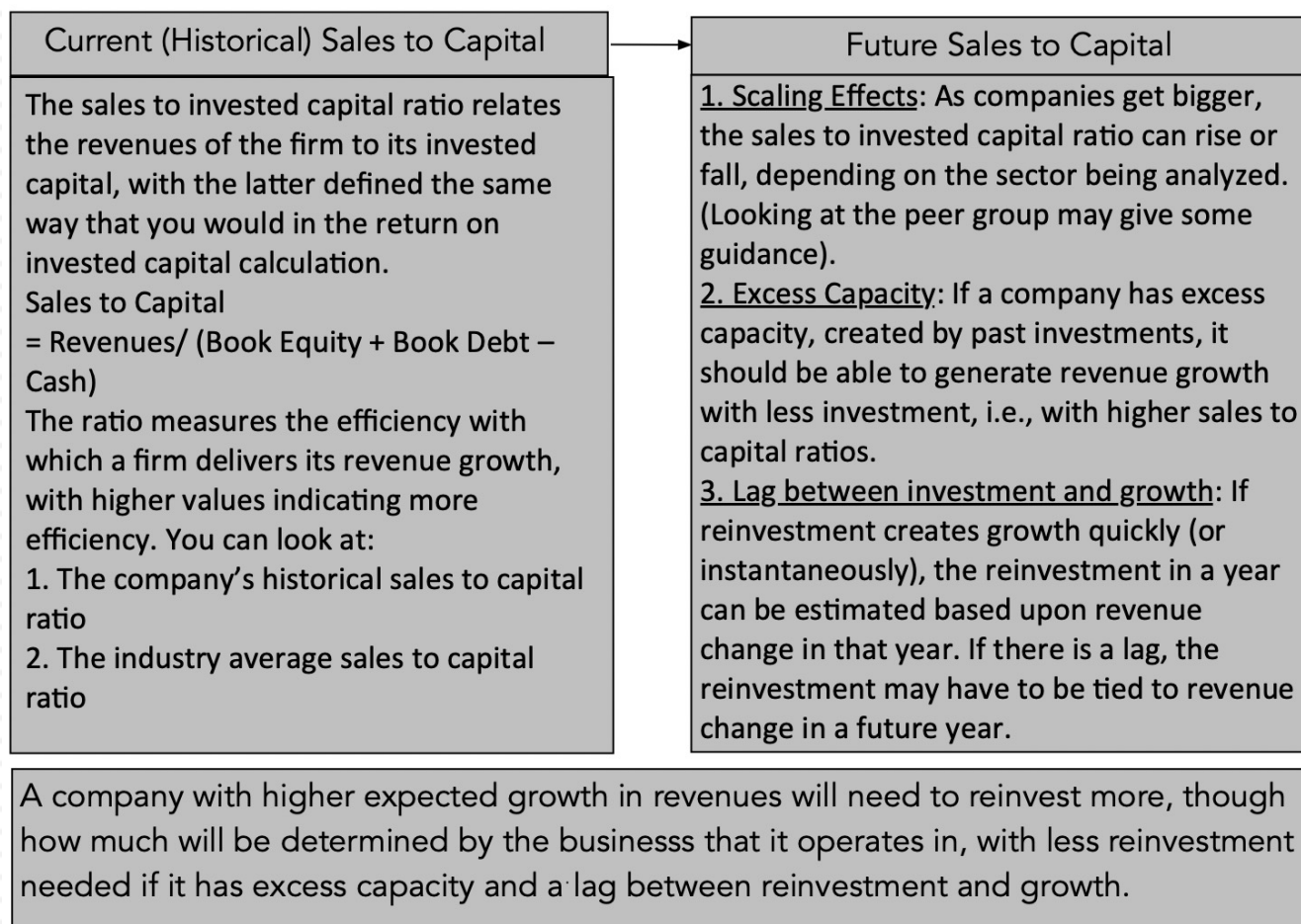
	<i>Gross Bookings</i>	<i>Revenues</i>	<i>Revenue Growth</i>	<i>Operating Margin</i>
<i>LTM</i>	\$ 26,491,803.00	\$ 3,625,731		
1	\$ 37,088,524.20	\$ 4,691,698	40.00%	-10.00%
2	\$ 46,360,655.25	\$ 5,989,797	25.00%	-3.00%
3	\$ 57,950,819.06	\$ 7,565,479	25.00%	0.50%
4	\$ 72,438,523.83	\$ 9,554,641	25.00%	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

$\text{Reinvestment} = \text{Net Cap Ex} + \text{Acquisitions} + \text{Capitalized R\&D} + \text{Chg in Working Capital}$

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

$\text{ROIC} = \text{EBIT (1-t)} / \text{Invested Capital in year t}$

Aggregate versus Marginal Values

197

- While sustainable growth equations are stated in terms of returns on capital (equity) or sales to capital the numbers that drive growth are returns on new investments, i.e., marginal returns on capital (equity) or marginal sales to capital ratios.
- The marginal returns and sales to capital ratios can be computed by looking at changes from year to year:
 - ▣
$$\text{Marginal ROC} = \frac{(\text{Operating Income}_t - \text{Operating Income}_{t-1})}{(\text{Invested Capital}_{t-1} - \text{Invested Capital}_{t-2})}$$
 - ▣
$$\text{Marginal ROC} = \frac{(\text{Sales}_t - \text{Sales}_{t-1})}{(\text{Invested Capital}_{t-1} - \text{Invested Capital}_{t-2})}$$
- As companies scale up, the marginal values for these variables can diverge from the aggregate values.
 - ▣ For companies where there are investing economies to scale, the marginal values can be significantly higher than the aggregate values.
 - ▣ For companies that are facing changing competitor or are entering new businesses, the marginal values can be lower than the aggregate values.

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Closure in Valuation

The Big Enchilada

Getting Closure in Valuation

199

- 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

200

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

201

- 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)
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.

Heineken: September 2019 (in Euros)

Cash flows from existing assets

	LTM	2013-2018
Revenues	€ 23,119	Growth rate = 3.22%
Operating Margin	14.86%	14.44%
Sales/Invested Capital	0.71	0.79
ROIC	7.46%	8.32%
Effective Tax Rate	29.70%	27.00%

The Payoff from growth

Revenues will grow 3.22% a year for next 5 years, tapering down to -0.5% growth in year 10

Operating margin (per-tax) will drop to 14.00%

Sales/Invested Capital will stay at five-year average of 0.79.

Maturity and Closure

Stable Growth
 $g = -0.5\%$;
 Cost of capital = 5%
 $ROC = 5\%$;
 $Reinvestment\ Rate = -0.5\%/5\% = -10\%$

Euro Cashflows

Terminal Value = $2972 / (0.05 - (-0.005)) = 54,034$

	1	2	3	4	5	6	7	8	9	10	Terminal year
Revenue growth rate	3.22%	3.22%	3.22%	3.22%	3.22%	2.48%	1.73%	0.99%	0.24%	-0.50%	-0.50%
Revenues	€ 23,863	€ 24,632	€ 25,425	€ 26,244	€ 27,089	€ 27,759	€ 28,240	€ 28,519	€ 28,589	€ 28,446	€ 28,304
EBIT (Operating) margin	14.38%	14.34%	14.30%	14.26%	14.21%	14.17%	14.13%	14.09%	14.04%	14.00%	14.00%
EBIT (Operating income)	€ 3,432	€ 3,532	€ 3,635	€ 3,741	€ 3,850	€ 3,934	€ 3,990	€ 4,017	€ 4,015	€ 3,982	\$ 3,963
Tax rate	29.70%	29.70%	29.70%	29.70%	29.70%	28.76%	27.82%	26.88%	25.94%	25.00%	\$ 0
EBIT(1-t)	€ 2,413	€ 2,483	€ 2,556	€ 2,630	€ 2,707	€ 2,802	€ 2,880	€ 2,937	€ 2,973	€ 2,987	\$ 2,972
- Reinvestment	€ 942	€ 973	€ 1,004	€ 1,036	€ 1,070	€ 849	€ 609	€ 353	€ 88	€ (181)	\$ (297)
FCFF	€ 1,471	€ 1,511	€ 1,552	€ 1,594	€ 1,637	€ 1,953	€ 2,271	€ 2,584	€ 2,885	€ 3,168	\$ 3,269

Discount at Euro Cost of Capital (WACC) = $7.66\% (.599) + 1.13\% (0.401) = 5.04\%$

The Risk in the Cash flows

On September 1, 2019, Heineken was trading at 93.25 Euros/share

Cost of Equity
7.66%

Cost of Debt
 $(-0.5\% + 2\%)(1 - 0.25) = 1.13\%$

Weights
E = 59.9% D = 40.1%

Riskfree Rate:
Euro Risk free rate = -0.50%

+ Beta = 1.20 x

Unlevered beta of alcoholic beverage business = 0.80

Firm's D/E
Ratio: 66.98%

ERP = 6.83%

Region	Revenues	Weight	ERP
Europe	10348	50.24%	6.90%
North America	5920	28.74%	5.75%
Asia	2919	14.17%	7.22%
Latin America & Caribbean	781	3.79%	10.53%
Africa & Mid East	631	3.06%	9.30%
Total	20599	100.00%	6.83%

2. Don't wait too long...

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- Most growth firms have difficulty sustaining their growth for long periods, especially while earning excess returns. Assuming long growth periods for all firms is ignoring this reality.
- 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.
 - Proposition 1: The stronger and more sustainable the competitive advantages, the longer a growth company can sustain “value creating” growth.
 - Proposition 2: Growth companies with strong and sustainable competitive advantages are rare.

3. Do not forget that growth has to be earned..

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- The reinvestment rate in stable growth will be a function of the stable growth rate and return on capital in perpetuity
 - ▣ Reinvestment Rate = Stable growth rate/ Stable period ROC = g / ROC
 - ▣ Terminal Value in year $n = \frac{\text{EBIT}_{n+1} (1-t)(1-\frac{g}{\text{ROC}})}{(\text{Cost of Capital}-g)}$

		Return on capital in perpetuity				
		6%	8%	10%	12%	14%
Growth rate forever	0.0%	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
	0.5%	\$965	\$987	\$1,000	\$1,009	\$1,015
	1.0%	\$926	\$972	\$1,000	\$1,019	\$1,032
	1.5%	\$882	\$956	\$1,000	\$1,029	\$1,050
	2.0%	\$833	\$938	\$1,000	\$1,042	\$1,071
	2.5%	\$778	\$917	\$1,000	\$1,056	\$1,095
	3.0%	\$714	\$893	\$1,000	\$1,071	\$1,122

Excess Returns to Zero?

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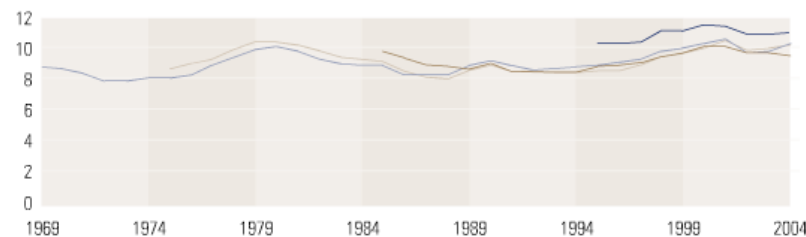
- There are some (McKinsey, for instance) who argue that the return on capital should always be equal to cost of capital in stable growth.
- But excess returns seem to persist for very long time periods.

A more sustainable measure

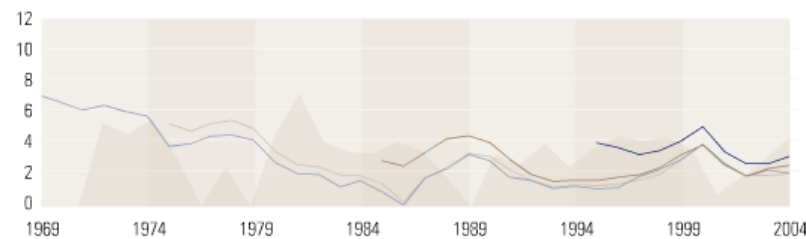
Median for top 500 publicly listed US companies by revenues in 1965, 1975, 1985, and 1995

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

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

And don't fall for sleight of hand...

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- 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.
 - a. If you make this assumption, what expected growth rate can you use in your terminal value computation?
 - b. What if the stable growth rate = inflation rate? Is it okay to make this assumption then?

4. Be internally consistent

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- 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. $ROC \rightarrow \text{Cost of capital}$ and $ROE \rightarrow \text{Cost of equity}$
- 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

Beyond Inputs: Choosing and Using the Right Model

Choosing the right model

Summarizing the Inputs

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- In summary, at this stage in the process, we should have an estimate of the
 - ▣ the current cash flows on the investment, either to equity investors (dividends or free cash flows to equity) or to the firm (cash flow to the firm)
 - ▣ the current cost of equity and/or capital on the investment
 - ▣ the expected growth rate in earnings, based upon historical growth, analysts forecasts and/or fundamentals
- The next step in the process is deciding
 - ▣ which cash flow to discount, which should indicate
 - ▣ which discount rate needs to be estimated and
 - ▣ what pattern we will assume growth to follow

Which cash flow should I discount?

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- Use Equity Valuation

- (a) for firms which have stable leverage, whether high or not, and
- (b) if equity (stock) is being valued

- Use Firm Valuation

- (a) for firms which have leverage which is too high or too low, and expect to change the leverage over time, because debt payments and issues do not have to be factored in the cash flows and the discount rate (cost of capital) does not change dramatically over time.
- (b) for firms for which you have partial information on leverage (eg: interest expenses are missing..)
- (c) in all other cases, where you are more interested in valuing the firm than the equity. (Value Consulting?)

Given cash flows to equity, should I discount dividends or FCFE?

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- Use the Dividend Discount Model
 - (a) For firms which pay dividends (and repurchase stock) which are close to the Free Cash Flow to Equity (over a extended period)
 - (b) For firms where FCFE are difficult to estimate (Example: Banks and Financial Service companies)
- Use the FCFE Model
 - (a) For firms which pay dividends which are significantly higher or lower than the Free Cash Flow to Equity. (What is significant? ... As a rule of thumb, if dividends are less than 80% of FCFE or dividends are greater than 110% of FCFE over a 5-year period, use the FCFE model)
 - (b) For firms where dividends are not available (Example: Private Companies, IPOs)

What discount rate should I use?

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- Cost of Equity versus Cost of Capital
 - ▣ If discounting cash flows to equity -> Cost of Equity
 - ▣ If discounting cash flows to the firm -> Cost of Capital
- What currency should the discount rate (risk free rate) be in?
 - ▣ Match the currency in which you estimate the risk free rate to the currency of your cash flows
- Should I use real or nominal cash flows?
 - ▣ If discounting real cash flows -> real cost of capital
 - ▣ If nominal cash flows -> nominal cost of capital
 - ▣ If inflation is low (<10%), stick with nominal cash flows since taxes are based upon nominal income
 - ▣ If inflation is high (>10%) switch to real cash flows

Which Growth Pattern Should I use?

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- If your firm is
 - ▣ large and growing at a rate close to or less than growth rate of the economy, or
 - ▣ constrained by regulation from growing at rate faster than the economy
 - ▣ has the characteristics of a stable firm (average risk & reinvestment rates)

Use a Stable Growth Model

- If your firm
 - ▣ is large & growing at a moderate rate (\leq Overall growth rate + 10%) or
 - ▣ has a single product & barriers to entry with a finite life (e.g. patents)

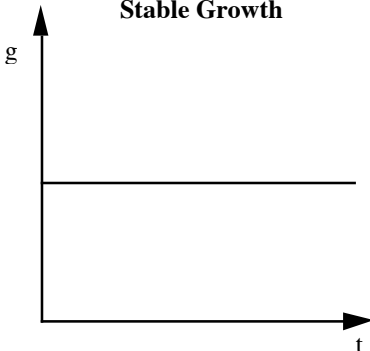
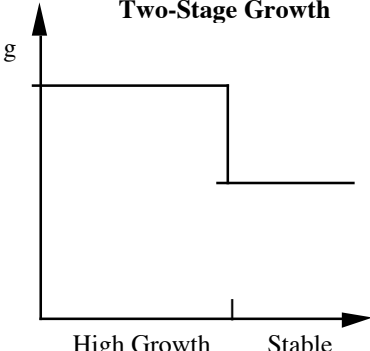
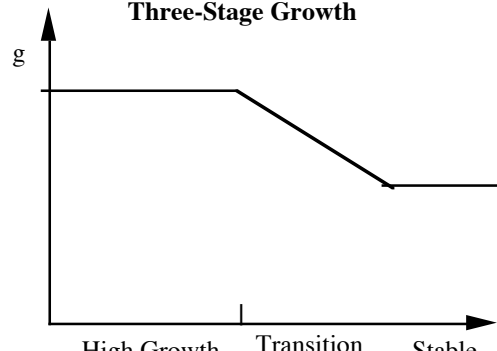
Use a 2-Stage Growth Model

- If your firm
 - ▣ is small and growing at a very high rate ($>$ Overall growth rate + 10%) or
 - ▣ has significant barriers to entry into the business
 - ▣ has firm characteristics that are very different from the norm

Use a 3-Stage or n-stage Model

The Building Blocks of Valuation

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Choose a			
Cash Flow	<p><i>Dividends</i></p> <p>Expected Dividends to Stockholders</p>	<p><i>Cashflows to Equity</i></p> <p>Net Income - $(1 - \delta) (\text{Capital Exp.} - \text{Deprec'n})$ - $(1 - \delta) \text{Change in Work. Capital}$ = Free Cash flow to Equity (FCFE) [δ = Debt Ratio]</p>	<p><i>Cashflows to Firm</i></p> <p>EBIT $(1 - \text{tax rate})$ - $(\text{Capital Exp.} - \text{Deprec'n})$ - Change in Work. Capital = Free Cash flow to Firm (FCFF)</p>
& A Discount Rate	<p><i>Cost of Equity</i></p> <ul style="list-style-type: none"> <i>Basis:</i> The riskier the investment, the greater is the cost of equity. <i>Models:</i> CAPM: Riskfree Rate + Beta (Risk Premium) APM: Riskfree Rate + $\sum \text{Beta}_j (\text{Risk Premium}_j)$; n factors 		<p><i>Cost of Capital</i></p> <p>$\text{WACC} = k_e (E / (D+E))$ $+ k_d (D / (D+E))$ k_d = Current Borrowing Rate $(1-t)$ E, D: Mkt Val of Equity and Debt</p>
& a growth pattern	<p>Stable Growth</p> 	<p>Two-Stage Growth</p>  <p>High Growth Stable</p>	<p>Three-Stage Growth</p>  <p>High Growth Transition Stable</p>

Tying up Loose Ends

The trouble starts after you tell me you are done..

But what comes next?

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Value of Operating Assets	Since this is a discounted cashflow valuation, should there be a real option premium?
+ Cash and Marketable Securities	Operating versus Non-operating cash Should cash be discounted for earning a low return?
+ Value of Cross Holdings	How do you value cross holdings in other companies? What if the cross holdings are in private businesses?
+ Value of Other Assets	What about other valuable assets? How do you consider under utilized assets?
Value of Firm	Should you discount this value for opacity or complexity? How about a premium for synergy? What about a premium for intangibles (brand name)?
- Value of Debt	What should be counted in debt? Should you subtract book or market value of debt? What about other obligations (pension fund and health care)? What about contingent liabilities? What about minority interests?
= Value of Equity	Should there be a premium/discount for control? Should there be a discount for distress
- Value of Equity Options	What equity options should be valued here (vested versus non-vested)? How do you value equity options?
= Value of Common Stock	Should you divide by primary or diluted shares?
/ Number of shares	
= Value per share	Should there be a discount for illiquidity/ marketability? Should there be a discount for minority interests?

1. The Value of Cash

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- The simplest and most direct way of dealing with cash and marketable securities is to keep it out of the valuation - the cash flows should be before interest income from cash and securities, and the discount rate should not be contaminated by the inclusion of cash. (Use betas of the operating assets alone to estimate the cost of equity).
- Once the operating assets have been valued, you should add back the value of cash and marketable securities.
- In many equity valuations, the interest income from cash is included in the cashflows. The discount rate has to be adjusted then for the presence of cash. (The beta used will be weighted down by the cash holdings). Unless cash remains a fixed percentage of overall value over time, these valuations will tend to break down.

An Exercise in Cash Valuation

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	<i>Company A</i>	<i>Company B</i>	<i>Company C</i>
Enterprise Value	\$1,000.0	\$1,000.0	\$1,000.0
Cash	\$100.0	\$100.0	\$100.0
Return on invested capital	10%	5%	22%
Cost of capital	10%	10%	12%
Trades in	US	US	Argentina

In which of these companies is cash most likely to be

- a) A Neutral Asset (worth \$100 million)
- b) A Wasting Asset (worth less than \$100 million)
- c) A Potential Value Creator (worth >\$100 million)

Should you ever discount cash for its low returns?

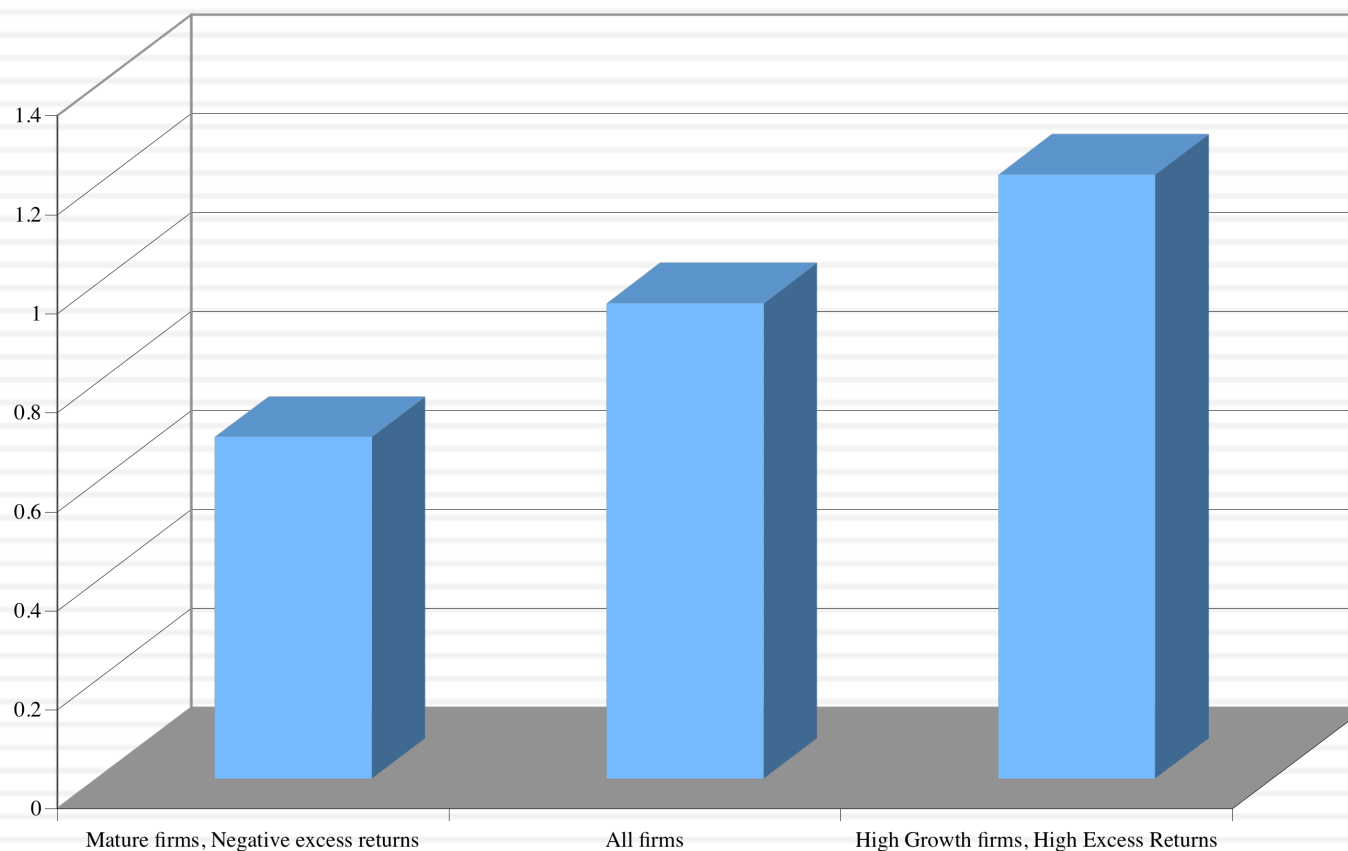
221

- There are some analysts who argue that companies with a lot of cash on their balance sheets should be penalized by having the excess cash discounted to reflect the fact that it earns a low return.
 - Excess cash is usually defined as holding cash that is greater than what the firm needs for operations.
 - A low return is defined as a return lower than what the firm earns on its non-cash investments.
- This is the wrong reason for discounting cash. If the cash is invested in riskless securities, it should earn a low rate of return. As long as the return is high enough, given the riskless nature of the investment, cash does not destroy value.
- There is a right reason, though, that may apply to some companies... Managers can do stupid things with cash (overpriced acquisitions, pie-in-the-sky projects....) and you have to discount for this possibility.

Cash: Discount or Premium?

222

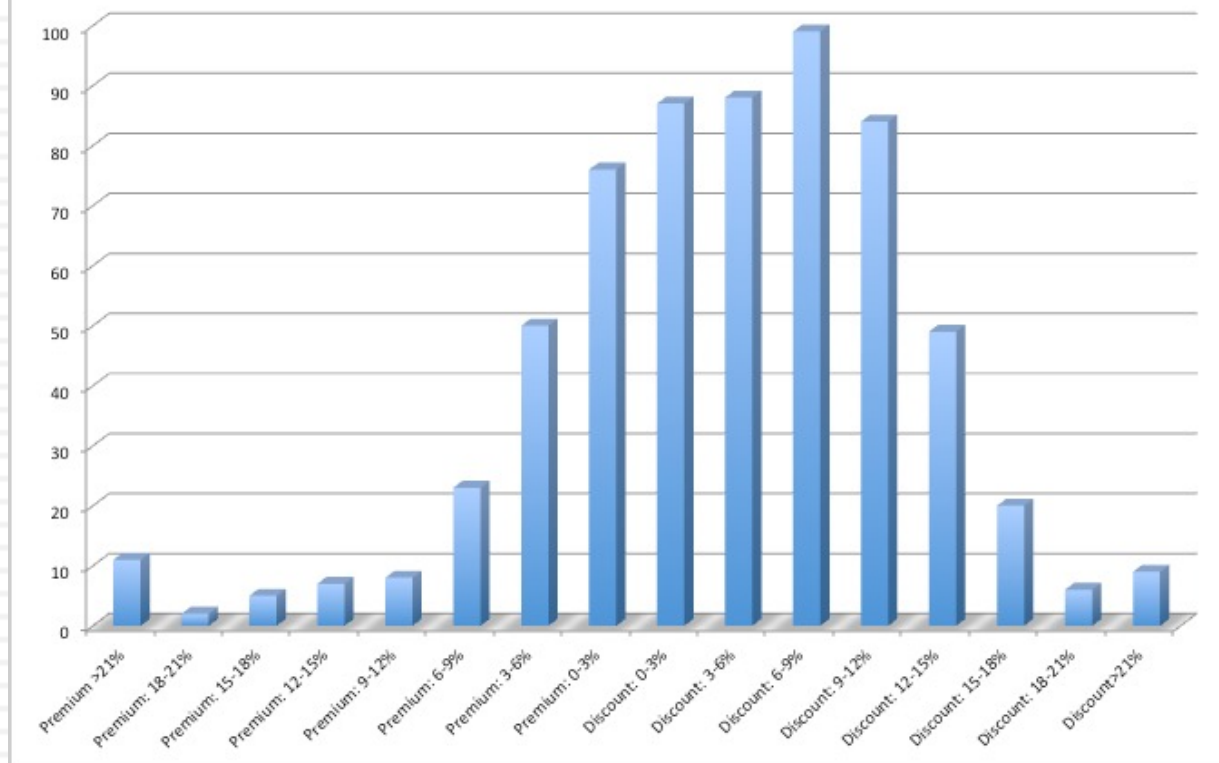
*Market Value of \$ 1 in cash:
Estimates obtained by regressing Enterprise Value against Cash Balances*



A Detour: Closed End Mutual Funds

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Figure 11.7: Premiums/Discounts on Closed End Funds- November 2011

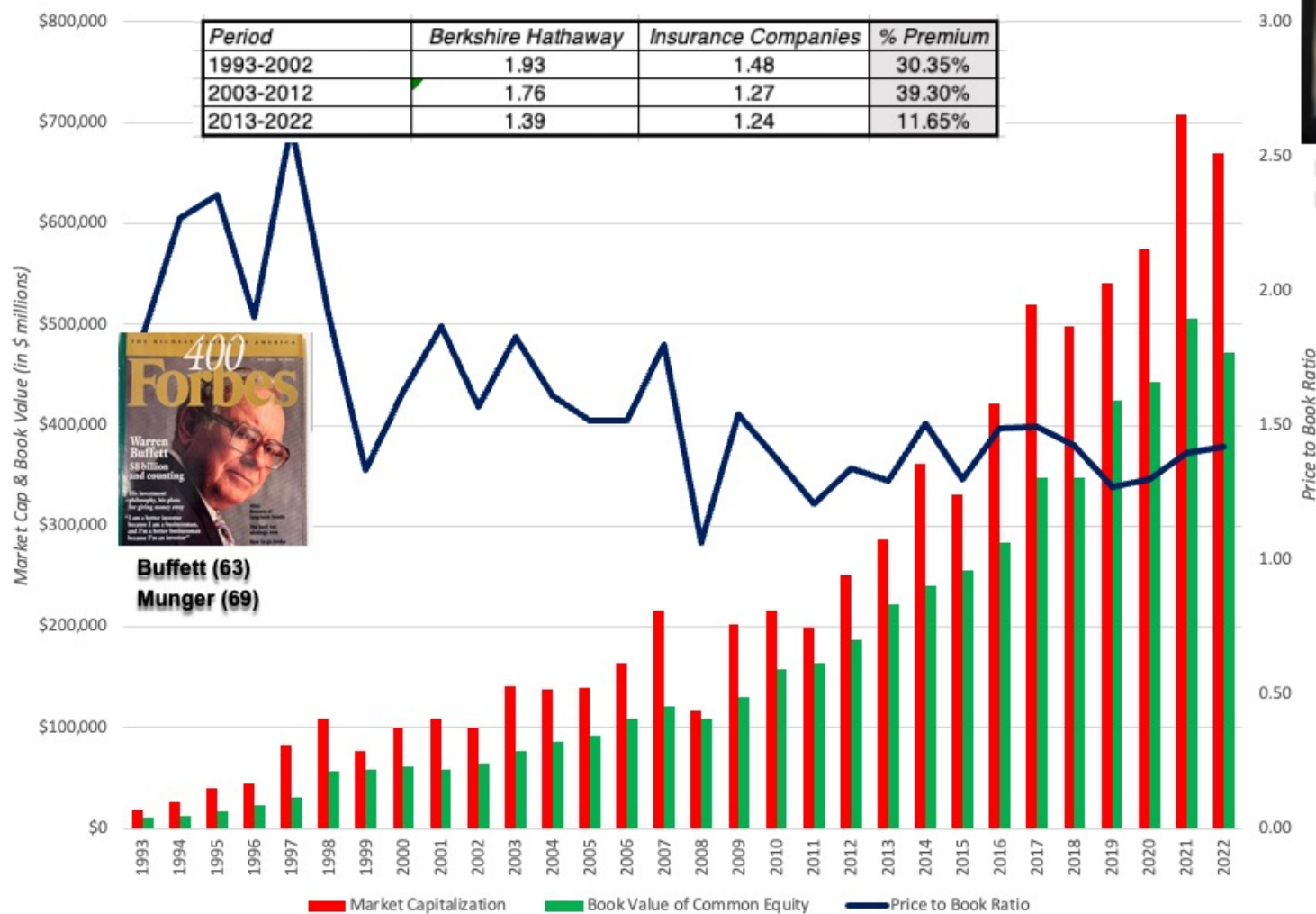


- Assume that you have a closed-end fund that invests in ‘average risk’ stocks. Assume also that you expect the market (average risk investments) to make 11.5% annually over the long term. If the closed end fund underperforms the market by 0.50%, estimate the discount on the fund.

The Most Famous Closed End Fund in History?

224

Berkshire Hathaway: Price to Book - 1993 to 2022



2. Dealing with Holdings in Other firms

225

- Holdings in other firms can be categorized into
 - ▣ Minority passive holdings, in which case only the dividend from the holdings is shown in the balance sheet
 - ▣ Minority active holdings, in which case the share of equity income is shown in the income statements
 - ▣ Majority active holdings, in which case the financial statements are consolidated.
- In an intrinsic valuation, you would like to estimate the intrinsic value of these holdings and including them in your overall intrinsic valuation of the company.

If you really want to value cross holdings right....

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- Step 1: Value the parent company without any cross holdings. This will require using unconsolidated financial statements rather than consolidated ones.
- Step 2: Value each of the cross holdings individually. (If you use the market values of the cross holdings, you will build in errors the market makes in valuing them into your valuation).
- Step 3: The final value of the equity in the parent company with N cross holdings will be:
Value of unconsolidated parent company
– Debt of unconsolidated parent company
+ $\sum_{j=1}^{j=N} \% \text{ owned of Company } j * (\text{Value of Company } j - \text{Debt of Company } j)$

Valuing Yahoo as the sum of its intrinsic pieces

227

100% of Yahoo! US Equity	+ 35% of Yahoo! Japan Equity	+ 22.1% of Alibaba Equity	- Loose Ends =	
Operating assets =\$4383	Operating assets = \$17,884	Operating assets = \$127,484	- Taxes due = \$5,017	Equity value= \$41,571 Per share = \$41.19
+ Cash = \$4,571	+ Cash = \$3,113	+ Cash = \$27963		
- Debt = \$1,591	- Debt = \$0	- Debt = \$6,670	- Yahoo options = \$298	
=Parent Equity = \$7,363	Equity = \$20,997 35% of value = \$7,349	Equity = \$145,587 22.1% of value = \$32,175		

If you have to settle for an approximation, try this...

228

- For majority holdings, with full consolidation, convert the minority interest from book value to market value by applying a price to book ratio (based upon the sector average for the subsidiary) to the minority interest.
 - ▣ Estimated market value of minority interest = Minority interest on balance sheet * Price to Book ratio for sector (of subsidiary)
 - ▣ Subtract this from the estimated value of the consolidated firm to get to value of the equity in the parent company.
- For minority holdings in other companies, convert the book value of these holdings (which are reported on the balance sheet) into market value by multiplying by the price to book ratio of the sector(s). Add this value on to the value of the operating assets to arrive at total firm value.

Yahoo: A pricing game?

229

100% of Yahoo! US Equity	+ 35% of Yahoo! Japan Equity	+ 22.1% of Alibaba Equity	- Loose Ends =	
EV/Sales* Sales = 0.63* \$4672 = \$2,948	EV/Sales* Sales = 7.91* \$3929 = \$31,075	EV/Sales* Sales = 12.18* \$7911 = \$96,331	Taxes due = \$4,011	Equity value= \$39,580 Per share = \$39.19
+ Cash = \$4,571	+ Cash = \$3,113	+ Cash = \$27963		
- Debt = \$1,591	- Debt = \$0	- Debt = \$6,670	Yahoo options \$298	
=Parent Equity = \$5,929	Equity = \$34,188 35% of value = \$11,966	Equity = \$117,623 22.1% of value = \$25,995		

3. Other Assets that have not been counted yet..

230

- Assets that you should not be counting (or adding on to DCF values)
 - If an asset is contributing to your cashflows, you cannot count the market value of the asset in your value.
- Assets that you can count (or add on to your DCF valuation)
 - Overfunded pension plans: If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:
 - Collective bargaining agreements may prevent you from laying claim to these excess assets.
 - There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates.
 - Unutilized assets: If you have assets or property that are not being utilized to generate cash flows (vacant land, for example), you have not valued them yet. You can assess a market value for these assets and add them on to the value of the firm.

An Uncounted Asset?

231

Price tag: \$200 million



The longtime home of Playboy magazine founder Hugh Hefner is to be sold to Daren Metropoulos, a principal at private-equity firm Metropoulos & Co. PHOTO: GETTY IMAGES

4. A Discount for Complexity: An Experiment

232

	Company A	Company B
Operating Income	\$ 1 billion	\$ 1 billion
Tax rate	40%	40%
ROIC	10%	10%
Expected Growth	5%	5%
Cost of capital	8%	8%
Business Mix	Single	Multiple
Holdings	Simple	Complex
Accounting	Transparent	Opaque
Which firm would you value more highly?		

Measuring Complexity: Volume of Data in Financial Statements

233

<i>Company</i>	<i>Number of pages in last 10Q</i>	<i>Number of pages in last 10K</i>
General Electric	65	410
Microsoft	63	218
Wal-mart	38	244
Exxon Mobil	86	332
Pfizer	171	460
Citigroup	252	1026
Intel	69	215
AIG	164	720
Johnson & Johnson	63	218
IBM	85	353

Measuring Complexity: A Complexity Score

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Item	Factors	Follow-up Question	Answer	Weighting factor	Hyundai Heavy Score
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	3	2.00	6
	2. One-time income and expenses	Percent of operating income =	5%	10.00	0.5
	3. Income from unspecified sources	Percent of operating income =	15%	10.00	1.5
	4. Items in income statement that are volatile	Percent of operating income =	20%	5.00	1
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	75%	3.00	2.25
	2. Different tax and reporting books	Yes or No	No	Yes=3	0
	3. Headquarters in tax havens	Yes or No	No	Yes=3	0
	4. Volatile effective tax rate	Yes or No	Yes	Yes=2	2
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	Yes=2	2
	2. Frequent and large acquisitions	Yes or No	No	Yes=4	0
	3. Stock payment for acquisitions and investments	Yes or No	No	Yes=4	0
	4. Volatile working capital items	Yes or No	Yes	Yes=2	2
Expected Growth rate	1. Off-balance sheet assets and liabilities (operating leases and R&D)	Yes or No	No	Yes=3	0
	2. Substantial stock buybacks	Yes or No	No	Yes=3	0
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	Yes=5	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	Yes	Yes=5	5
Cost of capital	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	3	1.00	3
	2. Operations in emerging markets	Percent of revenues=	50%	5.00	2.5
	3. Is the debt market traded?	Yes or No	No	No=2	2
	4. Does the company have a rating?	Yes or No	No	No=2	2
	5. Does the company have off-balance sheet debt?	Yes or No	No	Yes=5	0
No-operating assets	Minority holdings as percent of book assets	Minority holdings as percent of book assets	30%	20.00	6
Firm to Equity value	Consolidation of subsidiaries	Minority interest as percent of book value of equity	20%	20.00	4
Per share value	Shares with different voting rights	Does the firm have shares with different voting rights?	No	Yes = 10	0
	Equity options outstanding	Options outstanding as percent of shares	0%	10.00	0
		Complexity Score =			49.75

Dealing with Complexity

235

□ In Discounted Cashflow Valuation

- The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
- The Conservative Analyst: Don't value what you cannot see.
- The Compromise: Adjust the value for complexity
 - Adjust cash flows for complexity
 - Adjust the discount rate for complexity
 - Adjust the expected growth rate/ length of growth period
 - Value the firm and then discount value for complexity

□ In relative valuation

- In a relative valuation, you may be able to assess the price that the market is charging for complexity:

- With the hundred largest market cap firms, for instance:

$$PBV = 0.65 + 15.31 \text{ ROE} - 0.55 \text{ Beta} + 3.04 \text{ Expected growth rate} - 0.003 \text{ \# Pages in 10K}$$

5. Be circumspect about defining debt for cost of capital purposes...

236

- General Rule: Debt generally has the following characteristics:
 - ▣ Commitment to make fixed payments in the future
 - ▣ The fixed payments are tax deductible
 - ▣ Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- Defined as such, debt should include
 - ▣ All interest bearing liabilities, short term as well as long term
 - ▣ All leases, operating as well as capital
- Debt should not include
 - ▣ Accounts payable or supplier credit
- Be wary of your conservative impulses which will tell you to count everything as debt. That will push up the debt ratio and lead you to understate your cost of capital.

Book Value or Market Value

237

- You are valuing a distressed telecom company and have arrived at an estimate of \$ 1 billion for the enterprise value (using a discounted cash flow valuation). The company has \$ 1 billion in face value of debt outstanding but the debt is trading at 50% of face value (because of the distress). What is the value of the equity to you as an investor?
 - a. The equity is worth nothing (EV minus Face Value of Debt)
 - b. The equity is worth \$ 500 million (EV minus Market Value of Debt)

- Would your answer be different if you were told that the liquidation value of the assets of the firm today is \$1.2 billion and that you were planning to liquidate the firm today?

But you should consider other potential liabilities when getting to equity value

238

- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
 - ▣ If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
 - ▣ You should not be counting these items as debt in your cost of capital calculations....
- If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities
 - ▣ Value of contingent liability = Probability that the liability will occur * Expected value of liability

6. Equity to Employees: Effect on Value

- In recent years, firms have turned to giving employees (and especially top managers) equity option or restricted stock packages as part of compensation. If they are options, they usually are long term and on volatile stocks. If restricted stock, the restrictions are usually on trading.
- These equity compensation packages are clearly valuable and the question becomes how best to deal with them in valuation.
- Two key issues with employee options:
 - How do options or restricted stock granted in the past affect equity value per share today?
 - How do expected grants of either, in the future, affect equity value today?

The Easier Problem: Restricted Stock Grants

- When employee compensation takes the form of restricted stock grants, the solution is relatively simple.
- To account for restricted stock grants in the past, make sure that you count the restricted stock that have already been granted in shares outstanding today. That will reduce your value per share.
- To account for expected stock grants in the future, estimate the value of these grants as a percent of revenue and forecast that as expense as part of compensation expenses. That will reduce future income and cash flows.

The Bigger Challenge: Employee Options

241

- It is true that options can increase the number of shares outstanding but dilution per se is not the problem.
- Options affect equity value at exercise because
 - ▣ Shares are issued at below the prevailing market price. Options get exercised only when they are in the money.
 - ▣ Alternatively, the company can use cashflows that would have been available to equity investors to buy back shares which are then used to meet option exercise. The lower cashflows reduce equity value.
- Options affect equity value before exercise because we have to build in the expectation that there is a probability of and a cost to exercise.

A simple example...

242

- XYZ company has \$ 100 million in free cashflows to the firm, growing 3% a year in perpetuity and a cost of capital of 8%. It has 100 million shares outstanding and \$ 1 billion in debt. Its value can be written as follows:

Value of firm = $100 / (.08 - .03)$	= 2000
Debt	= 1000
= Equity	= 1000
Value per share	= $1000 / 100 = \$10$

- XYZ decides to give 10 million options at the money (with a strike price of \$10) to its CEO. What effect will this have on the value of equity per share?
 - a. None. The options are not in-the-money.
 - b. Decrease by 10%, since the number of shares could increase by 10 million
 - c. Decrease by less than 10%. The options will bring in cash into the firm but they have time value.

I. The Diluted Share Count Approach

243

- The simplest way of dealing with options is to try to adjust the denominator for shares that will become outstanding if the options get exercised. In the example cited, this would imply the following:

Value of firm	$= 100 / (.08 - .03)$	$= 2000$
Debt		$= 1000$
= Equity		$= 1000$
Number of diluted shares		$= 110$
Value per share		$= 1000 / 110 = \$9.09$

- The diluted approach fails to consider that exercising options will bring in cash into the firm. Consequently, they will overestimate the impact of options and understate the value of equity per share.

II. The Treasury Stock Approach

244

- The treasury stock approach adds the proceeds from the exercise of options to the value of the equity before dividing by the diluted number of shares outstanding.
- In the example cited, this would imply the following:

Value of firm = $100 / (.08 - .03)$	= 2000
Debt	= 1000
= Equity	= 1000
Number of diluted shares	= 110
Proceeds from option exercise	= $10 * 10 = 100$
Value per share	= $(1000 + 100) / 110 = \$ 10$
- The treasury stock approach fails to consider the time premium on the options. The treasury stock approach also has problems with out-of-the-money options. If considered, they can increase the value of equity per share. If ignored, they are treated as non-existent.

III. Option Value Drag

245

- Step 1: Value the firm, using discounted cash flow or other valuation models.
- Step 2: Subtract out the value of the outstanding debt to arrive at the value of equity. Alternatively, skip step 1 and estimate the value of equity directly.
- Step 3: Subtract out the market value (or estimated market value) of other equity claims:
 - Value of Warrants = Market Price per Warrant * Number of Warrants
: Alternatively estimate the value using option pricing model
 - Value of Conversion Option = Market Value of Convertible Bonds - Value of Straight Debt Portion of Convertible Bonds
 - Value of employee Options: Value using the average exercise price and maturity.
- Step 4: Divide the remaining value of equity by the number of shares outstanding to get value per share.

Valuing Equity Options issued by firms... The Dilution Problem

246

- Option pricing models can be used to value employee options with four caveats –
 - Employee options are long term, making the assumptions about constant variance and constant dividend yields much shakier,
 - Employee options result in stock dilution, and
 - Employee options are often exercised before expiration, making it dangerous to use European option pricing models.
 - Employee options cannot be exercised until the employee is vested.
- These problems can be partially alleviated by using an option pricing model, allowing for shifts in variance and early exercise, and factoring in the dilution effect. The resulting value can be adjusted for the probability that the employee will not be vested.

Valuing Employee Options

247

- To value employee options, you need the following inputs into the option valuation model:
 - ▣ Stock Price = \$ 10, Adjusted for dilution = \$9.58
 - ▣ Strike Price = \$ 10
 - ▣ Maturity = 10 years (Can reduce to reflect early exercise)
 - ▣ Standard deviation in stock price = 40%
 - ▣ Riskless Rate = 4%
- Using a dilution-adjusted Black Scholes model, we arrive at the following inputs:
 - ▣ $N(d1) = 0.8199$
 - ▣ $N(d2) = 0.3624$
 - ▣ Value per call = $\$ 9.58 (0.8199) - \$10 e^{-(0.04)(10)}(0.3624) = \5.42

Value of Equity to Value of Equity per share

248

- Using the value per call of \$5.42, we can now estimate the value of equity per share after the option grant:

Value of firm = $100 / (.08-.03)$	= 2000
Debt	= 1000
= Equity	= 1000
Value of options granted	= \$ 54.2
= Value of Equity in stock	= \$945.8
/ Number of shares outstanding	/ 100
= Value per share	= \$ 9.46
- Note that this approach yields a higher value than the diluted share count approach (which ignores exercise proceeds) and a lower value than the treasury stock approach (which ignores the time premium on the options)

Option grants in the future...

249

- Assume now that this firm intends to continue granting options each year to its top management as part of compensation. These expected option grants will also affect value.
- The simplest mechanism for bringing in future option grants into the analysis is to do the following:
 - ▣ Estimate the value of options granted each year over the last few years as a percent of revenues.
 - ▣ Forecast out the value of option grants as a percent of revenues into future years, allowing for the fact that as revenues get larger, option grants as a percent of revenues will become smaller.
 - ▣ Consider this line item as part of operating expenses each year. This will reduce the operating margin and cashflow each year.



NARRATIVE AND NUMBERS: VALUATION AS A BRIDGE

Tell me a story..

Valuation as a bridge

Number Crunchers

Story Tellers

What stories do for a numbers valuation

1. Stories are better "hooks" & more memorable.
2. Stories force consistency tests on numbers.
3. Stories allow for follow through in businesses.

Valuation Numbers

The Dangers of a pure numbers valuation

1. You can "play" with numbers to change value
2. You can fool yourself with false precision
3. You can deny your own biases

**A Good Valuation =
Story + Numbers**

What numbers can do for a story valuation

1. Numbers give stories credibility.
2. Numbers allow for plausibility checks
3. Numbers create accountability in businesses.

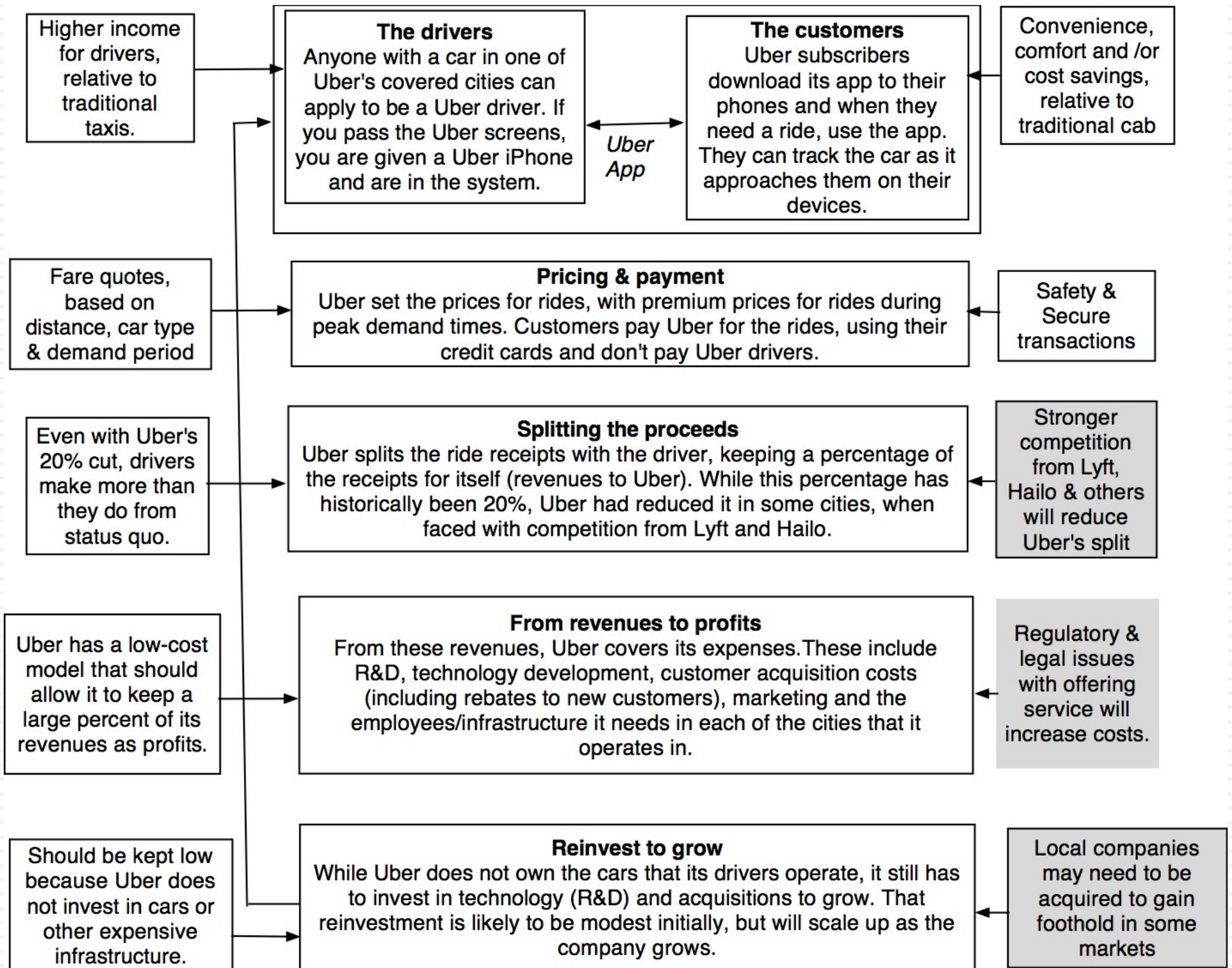
Valuation Story

The Dangers of a pure story valuation

1. You can tell fairy tales
2. You will be guided by anecdotal evidence
3. Your biases will be unconstrained

Step 1: Survey the landscape

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of
 - ▣ Your company (its products, its management and its history.
 - ▣ The market or markets that you see it growing in.
 - ▣ The competition it faces and will face.
 - ▣ The macro environment in which it operates.



Step 2: Create a narrative for the future

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of your company (its products, its management), the market or markets that you see it growing in, the competition it faces and will face and the macro environment in which it operates.
 - ▣ Rule 1: Keep it simple.
 - ▣ Rule 2: Keep it focused.
 - ▣ Rule 3: Stay grounded in reality.

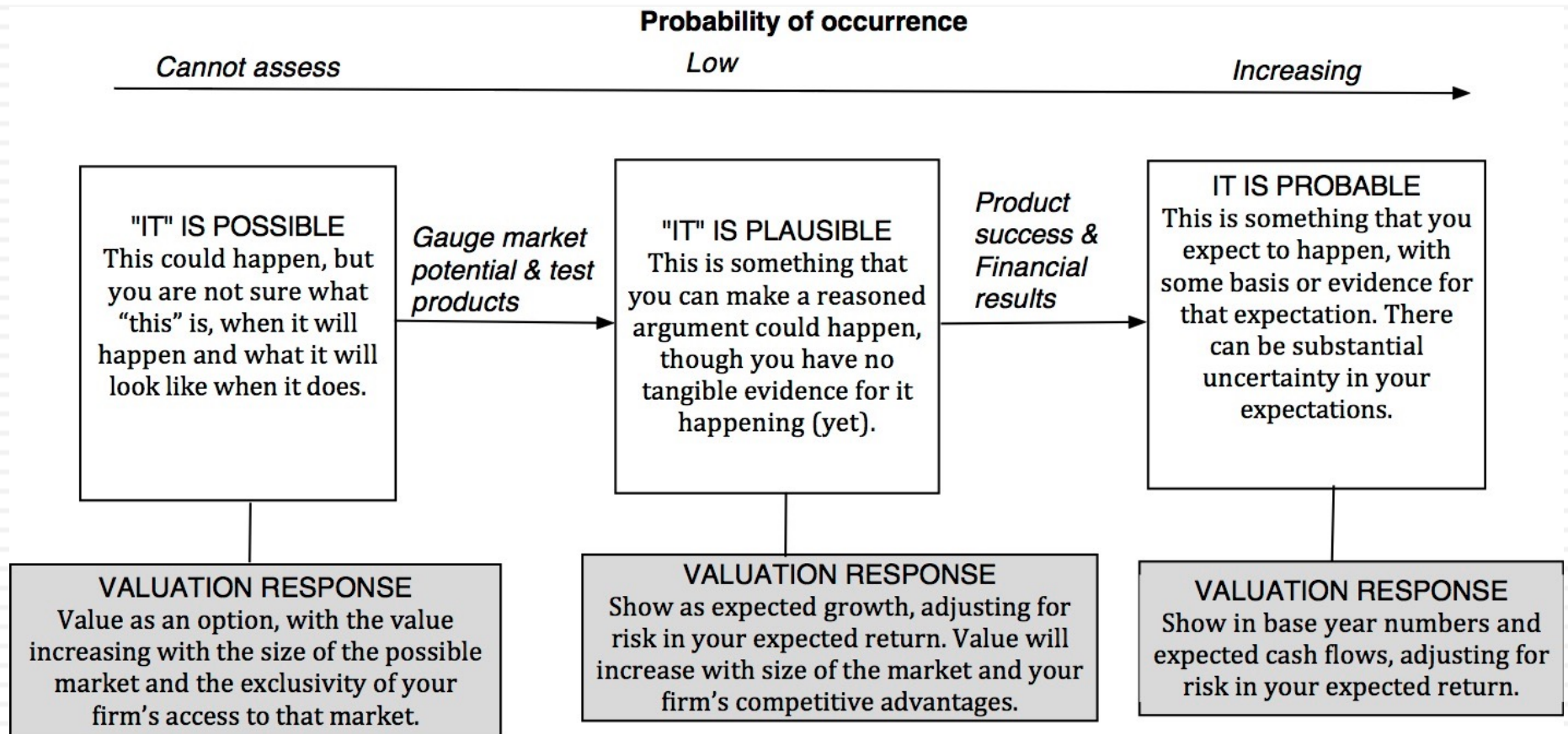
The Uber Narrative

In June 2014, my initial narrative for Uber was that it would be

1. An urban car service business: I saw Uber primarily as a force in urban areas and only in the car service business.
2. Which would expand the business moderately (about 40% over ten years) by bringing in new users.
3. With local networking benefits: If Uber becomes large enough in any city, it will quickly become larger, but that will be of little help when it enters a new city.
4. Maintain its revenue sharing (20%) system due to strong competitive advantages (from being a first mover).
5. And its existing low-capital business model, with drivers as contractors and very little investment in infrastructure.

Step 3: Check the narrative against history, economic first principles & common sense

256



The Impossible, The Implausible and the Improbable

257

The Impossible

Bigger than the economy

Assuming Growth rate for company in perpetuity > Growth rate for economy

Bigger than the total market

Allowing a company's revenues to grow so much that it has more than a 100% market share of whatever business it is in.

Profit margin > 100%

Assuming earnings growth will exceed revenue growth for a long enough period, and pushing margins above 100%

Depreciation without cap ex

Assuming that depreciation will exceed cap ex in perpetuity.

The Implausible

Growth without reinvestment

Assuming growth forever without reinvestment.

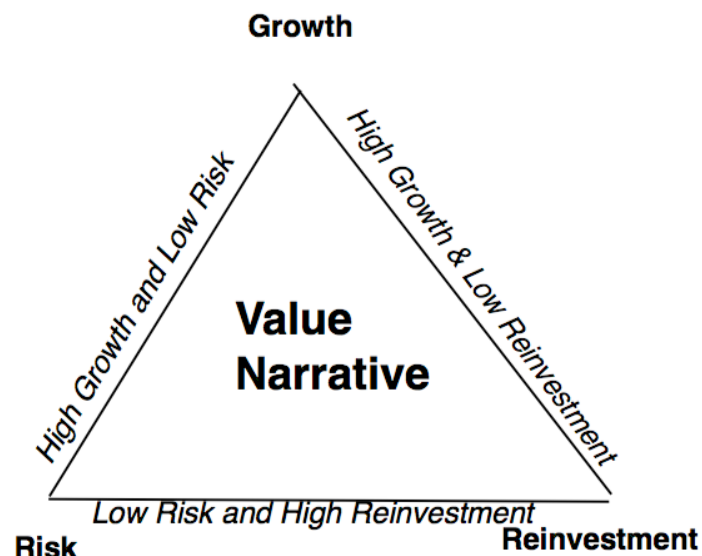
Profits without competition

Assuming that your company will grow and earn higher profits, with no competition.

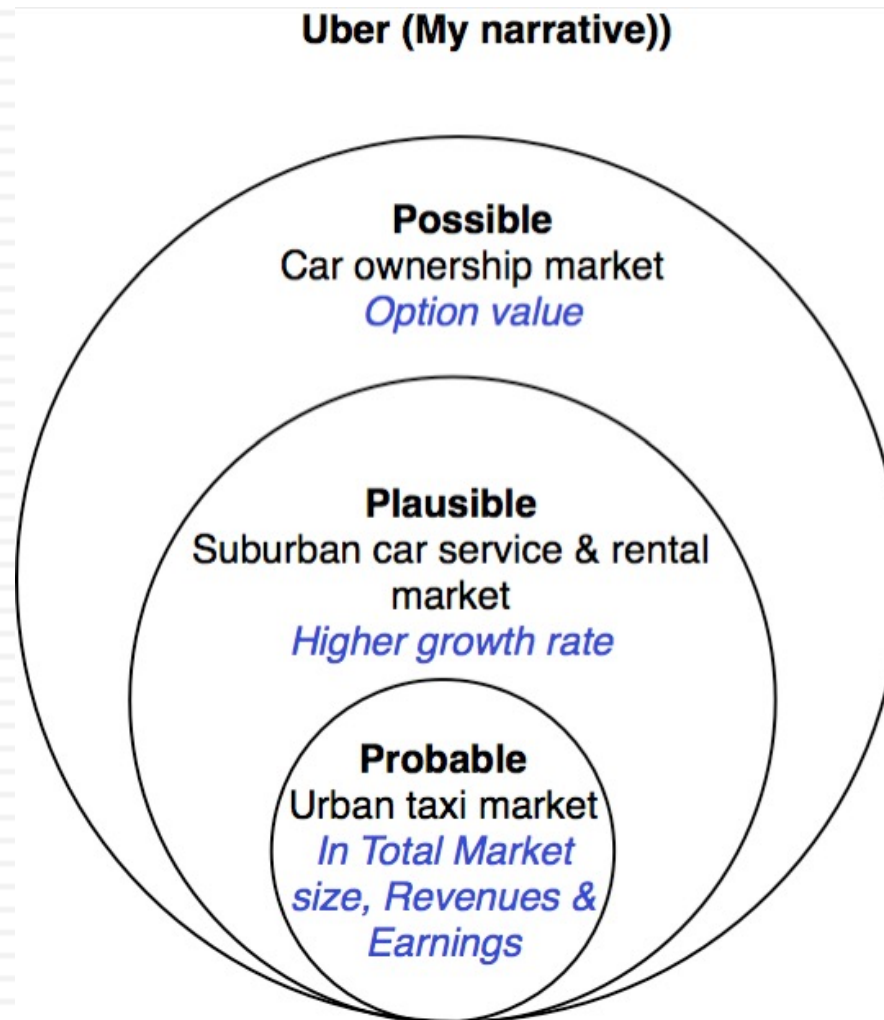
Returns without risk

Assuming that you can generate high returns in a business with no risk.

The Improbable



Uber: Possible, Plausible and Probable

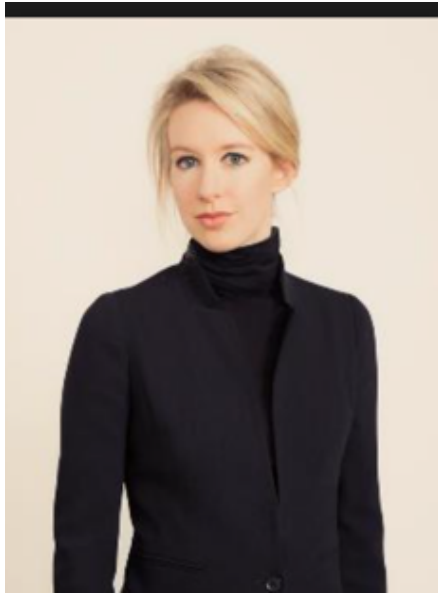


The Runaway Story: When you want a story to be true...

- With a runaway business story, you usually have three ingredients:
 1. Charismatic, likeable Narrator: The narrator of the business story is someone that you want to see succeed, either because you like the narrator or because he/she will be a good role model.
 2. Telling a story about disrupting a much business, where you dislike the status quo: The status quo in the business that the story is disrupting is dissatisfying (to everyone involved)>
 3. With a societal benefit as bonus: And if the story holds, society and humanity will benefit.
- Since you want this story to work out, you stop asking questions, because the answers may put the story at risk.

The Impossible: The Runaway Story

The Story



+

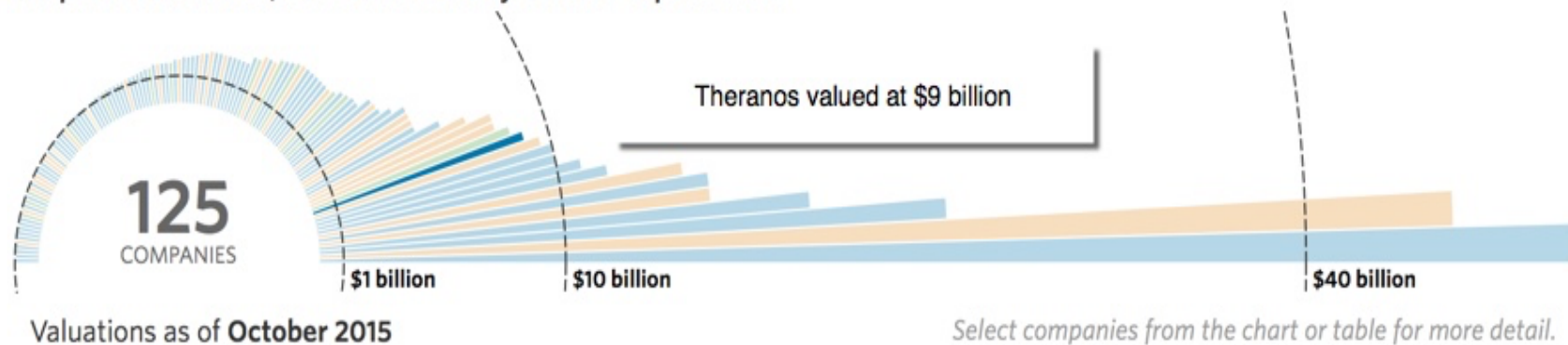
The Checks (?)

Board Member	Designation	Age
Henry Kissinger	Former Secretary of State	92
Bill Perry	Former Secretary of Defense	88
George Schultz	Former Secretary of State	94
Bill Frist	Former Senate Majority Leader	63
Sam Nunn	Former Senator	77
Gary Roughead	Former Navy Admiral	64
James Mattis	Former Marine Corps General	65
Dick Kovocovich	Former CEO of Wells Fargo	72
Riley Bechtel	Former CEO of Bechtel	63
William Foege	Epidemiologist	79
Elizabeth Holmes	Founder & CEO, Theranos	31
Sunny Balwani	President & COO, Theranos	NA

+

Money

Companies valued at \$1 billion or more by venture-capital firms



When runaway stories melt down..

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The Meltdown Story

Untrustworthy Storyteller

A narrator, who through his/her words or actions has become untrustworthy.

+

Story at war with numbers

The company's narrative conflicts with its own actions and/or with the actual results/numbers reported by the company.

+

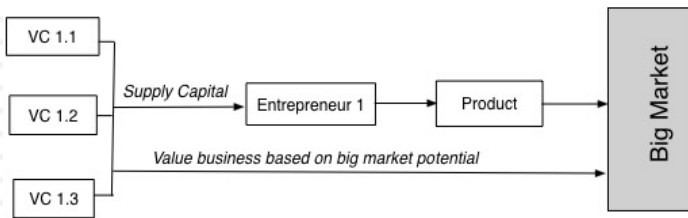
Bad Business Model

The business model has a fundamental flaw that can affect either future profitability or survival, but the management is either in denial about the flaw or opaque in how it plans to deal with it.

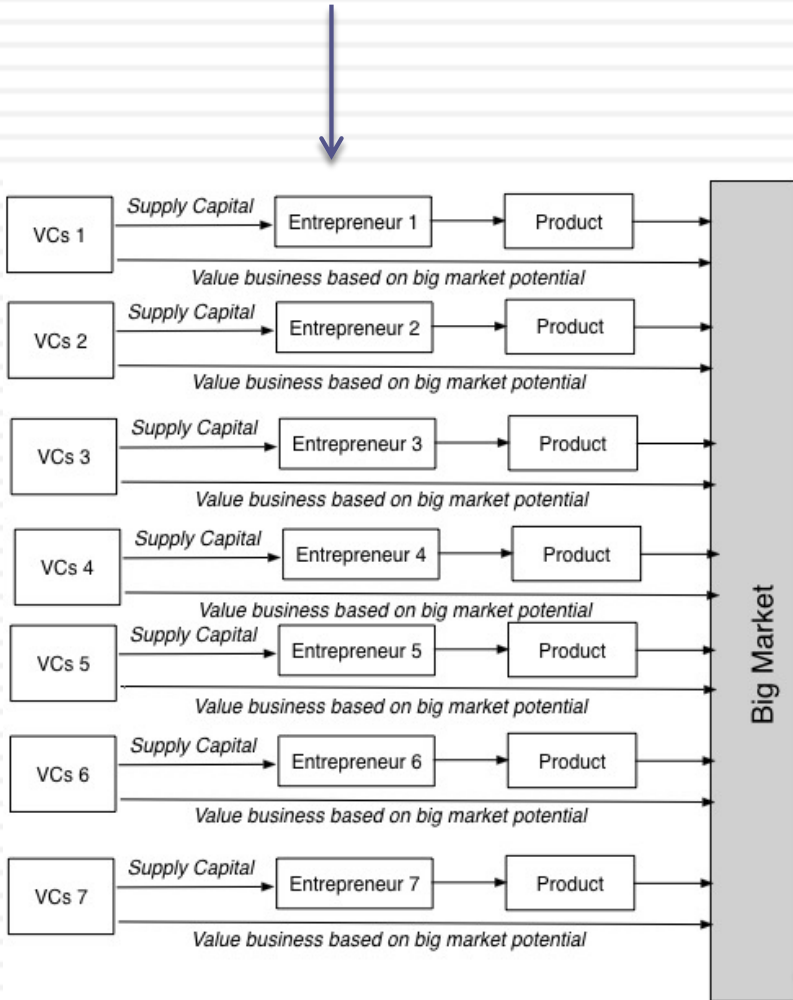
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Meltdown Story

Investors, lenders and observers question story, unwilling to accept the company's spin on number, pushing pricing down.



The Implausible: The Big Market Delusion

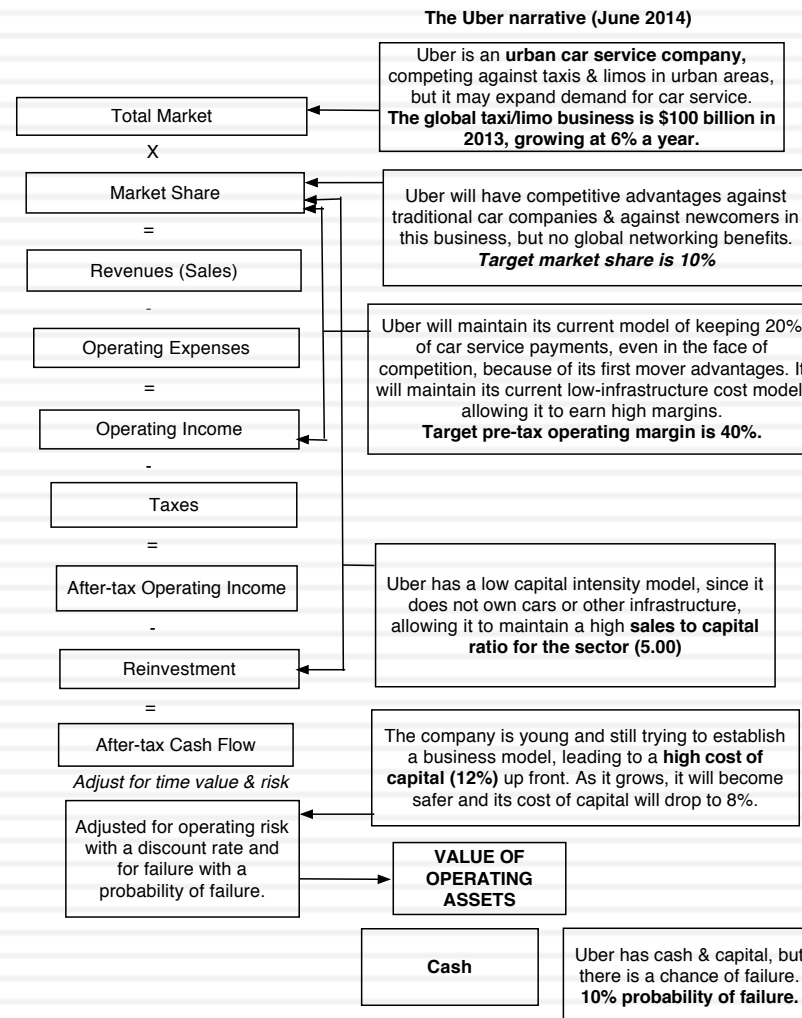


Company	Market Cap	Enterprise Value	Current Revenues	Breakeven Revenues (2025)	% from Online Advertising	Imputed Online Ad Revenue (2025)
Google	\$441,572.00	\$386,954.00	\$69,611.00	\$224,923.20	89.50%	\$201,306.26
Facebook	\$245,662.00	\$234,696.00	\$14,640.00	\$129,375.54	92.20%	\$119,284.25
Yahoo!	\$30,614.00	\$23,836.10	\$4,871.00	\$25,413.13	100.00%	\$25,413.13
LinkedIn	\$23,265.00	\$20,904.00	\$2,561.00	\$22,371.44	80.30%	\$17,964.26
Twitter	\$16,927.90	\$14,912.90	\$1,779.00	\$23,128.68	89.50%	\$20,700.17
Pandora	\$3,643.00	\$3,271.00	\$1,024.00	\$2,915.67	79.50%	\$2,317.96
Yelp	\$1,765.00	\$0.00	\$465.00	\$1,144.26	93.60%	\$1,071.02
Zillow	\$4,496.00	\$4,101.00	\$480.00	\$4,156.21	18.00%	\$748.12
Zynga	\$2,241.00	\$1,142.00	\$752.00	\$757.86	22.10%	\$167.49
Total US	\$770,185.90	\$689,817.00	\$96,183.00	\$434,185.98		\$388,972.66
Alibaba	\$184,362.00	\$173,871.00	\$12,598.00	\$111,414.06	60.00%	\$66,848.43
Tencent	\$154,366.00	\$151,554.00	\$13,969.00	\$63,730.36	10.50%	\$6,691.69
Baidu	\$49,991.00	\$44,864.00	\$9,172.00	\$30,999.49	98.90%	\$30,658.50
Sohu.com	\$18,240.00	\$17,411.00	\$1,857.00	\$16,973.01	53.70%	\$9,114.51
Naver	\$13,699.00	\$12,686.00	\$2,755.00	\$12,139.34	76.60%	\$9,298.74
Yandex	\$3,454.00	\$3,449.00	\$972.00	\$2,082.52	98.80%	\$2,057.52
Yahoo! Japan	\$23,188.00	\$18,988.00	\$3,591.00	\$5,707.61	69.40%	\$3,961.08
Sina	\$2,113.00	\$746.00	\$808.00	\$505.09	48.90%	\$246.99
Netease	\$14,566.00	\$11,257.00	\$2,388.00	\$840.00	11.90%	\$3,013.71
Mail.ru	\$3,492.00	\$3,768.00	\$636.00	\$1,676.47	35.00%	\$586.76
Mixi	\$3,095.00	\$2,661.00	\$1,229.00	\$777.02	96.00%	\$745.94
Kakaku	\$3,565.00	\$3,358.00	\$404.00	\$1,650.49	11.60%	\$191.46
Total non-US	\$474,131.00	\$444,613.00	\$50,379.00	\$248,495.46		\$133,415.32
Global Total	\$1,244,316.90	\$1,134,430.00	\$146,562.00	\$682,681.44		\$522,387.98

ES

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Unit Volume	24,298	36,883	64,684	86,713	149,869	214,841	291,861	384,747	466,559	550,398	643,850	726,655	820,645	922,481	1,034,215	1,137,780
% Growth		52%	75%	34%	73%	43%	36%	32%	21%	18%	17%	13%	13%	12%	12%	10%
Automotive Revenue Per Unit (\$)	93,403	85,342	83,432	78,932	65,465	58,258	56,407	55,553	55,991	56,586	56,969	57,540	58,138	58,603	59,002	59,554
% Growth		-9%	-2%	-5%	-17%	-11%	-3%	-2%	1%	1%	1%	1%	1%	1%	1%	1%
Automotive Sales	2,462	3,321	5,613	7,051	10,025	12,720	16,685	21,595	26,347	31,357	36,897	42,022	47,949	54,283	61,221	67,980
Development Service Sales	16	40	42	44	46	49	51	54	56	59	62	65	68	72	75	79
Total Sales	2,478	3,361	5,655	7,095	10,072	12,768	16,736	21,648	26,403	31,416	36,959	42,087	48,017	54,355	61,296	68,059
% Growth		36%	68%	25%	42%	27%	31%	29%	22%	19%	18%	14%	14%	13%	13%	11%
EBITDA	148	417	920	1,042	1,586	2,150	3,138	4,066	4,857	5,723	6,328	7,182	8,144	9,688	10,874	12,099
% Margin	6.0%	12.4%	16.3%	14.7%	15.7%	16.8%	18.7%	18.8%	18.4%	18.2%	17.1%	17.1%	17.0%	17.8%	17.7%	17.8%
D&A	103	158	172	203	301	353	389	537	606	696	811	938	1,088	1,260	1,451	1,661
% of Capex	41%	79%	53%	65%	62%	69%	78%	86%	77%	79%	76%	76%	76%	76%	76%	77%
EBIT	45	259	748	839	1,285	1,796	2,749	3,529	4,252	5,027	5,517	6,244	7,056	8,429	9,423	10,439
% Margin	1.8%	7.7%	13.2%	11.8%	12.8%	14.1%	16.4%	16.3%	16.1%	16.0%	14.9%	14.8%	14.7%	15.5%	15.4%	15.3%
Net Interest Income (Expense)	(27)	(1)	9	33	47	90	108	155	199	278	358	445	542	651	784	934
Other Income	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pretax Income	46	258	758	872	1,332	1,886	2,857	3,684	4,451	5,305	5,875	6,688	7,598	9,080	10,207	11,373
Income Taxes	3	2	14	34	86	262	462	641	807	1,003	1,134	1,317	1,470	1,761	2,028	2,323
% Effective Rate	6%	1%	2%	4%	6%	14%	16%	17%	18%	19%	19%	20%	19%	19%	20%	20%
Net Income	44	256	744	839	1,246	1,624	2,395	3,043	3,644	4,303	4,741	5,372	6,128	7,319	8,179	9,050
Plus:																
After-tax Interest Expense (Income)	27	1	(9)	(33)	(47)	(90)	(108)	(154)	(199)	(278)	(357)	(444)	(541)	(650)	(782)	(932)
Depreciation of PP&E	103	158	172	203	301	353	389	537	606	696	811	938	1,088	1,260	1,451	1,661
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less:																
Change in Working Capital	(155)	(14)	(157)	(167)	(172)	(325)	(163)	(81)	(28)	(299)	(356)	(328)	(219)	(329)	(365)	(376)
% of Change in Sales		-2%	-7%	-12%	-6%	-1										

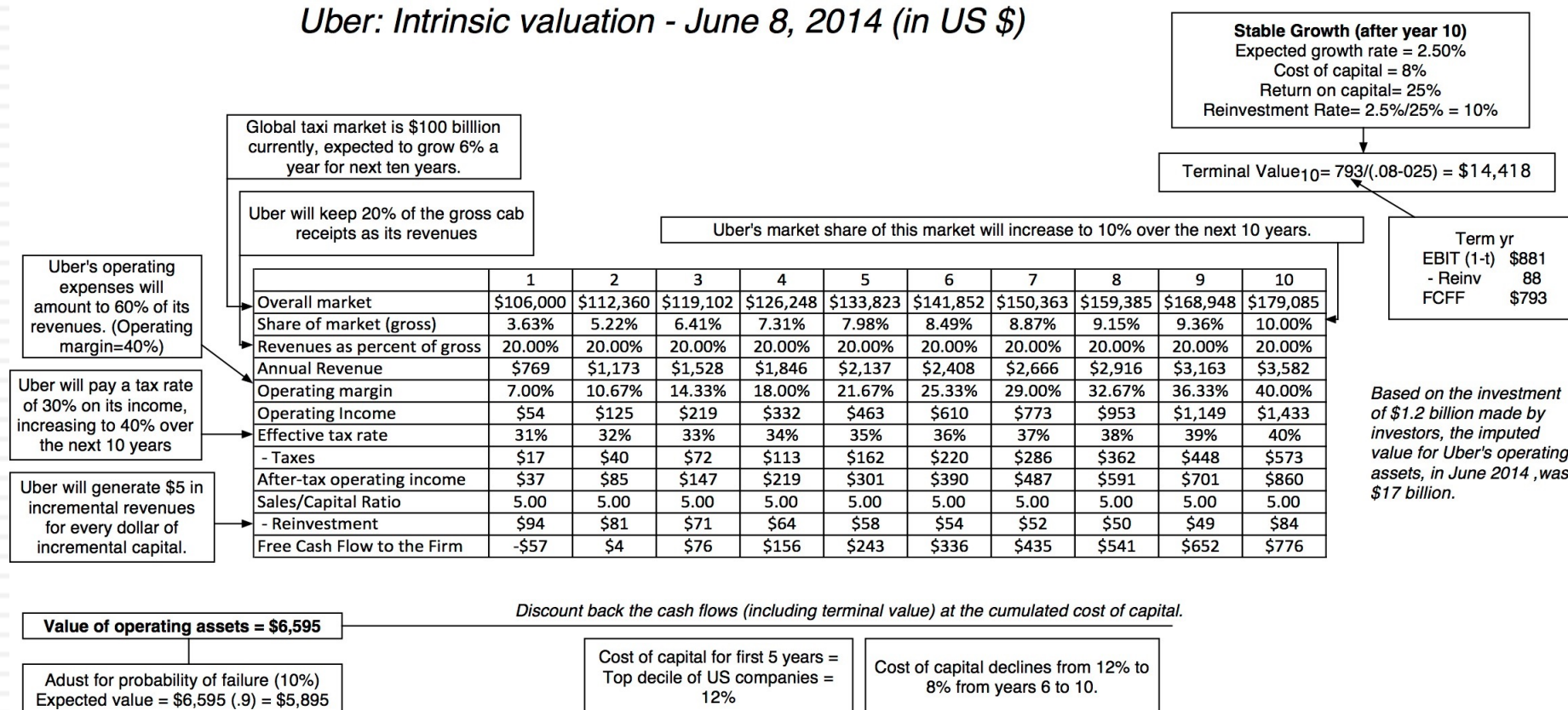
Step 4: Connect your narrative to key drivers of value



Step 4: Value the company (Uber)

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Uber: Intrinsic valuation - June 8, 2014 (in US \$)



Step 5: Keep the feedback loop open...

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1. Not just car service company.: Uber is a car company, not just a car service company, and there may be a day when consumers will subscribe to a Uber service, rather than own their own cars. It could also expand into logistics, i.e., moving and transportation businesses.
2. Not just urban: Uber can create new demands for car service in parts of the country where taxis are not used (suburbia, small towns).
3. Global networking benefits: By linking with technology and credit card companies, Uber can have global networking benefits.

Valuing Bill Gurley's Uber narrative

	<i>Uber (Gurley)</i>	<i>Uber (Gurley Mod)</i>	<i>Uber (Damodaran)</i>
Narrative	Uber will <u>expand the car service market substantially</u> , bringing in mass transit users & non-users from the suburbs into the market, and use its <u>networking advantage</u> to gain a <u>dominant market share</u> , while maintaining its revenue slice at 20%.	Uber will <u>expand the car service market substantially</u> , bringing in mass transit users & non-users from the suburbs into the market, and use its <u>networking advantage</u> to gain a <u>dominant market share</u> , while cutting prices and margins (to 10%).	Uber will expand the car service market moderately, primarily in urban environments, and use its <u>competitive advantages</u> to get a <u>significant but not dominant market share</u> and maintain its revenue slice at 20%.
Total Market	\$300 billion, growing at 3% a year	\$300 billion, growing at 3% a year	\$100 billion, growing at 6% a year
Market Share	40%	40%	10%
Uber's revenue slice	20%	10%	20%
Value for Uber	\$53.4 billion + Option value of entering car ownership market (\$10 billion+)	\$28.7 billion + Option value of entering car ownership market (\$6 billion+)	\$5.9 billion + Option value of entering car ownership market (\$2-3 billion)

Different narratives, Different Numbers

<i>Total Market</i>	<i>Growth Effect</i>	<i>Network Effect</i>	<i>Competitive Advantages</i>	<i>Value of Uber</i>
A4. Mobility Services	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	\$90,457
A3. Logistics	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	\$65,158
A4. Mobility Services	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	\$52,346
A2. All car service	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	\$47,764
A1. Urban car service	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	\$31,952
A3. Logistics	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	\$14,321
A1. Urban car service	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	\$7,127
A2. All car service	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	\$4,764
A4. Mobility Services	B1. None	C1. No network effects	D1. None	\$1,888
A3. Logistics	B1. None	C1. No network effects	D1. None	\$1,417
A2. All car service	B1. None	C1. No network effects	D1. None	\$1,094
A1. Urban car service	B1. None	C1. No network effects	D1. None	\$799

Step 6: Be ready to modify narrative as events unfold

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Narrative Break/End	Narrative Shift	Narrative Change (Expansion or Contraction)
Events, external (legal, political or economic) or internal (management, competitive, default), that can cause the narrative to break or end.	Improvement or deterioration in initial business model, changing market size, market share and/or profitability.	Unexpected entry/success in a new market or unexpected exit/failure in an existing market.
Your valuation estimates (cash flows, risk, growth & value) are no longer operative	Your valuation estimates will have to be modified to reflect the new data about the company.	Valuation estimates have to be redone with new overall market potential and characteristics.
Estimate a probability that it will occur & consequences	Monte Carlo simulations or scenario analysis	Real Options



Let the games begin... Time to
value companies..

Let's have some fun!

Equity Risk Premiums in Valuation

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- The equity risk premiums that I have used in the valuations that follow reflect my thinking (and how it has evolved) on the issue.
 - Pre-1998 valuations: In the valuations prior to 1998, I use a risk premium of 5.5% for mature markets (close to both the historical and the implied premiums then)
 - Between 1998 and Sept 2008: In the valuations between 1998 and September 2008, I used a risk premium of 4% for mature markets, reflecting my belief that risk premiums in mature markets do not change much and revert back to historical norms (at least for implied premiums).
 - Valuations done in 2009: After the 2008 crisis and the jump in equity risk premiums to 6.43% in January 2008, I have used a higher equity risk premium (5-6%) for the next 5 years and will assume a reversion back to historical norms (4%) only after year 5.
 - After 2009: I have used updated equity risk premiums, as of the time that I did the valuations.

The Valuation Set up

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- With each company that I value in this next section, I will try to start with a story about the company and use that story to construct a valuation.
- With each valuation, rather than focus on all of the details (which will follow the blueprint already laid out), I will focus on a specific component of the valuation that is unique or different.

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Training Wheels On?

Stocks that look like Bonds, Things Change and
Market Valuations

Test 1: Is the firm paying dividends like a stable growth firm?

Dividend payout ratio is 73%
In trailing 12 months, through June 2008
Earnings per share = \$3.17
Dividends per share = \$2.32

*Training Wheels valuation:
Con Ed in August 2008*

Test 2: Is the stable growth rate consistent with fundamentals?

Retention Ratio = 27%
ROE = Cost of equity = 7.7%
Expected growth = 2.1%

Growth rate forever = 2.1%

Value per share today = Expected Dividends per share next year / (Cost of equity - Growth rate)
= $2.32 (1.021) / (.077 - .021) = \42.30

Cost of Equity = $4.1\% + 0.8 (4.5\%) = 7.70\%$

Riskfree rate
4.10%
10-year T.Bond rate

Beta
0.80
Beta for regulated
power utilities

Equity Risk
Premium
4.5%
Implied Equity Risk
Premium - US
market in 8/2008

On August 12, 2008
Con Ed was trading at \$
40.76.

Test 3: Is the firm's risk and cost of equity consistent with a stable growth firm?

Beta of 0.80 is at lower end of the range of stable company betas: 0.8 -1.2

Why a stable growth dividend discount model?

1. Why stable growth: Company is a regulated utility, restricted from investing in new growth markets. Growth is constrained by the fact that the population (and power needs) of its customers in New York are growing at very low rates.

Growth rate forever = 2%

2. Why equity: Company's debt ratio has been stable at about 70% equity, 30% debt for decades.

3. Why dividends: Company has paid out about 97% of its FCFE as dividends over the last five years.

From DCF value to target price and returns...

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- Assume that you believe that your valuation of Con Ed (\$42.30) is a fair estimate of the value, 7.70% is a reasonable estimate of Con Ed's cost of equity and that your expected dividends for next year (2.32×1.021) is a fair estimate, what is the expected stock price a year from now (assuming that the market corrects its mistake?)
- If you bought the stock today at \$40.76, what return can you expect to make over the next year (assuming again that the market corrects its mistake)?

3M: A Pre-crisis valuation

Current Cashflow to Firm

$EBIT(1-t) = 5344 (1-.35) = 3474$
 $- Nt CpX = 350$
 $- Chg WC = 691$
 $= FCFF = 2433$
 $Reinvestment Rate = 1041/3474 = 29.97\%$
 $Return on capital = 25.19\%$

Reinvestment Rate
 30%

Expected Growth in EBIT (1-t)
 $.30 * .25 = .075$
7.5%

Return on Capital
 25%

Stable Growth

$g = 3\%$; $Beta = 1.10$;
 $Debt Ratio = 20\%$; $Tax rate = 35\%$
 $Cost of capital = 6.76\%$
 $ROC = 6.76\%$;
 $Reinvestment Rate = 3/6.76 = 44\%$

First 5 years

Terminal Value₅ = $2645 / (.0676 - .03) = 70,409$

Op. Assets 60607
 $+ Cash: 3253$
 $- Debt 4920$
 $= Equity 58400$

Year	1	2	3	4	5
EBIT (1-t)	\$3,734	\$4,014	\$4,279	\$4,485	\$4,619
- Reinvestment	\$1,120	\$1,204	\$1,312	\$1,435	\$1,540
= FCFF	\$2,614	\$2,810	\$2,967	\$3,049	\$3,079

Term Yr
 \$4,758
 \$2,113
 \$2,645

Value/Share \$ 83.55

Cost of capital = $8.32\% (0.92) + 2.91\% (0.08) = 7.88\%$

Cost of Equity
8.32%

Cost of Debt
 $(3.72\% + .75\%) (1-.35)$
 $= 2.91\%$

Weights
 $E = 92\%$ $D = 8\%$

On September 12,
 2008, 3M was
 trading at \$70/share

Riskfree Rate:
 Riskfree rate = 3.72%

+

Beta
 1.15

x

Risk Premium
 4%

Unlevered Beta for
 Sectors: 1.09

$D/E = 8.8\%$

Lowered base operating income by 10%

3M: Post-crisis valuation

Did not increase debt ratio in stable growth to 20%

Current Cashflow to Firm

EBIT(1-t)=	4810 (1-.35)=	3,180
- Nt CpX=		350
- Chg WC		691
= FCFF	2139	
Reinvestment Rate =	1041/3180	
	=33%	
Return on capital =	23.06%	

Reinvestment Rate
25%

Reduced growth
rate to 5%

Expected Growth in
EBIT (1-t)
.25*.20=.05
5%

Return on Capital
20%

Stable Growth

g = 3%; Beta = 1.00;; ERP =4%
Debt Ratio= 8%; Tax rate=35%
Cost of capital = 7.55%
ROC= 7.55%;
Reinvestment Rate=3/7.55=40%

First 5 years

Terminal Value₅ = 2434 / (.0755 - .03) = 53,481

Op. Assets	43,975
+ Cash:	3253
- Debt	4920
=Equity	42308

Value/Share \$ 60.53

Year	1	2	3	4	5	Term Yr
EBIT (1-t)	\$3,339	\$3,506	\$3,667	\$3,807	\$3,921	\$4,038
- Reinvestment	\$835	\$877	\$1,025	\$1,288	\$1,558	\$1,604
= FCFF	\$2,504	\$2,630	\$2,642	\$2,519	\$2,363	\$2,434

Cost of capital = 10.86% (0.92) + 3.55% (0.08) = 10.27%

Higher default spread for next 5 years

Cost of Equity
10.86%

Cost of Debt
(3.96% + 1.5%)(1-.35)
= 3.55%

Weights
E = 92% D = 8%

On October 16, 2008,
MMM was trading at
\$57/share.

Riskfree Rate:
Riskfree rate = 3.96%

Increased risk premium to 6% for next 5 years

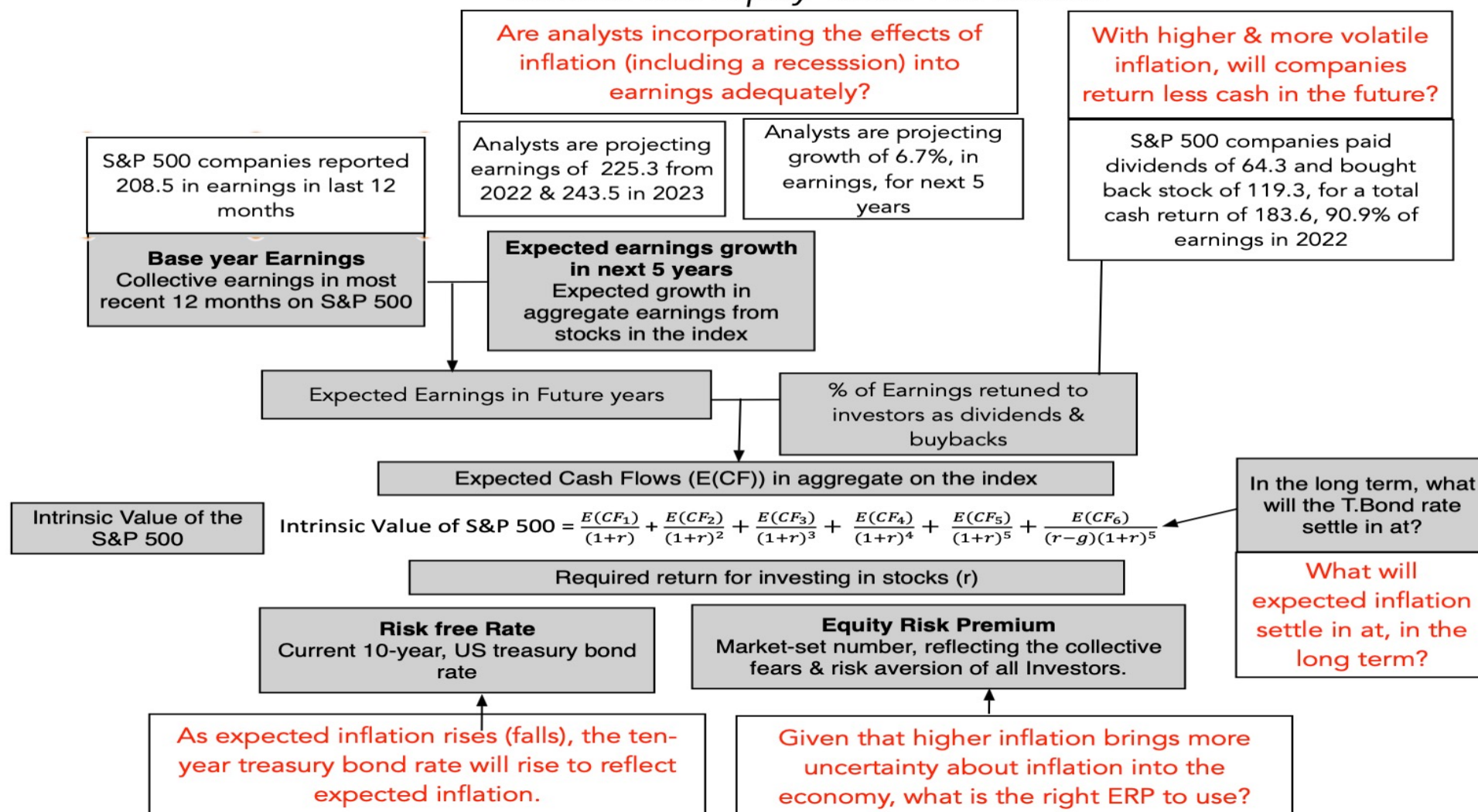
+ Beta 1.15 x Risk Premium 6%

Unlevered Beta for Sectors: 1.09

D/E=8.8%

Valuing the S&P 500 Index (September 2022)

Inflation and Equity Value: The Drivers



1. Earnings

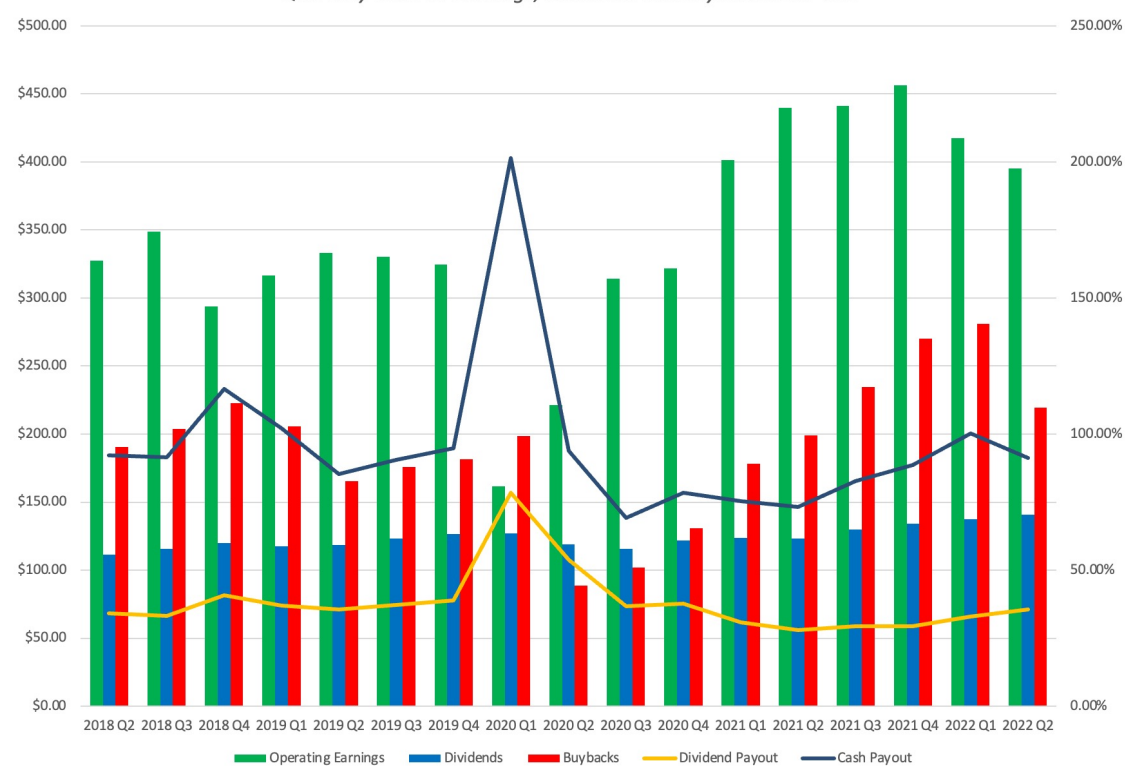
<i>Start of Month</i>	<i>Expected Earnings in 2022</i>	<i>% Change over prior month</i>	<i>% Change over start of year</i>	<i>Expected Earnings in 2023</i>	<i>% Change over prior month</i>	<i>% Change over start of year</i>
01/01/22	223.34			244.94		
02/01/22	223.78	0.20%	0.20%	245.93	0.40%	0.40%
03/01/22	225.43	0.74%	0.94%	247.94	0.82%	1.22%
04/01/22	227.3	0.83%	1.77%	249.52	0.64%	1.87%
05/01/22	227.29	0.00%	1.77%	250.11	0.24%	2.11%
06/01/22	228.03	0.33%	2.10%	248.96	-0.46%	1.64%
07/01/22	229.57	0.68%	2.79%	251.99	1.22%	2.88%
08/01/22	228.27	-0.57%	2.21%	248.35	-1.44%	1.39%
09/01/22	225.36	-1.27%	0.90%	243.64	-1.90%	-0.53%
09/20/22	225.34	-0.01%	0.90%	243.46	-0.07%	-0.60%

2. Cash Return

S&P 500 Aggregate Earnings, Dividends and Buybacks: 2001-2021

Year	Earnings	Dividends	Buybacks	Dividend Payout	Cash Payout
2001	38.85	15.74	14.34	40.51%	77.43%
2002	46.04	15.96	13.87	34.67%	64.78%
2003	54.69	17.88	13.70	32.69%	57.74%
2004	67.68	19.01	21.59	28.09%	59.99%
2005	76.45	22.34	38.82	29.23%	80.01%
2006	87.72	25.04	48.12	28.55%	83.40%
2007	82.54	28.14	67.22	34.09%	115.53%
2008	49.51	28.45	39.07	57.46%	136.37%
2009	56.86	21.97	15.46	38.64%	65.82%
2010	83.77	22.65	32.88	27.04%	66.28%
2011	96.44	26.53	44.75	27.51%	73.91%
2012	96.82	31.25	44.65	32.28%	78.39%
2013	104.92	34.90	53.23	33.26%	84.00%
2014	116.16	39.55	62.44	34.04%	87.79%
2015	100.48	43.41	64.94	43.20%	107.83%
2016	106.26	45.70	62.32	43.01%	101.66%
2017	124.51	48.93	60.85	39.30%	88.17%
2018	152.78	54.39	96.11	35.60%	98.51%
2019	157.18	58.50	87.81	37.22%	93.08%
2020	139.76	57.00	61.66	40.78%	84.90%
2021	205.35	60.65	104.61	29.53%	80.48%
Average				35.56%	85.05%
1st Quartile				29.53%	73.91%
Median				34.09%	83.40%
3rd Quartile				39.30%	93.08%

Quarterly Data on Earnings, Dividends and Buybacks: S&P 500



My S&P 500 Story

An Intrinsic (and Personal) Valuation of the S&P 500 on September 23, 2022

My Earnings Estimates

Analysts are underestimating the effect of a recession on future earnings, and I am reducing their 2023 estimates by 15%, with ripple effects on earnings beyond. (I am leaving 2022 estimates untouched, because the bulk of the year is behind us.

Cash Return

While companies have collectively returned 90.5% of earnings as dividends and buybacks in the most recent 12 months, recession fears and uncertainty will lead them to reduce this cash returns to 80% of earnings (consistent with growth in long term), over time.

Intrinsic Value Estimate (based on your choice of ERP)							
	2021	2022	2023	2024	2025	2026	Terminal Year
Analyst Estimate of Earnings	208.53	225.34	243.46	259.79	273.70	284.65	296.03
My Estimate of Earnings	\$208.53	225.34	206.94	225.03	243.13	252.85	262.97
Expected Earnings Growth Rate		8.06%	-8.16%	6.71%	5.35%	4.00%	4.00%
Expected cash payout as % of earnings	90.50%	90.50%	87.88%	85.25%	82.63%	80.00%	80.00%
Expected Dividends + Buybacks =	\$188.72	\$203.93	\$181.85	\$191.84	\$200.89	\$202.28	210.37
Expected Terminal Value =						\$ 4,207.49	
Riskfree Rate	3.69%	3.75%	3.81%	3.88%	3.94%	4.00%	4.00%
Required Return on Stocks	8.69%	8.75%	8.81%	8.88%	8.94%	9.00%	9.00%
Present Value =		\$187.52	\$153.67	\$148.90	\$143.12	\$2,882.41	
Intrinsic Value of Index =	3515.63						
Actual Index level =	3693.23						
% Under or Over Valuation =	-4.81%						

Ten-year Treasury Bond Rate

I will assume that the bulk of the rise in rates has already occurred, and that the T.Bond rate will converge to 4%, over the next five years.

Equity Risk Premium

The equity risk premium is 5%, close to both the historical average risk premium earned on stocks from 1928 - 2022 and the average implied equity risk premium over the last decade. Adding it to the ten-year bond rate yields the required return on stocks.

In my overarching story for equities, I am building in the assumption that there will be a recession that creates both short term & long term damage to corporate earnings, but helps in restraining inflation, bringing it down from 2022 levels to about 3% in the long term (above the 2011-2021 average of 1.73%).

What if?

Valuing the S&P 500 on Sept 23, 2022									
Riskfree Rate	<i>Earnings = 30% below Estimates</i>			<i>Earnings = 15% below Estimates</i>			<i>Earnings = Estimates</i>		
	<i>ERP = 4%</i>	<i>ERP = 5%</i>	<i>ERP = 6%</i>	<i>ERP = 4%</i>	<i>ERP = 5%</i>	<i>ERP = 6%</i>	<i>ERP = 4%</i>	<i>ERP = 5%</i>	<i>ERP = 6%</i>
2%	4276	3416	2842	4677	3737	3110	5449	4348	3615
3%	4132	3303	2750	4519	3613	3009	5169	4129	3436
4%	3979	3183	2653	4352	3482	2903	4889	3910	3257
5%	3819	3058	2551	4176	3345	2790	4609	3690	3078
6%	3650	2926	2443	3991	3200	2672	4328	3471	2899
<i>Index was trading at 3693 on 9/23/22. Shaded cells are higher than 3693</i>									

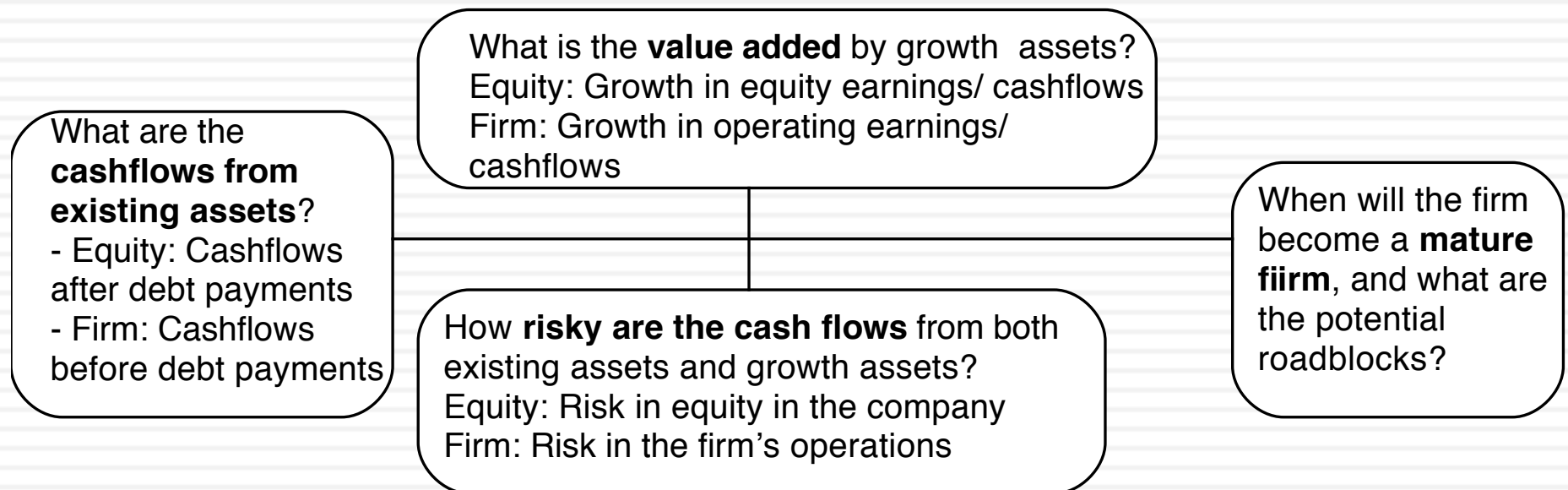
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The Dark Side of Valuation

Anyone can value a company that is stable,
makes money and has an established
business model!

The fundamental determinants of value...

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The Dark Side of Valuation...

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- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value “difficult” companies. In particular, the challenges are greatest when valuing:
 - ▣ Young companies, early in the life cycle, in young businesses
 - ▣ Companies that don’t fit the accounting mold
 - ▣ Companies that face substantial truncation risk (default or nationalization risk)

Difficult to value companies...

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- Across the life cycle:
 - ▣ Young, growth firms: Limited history, small revenues in conjunction with big operating losses and a propensity for failure make these companies tough to value.
 - ▣ Mature companies in transition: When mature companies change or are forced to change, history may have to be abandoned and parameters have to be reestimated.
 - ▣ Declining and Distressed firms: A long but irrelevant history, declining markets, high debt loads and the likelihood of distress make them troublesome.
- Across markets
 - ▣ Emerging market companies are often difficult to value because of the way they are structured, their exposure to country risk and poor corporate governance.
- Across sectors
 - ▣ Financial service firms: Opacity of financial statements and difficulties in estimating basic inputs leave us trusting managers to tell us what's going on.
 - ▣ Commodity and cyclical firms: Dependence of the underlying commodity prices or overall economic growth make these valuations susceptible to macro factors.
 - ▣ Firms with intangible assets: Accounting principles are left to the wayside on these firms.

I. The challenge with young companies...

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Making judgments on revenues/ profits difficult because you cannot draw on history. If you have no product/ service, it is difficult to gauge market potential or profitability. The company's entire value lies in future growth but you have little to base your estimate on.

Cash flows from existing assets non-existent or negative.

What are the cashflows from existing assets?

Different claims on cash flows can affect value of equity at each stage.

What is the value of equity in the firm?

What is the value added by growth assets?

How risky are the cash flows from both existing assets and growth assets?

Limited historical data on earnings, and no market prices for securities makes it difficult to assess risk.

When will the firm become a mature firm, and what are the potential roadblocks?

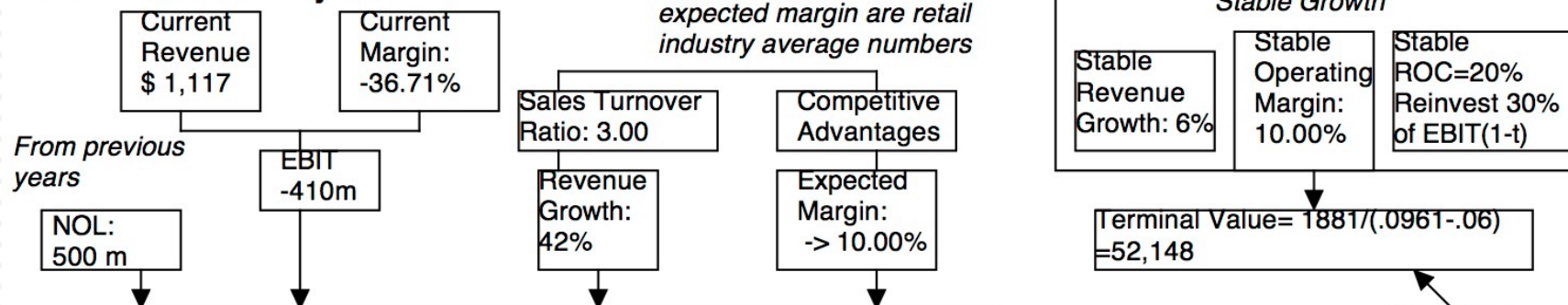
Will the firm will make it through the gauntlet of market demand and competition. Even if it does, assessing when it will become mature is difficult because there is so little to go on.

Upping the ante.. Young companies in young businesses...

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- When valuing a business, we generally draw on three sources of information
 - ▣ The firm's current financial statement
 - How much did the firm sell?
 - How much did it earn?
 - ▣ The firm's financial history, usually summarized in its financial statements.
 - How fast have the firm's revenues and earnings grown over time?
 - What can we learn about cost structure and profitability from these trends?
 - Susceptibility to macro-economic factors (recessions and cyclical firms)
 - ▣ The industry and comparable firm data
 - What happens to firms as they mature? (Margins.. Revenue growth... Reinvestment needs... Risk)
- It is when valuing these companies that you find yourself tempted by the dark side, where
 - ▣ "Paradigm shifts" happen...
 - ▣ New metrics are invented ...
 - ▣ The story dominates and the numbers lag...

Amazon in January 2000



Value of Op Assets \$ 15,170
 + Cash \$ 26
 = Value of Firm \$14,936
 - Value of Debt \$ 349
 = Value of Equity \$14,847
 - Equity Options \$ 2,892
 Value per share \$ 35.08

All existing options valued as options, using current stock price of \$84.

Revenue Growth	150.00%	100.00%	75.00%	50.00%	30.00%	25.20%	20.40%	15.60%	10.80%	6.00%	Term. Year
Revenues	\$ 2,793	\$ 5,585	\$ 9,774	\$ 14,661	\$ 19,059	\$ 23,862	\$ 28,729	\$ 33,211	\$ 36,798	\$ 39,006	6%
Operating Margin	-13.35%	-1.68%	4.16%	7.08%	8.54%	9.27%	9.64%	9.82%	9.91%	9.95%	10.00%
EBIT	-\$373	-\$94	\$407	\$1,038	\$1,628	\$2,212	\$2,768	\$3,261	\$3,646	\$3,883	\$ 41,346
EBIT(1-t)	-\$373	-\$94	\$407	\$871	\$1,058	\$1,438	\$1,799	\$2,119	\$2,370	\$2,524	\$2,688
- Reinvestment	\$600	\$967	\$1,420	\$1,663	\$1,543	\$1,688	\$1,721	\$1,619	\$1,363	\$961	\$155
FCFF	-\$931	-\$1,024	-\$989	-\$758	-\$408	-\$163	\$177	\$625	\$1,174	\$1,788	\$1,881

	1	2	3	4	5	6	7	8	9	10	Forever
Cost of Equity	12.90%	12.90%	12.90%	12.90%	12.90%	12.42%	11.94%	11.46%	10.98%	10.50%	
Cost of Debt	8.00%	8.00%	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%	
After-tax cost of debt	8.00%	8.00%	8.00%	6.71%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%	
Cost of Capital	12.84%	12.84%	12.84%	12.83%	12.81%	12.13%	11.62%	11.08%	10.49%	9.61%	

Cost of Equity 12.90%

Used average interest coverage ratio over next 5 years to get BBB rating.

Cost of Debt 6.5%+1.5%=8.0%
 Tax rate = 0% -> 35%

Weights Debt= 1.2% -> 15%

Amazon was trading at \$84 in January 2000.

Pushed debt ratio to retail industry average of 15%.

Riskfree Rate: T. Bond rate = 6.5%

Dot.com retailers for first 5 years
 Conventional retailers after year 5

Beta 1.60 -> 1.00

Risk Premium 4%

Internet/Retail

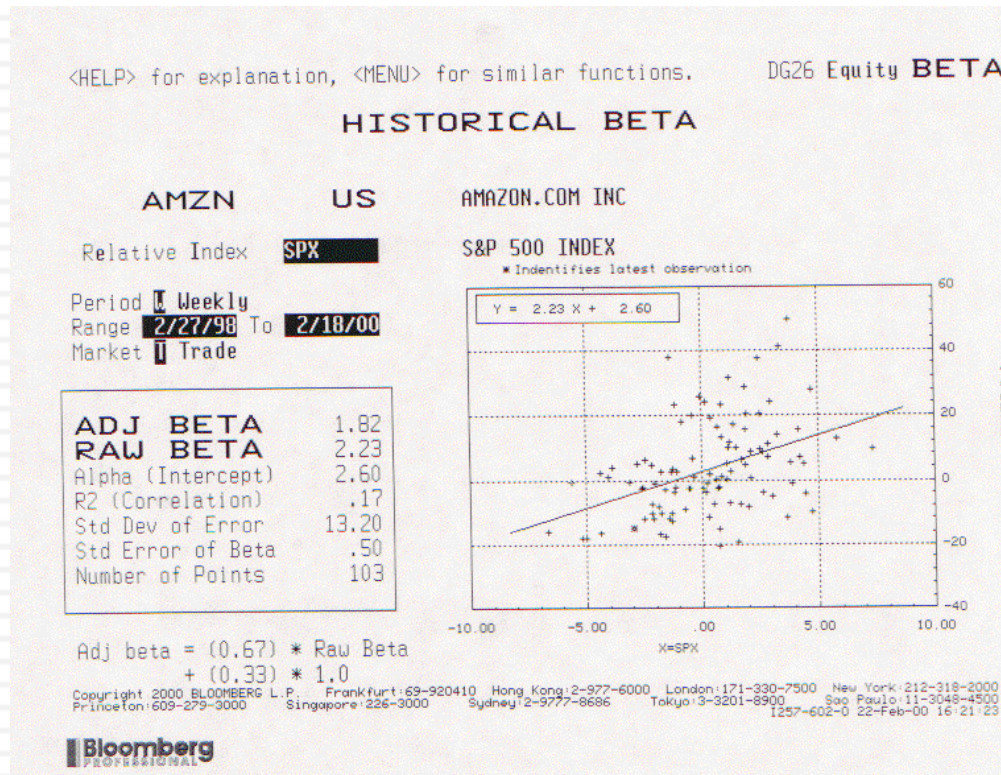
Operating Leverage

Current D/E: 1.21%

Base Equity Premium

Country Risk Premium

Lesson 1: Don't sweat the small stuff



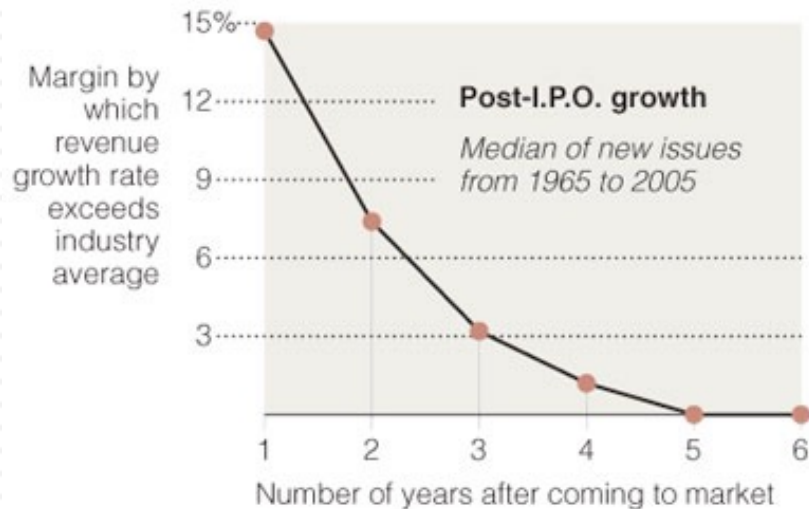
- Spotlight the business the company is in & use the beta of that business.
- Don't try to incorporate failure risk into the discount rate.
- Let the cost of capital change over time, as the company changes.
- If you are desperate, use the cross section of costs of capital to get your estimation going (use the 90th or 95th percentile across all companies).

Lesson 2: Work backwards and keep it simple...

Year	Revenue Growth	Sales	Operating Margin	EBIT	EBIT (1-t)
Tr 12 mths		\$1,117	-36.71%	-\$410	-\$410
1	150.00%	\$2,793	-13.35%	-\$373	-\$373
2	100.00%	\$5,585	-1.68%	-\$94	-\$94
3	75.00%	\$9,774	4.16%	\$407	\$407
4	50.00%	\$14,661	7.08%	\$1,038	\$871
5	30.00%	\$19,059	8.54%	\$1,628	\$1,058
6	25.20%	\$23,862	9.27%	\$2,212	\$1,438
7	20.40%	\$28,729	9.64%	\$2,768	\$1,799
8	15.60%	\$33,211	9.82%	\$3,261	\$2,119
9	10.80%	\$36,798	9.91%	\$3,646	\$2,370
10	6.00%	\$39,006	9.95%	\$3,883	\$2,524
TY	6.00%	\$41,346	10.00%	\$4,135	\$2,688

Lesson 3: Scaling up is hard to do & failure is common

Typically, the revenue growth rate of a newly public company outpaces its industry average for only about five years.



Source: Andrew Metrick

The New York Times

- Lower revenue growth rates, as revenues scale up.
- Keep track of dollar revenues, as you go through time, measuring against market size.

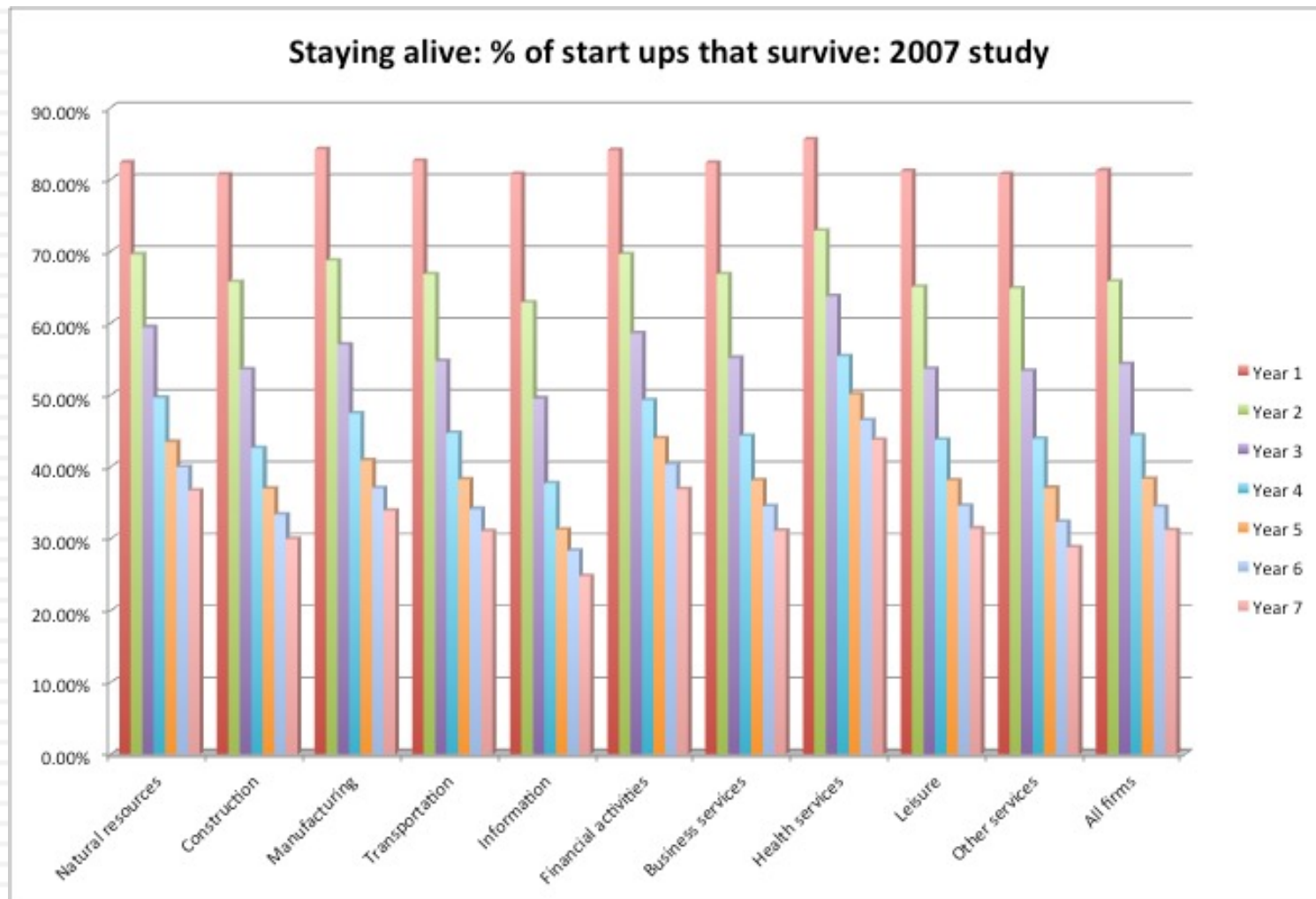
Lesson 4: Don't forget to pay for growth...

Year	Revenues	Δ Revenue	Sales/Cap	Δ Investment	Invested Capital	EBIT (1-t)	Imputed ROC
Tr 12 mths	\$1,117				\$ 487	-\$410	
1	\$2,793	\$1,676	3.00	\$559	\$ 1,045	-\$373	-76.62%
2	\$5,585	\$2,793	3.00	\$931	\$ 1,976	-\$94	-8.96%
3	\$9,774	\$4,189	3.00	\$1,396	\$ 3,372	\$407	20.59%
4	\$14,661	\$4,887	3.00	\$1,629	\$ 5,001	\$871	25.82%
5	\$19,059	\$4,398	3.00	\$1,466	\$ 6,467	\$1,058	21.16%
6	\$23,862	\$4,803	3.00	\$1,601	\$ 8,068	\$1,438	22.23%
7	\$28,729	\$4,868	3.00	\$1,623	\$ 9,691	\$1,799	22.30%
8	\$33,211	\$4,482	3.00	\$1,494	\$ 11,185	\$2,119	21.87%
9	\$36,798	\$3,587	3.00	\$1,196	\$ 12,380	\$2,370	21.19%
10	\$39,006	\$2,208	3.00	\$736	\$ 13,116	\$2,524	20.39%
TY	\$41,346	\$2,340	NA		Assumed to be =		20.00%

Lesson 5: The dilution is taken care off..

- With young growth companies, it is almost a given that the number of shares outstanding will increase over time for two reasons:
 - ▣ To grow, the company will have to issue new shares either to raise cash to take projects or to offer to target company stockholders in acquisitions
 - ▣ Many young, growth companies also offer options to managers as compensation and these options will get exercised, if the company is successful.
- Both effects are already incorporated into the value per share, even though we use the current number of shares in estimating value per share
 - ▣ The need for new equity issues is captured in negative cash flows in the earlier years. The present value of these negative cash flows will drag down the current value of equity and this is the effect of future dilution. In the Amazon valuation, the value of equity is reduced by \$3.09 billion (the present value of negative FCFF in the first 6 years), about a 16% reduction. That takes care of new issues in the future.
 - ▣ The existing options are valued and netted out against the current value, taking care of the option overhang. The future earnings are after stock based compensation expenses (don't fall for the "its not a cash expense" ploy) to take care of future option grants.

Lesson 6: If you are worried about failure, incorporate into value

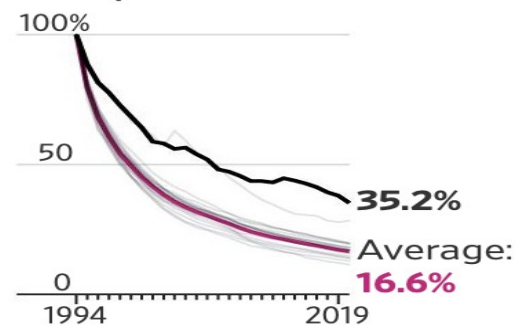


A 2019 Update: Sector Comparison

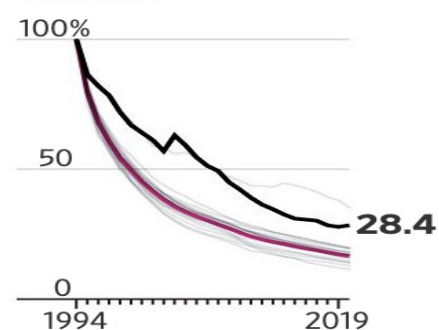
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Sectors with highest and lowest annual survival rate, compared to all sectors

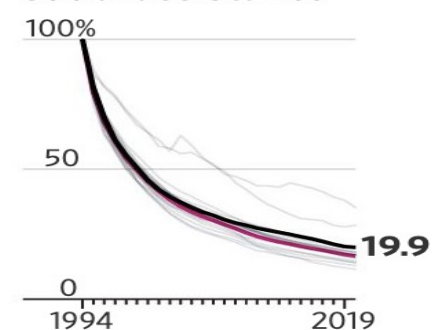
Management of companies and enterprises



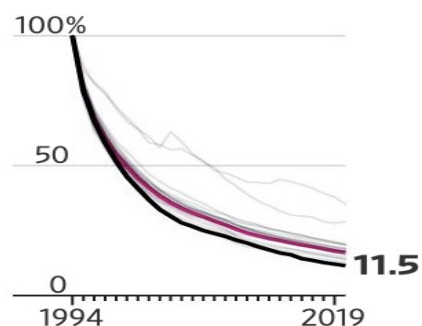
Utilities



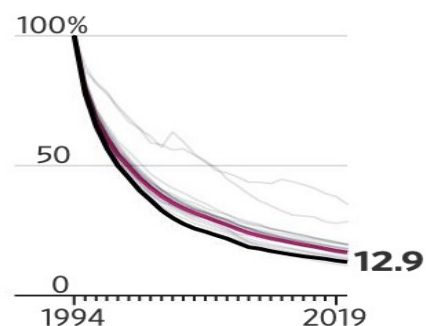
Health care and social assistance



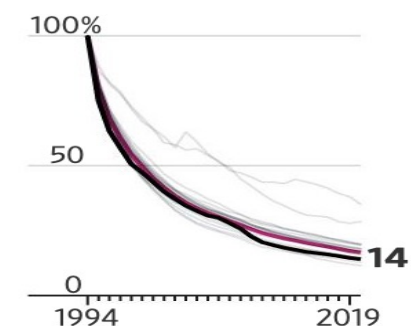
Information



Transportation and warehousing



Wholesale trade



Source: Bureau of Labor Statistics, Business Employment Dynamics data

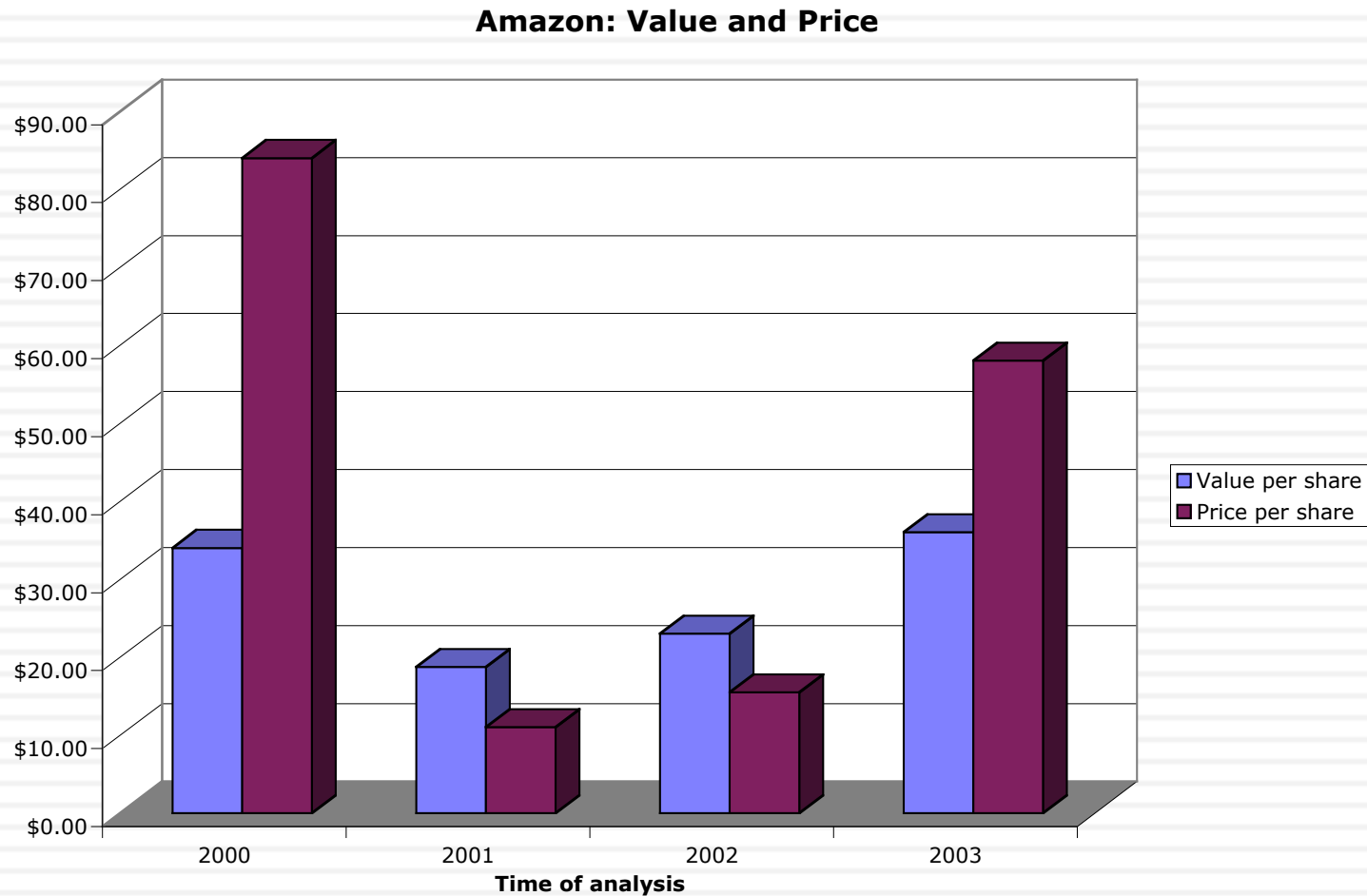
Lesson 7: There are always scenarios where the market price can be justified...

	6%	8%	10%	12%	14%
30%	\$ (1.94)	\$ 2.95	\$ 7.84	\$ 12.71	\$ 17.57
35%	\$ 1.41	\$ 8.37	\$ 15.33	\$ 22.27	\$ 29.21
40%	\$ 6.10	\$ 15.93	\$ 25.74	\$ 35.54	\$ 45.34
45%	\$ 12.59	\$ 26.34	\$ 40.05	\$ 53.77	\$ 67.48
50%	\$ 21.47	\$ 40.50	\$ 59.52	\$ 78.53	\$ 97.54
55%	\$ 33.47	\$ 59.60	\$ 85.72	\$ 111.84	\$ 137.95
60%	\$ 49.53	\$ 85.10	\$ 120.66	\$ 156.22	\$ 191.77

Lesson 8: You will be wrong 100% of the time and it really is not your fault...

- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.
- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.
- A test: If your valuations are unbiased, you should find yourself increasing estimated values as often as you are decreasing values. In other words, there should be equal doses of good and bad news affecting valuations (at least over time).

And the market is often “more wrong”....



Assessing my 2000 forecasts, in 2014

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Year	Revenues		Operating Income		Operating Margin	
	My forecast (2000)	Actual	My forecast (2000)	Actual	My forecast (2000)	Actual
2000	\$2,793	\$2,762	-\$ 373	-\$ 664.00	-13.35%	-24.04%
2001	\$5,585	\$3,122	-\$ 94	-\$ 231.00	-1.68%	-7.40%
2002	\$9,774	\$3,932	\$ 407	\$ 106.00	4.16%	2.70%
2003	\$14,661	\$5,264	\$ 1,038	\$ 271.00	7.08%	5.15%
2004	\$19,059	\$6,921	\$ 1,628	\$ 440.00	8.54%	6.36%
2005	\$23,862	\$8,490	\$ 2,212	\$ 432.00	9.27%	5.09%
2006	\$28,729	\$10,711	\$ 2,768	\$ 389.00	9.63%	3.63%
2007	\$33,211	\$14,835	\$ 3,261	\$ 655.00	9.82%	4.42%
2008	\$36,798	\$19,166	\$ 3,646	\$ 842.00	9.91%	4.39%
2009	\$39,006	\$24,509	\$ 3,883	\$ 1,129.00	9.95%	4.61%
2010	\$41,346	\$34,204	\$ 4,135	\$ 1,406.00	10.00%	4.11%
2011	\$43,827	\$48,077	\$ 4,383	\$ 862.00	10.00%	1.79%
2012	\$46,457	\$61,093	\$ 4,646	\$ 676.00	10.00%	1.11%
2013	\$49,244	\$74,452	\$ 4,925	\$ 745.00	10.00%	1.00%
2014 (LTM)	\$51,460	\$85,247	\$ 5,146.35	\$ 97.00	10.00%	0.11%

Amazon

The Greatest (and most Feared) Disruptive Platform in History

Amazon will complete its metaphorsis from being a retail company to one that can take its competitive advantages - access to capital & willingness to lose money for long periods, while disrupting and changing the status quo - to any business that it targets, giving it the potential for high revenue growth on top of already-large revenues. It will be able to use the pricing power it accumulates in each business it is in, to increase profit margins, partly through economies of scale and partly through higher prices. Its low debt ratio and divergent business mix give it a low cost of capital.

The Assumptions

	Base year	Years 1-5	Years 6-10		After year 10	Link to story
Revenues (a)	\$ 208,125	15.00% → 3.00%			3.00%	Expanding into new businesses
Operating margin (b)	7.71%	7.71% → 12.50%			12.50%	Economies of scale and pricing power increase margins
Tax rate	20.20%	20.20% → 24.00%			24.00%	Converging on a global tax rate of 25%
Reinvestment (c)		Sales to capital ratio 5.95		RIR =	30.00%	Big payoffs from investing in technology and content
Return on capital	15.24%	Marginal ROIC =	89.16%		10.00%	The last man standing...
Cost of capital (d)		7.97% → 7.50%			7.50%	Low debt & diverse business mix

The Cash Flows

	Revenues	Operating Margin	EBIT	EBIT (1-t)	Reinvestment	FCFF
1	\$ 239,344	8.67%	\$ 20,753	\$ 16,560	\$ 5,249	\$ 11,311
2	\$ 275,245	9.63%	\$ 26,501	\$ 21,147	\$ 6,037	\$ 15,110
3	\$ 316,532	10.59%	\$ 33,506	\$ 26,736	\$ 6,942	\$ 19,794
4	\$ 364,012	11.54%	\$ 42,017	\$ 33,527	\$ 7,983	\$ 25,544
5	\$ 418,614	12.50%	\$ 52,327	\$ 41,754	\$ 9,181	\$ 32,573
6	\$ 471,359	12.50%	\$ 58,920	\$ 46,568	\$ 8,869	\$ 37,699
7	\$ 519,438	12.50%	\$ 64,930	\$ 50,825	\$ 8,084	\$ 42,741
8	\$ 559,954	12.50%	\$ 69,994	\$ 54,258	\$ 6,813	\$ 47,446
9	\$ 590,191	12.50%	\$ 73,774	\$ 56,628	\$ 5,084	\$ 51,544
10	\$ 607,897	12.50%	\$ 75,987	\$ 57,750	\$ 2,977	\$ 54,773
Terminal year	\$ 626,134	12.50%	\$ 78,267	\$ 59,483	\$ 17,845	\$ 41,638

The Value

Terminal value	\$ 925,287		
PV(Terminal value)	\$ 435,438		
PV (CF over next 10 years)	\$ 206,707		
Value of operating assets =	\$ 642,144		
Adjustment for distress	\$ -	Probability of failure =	0.00%
- Debt & Mnority Interests	\$ 45,435		
+ Cash & Other Non-operating assets	\$ 27,050		
Value of equity	\$ 623,759		
- Value of equity options	\$ -		
Number of shares	497.00		
Value per share	\$ 1,255.05	Stock was trading at =	\$1,970.19

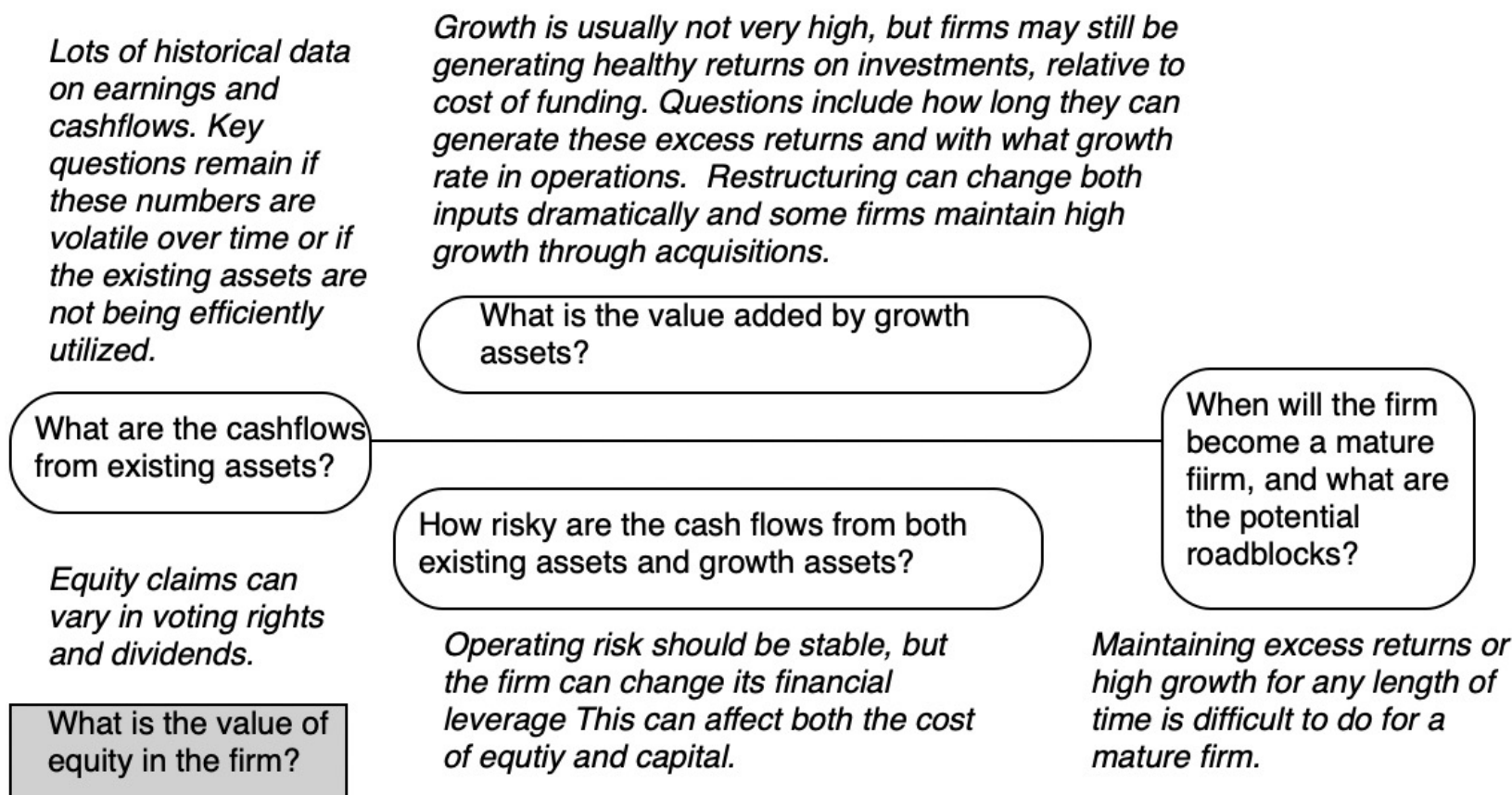
II. Mature Companies in transition..

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- Mature companies are generally the easiest group to value. They have long, established histories that can be mined for inputs. They have investment policies that are set and capital structures that are stable, thus making valuation more grounded in past data.
- However, this stability in the numbers can mask real problems at the company. The company may be set in a process, where it invests more or less than it should and does not have the right financing mix. In effect, the policies are consistent, stable and bad.
- If you expect these companies to change or as is more often the case to have change thrust upon them,

The perils of valuing mature companies...

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Hormel Foods: The Value of Control Changing

Hormel Foods sells packaged meat and other food products and has been in existence as a publicly traded company for almost 80 years. In 2008, the firm reported after-tax operating income of \$315 million, reflecting a compounded growth of 5% over the previous 5 years.

The Status Quo

Run by existing management, with conservative reinvestment policies (reinvestment rate = 14.34% and debt ratio = 10.4%.

Anemic growth rate and short growth period, due to reinvestment policy

Low debt ratio affects cost of capital

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	\$315							
1	\$324	2.75%	14.34%	19.14%	\$62	\$262	6.79%	\$245
2	\$333	2.75%	14.34%	19.14%	\$64	\$269	6.79%	\$236
3	\$342	2.75%	14.34%	19.14%	\$65	\$276	6.79%	\$227
Beyond	\$350	2.35%	7.23%	32.52%	\$114	\$4,840	7.23%	\$3,974
Value of operating assets								\$4,682
(Add) Cash								\$155
(Subtract) Debt								\$491
(Subtract) Management Options								\$53
Value of equity in common stock								\$4,293
Value per share								\$31.91

New and better management

More aggressive reinvestment which increases the reinvestment rate (to 40%) and tlength of growth (to 5 years), and higher debt ratio (20%).

Operating Restructuring ①

Expected growth rate = $ROC \times \text{Reinvestment Rate}$
 Expected growth rate (status quo) = $14.34\% \times 19.14\% = 2.75\%$
 Expected growth rate (optimal) = $14.00\% \times 40\% = 5.60\%$
 ROC drops, reinvestment rises and growth goes up.

Financial restructuring ②

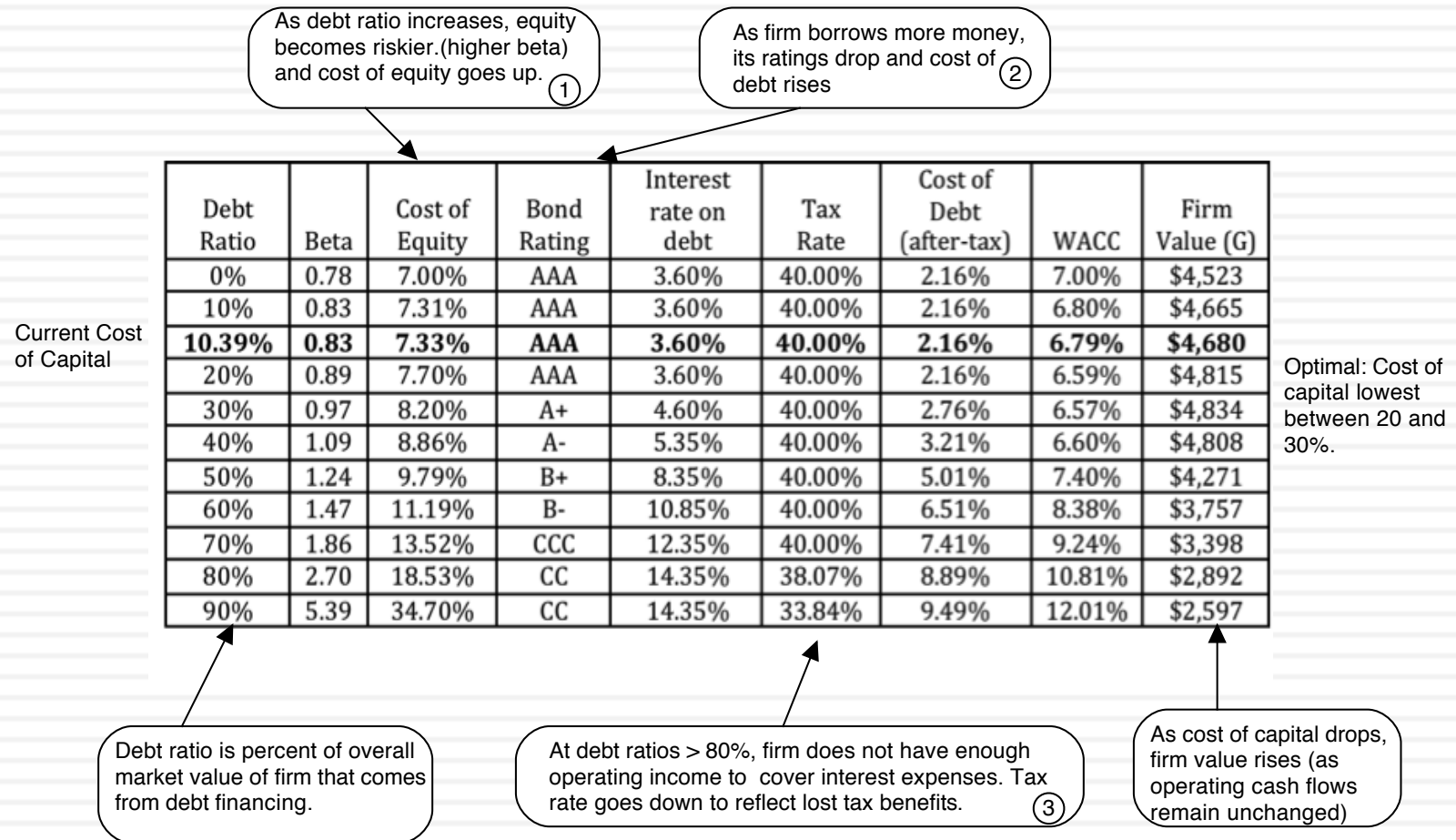
Cost of capital = Cost of equity (1-Debt ratio) + Cost of debt (Debt ratio)
 Status quo = $7.33\% (1-.104) + 3.60\% (.104) = 6.79\%$
 Optimal = $7.75\% (1-.20) + 3.60\% (.20) = 6.63\%$
 Cost of equity rises but cost of capital drops.

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	\$315							
1	\$333	5.60%	14.00%	40.00%	\$133	\$200	6.63%	\$187
2	\$351	5.60%	14.00%	40.00%	\$141	\$211	6.63%	\$185
3	\$371	5.60%	14.00%	40.00%	\$148	\$223	6.63%	\$184
4	\$392	5.60%	14.00%	40.00%	\$260	\$235	6.63%	\$182
5	\$414	5.60%	14.00%	40.00%	\$223	\$248	6.63%	\$180
Beyond	\$423	2.35%	6.74%	34.87%	\$148	\$6,282	6.74%	\$4,557
Value of operating assets								\$5,475
(Add) Cash								\$155
(Subtract) Debt								\$491
(Subtract) Management Options								\$53
Value of equity in common stock								\$5,085
Value per share								\$37.80

Financial leverage is a double-edged sword..

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Exhibit 7.1: Optimal Financing Mix: Hormel Foods in January 2009



III. Dealing with decline and distress...

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Historical data often reflects flat or declining revenues and falling margins. Investments often earn less than the cost of capital.

Growth can be negative, as firm sheds assets and shrinks. As less profitable assets are shed, the firm's remaining assets may improve in quality.

What is the value added by growth assets?

What are the cashflows from existing assets?

Underfunded pension obligations and litigation claims can lower value of equity. Liquidation preferences can affect value of equity

What is the value of equity in the firm?

How risky are the cash flows from both existing assets and growth assets?

Depending upon the risk of the assets being divested and the use of the proceeds from the divestiture (to pay dividends or retire debt), the risk in both the firm and its equity can change.

When will the firm become a mature firm, and what are the potential roadblocks?

There is a real chance, especially with high financial leverage, that the firm will not make it. If it is expected to survive as a going concern, it will be as a much smaller entity.

a. Dealing with Decline

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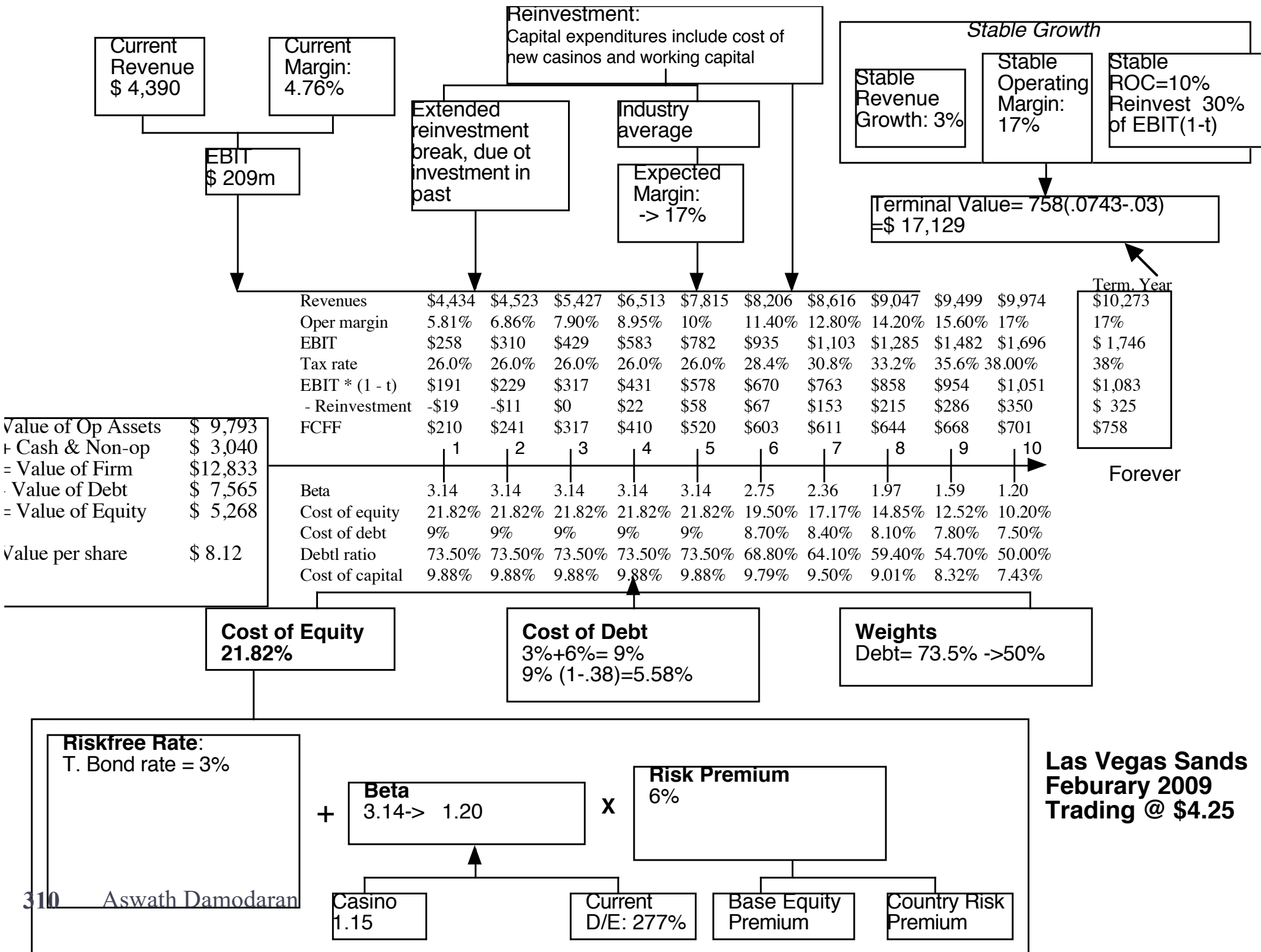
- In decline, firms often see declining revenues and lower margins, translating in negative expected growth over time.
- If these firms are run by good managers, they will not fight decline. Instead, they will adapt to it and shut down or sell investments that do not generate the cost of capital. This can translate into negative net capital expenditures (depreciation exceeds cap ex), declining working capital and an overall negative reinvestment rate. The best case scenario is that the firm can shed its bad assets, make itself a much smaller and healthier firm and then settle into long-term stable growth.
- As an investor, your worst case scenario is that these firms are run by managers in denial who continue to expand the firm by making bad investments (that generate lower returns than the cost of capital). These firms may be able to grow revenues and operating income but will destroy value along the way.

Bed, Bath & Beyond						Sep-22
Incredible Shrinking Store						
Bed Bath and Beyond is in a downward spiral, but we see a glimmer of hope, where the company shuts stores that require the most capital and get the least foot traffic over the next decade, shrinking already-shrunk revenues further, but seeing its operating margins improve to the US brick-and-mortar sector average margin, over the next five years. Along the way, the divestitures and shut downs will release cash that can be returned and used to pay down debt. By the end of the forecast period, BB&B finds a niche market, albeit with a smaller footprint, growing at the same rate as the economy and earning no excess returns..						
The Assumptions						
	Base year	Next year	Years 2-5	Years 6-10	After year 10	Link to story
Revenues (a)	\$7,868.00	-10.0%	-5.00%	3.00%	3.00%	Disruption platform in multiple businesses
Operating margin (b)	-1.00%	-1.0%	-1.00%	5.54%	5.54%	Margins improve, aided by cloud business & continued economies of scale.
Tax rate	25.00%		25.00%	25.00%	25.00%	Global/US marginal tax rate over time
Reinvestment (c)		2.00	2.00	2.00	30.00%	Maintained at Amazon's current level
Return on capital	-2.80%	Marginal ROIC =	-57.31%		10.00%	Strong competitive edges
Cost of capital (d)			8.79%	7.50%	7.50%	Cost of capital close to median company
The Cash Flows						
	Revenues	Operating Margin	EBIT	EBIT (1-t)	Reinvestment	FCFF
1	\$7,081.20	-1.00%	-\$70.81	-\$70.81	\$0.00	-\$70.81
2	\$6,727.14	1.62%	\$108.72	\$108.72	-\$177.03	\$285.75
3	\$6,390.78	2.92%	\$186.89	\$186.89	-\$168.18	\$355.06
4	\$6,071.24	4.23%	\$256.96	\$256.96	-\$159.77	\$416.73
5	\$5,767.68	5.54%	\$319.56	\$244.23	-\$151.78	\$396.01
6	\$5,571.58	5.54%	\$308.69	\$231.52	-\$98.05	\$329.57
7	\$5,471.29	5.54%	\$303.14	\$227.35	-\$50.14	\$277.50
8	\$5,460.35	5.54%	\$302.53	\$226.90	-\$5.47	\$232.37
9	\$5,536.79	5.54%	\$306.77	\$230.07	\$38.22	\$191.85
10	\$5,702.90	5.54%	\$315.97	\$236.98	\$83.05	\$153.92
Terminal year	\$5,873.99	5.54%	\$325.45	\$244.09	\$73.23	\$170.86
The Value						
Terminal value	\$3,796.89					
PV(Terminal value)	\$1,695.10					
PV (CF over next 10 years)	\$1,644.97					
Value of operating assets =	\$3,340.07					
Adjustment for distress	\$396.47		Probability of failure = 23.74%			
- Debt & Minority Interests	\$3,085.00					
+ Cash & Other Non-operating assets	\$440.00					
Value of equity	\$298.60					
- Value of equity options	\$0.00					
Number of shares	92.50					
Value per share	\$3.23		Stock was trading at = \$8.79			

b. Dealing with the “downside” of Distress

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- A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cashflows (a distress sale value), DCF valuations will overstate the value of the firm.
- $\text{Value of Equity} = \text{DCF value of equity} (1 - \text{Probability of distress}) + \text{Distress sale value of equity} (\text{Probability of distress})$
- There are three ways in which we can estimate the probability of distress:
 - Use the bond rating to estimate the cumulative probability of distress over 10 years
 - Estimate the probability of distress with a probit
 - Estimate the probability of distress by looking at market value of bonds..
- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).



Adjusting the value of LVS for distress..

- Ratings based approach: In February 2009, Las Vegas Sands was rated B+, and based upon history (previous ten years), the likelihood of default is 28.25%.
- Bond Price based: In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at \$529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

$$529 = \sum_{t=1}^{t=7} \frac{63.75(1 - \pi_{\text{Distress}})^t}{(1.03)^t} + \frac{1000(1 - \pi_{\text{Distress}})^7}{(1.03)^7}$$

π_{Distress} = Annual probability of default = 13.54%

Cumulative probability of surviving 10 years = $(1 - .1354)^{10} = 23.34\%$

Cumulative probability of distress over 10 years = $1 - .2334 = .7666$ or 76.66%

- If LVS is becomes distressed:
 - ▣ Expected distress sale proceeds = \$2,769 million < Face value of debt
 - ▣ Expected equity value/share = \$0.00
- Expected value per share
 - ▣ With ratings-based approach: $\$8.12 (.7175) + \$0 (.2825) = \$5.83$
 - ▣ With bond-based approach: $\$8.12 (1 - .7666) + \$0.00 (.7666) = \$1.92$

IV. Emerging Market Companies

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Estimation Issues - Emerging Market Companies

Big shifts in economic environment (inflation, interest rates) can affect operating earnings history. Poor corporate governance and weak accounting standards can lead to lack of transparency on earnings.

Growth rates for a company will be affected heavily by growth rate and political developments in the country in which it operates.

What is the value added by growth assets?

What are the cashflows from existing assets?

Cross holdings can affect value of equity

What is the value of equity in the firm?

How risky are the cash flows from both existing assets and growth assets?

Even if the company's risk is stable, there can be significant changes in country risk over time.

When will the firm become a mature firm, and what are the potential roadblocks?

Economic crises can put many companies at risk. Government actions (nationalization) can affect long term value.

Lesson 1: Country risk has to be incorporated... but with a scalpel, not a bludgeon

313

- Emerging market companies are undoubtedly exposed to additional country risk because they are incorporated in countries that are more exposed to political and economic risk.
- Not all emerging market companies are equally exposed to country risk and many developed markets have emerging market risk exposure because of their operations.
- You can use either the “weighted country risk premium”, with the weights reflecting the countries you get your revenues from or the lambda approach (which may incorporate more than revenues) to capture country risk exposure.

Lesson 2: Currency should not matter

314

- You can value any company in any currency. Thus, you can value a Brazilian company in nominal reais, US dollars or Swiss Francs.
- For your valuation to stay invariant and consistent, your cash flows and discount rates have to be in the same currency. Thus, if you are using a high inflation currency, both your growth rates and discount rates will be much higher.
- For your cash flows to be consistent, you have to use expected exchange rates that reflect purchasing power parity (the higher inflation currency has to depreciate by the inflation differential each year).

Valuing Infosys: In US\$ and Indian Rupees

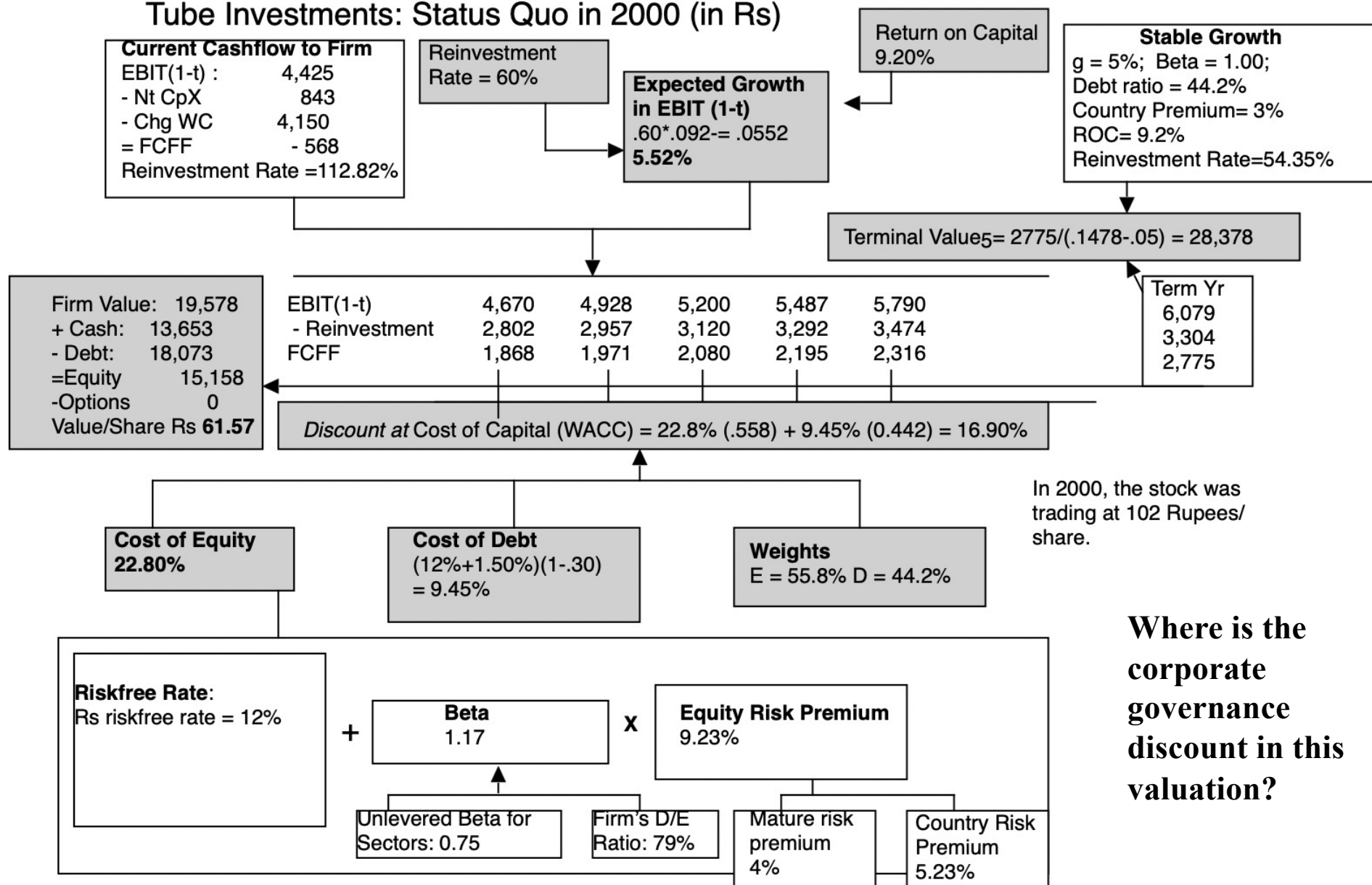
	In Indian Rupees	In US \$
Risk free Rate	5.00%	2.00%
Expected inflation rate	4.00%	1.00%
Cost of capital		
- High Growth	12.50%	9.25%
- Stable Growth	10.39%	7.21%
Expected growth rate		
- High Growth	12.01%	8.78%
- Stable Growth	5.00%	2.00%
Return on Capital		
- High Growth	17.16%	13.78%
- Stable Growth	10.39%	7.21%
Value per share	Rs 614	\$12.79/share (roughly Rs 614 at current exchange rate)

Lesson 3: The “corporate governance” drag

316

- Stockholders in Asian, Latin American and many European companies have little or no power over the managers of the firm. In many cases, insiders own voting shares and control the firm and the potential for conflict of interests is huge.
- This weak corporate governance is often a reason for given for using higher discount rates or discounting the estimated value for these companies.
- Would you discount the value that you estimate for an emerging market company to allow for this absence of stockholder power?
 - a. Yes
 - b. No.

Tube Investments: Status Quo in 2000 (in Rs)



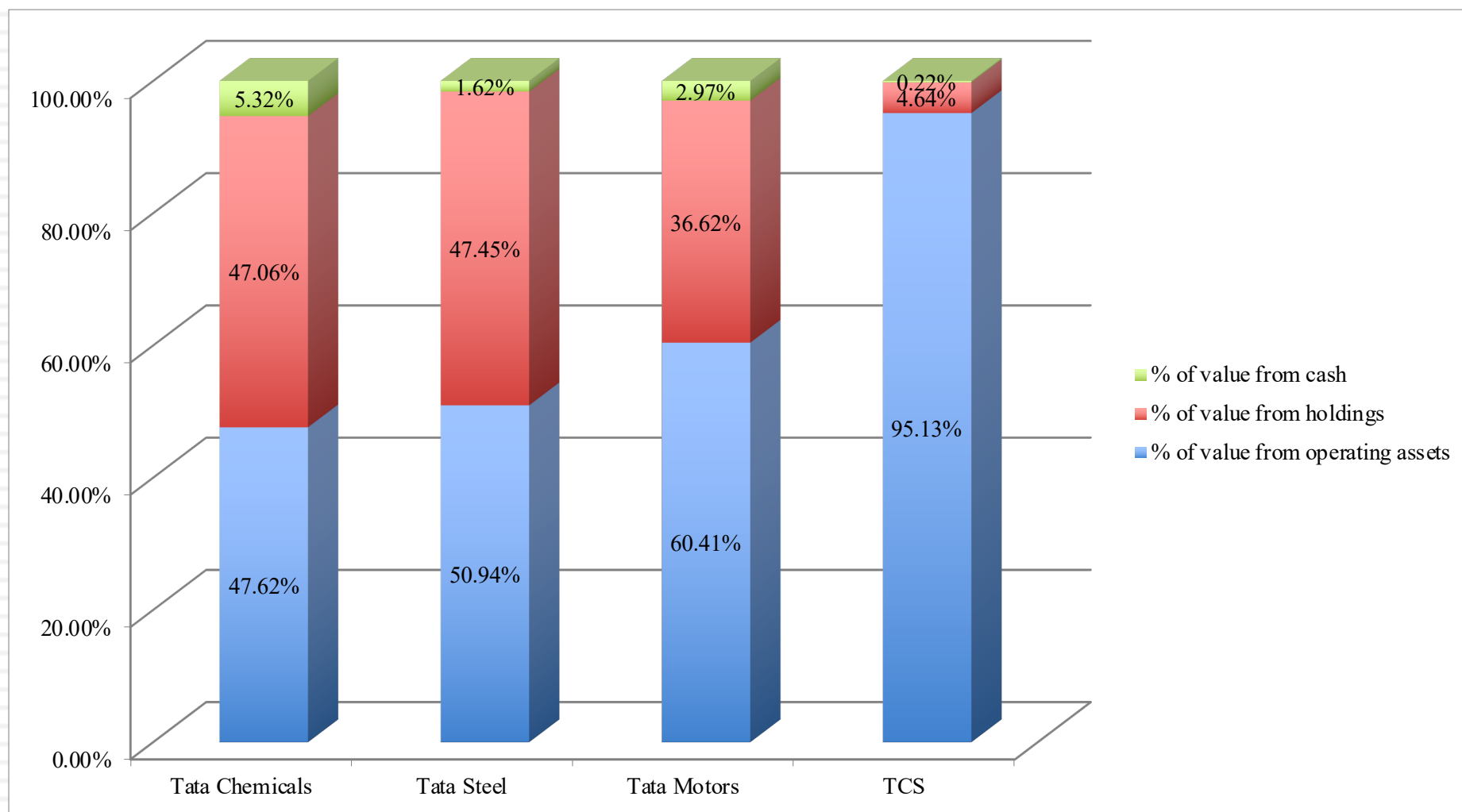
Lesson 4: Watch out for cross holdings...

318

- Emerging market companies are more prone to having cross holdings than companies in developed markets.
 - This is partially the result of history (since many of the larger public companies used to be family owned businesses until a few decades ago)
 - And partly because those who run these companies value control (and use cross holdings to preserve this control).
- In many emerging market companies, the real process of valuation begins when you have finished your DCF valuation, since the cross holdings (which can be numerous) have to be valued, often with minimal information.

Tata Companies in 2010: Value Breakdown

319



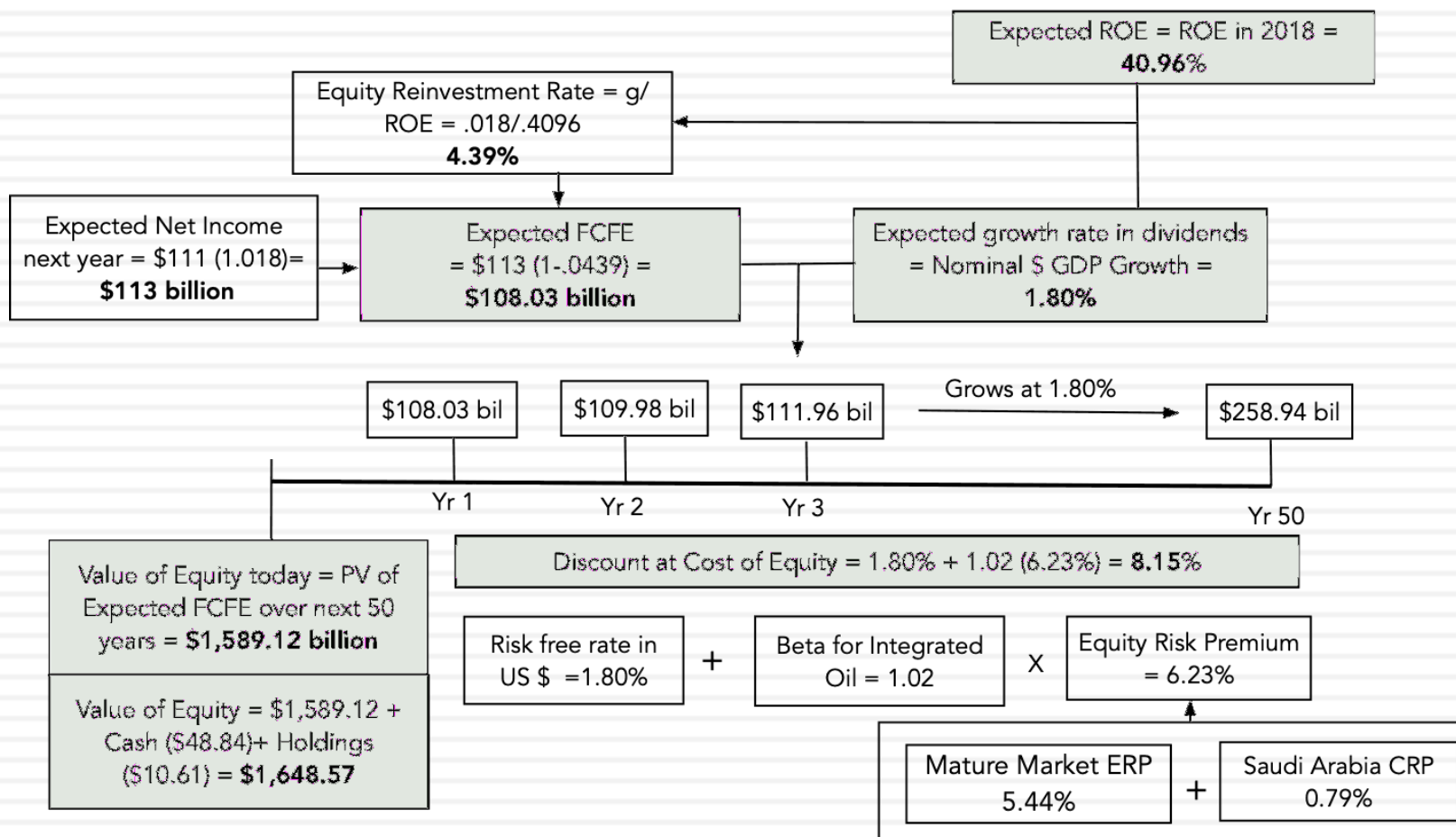
Lesson 5: Truncation risk can come in many forms...

320

- Natural disasters: Small companies in some economies are much exposed to natural disasters (hurricanes, earthquakes), without the means to hedge against that risk (with insurance or derivative products).
- Terrorism risk: Companies in some countries that are unstable or in the grips of civil war are exposed to damage or destruction.
- Nationalization risk: While less common than it used to be, there are countries where businesses may be nationalized, with owners receiving less than fair value as compensation.

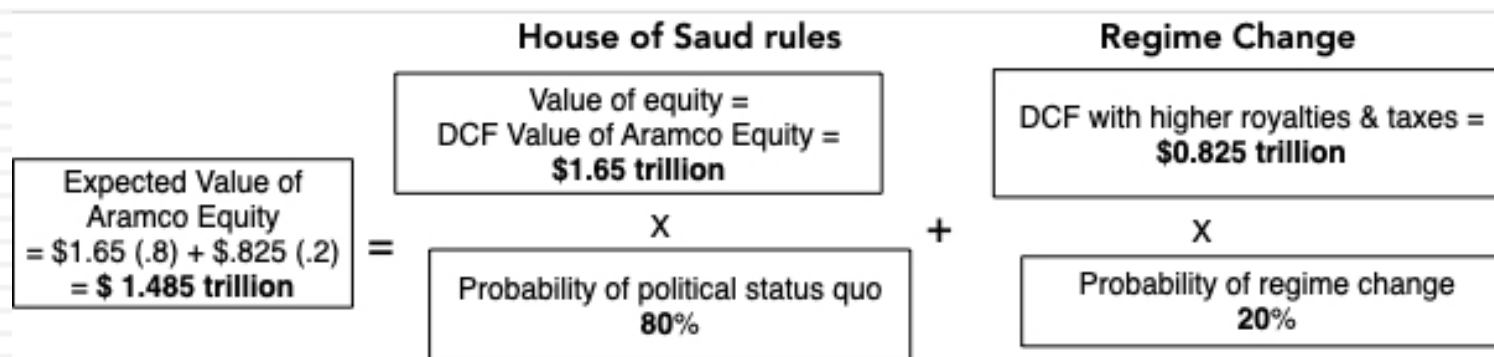
Valuing Aramco: Potential Dividends

A Potential Dividend (FCFE) Discount Model Valuation of Aramco



Adjusting for regime change

- If you believe that there is no chance of regime change, your expected value will remain \$1.65 trillion.
- If you believe that regime change is imminent, and that your equity will be fully expropriated, your expected value will be zero.
- If you believe that there remains a non-trivial chance (perhaps as high as 20%) that there will be a regime change and that if there is one, there will be changes that reduce, but not extinguish, your equity claim:



V. Valuing Financial Service Companies

323

Existing assets are usually financial assets or loans, often marked to market. Earnings do not provide much information on underlying risk.

Defining capital expenditures and working capital is a challenge. Growth can be strongly influenced by regulatory limits and constraints. Both the amount of new investments and the returns on these investments can change with regulatory changes.

What is the value added by growth assets?

What are the cashflows from existing assets?

Preferred stock is a significant source of capital.

What is the value of equity in the firm?

How risky are the cash flows from both existing assets and growth assets?

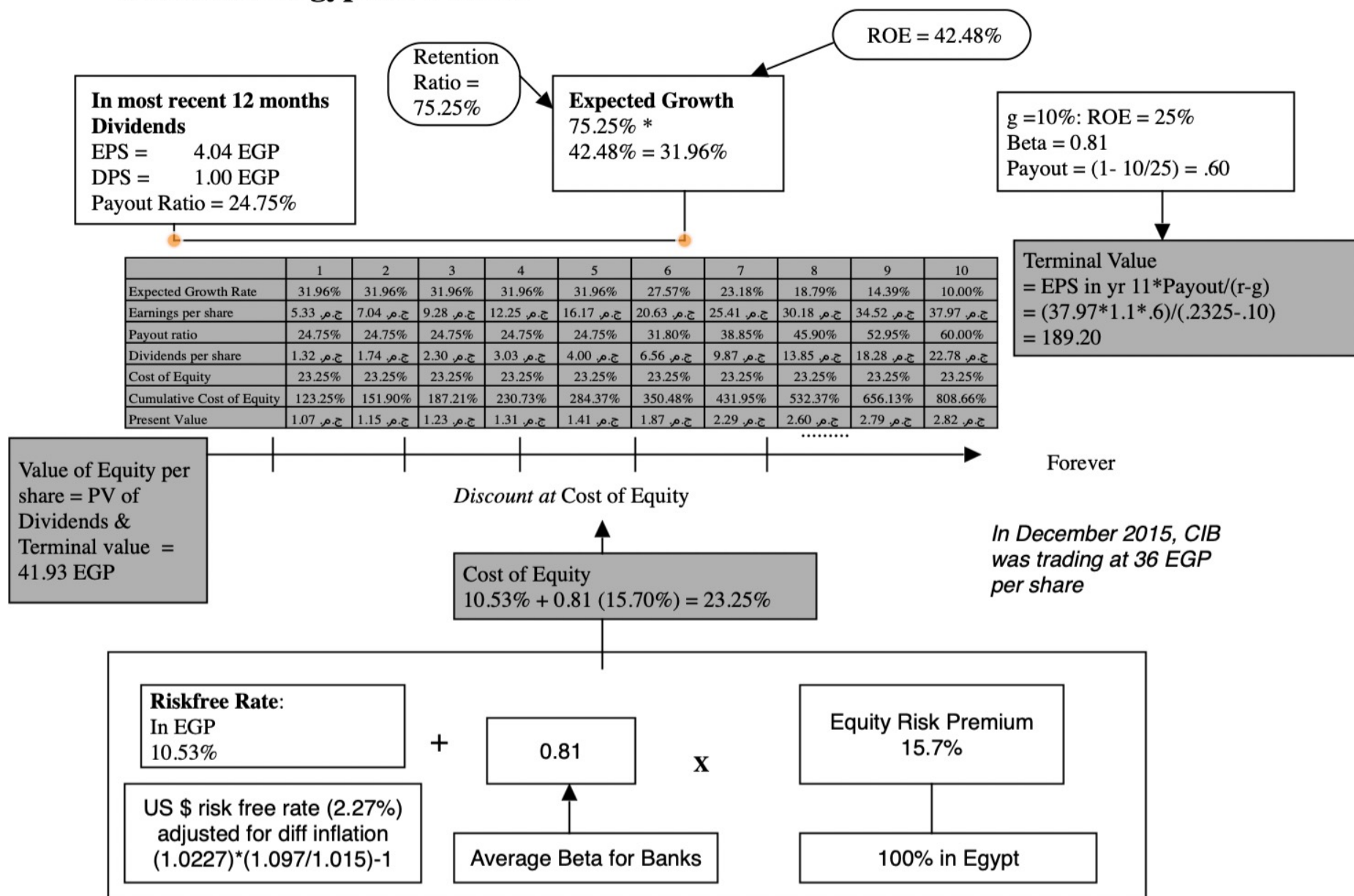
For financial service firms, debt is raw material rather than a source of capital. It is not only tough to define but if defined broadly can result in high financial leverage, magnifying the impact of small operating risk changes on equity risk.

When will the firm become a mature firm, and what are the potential roadblocks?

In addition to all the normal constraints, financial service firms also have to worry about maintaining capital ratios that are acceptable to regulators. If they do not, they can be taken over and shut down.

CIB Egypt in December 2015

Valuation in Egyptian Pounds



Lesson 1: Financial service companies are opaque...

325

- With financial service firms, we enter into a Faustian bargain. They tell us very little about the quality of their assets (loans, for a bank, for instance are not broken down by default risk status) but we accept that in return for assets being marked to market (by accountants who presumably have access to the information that we don't have).
- In addition, estimating cash flows for a financial service firm is difficult to do. So, we trust financial service firms to pay out their cash flows as dividends. Hence, the use of the dividend discount model.
- During times of crises or when you don't trust banks to pay out what they can afford to in dividends, using the dividend discount model may not give you a "reliable" value.

Lesson 2: For financial service companies, book value matters...

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- The book value of assets and equity is mostly irrelevant when valuing non-financial service companies. After all, the book value of equity is a historical figure and can be nonsensical. (The book value of equity can be negative and is so for more than a 1000 publicly traded US companies)
- With financial service firms, book value of equity is relevant for two reasons:
 - Since financial service firms mark to market, the book value is more likely to reflect what the firms own right now (rather than a historical value)
 - The regulatory capital ratios are based on book equity. Thus, a bank with negative or even low book equity will be shut down by the regulators.
- From a valuation perspective, it therefore makes sense to pay heed to book value. In fact, you can argue that reinvestment for a bank is the amount that it needs to add to book equity to sustain its growth ambitions and safety requirements:
 - $FCFE = \text{Net Income} - \text{Reinvestment in regulatory capital (book equity)}$

Deutsche Bank: A Crisis Valuation (October 2016)

Risk adjusted assets grows at inflation rate of 1% a year forever.

Tier 1 capital ratio increases to 15.67%, the 75th percentile for all banks

Expected DOJ fine of \$10 billions lower Tier 1 capital today

Common Equity increases in tandem with Tier 1 capital

Cost of equity starts at 10.2% (75th percentile of banks) & decreases after year 5 to 9.44% (median across banks).

	Current	1	2	3	4	5	6	7	8	9	10
Risk Adjusted Assets	\$ 445,570	\$ 450,026	\$ 454,526	\$ 459,071	\$ 463,662	\$ 468,299	\$ 472,982	\$ 477,711	\$ 482,488	\$ 487,313	\$ 492,186
Tier 1 Capital Ratio	12.41%	13.74%	13.95%	14.17%	14.38%	14.60%	14.81%	15.03%	15.24%	15.46%	15.67%
Tier 1 Capital (Risk Adjusted Assets * Tier 1 Capital Ratio)	\$55,282	\$61,834	\$63,427	\$65,045	\$66,690	\$68,361	\$70,059	\$71,784	\$73,537	\$75,317	\$77,126
Change in regulatory capital (Tier 1)		\$6,552	\$1,593	\$1,619	\$1,645	\$1,671	\$1,698	\$1,725	\$1,753	\$1,780	\$1,809
Book Equity	\$64,609	\$71,161	\$72,754	\$74,372	\$76,017	\$77,688	\$79,386	\$81,111	\$82,864	\$84,644	\$86,453
Expected ROE	-13.70%	-7.18%	-2.84%	0.06%	1.99%	5.85%	6.568%	7.286%	8.004%	8.722%	9.440%
Net Income (Book Equity * ROE)	\$ (8,851)	\$ (5,111)	\$ (2,065)	\$ 43	\$ 1,512	\$ 4,545	\$ 5,214	\$ 5,910	\$ 6,632	\$ 7,383	\$ 8,161
- Investment in Regulatory Capital		\$ 6,552	\$ 1,593	\$ 1,619	\$ 1,645	\$ 1,671	\$ 1,698	\$ 1,725	\$ 1,753	\$ 1,780	\$ 1,809
FCFE		\$ (11,663)	\$ (3,658)	\$ (1,576)	\$ (133)	\$ 2,874	\$ 3,516	\$ 4,185	\$ 4,880	\$ 5,602	\$ 6,352
Terminal value of equity											\$87,317
Present value		\$ (10,583)	\$ (3,012)	\$ (1,178)	\$ (90)	\$ 1,768	\$ 1,966	\$ 2,129	\$ 2,262	\$ 2,370	\$ 36,207
Cost of equity	10.20%	10.20%	10.20%	10.20%	10.20%	10.20%	10.048%	9.896%	9.744%	9.592%	9.440%
Cumulative Cost of equity		1.1020	1.2144	1.3383	1.4748	1.6252	1.7885	1.9655	2.1570	2.3639	2.5871
Value of equity today =	\$31,838.74										
Number of shares outstanding =	1386.00										
DCF Value per share =	\$ 22.97										
Probability of equity wipeout	10.00%										
Adjusted value per share =	\$ 20.67										
Stock price on October 3, 2016 =	\$ 13.33										

Value per share adjusted for probability of catastrophic failure (bailout) resulting in complete loss of equity.

Return on equity increases to 5.85% (25th percentile of banks) in year 5 and 9.44% (cost of equity) in year 10

Lesson 3: Not all financial service firms are built alike..

328

- Financial service is a broad category, and while banks may be its most substantive component, there are a range of other companies, with very different business models.
- For instance, payment processing companies and credit card companies are also financial service companies, but they derive their value from
 - ▣ Getting consumers to use their platforms to make payments to businesses or to each other, resulting in transactions on the platform (called Gross Merchandising Value or GMV)
 - ▣ Keeping a slice, called a take rate, of the GMV for themselves.

Paytm						Sep-21
The Story						
Paytm will continue its dominance of the Indian mobile payment market, while that market continues to grow. Along the way, its management will focus more on converting transactions on its platform into revenues, and revenues into operating income.						
The Assumptions						
	Base year	Next year	Years 2-5	Years 6-10	After year 10	Link to story
GMV	₹ 4,033,000	40.00%	40.00%	→ 4.19%	4.19%	Growing mobile payment market
Revenue as % of GMV	0.79%	0.83%	1.00%	→ 2.00%	2.00%	Take rate improves, as company matures
Operating margin (b)	-49.00%	-20.0%	5.00%	→ 30.00%	30.00%	High-margin intermediary business
Tax rate	25.00%		25.00%	→ 25.00%	25.00%	Converge on statutory tax rate
Reinvestment (c)		3.00	2.45	→ 2.45	27.93%	Industry average reinvestment, for capital intensive business.
Return on capital	-21.78%	Marginal ROIC =	80.13%		15.00%	Competitive advantages fade over time.
Cost of capital (d)			10.44%	→ 8.91%	8.91%	Cost of capital relatively stable.
The Cash Flows						
	GMV	Revenues	Operating Margin	EBIT (1-t)	Reinvestment	FCFF
1	₹ 5,646,200	₹ 46,984.56	-20.00%	₹ -9,396.91	₹ 5,038.85	₹ -14,435.77
2	₹ 7,904,680	₹ 69,095.49	-10.00%	₹ -6,909.55	₹ 9,024.87	₹ -15,934.42
3	₹ 11,066,552	₹ 101,377.63	-5.00%	₹ -5,068.88	₹ 13,176.38	₹ -18,245.27
4	₹ 15,493,173	₹ 148,430.20	0.00%	₹ -0.00	₹ 19,205.13	₹ -19,205.13
5	₹ 21,690,442	₹ 216,904.42	5.00%	₹ 10,845.22	₹ 27,948.66	₹ -17,103.44
6	₹ 28,813,149	₹ 345,757.79	10.00%	₹ 28,564.36	₹ 52,593.21	₹ -24,028.85
7	₹ 36,211,213	₹ 506,956.99	15.00%	₹ 57,032.66	₹ 65,795.59	₹ -8,762.93
8	₹ 42,915,357	₹ 686,645.72	20.00%	₹ 102,996.86	₹ 73,342.34	₹ 29,654.52
9	₹ 47,787,109	₹ 860,167.96	25.00%	₹ 161,281.49	₹ 70,825.40	₹ 90,456.09
10	₹ 49,789,389	₹ 995,787.77	30.00%	₹ 224,052.25	₹ 55,355.03	₹ 168,697.22
Terminal year	₹ 51,875,564	₹ 1,037,511.28	30.00%	₹ 233,440.04	₹ 65,207.58	₹ 168,232.45
The Value						
Terminal value	₹ 3,564,246.92					
PV(Terminal value)	₹ 1,377,090.74					
PV (CF over next 10 years)	₹ 36,169.53					
Value of operating assets =	₹ 1,413,260.27					
Adjustment for distress	₹ 35,331.51				Probability of failure = 5.00%	
- Debt & Minority Interests	₹ 12,006.00					
+ Cash & Other Non-operating assets	₹ 7,785.00					
+IPO Proceeds	₹ 83,000.00				Total proceeds expected to be 166,000, but half will be cashing out existing stockholders.	
Value of equity	₹ 1,456,707.76					
- Value of equity options	₹ 45,696.90					
Number of shares	644.23					
Value per share	₹ 2,190.24				Stock was trading at = ₹	2,950.00

VI. Valuing Companies with “intangible” assets

330

If capital expenditures are miscategorized as operating expenses, it becomes very difficult to assess how much a firm is reinvesting for future growth and how well its investments are doing.

What is the value added by growth assets?

What are the cashflows from existing assets?

The capital expenditures associated with acquiring intangible assets (technology, human capital) are mis-categorized as operating expenses, leading to incorrect accounting earnings and measures of capital invested.

How risky are the cash flows from both existing assets and growth assets?

It can be more difficult to borrow against intangible assets than it is against tangible assets. The risk in operations can change depending upon how stable the intangible asset is.

When will the firm become a mature firm, and what are the potential roadblocks?

Intangible assets such as brand name and customer loyalty can last for very long periods or dissipate overnight.

Lesson 1: Accounting rules are cluttered with inconsistencies...

331

- If we start with accounting first principles, capital expenditures are expenditures designed to create benefits over many periods. They should not be used to reduce operating income in the period that they are made, but should be depreciated/amortized over their life. They should show up as assets on the balance sheet.
- Accounting is consistent in its treatment of cap ex with manufacturing firms, but is inconsistent with firms that do not fit the mold.
 - With pharmaceutical and technology firms, R&D is the ultimate cap ex but is treated as an operating expense.
 - With consulting firms and other firms dependent on human capital, recruiting and training expenses are your long term investments that are treated as operating expenses.
 - With brand name consumer product companies, a portion of the advertising expense is to build up brand name and is the real capital expenditure. It is treated as an operating expense.

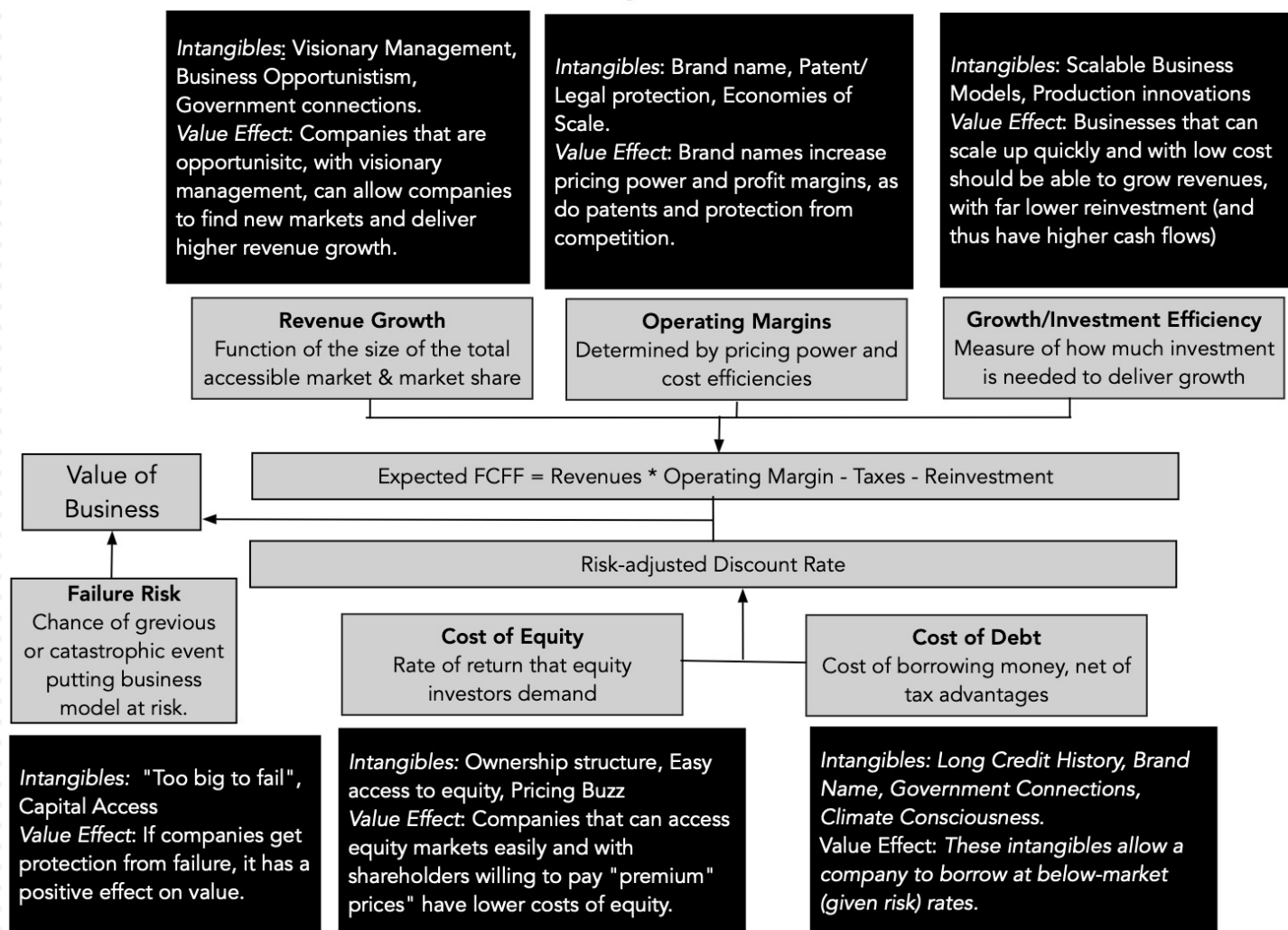
Lesson 2: And fixing those inconsistencies can alter your view of a company and affect its value

332

	No R&D adjustment	R&D adjustment
EBIT	\$5,071	\$7,336
Invested Capital	\$25,277	\$33,173
ROIC	14.58%	18.26%
Reinvestment Rate	115.68%	106.98%
Value of firm	\$58,617	\$95,497
Value of equity	\$50,346	\$87,226
Value/share	\$42.73	\$74.33

Intangibles in Intrinsic Value

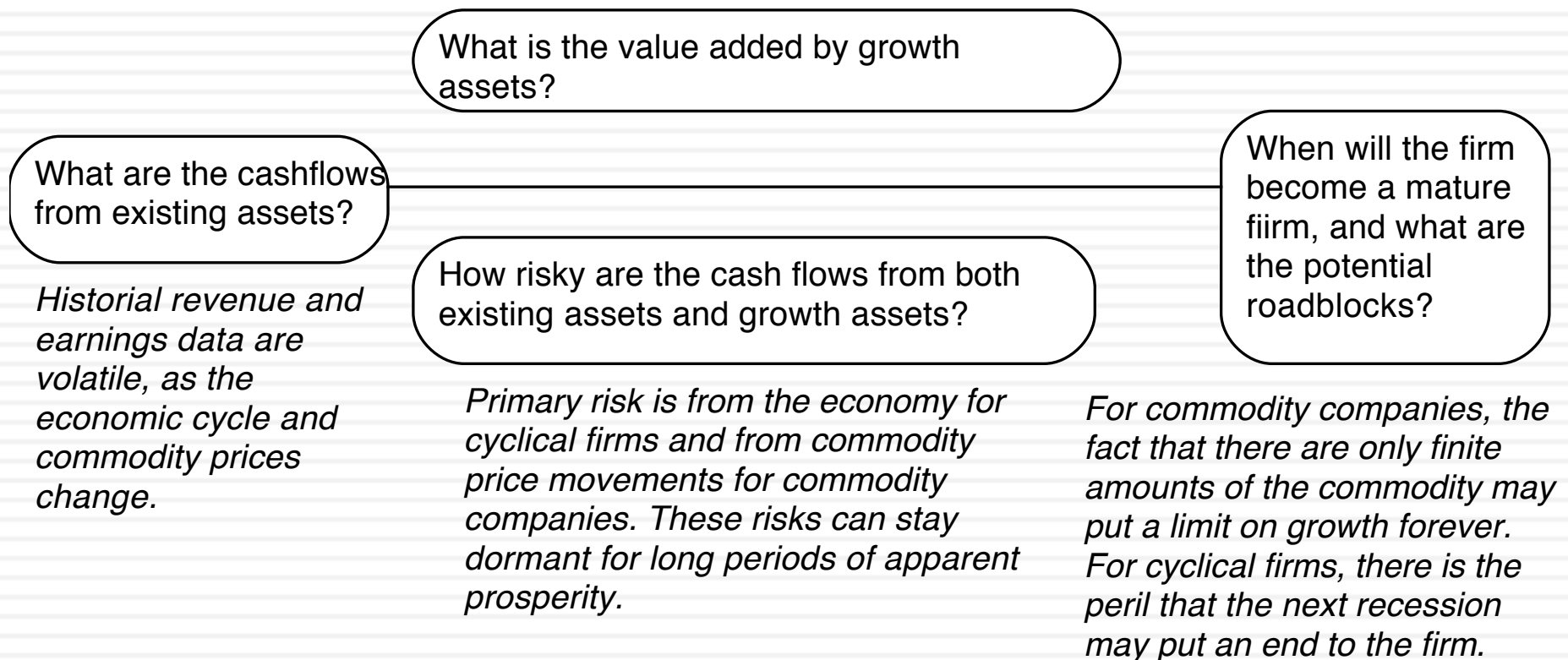
Intangibles and Value



VII. Valuing cyclical and commodity companies

334

Company growth often comes from movements in the economic cycle, for cyclical firms, or commodity prices, for commodity companies.



Lesson 1: With “macro” companies, it is easy to get lost in “macro” assumptions...

335

- With cyclical and commodity companies, it is undeniable that the value you arrive at will be affected by your views on the economy or the price of the commodity.
- Consequently, you will feel the urge to take a stand on these macro variables and build them into your valuation. Doing so, though, will create valuations that are jointly impacted by your views on macro variables and your views on the company, and it is difficult to separate the two.
- The best (though not easiest) thing to do is to separate your macro views from your micro views. Use current market based numbers for your valuation, but then provide a separate assessment of what you think about those market numbers.

Lesson 2: Use probabilistic tools to assess value as a function of macro variables...

336

- If there is a key macro variable affecting the value of your company that you are uncertain about (and who is not), why not quantify the uncertainty in a distribution (rather than a single price) and use that distribution in your valuation.
- That is exactly what you do in a Monte Carlo simulation, where you allow one or more variables to be distributions and compute a distribution of values for the company.
- With a simulation, you get not only everything you would get in a standard valuation (an estimated value for your company) but you will get additional output (on the variation in that value and the likelihood that your firm is under or over valued)

Shell: A "Oil Price" Neutral Valuation: March 2016

Revenue calculated from prevailing oil price of \$40/barrel in March 2016
 Revenue = $39992.77 + 4039.40 \times \40
 = \$201,569

Compounded revenue growth of 3.91% a year, based on Shell's historical revenue growth rate from 2000 to 2015

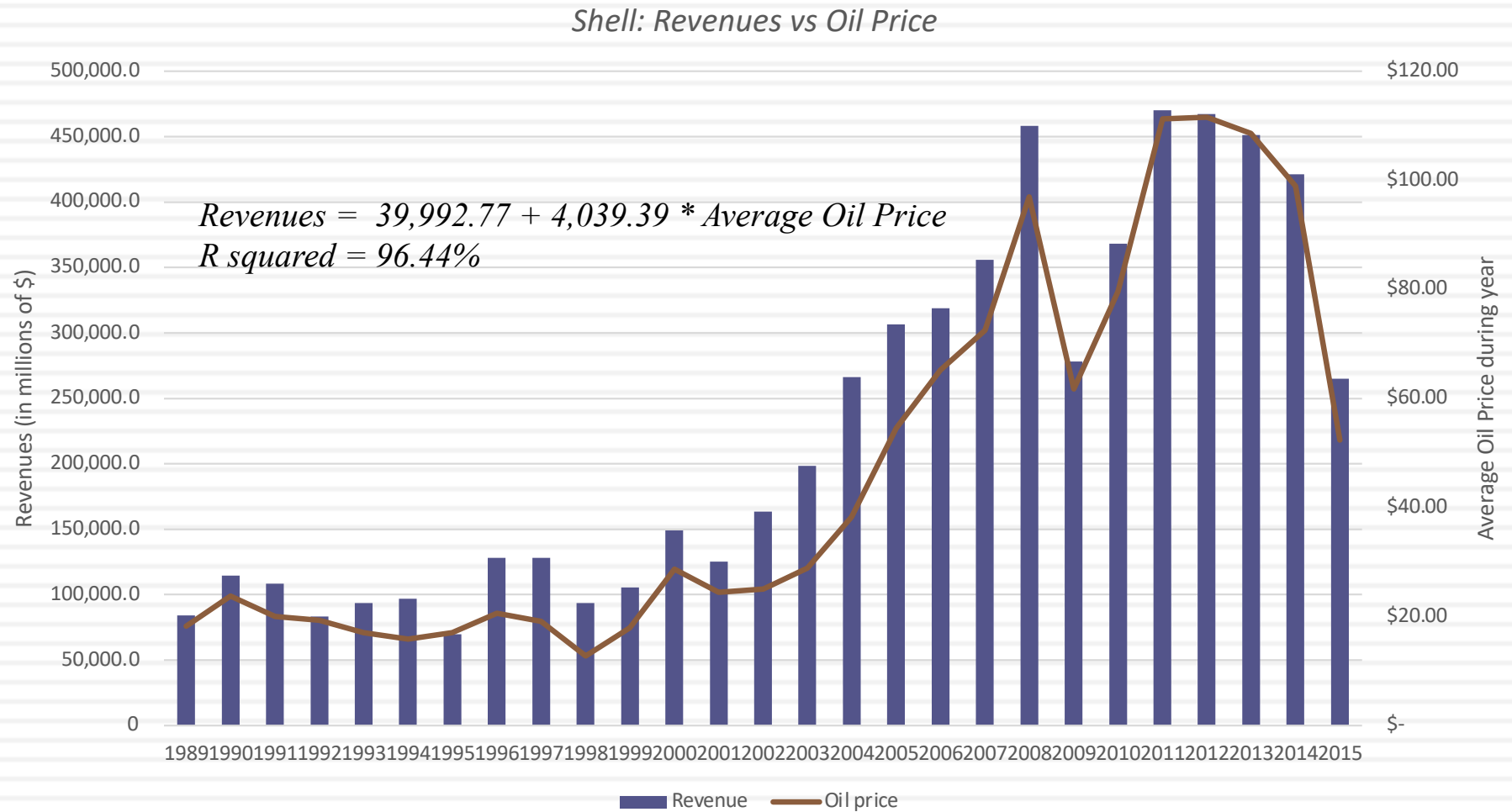
Operating margin converges on Shell's historical average margin of 9.35% from 200-2015

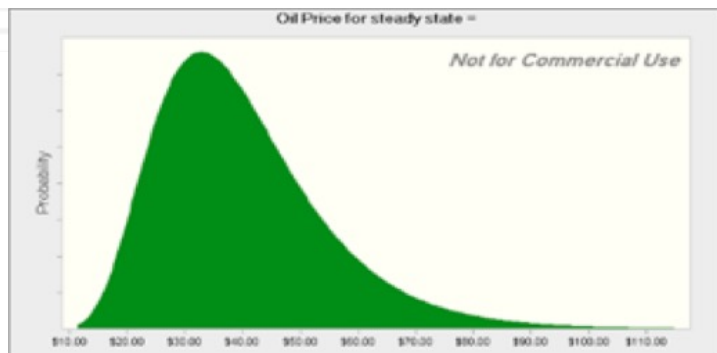
Return on capital reverts and stays at Shell's historic average of 12.37% from 200-2015

	Base Year	1	2	3	4	5	Terminal Year
Revenues	\$ 201,569	\$ 209,450	\$ 217,639	\$ 226,149	\$ 234,991	\$ 244,180	\$ 249,063
Operating Margin	3.01%	6.18%	7.76%	8.56%	8.95%	9.35%	9.35%
Operating Income	\$ 6,065.00	\$ 12,942.85	\$ 16,899.10	\$ 19,352.39	\$ 21,040.39	\$ 22,830.80	\$ 23,287.41
Effective tax rate	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%
AT Operating Income	\$ 4,245.50	\$ 9,060.00	\$ 11,829.37	\$ 13,546.68	\$ 14,728.27	\$ 15,981.56	\$ 16,301.19
+ Depreciation	\$ 26,714.00	\$ 27,759	\$ 28,844	\$ 29,972	\$ 31,144	\$ 32,361	
- Cap Ex	\$ 31,854.00	\$ 33,099	\$ 34,394	\$ 35,738	\$ 37,136	\$ 38,588	
- Chg in WC		\$ 472.88	\$ 491.37	\$ 510.58	\$ 530.55	\$ 551.29	
FCFF		\$ 3,246.14	\$ 5,788.19	\$ 7,269.29	\$ 8,205.44	\$ 9,203.68	\$ 13,011.34
Terminal Value						\$ 216,855.71	
Return on capital							12.37%
Cost of Capital		9.91%	9.91%	9.91%	9.91%	9.91%	8.00%
Cumulated Discount Factor		1.0991	1.2080	1.3277	1.4593	1.6039	
Present Value		\$ 2,953.45	\$ 4,791.47	\$ 5,474.95	\$ 5,622.81	\$ 140,940.73	
Value of Operating Assets	\$ 159,783.41						
+ Cash	\$ 31,752.00						
+ Cross Holdings	\$ 33,566.00						
- Debt	\$ 58,379.00						
- Minority Interests	\$ 1,245.00						
Value of Equity	\$ 165,477.41						
Number of shares	4209.7						
Value per share	\$ 39.31						

Added long term investments in joint ventures and subtracted out minority interest in consolidated holdings.

Shell's Revenues & Oil Prices





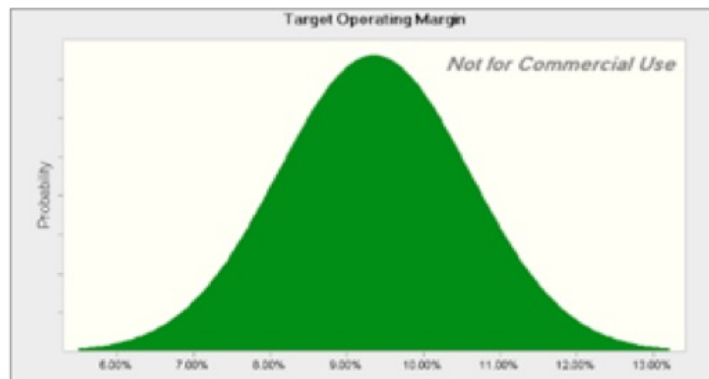
Revenue calculated from the oil price drawn from distribution

$$\text{Revenue} = 39992.77 + 4039.40 \times \text{Oil Price/Barrel}$$

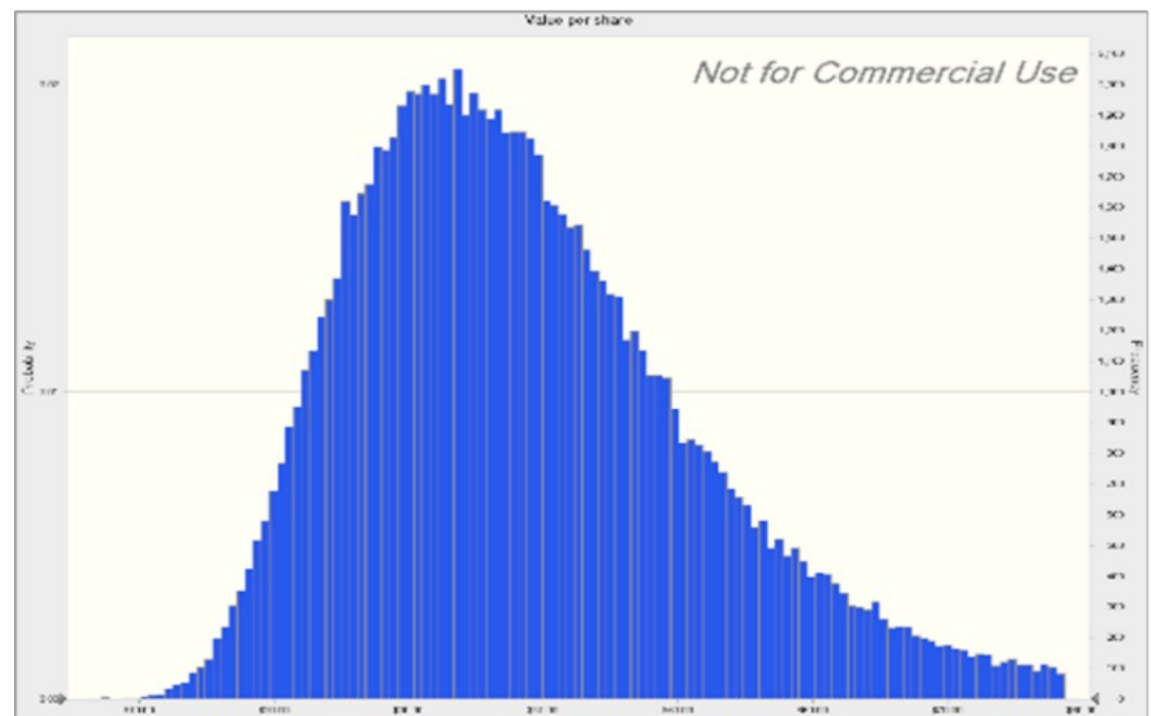
Pre-tax Operating Income based on revenue & selected margin

$$\text{Pre-tax Operating Income} = \text{Revenues} \times \text{Operating Margin}$$

Value Shell based on operating income, assuming other assumptions (tax rate, revenue growth, cost of capital)



Percentiles:	Forecast values
0%	\$6.55
10%	\$23.90
20%	\$27.73
30%	\$30.89
40%	\$33.88
50%	\$36.99
60%	\$40.28
70%	\$44.22
80%	\$49.24
90%	\$57.49
100%	\$197.11





VALUE, PRICE AND INFORMATION: CLOSING THE DEAL

Value versus Price

Are you valuing or pricing?

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Tools for intrinsic analysis

- Discounted Cashflow Valuation (DCF)
- Intrinsic multiples
- Book value based approaches
- Excess Return Models

Tools for "the gap"

- Behavioral finance
- Price catalysts

Tools for pricing

- Multiples and comparables
- Charting and technical indicators
- Pseudo DCF

Value of cashflows,
adjusted for time
and risk

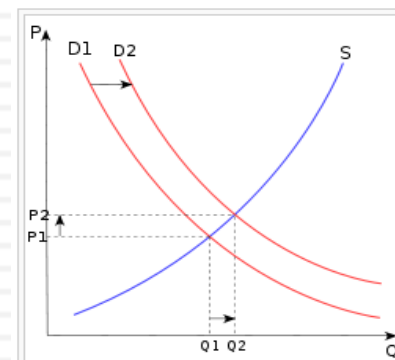
INTRINSIC
VALUE

Value

THE GAP
Is there one?
Will it close?

Price

PRICE



Drivers of intrinsic value

- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of "the gap"

- Information
- Liquidity
- Corporate governance

Drivers of price

- Market moods & momentum
- Surface stories about fundamentals

Value versus Price

	View of the gap	Investment Strategies
The Efficient Marketer	The gaps between price and value, if they do occur, are random.	Index funds
The “value” extremist	You view pricers as dilettantes who will move on to fad and fad. Eventually, the price will converge on value.	Buy and hold stocks where value < price
The pricing extremist	Value is only in the heads of the “eggheads”. Even if it exists (and it is questionable), price may never converge on value.	(1) Look for mispriced securities. (2) Get ahead of shifts in demand/momentum.

The valuer's dilemma and ways of dealing with it...

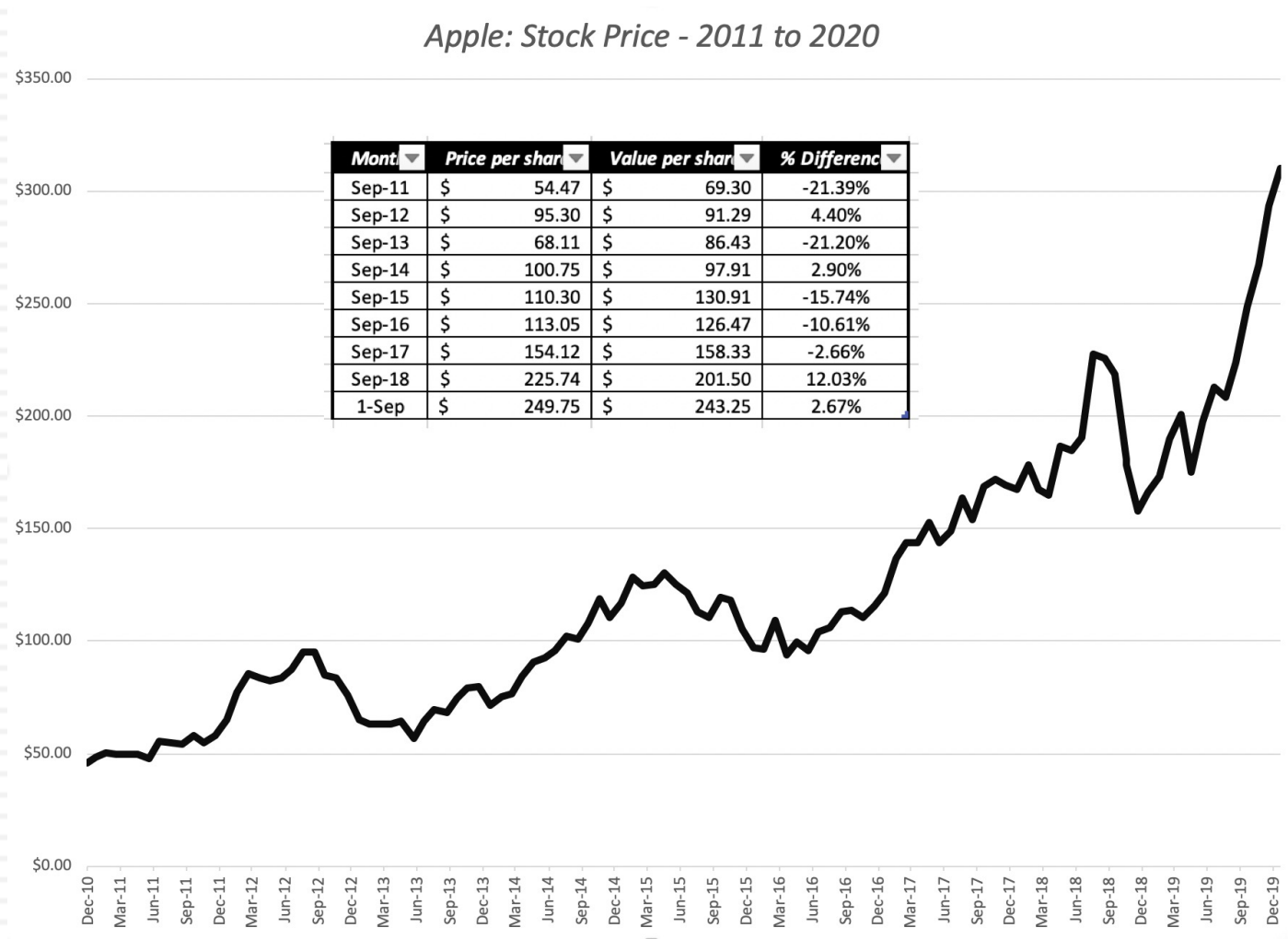
- Uncertainty about the magnitude of the gap:
 - ▣ Margin of safety: Many value investors swear by the notion of the “margin of safety” as protection against risk/uncertainty.
 - ▣ Collect more information: Collecting more information about the company is viewed as one way to make your investment less risky.
 - ▣ Ask what if questions: Doing scenario analysis or what if analysis gives you a sense of whether you should invest.
 - ▣ Confront uncertainty: Face up to the uncertainty, bring it into the analysis and deal with the consequences.
- Uncertainty about gap closing: This is tougher and you can reduce your exposure to it by
 - ▣ Lengthening your time horizon
 - ▣ Providing or looking for a catalyst that will cause the gap to close.

Strategies for managing the risk in the “closing” of the gap

- The “karmic” approach: In this one, you buy (sell short) under (over) valued companies and sit back and wait for the gap to close. You are implicitly assuming that given time, the market will see the error of its ways and fix that error.
- The catalyst approach: For the gap to close, the price has to converge on value. For that convergence to occur, there usually has to be a catalyst.
 - If you are an activist investor, you may be the catalyst yourself. In fact, your act of buying the stock may be a sufficient signal for the market to reassess the price.
 - If you are not, you have to look for other catalysts. Here are some to watch for: a new CEO or management team, a “blockbuster” new product or an acquisition bid where the firm is targeted.

An example: Apple – Price versus Value (my estimates) from 2011 to 2020

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A closing thought...

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