

Valuation: Lecture Note Packet 1

Intrinsic Valuation

The essence of intrinsic value

2

- 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 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.

The two faces of discounted cash flow valuation

3

- 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:

$$\text{Value of asset} = \frac{E(\text{CF}_1)}{(1+r)} + \frac{E(\text{CF}_2)}{(1+r)^2} + \frac{E(\text{CF}_3)}{(1+r)^3} \dots + \frac{E(\text{CF}_n)}{(1+r)^n}$$

where the asset has an n-year life, $E(\text{CF}_t)$ 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:

$$\text{Value of asset} = \frac{\text{CE}(\text{CF}_1)}{(1+r_f)} + \frac{\text{CE}(\text{CF}_2)}{(1+r_f)^2} + \frac{\text{CE}(\text{CF}_3)}{(1+r_f)^3} \dots + \frac{\text{CE}(\text{CF}_n)}{(1+r_f)^n}$$

where $\text{CE}(\text{CF}_t)$ is the certainty equivalent of $E(\text{CF}_t)$ and r_f is the riskfree rate.

Risk Adjusted Value: Two Basic Propositions

4

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

$$\text{Value of asset} = \frac{E(\text{CF}_1)}{(1+r)} + \frac{E(\text{CF}_2)}{(1+r)^2} + \frac{E(\text{CF}_3)}{(1+r)^3} \dots + \frac{E(\text{CF}_n)}{(1+r)^n}$$

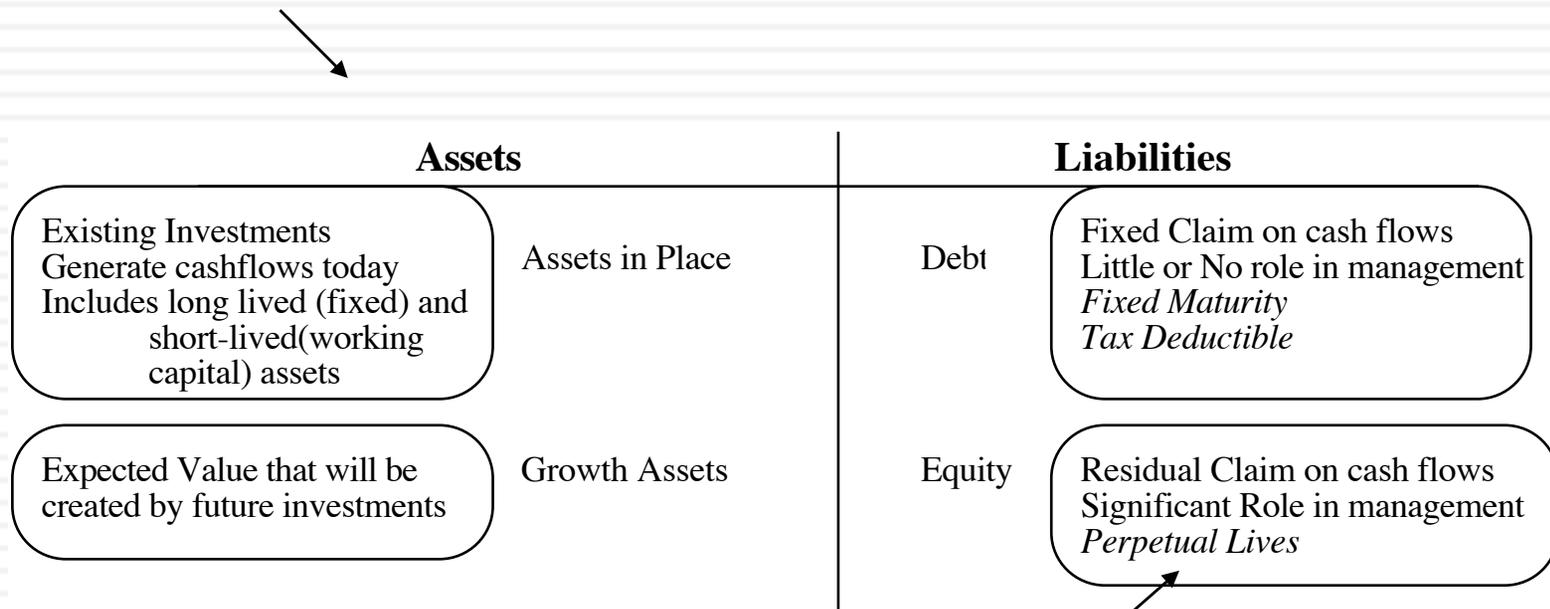
$$\text{Value of asset} = \frac{\text{CE}(\text{CF}_1)}{(1+r_f)} + \frac{\text{CE}(\text{CF}_2)}{(1+r_f)^2} + \frac{\text{CE}(\text{CF}_3)}{(1+r_f)^3} \dots + \frac{\text{CE}(\text{CF}_n)}{(1+r_f)^n}$$

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 “DUH” proposition: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
3. 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

5

Firm Valuation: Value the entire business

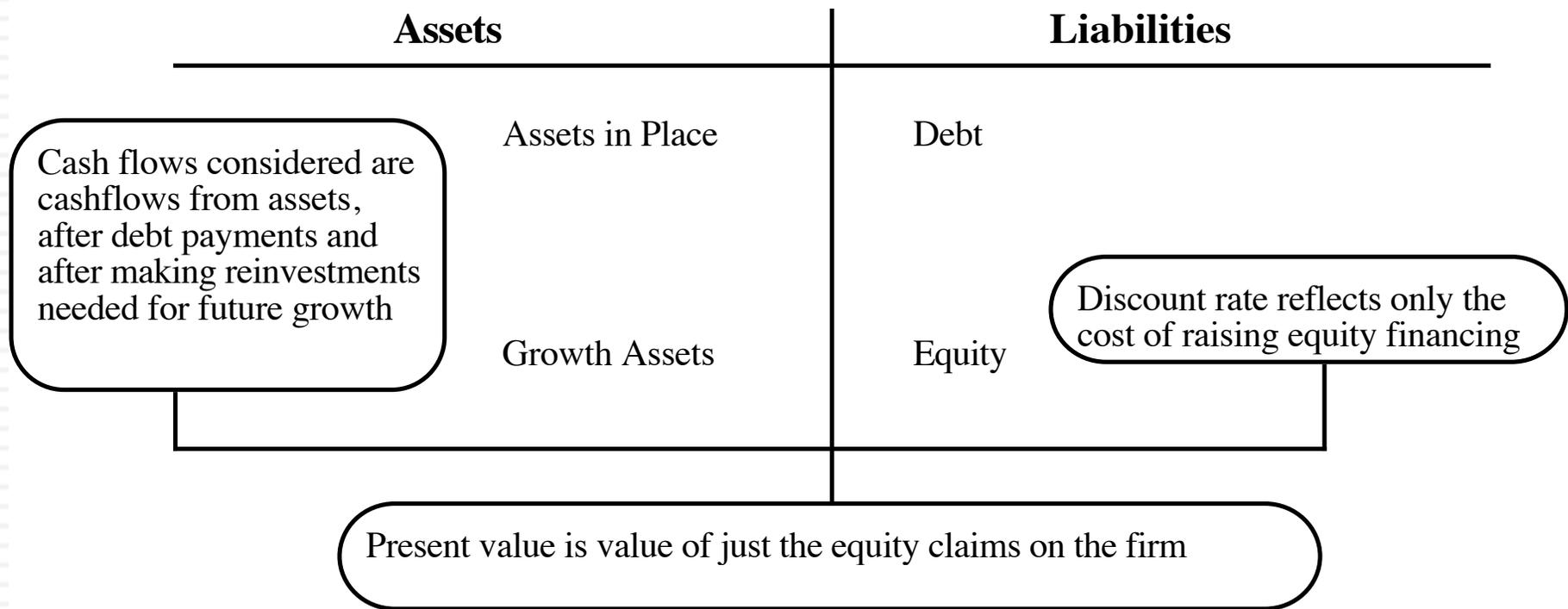


Equity valuation: Value just the equity claim in the business

Equity Valuation

6

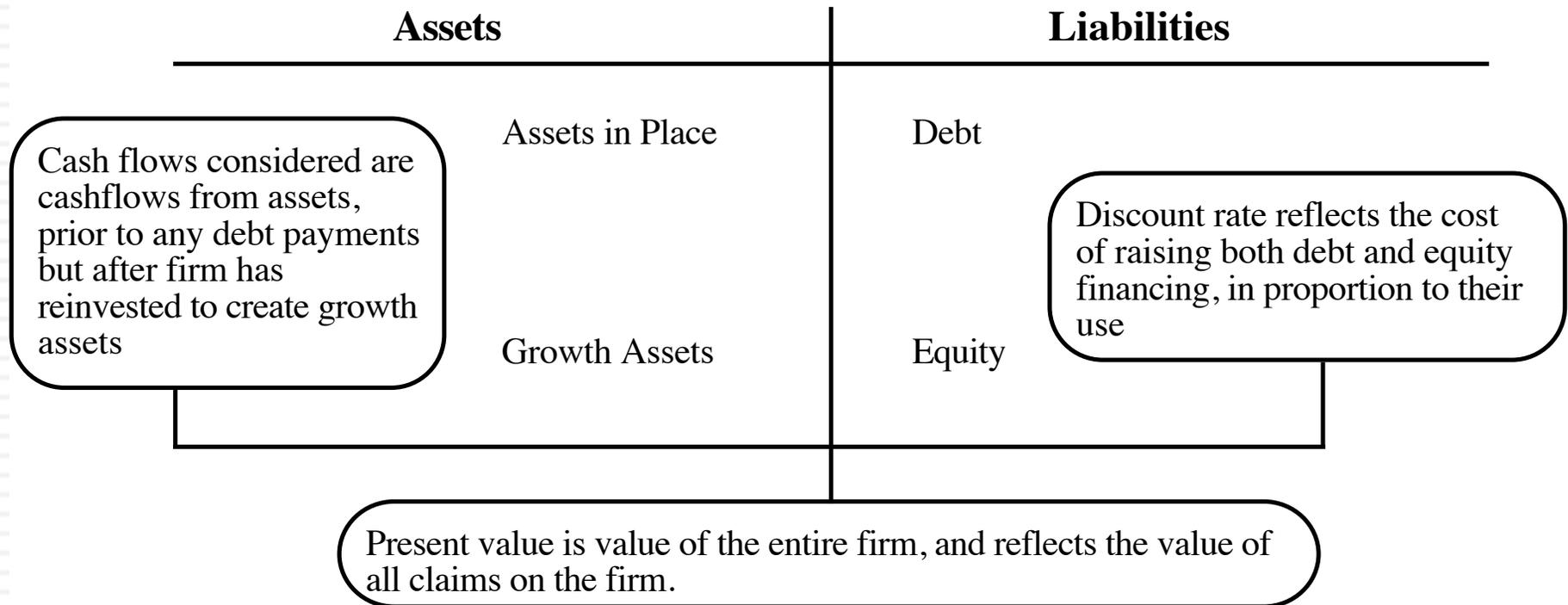
Figure 5.5: Equity Valuation



Firm Valuation

7

Figure 5.6: Firm Valuation



Firm Value and Equity Value

8

- 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

9

- 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

10

- 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 = $90/1.0994 + 100/1.0994^2 + 108/1.0994^3 + 116.2/1.0994^4 + (123.49+2363)/1.0994^5 = \mathbf{\$1873}$
 - ▣ Value of Equity = Value of Firm - Market Value of Debt
= \$ 1873 - \$ 800 = **\$1073**

First Principle of Valuation

11

- Discounting Consistency Principle: Never mix and match cash flows and discount rates.
- 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

12

- Error 1: Discount CF to Equity at Cost of Capital to get equity value
 - ▣ PV 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 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 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

13

DCF: First Steps

Discounted Cash Flow Valuation: The Steps

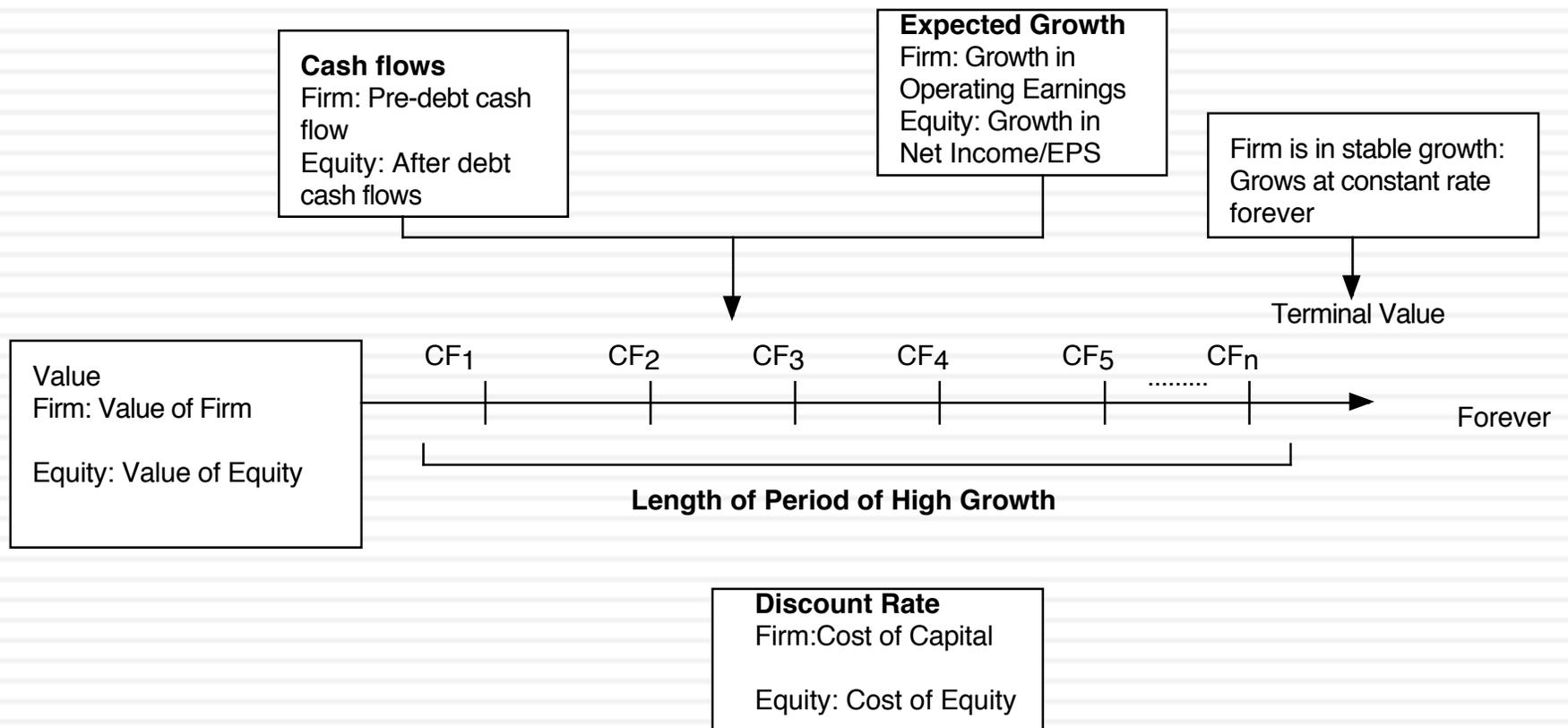
14

1. Estimate the discount rate or rates to use in the valuation
 1. Discount rate can be either a cost of equity (if doing equity valuation) or a cost of capital (if valuing the firm)
 2. Discount rate can be in nominal terms or real terms, depending upon whether the cash flows are nominal or real
 3. Discount rate can vary across time.
2. Estimate the current earnings and cash flows on the asset, to either equity investors (CF to Equity) or to all claimholders (CF to Firm)
3. Estimate the future earnings and cash flows on the firm being valued, generally by estimating an expected growth rate in earnings.
4. Estimate when the firm will reach “stable growth” and what characteristics (risk & cash flow) it will have when it does.
5. Choose the right DCF model for this asset and value it.

Generic DCF Valuation Model

15

DISCOUNTED CASHFLOW VALUATION



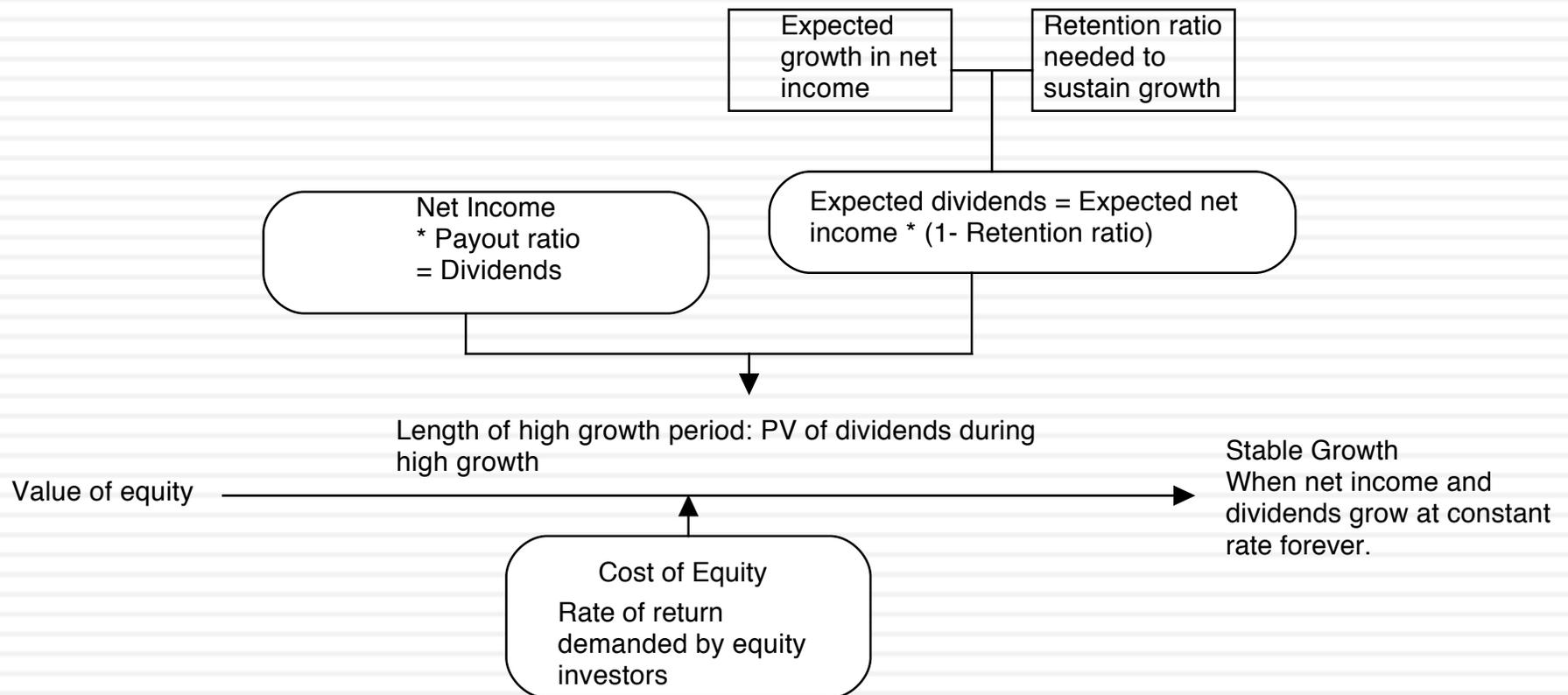
Same ingredients, different approaches...

16

| 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 |

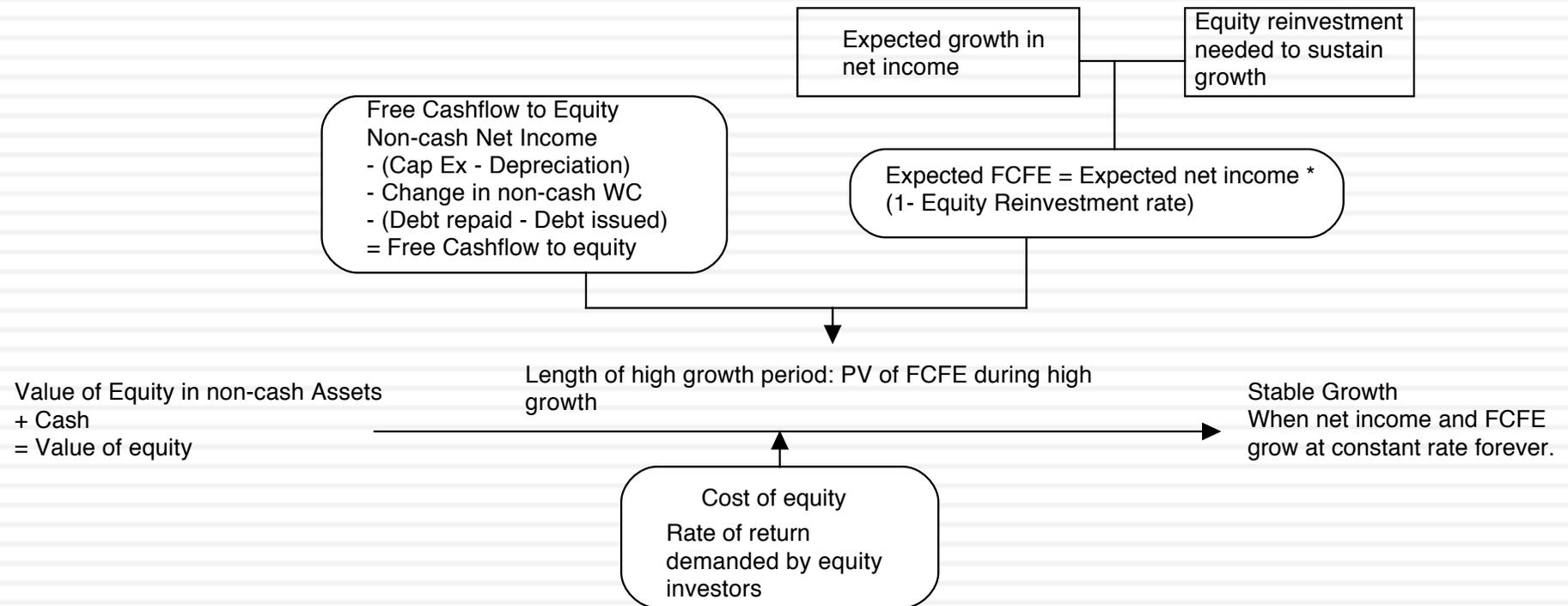
Start easy: The Dividend Discount Model

17



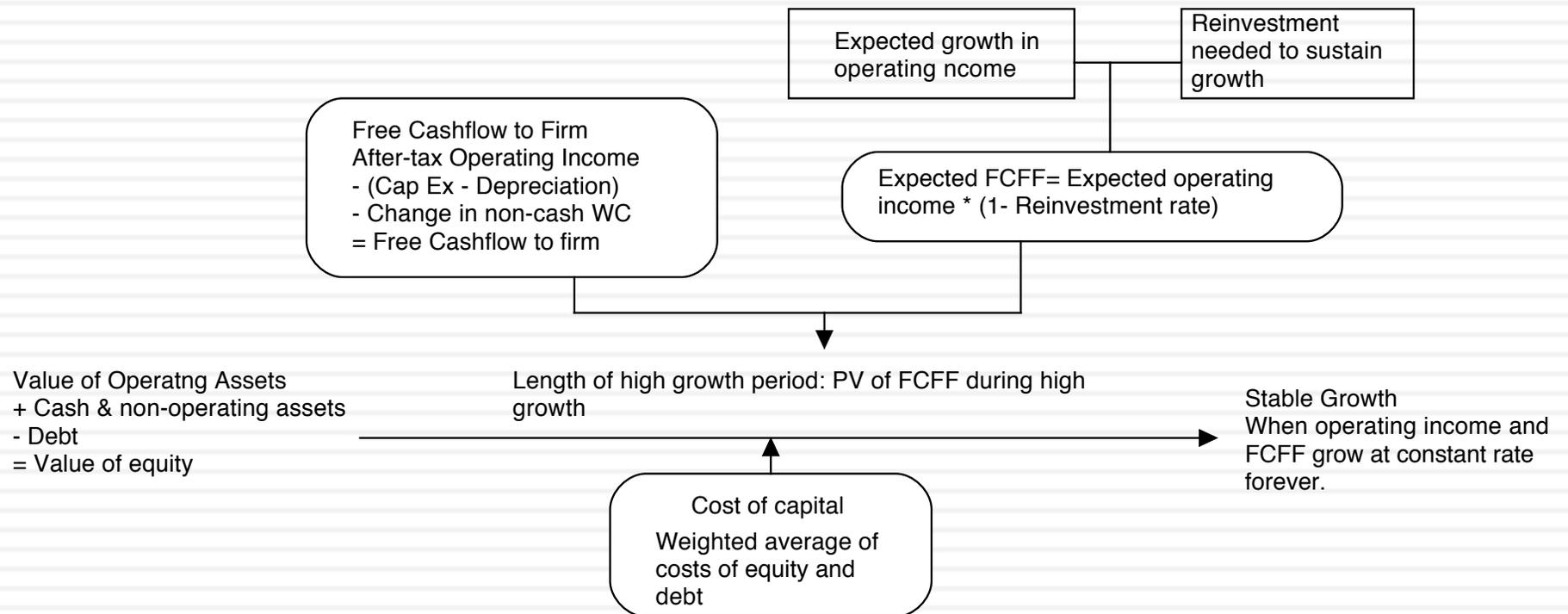
Moving on up: The “potential dividends” or FCFE model

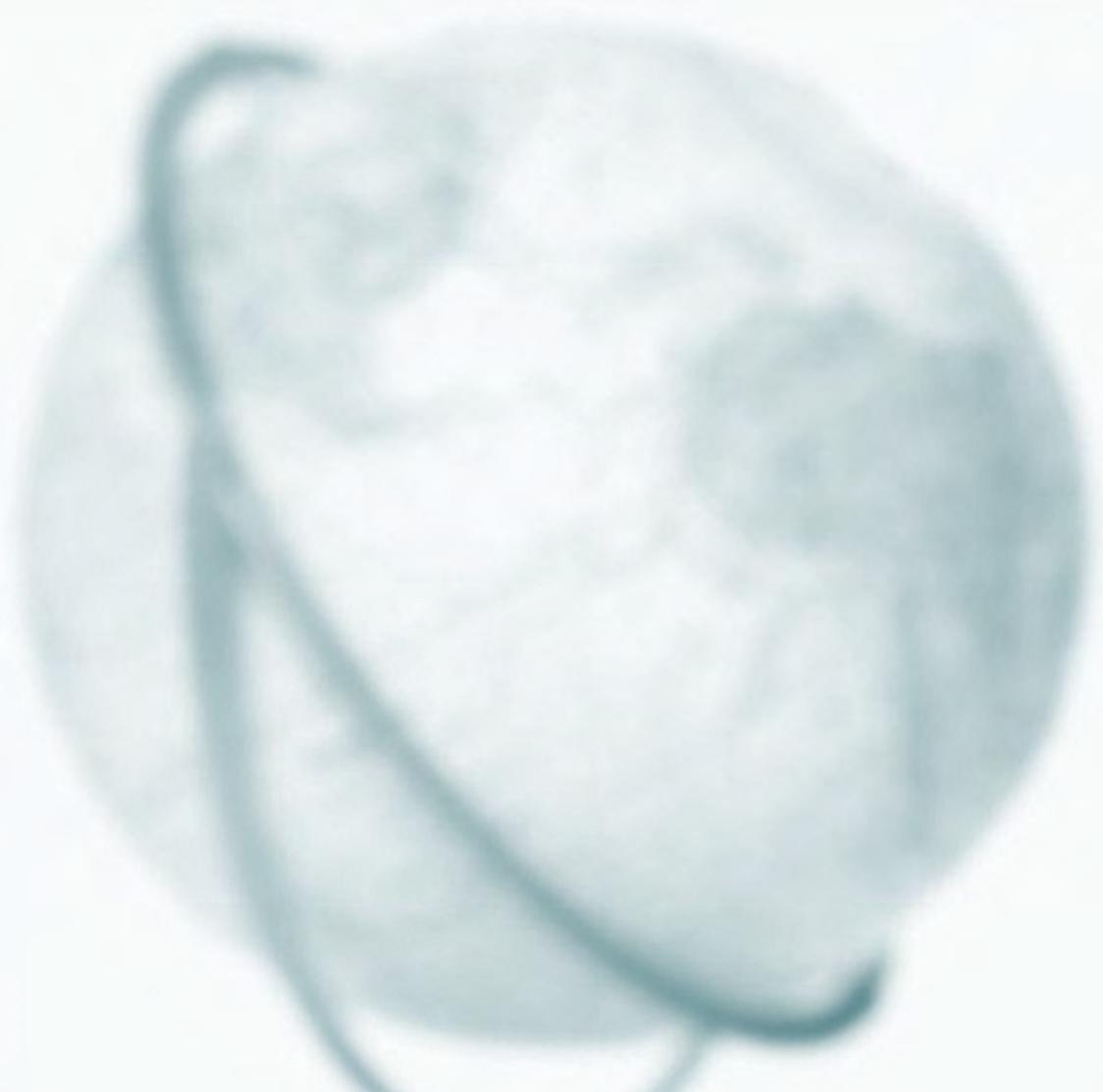
18



To valuing the entire business: The FCFF model

19





DISCOUNT RATES

The D in the DCF..

Estimating Inputs: Discount Rates

21

- 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

22

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

$$\frac{\text{Expected Cash Flows}}{\text{Risk Adjusted Discount Rate}}$$

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...

23

- 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 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

24

- 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

25

| 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

26

- 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)

27

Discount Rates I

The Riskfree Rate

The Risk Free Rate: Laying the Foundations

28

- 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!

29

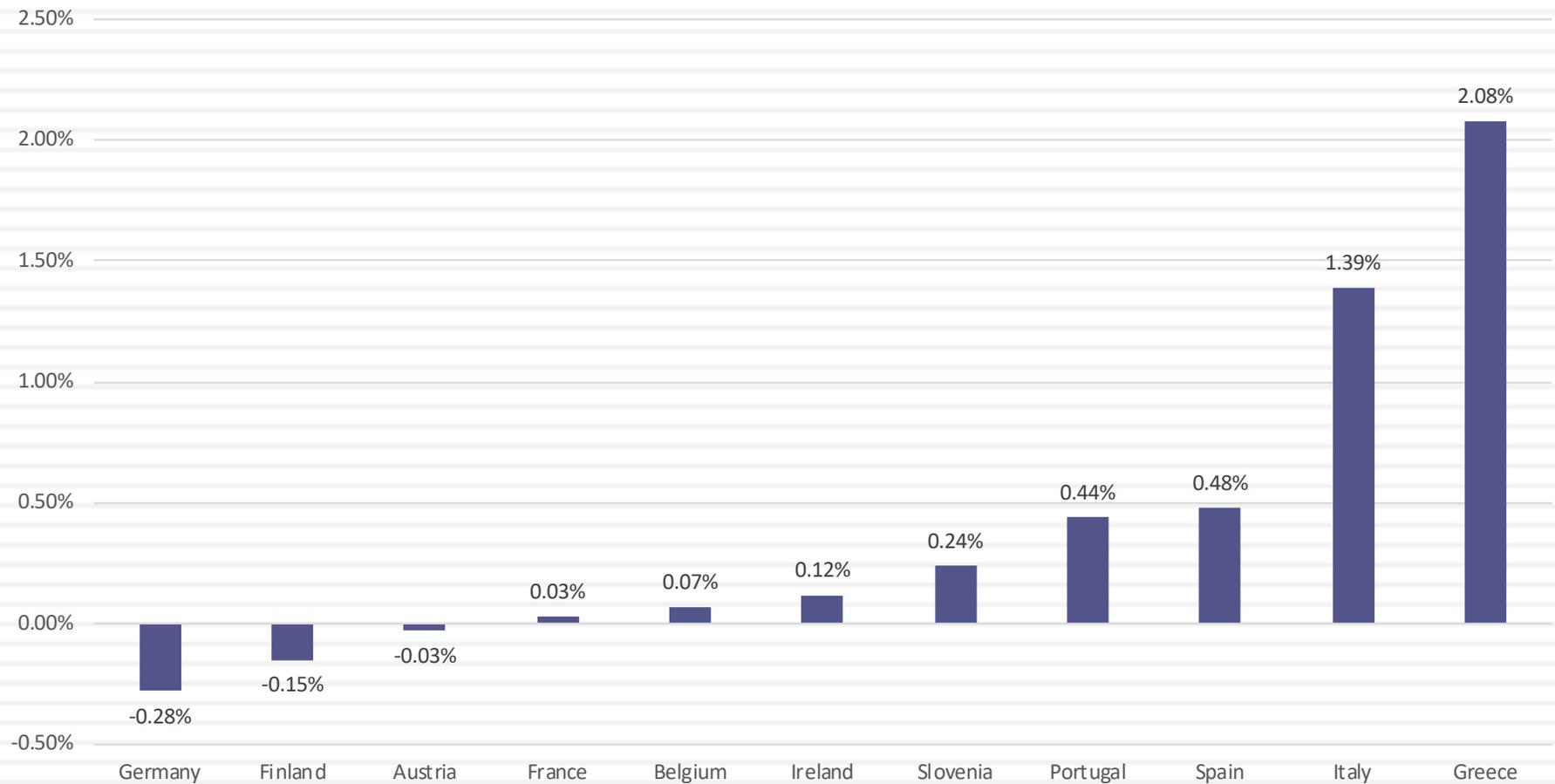
- In valuation, we estimate cash flows forever (or at least for very long time periods). The right risk free rate to use in valuing a company in US dollars would be
 - a. A three-month Treasury bill rate (1.5%)
 - b. A ten-year Treasury bond rate (1.9%)
 - c. A thirty-year Treasury bond rate (2.2%)
 - d. A TIPs (inflation-indexed treasury) rate (0.6%)
 - e. None of the above

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

Test 2: A Riskfree Rate in Euros?

30

Euro 10-year Bond Rate on 1/1/20



Test 3: A Riskfree Rate in Indian Rupees

31

- The Indian government had 10-year Rupee bonds outstanding, with a yield to maturity of about 6.56% on January 1, 2020.
- In January 2020, the Indian government had a local currency sovereign rating of Baa2. The typical default spread (over a default free rate) for Baa2 rated country bonds in early 2018 was 1.59%. The riskfree rate in Indian Rupees is
 - a. The yield to maturity on the 10-year bond (6.56%)
 - b. The yield to maturity on the 10-year bond + Default spread (8.15%)
 - c. The yield to maturity on the 10-year bond – Default spread (4.97%)
 - d. None of the above

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

32

- 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.

Local Currency Government Bond Rates – January 2020

33

| Currency | Govt Bond Rate 12/31/19 | Currency | Govt Bond Rate 12/31/19 |
|-------------------|----------------------------|--------------------|----------------------------|
| Australian \$ | 1.24% | Mexican Peso | 6.86% |
| Brazilian Reai | 6.77% | Nigerian Naira | 10.95% |
| British Pound | 0.82% | Norwegian Krone | 1.40% |
| Bulgarian Lev | 0.40% | NZ \$ | 1.52% |
| Canadian \$ | 1.63% | Pakistani Rupee | 11.02% |
| Chilean Peso | 3.28% | Peruvian Sol | 5.43% |
| Chinese Yuan | 3.17% | Phillipine Peso | 4.71% |
| Colombian Peso | 5.97% | Polish Zloty | 2.21% |
| Croatian Kuna | 0.66% | Qatari Dinar | 2.69% |
| Czech Koruna | 1.62% | Romanian Lev | 4.41% |
| Danish Krone | -0.25% | Russian Ruble | 6.28% |
| Euro | -0.28% | Singapore \$ | 1.73% |
| HK \$ | 1.60% | South African Rand | 8.25% |
| Hungarian Forint | 2.10% | Swedish Krona | 0.13% |
| Iceland Krona | 3.51% | Swiss Franc | -0.61% |
| Indian Rupee | 6.56% | Taiwanese \$ | 0.66% |
| Indonesian Rupiah | 7.07% | Thai Baht | 1.41% |
| Israeli Shekel | 0.77% | Turkish Lira | 11.86% |
| Japanese Yen | -0.02% | US \$ | 1.92% |
| Kenyan Shilling | 12.20% | Vietnamese Dong | 3.12% |
| Korean Won | 1.63% | Zambian kwacha | 32.50% |
| Malyasian Ringgit | 3.28% | | |

Aswath Damodaran

Approach 1: Default spread from Government Bonds

| Country | \$ Bond Rate | Riskfree Rate | Default Spread |
|---------------|--------------|---------------|----------------|
| | \$ Bonds | | |
| Peru | 3.10% | 1.92% | 1.18% |
| Brazil | 3.63% | 1.92% | 1.71% |
| Colombia | 3.17% | 1.92% | 1.25% |
| Poland | 2.83% | 1.92% | 0.91% |
| Turkey | 5.82% | 1.92% | 3.90% |
| Mexico | 2.65% | 1.92% | 0.73% |
| Russia | 3.31% | 1.92% | 1.39% |
| | Euro Bonds | | |
| Bulgaria | 1.00% | -0.28% | 1.28% |

Approach 2: CDS Spreads – January 2020

35

| Country | 12/31/19 | CDS Spread net of US | Country | 12/31/19 | CDS Spread net of US | Country | 12/31/19 | CDS Spread net of US |
|----------------|----------|----------------------|-------------|----------|----------------------|----------------|----------|----------------------|
| Abu Dhabi | 0.69% | 0.51% | Guatemala | 1.99% | 1.81% | Peru | 0.89% | 0.71% |
| Algeria | 0.91% | 0.73% | Hong Kong | 0.55% | 0.37% | Philippines | 0.76% | 0.58% |
| Angola | 4.77% | 4.59% | Hungary | 1.13% | 0.95% | Poland | 0.90% | 0.72% |
| Argentina | NA | NA | Iceland | 0.93% | 0.75% | Portugal | 0.68% | 0.50% |
| Australia | 0.30% | 0.12% | India | 1.28% | 1.10% | Qatar | 0.72% | 0.54% |
| Austria | 0.21% | 0.03% | Indonesia | 1.35% | 1.17% | Romania | 1.20% | 1.02% |
| Bahrain | 2.24% | 2.06% | Iraq | 5.13% | 4.95% | Russia | 1.06% | 0.88% |
| Belgium | 0.30% | 0.12% | Ireland | 0.34% | 0.16% | Rwanda | 3.16% | 2.98% |
| Brazil | 1.74% | 1.56% | Israel | 0.75% | 0.57% | Saudi Arabia | 1.03% | 0.85% |
| Bulgaria | 0.89% | 0.71% | Italy | 1.68% | 1.50% | Senegal | 2.78% | 2.60% |
| Cameroon | 5.60% | 5.42% | Japan | 0.39% | 0.21% | Serbia | 1.28% | 1.10% |
| Canada | 0.34% | 0.16% | Kazakhstan | 1.04% | 0.86% | Slovakia | 0.65% | 0.47% |
| Chile | 0.79% | 0.61% | Kenya | 4.17% | 3.99% | Slovenia | 1.13% | 0.95% |
| China | 0.72% | 0.54% | Korea | 0.48% | 0.30% | South Africa | 2.48% | 2.30% |
| Colombia | 1.37% | 1.19% | Kuwait | 0.74% | 0.56% | Spain | 0.73% | 0.55% |
| Costa Rica | 3.71% | 3.53% | Latvia | 0.98% | 0.80% | Sweden | 0.19% | 0.01% |
| Croatia | 1.20% | 1.02% | Lebanon | NA | NA | Switzerland | 0.16% | -0.02% |
| Cyprus | 1.10% | 0.92% | Lithuania | 0.87% | 0.69% | Thailand | 0.48% | 0.30% |
| Czech Republic | 0.59% | 0.41% | Malaysia | 0.79% | 0.61% | Tunisia | 4.06% | 3.88% |
| Denmark | 0.18% | 0.00% | Mexico | 1.40% | 1.22% | Turkey | 3.47% | 3.29% |
| Dubai | 1.31% | 1.13% | Morocco | 1.26% | 1.08% | Ukraine | 5.25% | 5.07% |
| Egypt | 3.59% | 3.41% | Netherlands | 0.22% | 0.04% | United Kingdom | 0.34% | 0.16% |
| El Salvador | 4.22% | 4.04% | New Zealand | 0.33% | 0.15% | United States | 0.18% | 0.00% |
| Estonia | 0.72% | 0.54% | Nigeria | 4.10% | 3.92% | Uruguay | 1.29% | 1.11% |
| Finland | 0.21% | 0.03% | Norway | 0.22% | 0.04% | Venezuela | NA | NA |
| France | 0.33% | 0.15% | Oman | 2.92% | 2.74% | Vietnam | 1.59% | 1.41% |
| Germany | 0.18% | 0.00% | Pakistan | 4.66% | 4.48% | Zambia | 12.20% | 12.02% |
| Greece | 1.96% | 1.78% | Panama | 0.85% | 0.67% | | | |

Approach 3: Typical Default Spreads: January 2019

36

| S&P Sovereign Rating | Moody's Sovereign Rating | Default Spread |
|----------------------|--------------------------|----------------|
| AAA | Aaa | 0.00% |
| AA+ | Aa1 | 0.33% |
| AA | Aa2 | 0.41% |
| AA- | Aa3 | 0.51% |
| A+ | A1 | 0.59% |
| A | A2 | 0.71% |
| A- | A3 | 1.00% |
| BBB+ | Baa1 | 1.34% |
| BBB | Baa2 | 1.59% |
| BBB- | Baa3 | 1.84% |
| BB+ | Ba1 | 2.09% |
| BB | Ba2 | 2.51% |
| BB | Ba3 | 3.01% |
| B+ | B1 | 3.76% |
| B | B2 | 4.60% |
| B- | B3 | 5.44% |
| CCC+ | Caa1 | 6.27% |
| CCC | Caa2 | 7.53% |
| CCC- | Caa3 | 8.36% |
| CC+ | Ca1 | 10.03% |
| CC | Ca2 | 13.25% |
| CC- | Ca3 | 15.00% |
| C+ | C1 | 18.00% |
| C | C2 | 21.00% |
| C- | C3 | 24.00% |

Getting to a risk free rate in a currency: Example

37

- The Brazilian government bond rate in nominal reais on January 1, 2020 was 6.77%. To get to a riskfree rate in nominal reais, we can use one of three approaches.
 - Approach 1: Government Bond spread
 - The 2028 Brazil bond, denominated in US dollars, has a spread of 1.71% over the US treasury bond rate.
 - Riskfree rate in \$R = 6.77% - 1.71% = 5.06%
 - Approach 2: The CDS Spread
 - The CDS spread for Brazil, adjusted for the US CDS spread was 1.56%.
 - Riskfree rate in \$R = 6.77% - 1.56% = 5.21%
 - Approach 3: The Rating based spread
 - Brazil has a Ba2 local currency rating from Moody's. The default spread for that rating is 2.51%
 - Riskfree rate in \$R = 6.77% - 2.51% = 4.26%

Test 4: A Real Riskfree Rate

38

- 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 2020, the yield on a 10-year indexed treasury bond was 0.60%. Which of the following statements would you subscribe to?
 - a. This (0.60%) is the real riskfree rate to use, if you are valuing US companies in real terms.
 - b. This (0.60%) is the real riskfree rate to use, anywhere in the world

Explain.

No default free entity: Choices with riskfree rates....

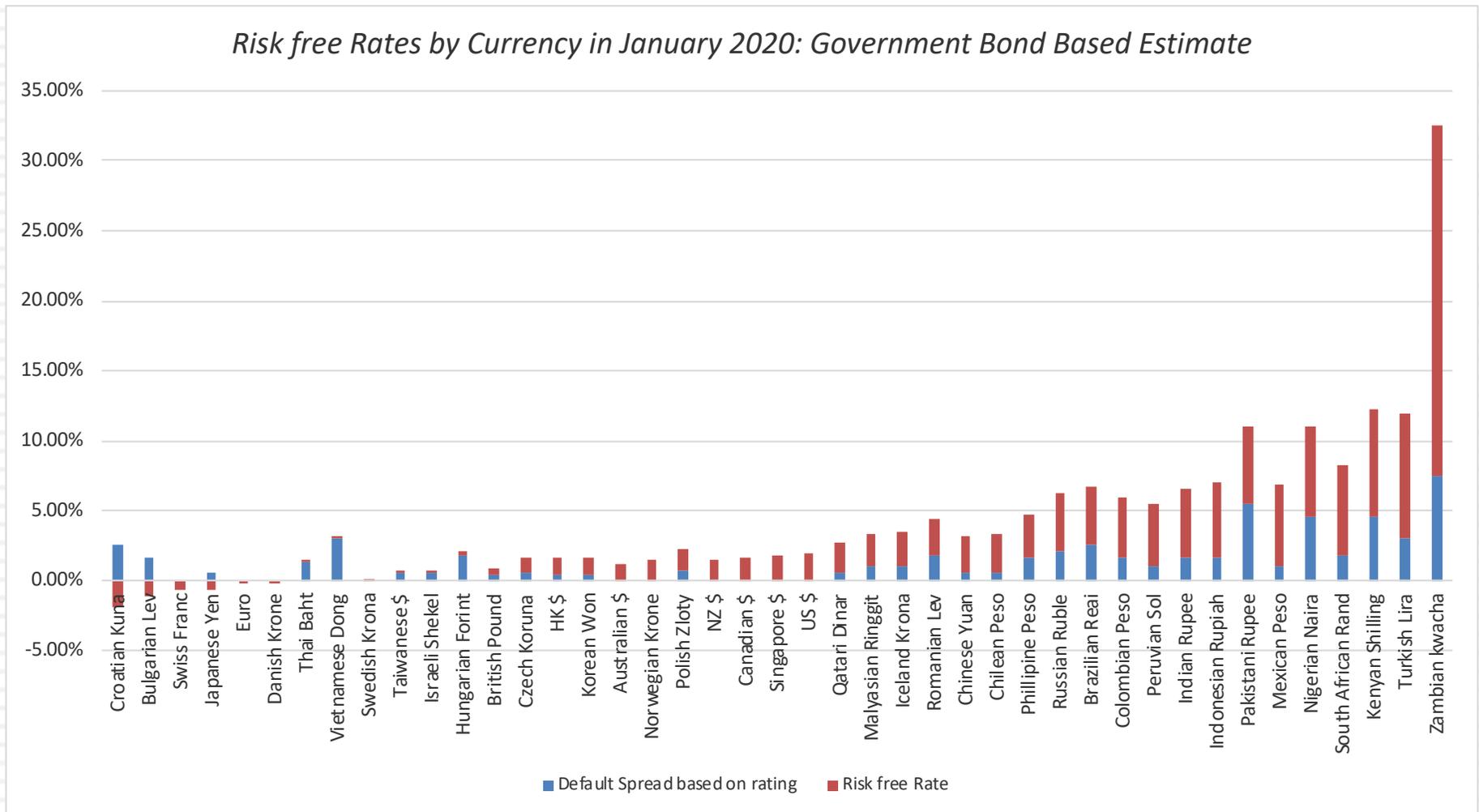
39

- Estimate a range for the riskfree rate in local terms:
 - Approach 1: Subtract default spread from local government bond rate:
Government bond rate in local currency terms - Default spread for Government in local currency
 - Approach 2: Use forward rates and the riskless rate in an index currency (say Euros or dollars) to estimate the riskless rate in the local currency.
- Do the analysis in real terms (rather than nominal terms) using a real riskfree rate, which can be obtained in one of two ways –
 - from an inflation-indexed government bond, if one exists
 - set equal, approximately, to the long term real growth rate of the economy in which the valuation is being done.
- Do the analysis in a currency where you can get a riskfree rate, say US dollars or Euros.

Why do risk free rates vary across currencies?

January 2020 Risk free rates

40



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

1. Build up approach: The risk free rate in any currency can be written as the sum of two variables:

Risk free rate = Expected Inflation in currency + Expected real interest rate

Thus, if the expected inflation rate in a country is expected to be 15% and the TIPs rate is 1%, the risk free rate is 16%.

2. US \$ rate & Differential Inflation: Alternatively, you can scale up the US \$ risk free rate by the differential inflation between the US \$ and the currency in question:

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

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

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

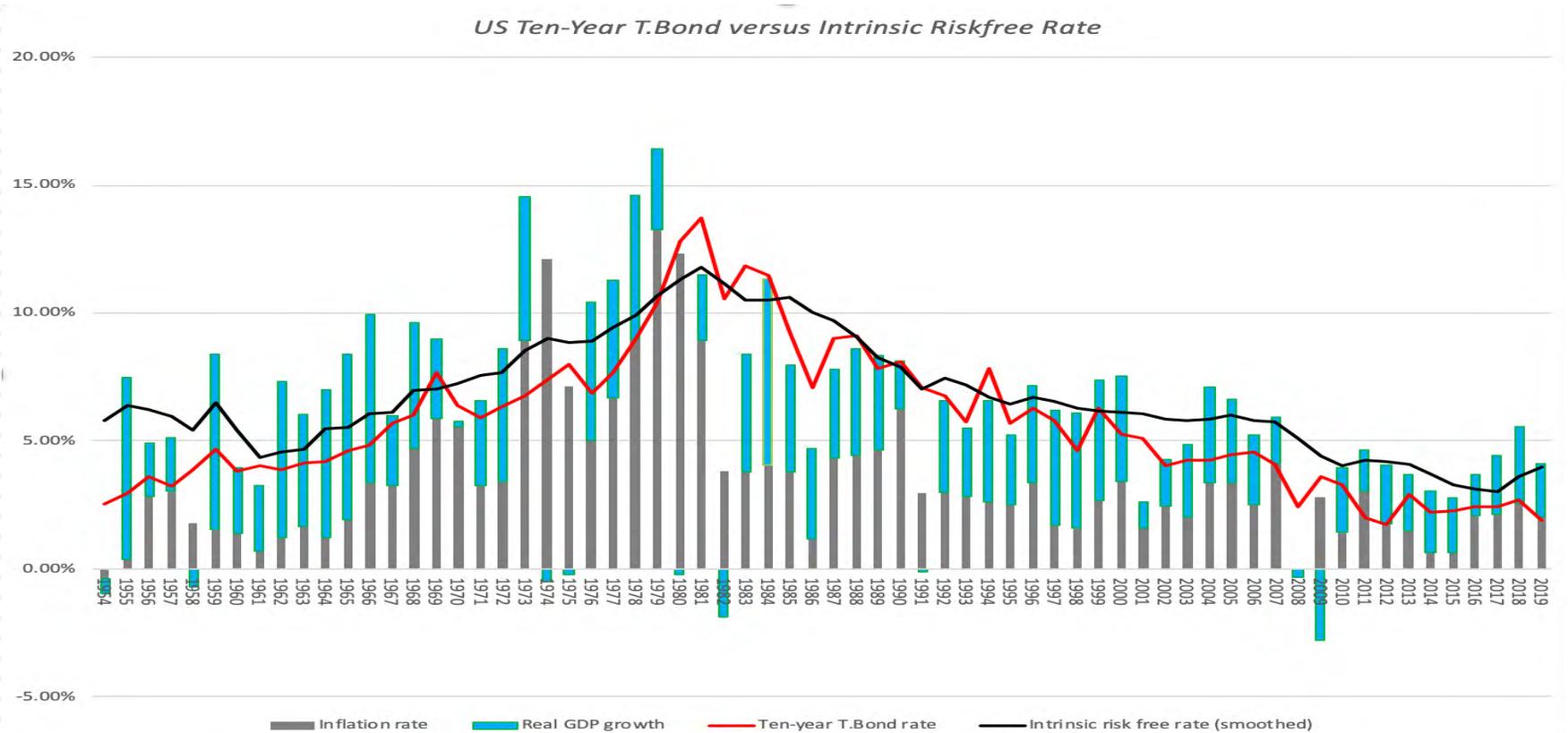
One more test on riskfree rates...

42

- On January 1, 2020, the 10-year treasury bond rate in the United States was 1.92%, low by historic standards. Assume that you were valuing a company in US dollars then, but were wary about the risk free 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

43



| Period | T.Bond Rate | Inflation rate | Real GDP Growth | Intrinsic Risk free rate | Difference |
|-----------|-------------|----------------|-----------------|--------------------------|------------|
| 1954-2019 | 5.72% | 3.53% | 3.01% | 6.54% | -0.82% |
| 1954-1980 | 5.83% | 4.49% | 3.50% | 7.98% | -2.15% |
| 1981-2008 | 6.88% | 3.26% | 3.04% | 6.30% | 0.58% |
| 2010-2019 | 2.38% | 1.86% | 1.72% | 3.58% | -1.03% |

Negative Interest Rates?

44

- In 2020, there were at least three currencies (Swiss Franc, Japanese Yen, Euro) with negative interest rates and perhaps two more (Croatian Kuna, Bulgarian Lev). 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?

45

Discount Rates: II

The Equity Risk Premium

II. The Equity Risk Premium

The ubiquitous historical risk premium

46

- 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:

| | Arithmetic Average | | Geometric Average | |
|-----------|--------------------|-------------------|-------------------|-------------------|
| | Stocks - T. Bills | Stocks - T. Bonds | Stocks - T. Bills | Stocks - T. Bonds |
| 1928-2019 | 8.18% | 6.43% | 6.35% | 4.83% |
| Std Error | 2.08% | 2.20% | | |
| 1970-2019 | 7.26% | 4.50% | 5.93% | 3.52% |
| Std Error | 2.38% | 2.73% | | |
| 2010-2019 | 13.51% | 9.67% | 12.93% | 9.31% |
| Std Error | 3.85% | 4.87% | | |

Aswat

The perils of trusting the past.....

47

- 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.

Risk Premium for a Mature Market? Broadening the sample to 1900-2017

48

| <i>Country</i> | <i>Geometric Mean</i> | <i>Standard Error</i> |
|----------------|-----------------------|-----------------------|
| Australia | 5.00% | 1.70% |
| Austria | 2.90% | 14.10% |
| Belgium | 2.20% | 1.90% |
| Canada | 3.50% | 1.70% |
| Denmark | 2.20% | 1.70% |
| Finland | 5.20% | 2.70% |
| France | 3.10% | 2.10% |
| Germany | 5.10% | 2.60% |
| Ireland | 2.70% | 1.80% |
| Italy | 3.20% | 2.70% |
| Japan | 5.10% | 3.00% |
| Netherlands | 3.30% | 2.00% |
| New Zealand | 4.00% | 1.60% |
| Norway | 2.40% | 2.50% |
| Portugal | 5.30% | 2.90% |
| South Africa | 5.30% | 1.80% |
| Spain | 1.80% | 1.90% |
| Sweden | 3.10% | 2.00% |
| Switzerland | 2.20% | 1.60% |
| U.K. | 3.70% | 1.60% |
| U.S. | 4.40% | 1.90% |
| Europe | 3.00% | 1.40% |
| World-ex U.S. | 2.80% | 1.30% |
| World | 3.20% | 1.40% |

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

49

- 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 2020, that spread was % for the Brazilian \$ bond) was 1.71%.
 - The sovereign CDS spread for the country. In January 2020, the ten-year CDS spread for Brazil, adjusted for the US CDS, was 1.56%.
 - 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 2.51% in January 2020.
- 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 5.20%.
 - Country Risk Premium for Brazil = 2.51%
 - Total ERP for Brazil = 5.20% + 2.51% = 7.71%

An equity volatility based approach to estimating the country total ERP

50

- 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 5.20%.
 - ▣ 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 = 5.20% (30%/18%) = 8.67%
 - ▣ Country equity risk premium for Brazil = 8.67% - 5.20% = 3.47%

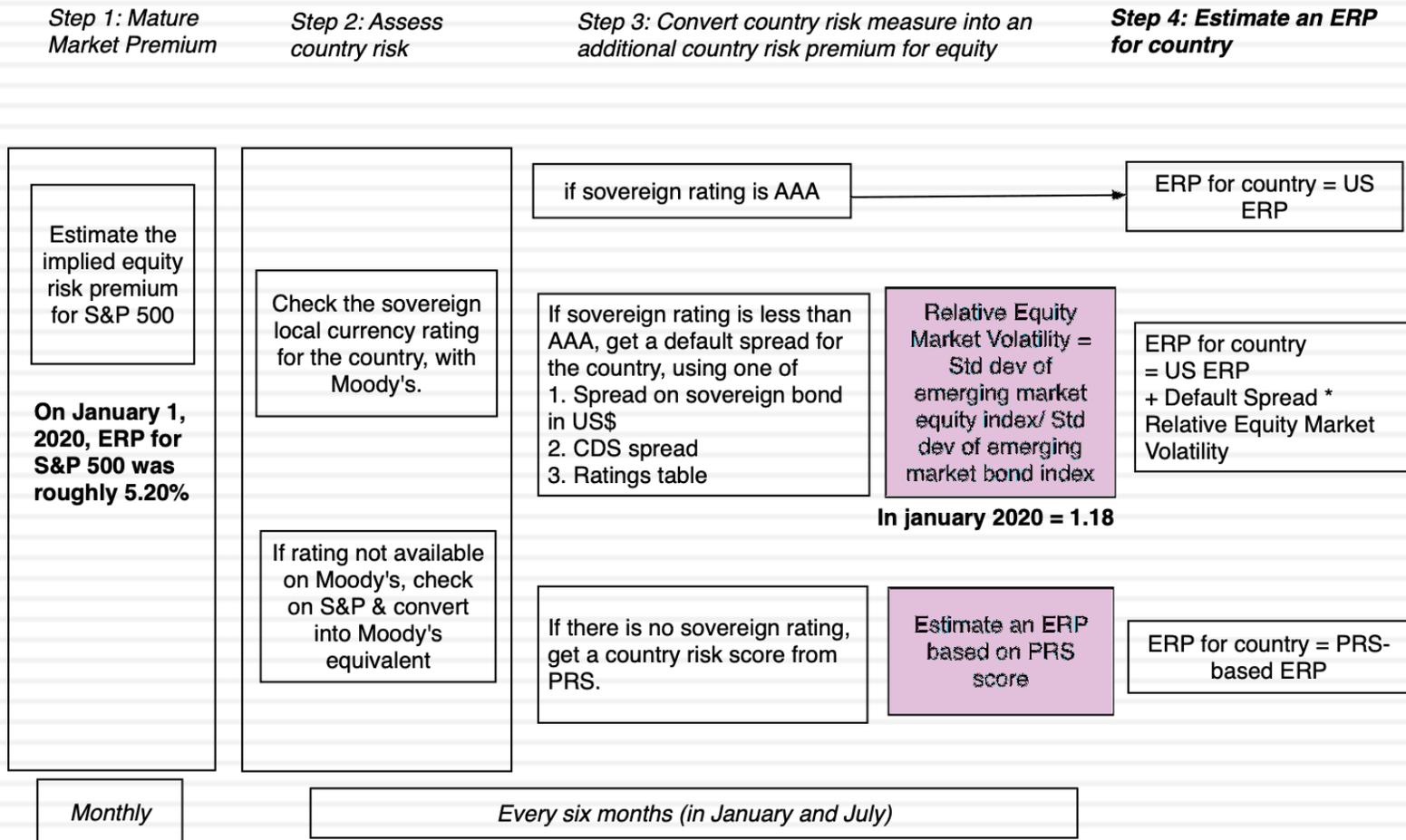
A melded approach to estimating the additional country risk premium

51

- 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 2020, 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 = 2.51%
 - ▣ Brazil Country Risk Premium = 2.51% (30%/20%) = 3.77%
 - ▣ Brazil Total ERP = Mature Market Premium + CRP = 5.20% + 3.77% = 8.97%

A Template for Estimating the ERP

ERP Estimation Procedure - January 1, 2020



ERP : Jan 2020

| | | | | | |
|---------------------------|-------|-------|-----------------------|--------------|--------------|
| Andorra (Principality of) | 7.08% | 1.88% | Italy | 7.37% | 2.17% |
| Austria | 5.59% | 0.39% | Jersey (States of) | 5.89% | 0.69% |
| Belgium | 5.80% | 0.60% | Liechtenstein | 5.20% | 0.00% |
| Cyprus | 8.16% | 2.96% | Luxembourg | 5.20% | 0.00% |
| Denmark | 5.20% | 0.00% | Malta | 6.04% | 0.84% |
| Finland | 5.59% | 0.39% | Netherlands | 5.20% | 0.00% |
| France | 5.69% | 0.49% | Norway | 5.20% | 0.00% |
| Germany | 5.20% | 0.00% | Portugal | 7.37% | 2.17% |
| Greece | 9.64% | 4.44% | Spain | 6.77% | 1.57% |
| Guernsey (States of) | 6.77% | 1.57% | Sweden | 5.20% | 0.00% |
| Iceland | 6.04% | 0.84% | Switzerland | 5.20% | 0.00% |
| Ireland | 6.04% | 0.84% | Turkey | 9.64% | 4.44% |
| Isle of Man | 5.69% | 0.49% | United Kingdom | 5.69% | 0.49% |
| | | | Western Europe | 6.01% | 0.81% |

| | | |
|----------------------|--------------|--------------|
| Canada | 5.20% | 0.00% |
| United States | 5.20% | 0.00% |
| North America | 5.20% | 0.00% |

| | | |
|-----------|--------|-------|
| Caribbean | 10.62% | 5.42% |
|-----------|--------|-------|

| | | |
|----------------------------------|--------------|--------------|
| Argentina | 14.08% | 8.88% |
| Belize | 11.62% | 6.42% |
| Bolivia | 8.75% | 3.55% |
| Brazil | 8.16% | 2.96% |
| Chile | 5.89% | 0.69% |
| Colombia | 7.08% | 1.88% |
| Costa Rica | 9.64% | 4.44% |
| Ecuador | 11.62% | 6.42% |
| El Salvador | 14.08% | 8.88% |
| Guatemala | 7.66% | 2.46% |
| Honduras | 9.64% | 4.44% |
| Mexico | 6.38% | 1.18% |
| Nicaragua | 10.63% | 5.43% |
| Panama | 6.77% | 1.57% |
| Paraguay | 7.66% | 2.46% |
| Peru | 6.38% | 1.18% |
| Suriname | 10.63% | 5.43% |
| Uruguay | 9.64% | 4.44% |
| Venezuela | 22.89% | 17.69% |
| Central and South America | 8.48% | 3.28% |

| Country | ERP | CRP |
|--------------------------------|--------------|--------------|
| Angola | 11.62% | 6.42% |
| Benin | 10.63% | 5.43% |
| Botswana | 6.04% | 0.84% |
| Burkina Faso | 10.63% | 5.43% |
| Cameroon | 10.63% | 5.43% |
| Cape Verde | 10.63% | 5.43% |
| Congo (Democratic Republic of) | 12.59% | 7.39% |
| Congo (Republic of) | 14.08% | 8.88% |
| Côte d'Ivoire | 8.75% | 3.55% |
| Egypt | 10.63% | 5.43% |
| Ethiopia | 9.64% | 4.44% |
| Gabon | 12.59% | 7.39% |
| Ghana | 11.62% | 6.42% |
| Kenya | 10.63% | 5.43% |
| Mali | 11.62% | 6.42% |
| Morocco | 7.66% | 2.46% |
| Mozambique | 14.08% | 8.88% |
| Namibia | 8.16% | 2.96% |
| Niger | 11.62% | 6.42% |
| Nigeria | 10.63% | 5.43% |
| Rwanda | 10.63% | 5.43% |
| Senegal | 8.75% | 3.55% |
| South Africa | 7.37% | 2.17% |
| Swaziland | 10.63% | 5.43% |
| Tanzania | 9.64% | 4.44% |
| Togo | 11.62% | 6.42% |
| Tunisia | 10.63% | 5.43% |
| Uganda | 10.63% | 5.43% |
| Zambia | 14.08% | 8.88% |
| Africa | 9.89% | 4.69% |

| | | |
|------------------------------------|--------------|--------------|
| Albania | 9.64% | 4.44% |
| Armenia | 8.75% | 3.55% |
| Azerbaijan | 8.16% | 2.96% |
| Belarus | 11.62% | 6.42% |
| Bosnia and Herzegovina | 11.62% | 6.42% |
| Bulgaria | 7.08% | 1.88% |
| Croatia | 8.16% | 2.96% |
| Czech Republic | 5.80% | 0.60% |
| Estonia | 5.89% | 0.69% |
| Georgia | 8.16% | 2.96% |
| Hungary | 7.37% | 2.17% |
| Kazakhstan | 7.37% | 2.17% |
| Kyrgyzstan | 10.63% | 5.43% |
| Latvia | 6.38% | 1.18% |
| Lithuania | 6.38% | 1.18% |
| Macedonia | 8.75% | 3.55% |
| Moldova | 11.62% | 6.42% |
| Montenegro | 9.64% | 4.44% |
| Poland | 6.04% | 0.84% |
| Romania | 7.37% | 2.17% |
| Russia | 7.37% | 2.17% |
| Serbia | 8.75% | 3.55% |
| Slovakia | 6.04% | 0.84% |
| Slovenia | 6.77% | 1.57% |
| Tajikistan | 11.62% | 6.42% |
| Ukraine | 12.59% | 7.39% |
| Uzbekistan | 7.08% | 1.88% |
| Eastern Europe & Russia | 7.34% | 2.14% |

| | | |
|----------------------|--------------|--------------|
| Abu Dhabi | 5.69% | 0.49% |
| Bahrain | 10.63% | 5.43% |
| Iraq | 12.59% | 7.39% |
| Israel | 5.89% | 0.69% |
| Jordan | 9.64% | 4.44% |
| Kuwait | 5.69% | 0.49% |
| Lebanon | 14.08% | 8.88% |
| Oman | 7.66% | 2.46% |
| Qatar | 5.80% | 0.60% |
| Ras Al Khaimah | 12.59% | 7.39% |
| Saudi Arabia | 5.89% | 0.69% |
| Sharjah | 6.38% | 1.18% |
| United Arab Emirates | 5.69% | 0.49% |
| Middle East | 6.77% | 1.57% |

| Country | PRS Composite Risk Score | ERP | CRP |
|-----------------|--------------------------|--------|--------|
| Algeria | 63 | 11.62% | 6.42% |
| Brunei | 82.75 | 5.59% | 0.39% |
| Gambia | 63.75 | 11.62% | 6.42% |
| Guinea | 57 | 15.06% | 9.86% |
| Guinea-Bissau | 63.25 | 11.62% | 6.42% |
| Guyana | 63.75 | 11.62% | 6.42% |
| Haiti | 57.5 | 14.08% | 8.88% |
| Iran | 62.5 | 11.62% | 6.42% |
| Korea, D.P.R. | 50.5 | 17.03% | 11.83% |
| Liberia | 49.5 | 21.71% | 16.51% |
| Libya | 69.5 | 8.16% | 2.96% |
| Madagascar | 65.5 | 10.63% | 5.43% |
| Malawi | 63.5 | 11.62% | 6.42% |
| Myanmar | 64 | 11.62% | 6.42% |
| Sierra Leone | 57 | 15.06% | 9.86% |
| Somalia | 53 | 17.03% | 11.83% |
| Sudan | 39.75 | 21.71% | 16.51% |
| Syria | 53 | 17.03% | 11.83% |
| Yemen, Republic | 54.5 | 17.03% | 11.83% |
| Zimbabwe | 50.5 | 17.03% | 11.83% |

| | | |
|------------------|--------------|--------------|
| Bangladesh | 8.75% | 3.55% |
| Cambodia | 10.63% | 5.43% |
| China | 5.89% | 0.69% |
| Fiji | 8.75% | 3.55% |
| Hong Kong | 5.69% | 0.49% |
| India | 7.08% | 1.88% |
| Indonesia | 7.08% | 1.88% |
| Japan | 5.89% | 0.69% |
| Korea | 5.69% | 0.49% |
| Macao | 5.80% | 0.60% |
| Malaysia | 6.38% | 1.18% |
| Maldives | 10.63% | 5.43% |
| Mauritius | 6.77% | 1.57% |
| Mongolia | 11.62% | 6.42% |
| Pakistan | 11.62% | 6.42% |
| Papua New Guinea | 10.63% | 5.43% |
| Philippines | 7.08% | 1.88% |
| Singapore | 5.20% | 0.00% |
| Solomon Islands | 11.62% | 6.42% |
| Sri Lanka | 10.63% | 5.43% |
| Taiwan | 5.80% | 0.60% |
| Thailand | 6.77% | 1.57% |
| Vietnam | 8.75% | 3.55% |
| Asia | 6.21% | 1.01% |

| | |
|------------------------------------|--------------|
| Australia | 5.20% |
| Cook Islands | 9.64% |
| New Zealand | 5.20% |
| Australia & New Zealand | 5.20% |

Aswath Damodaran

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average

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,
 - $E(\text{Return}) = \text{Riskfree Rate} + \text{CRP} + \text{Beta} (\text{Mature ERP})$
- Approach 2: Assume that a company's exposure to country risk is similar to its exposure to other market risk.
 - $E(\text{Return}) = \text{Riskfree Rate} + \text{Beta} (\text{Mature ERP} + \text{CRP})$
- 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

Approaches 1 & 2: Estimating country risk premium exposure

55

- Location based CRP: The standard approach in valuation is to attach a country risk premium to a company based upon its country of incorporation. Thus, if you are an Indian company, you are assumed to be exposed to the Indian country risk premium. A developed market company is assumed to be unexposed to emerging market risk.
- Operation-based CRP: There is a more reasonable modified version. The country risk premium for a company can be computed as a weighted average of the country risk premiums of the countries that it does business in, with the weights based upon revenues or operating income. If a company is exposed to risk in dozens of countries, you can take a weighted average of the risk premiums by region.

Operation based CRP: Single versus Multiple Emerging Markets

56

- 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

57

| <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..

58

- 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

59

| <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% |

Approach 3: Estimate a lambda for country risk

60

- 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

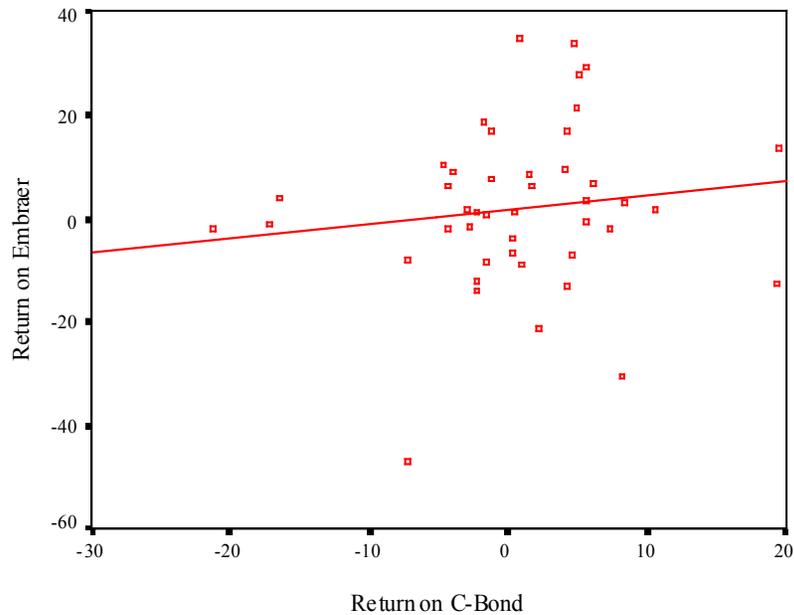
A Price/Return based Lambda

62

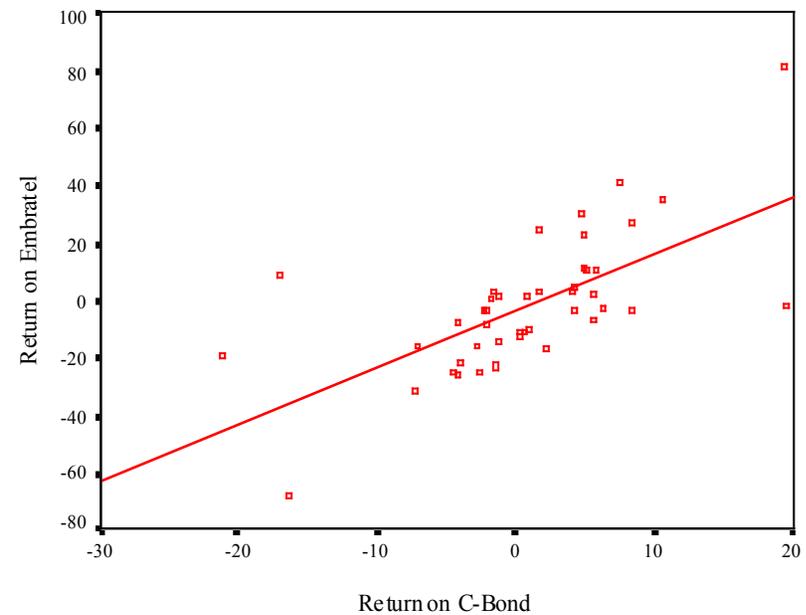
$$\text{Return}_{\text{Embraer}} = 0.0195 + \mathbf{0.2681} \text{Return}_{\text{C Bond}}$$

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

Embraer versus C Bond: 2000-2003



Embratel versus C Bond: 2000-2003



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

63

- 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
 - $E(\text{Return}) = 4\% + 1.07 (5\%) + (0.03*7.89\% + 0.97*0\%) = 9.59\%$
 - ▣ 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
 - $E(\text{Return}) = 4\% + 1.07 (5\% + (0.03*7.89\% + 0.97*0\%)) = 9.60\%$
 - ▣ 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

64

- 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

65

- 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).

Implied Equity Premiums: January 2008

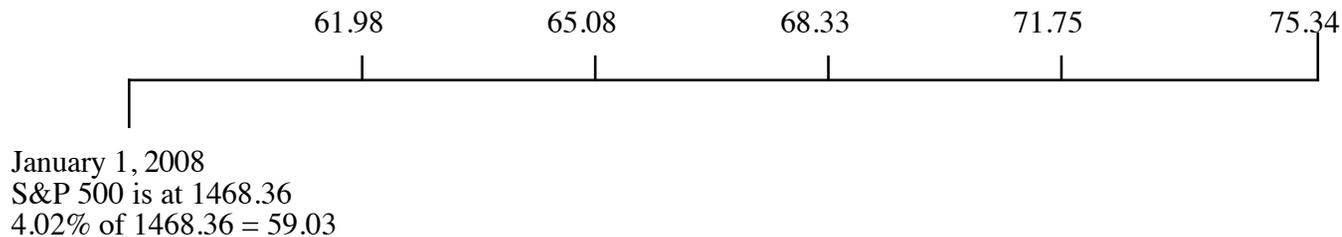
66

- We can use the information in stock prices to back out how risk averse the market is and how much of a risk premium it is demanding.

Between 2001 and 2007 dividends and stock buybacks averaged 4.02% of the index each year.

Analysts expect earnings to grow 5% a year for the next 5 years. We will assume that dividends & buybacks will keep pace.. Last year's cashflow (59.03) growing at 5% a year

After year 5, we will assume that earnings on the index will grow at 4.02%, the same rate as the entire economy (= riskfree rate).



- If you pay the current level of the index, you can expect to make a return of 8.39% on stocks (which is obtained by solving for r in the following equation)

$$1468.36 = \frac{61.98}{(1+r)} + \frac{65.08}{(1+r)^2} + \frac{68.33}{(1+r)^3} + \frac{71.75}{(1+r)^4} + \frac{75.34}{(1+r)^5} + \frac{75.35(1.0402)}{(r-.0402)(1+r)^5}$$

- Implied Equity risk premium = Expected return on stocks - Treasury bond rate = 8.39% - 4.02% = 4.37%

A year that made a difference.. The implied premium in January 2009

67

| Year | Market value of index | Dividends | Buybacks | Cash to equity | Dividend yield | Buyback yield | Total yield |
|------------|-----------------------|-----------|----------|----------------|----------------|---------------|-------------|
| 2001 | 1148.09 | 15.74 | 14.34 | 30.08 | 1.37% | 1.25% | 2.62% |
| 2002 | 879.82 | 15.96 | 13.87 | 29.83 | 1.81% | 1.58% | 3.39% |
| 2003 | 1111.91 | 17.88 | 13.70 | 31.58 | 1.61% | 1.23% | 2.84% |
| 2004 | 1211.92 | 19.01 | 21.59 | 40.60 | 1.57% | 1.78% | 3.35% |
| 2005 | 1248.29 | 22.34 | 38.82 | 61.17 | 1.79% | 3.11% | 4.90% |
| 2006 | 1418.30 | 25.04 | 48.12 | 73.16 | 1.77% | 3.39% | 5.16% |
| 2007 | 1468.36 | 28.14 | 67.22 | 95.36 | 1.92% | 4.58% | 6.49% |
| 2008 | 903.25 | 28.47 | 40.25 | 68.72 | 3.15% | 4.61% | 7.77% |
| Normalized | 903.25 | 28.47 | 24.11 | 52.584 | 3.15% | 2.67% | 5.82% |

In 2008, the actual cash returned to stockholders was 68.72. However, there was a 41% dropoff in buybacks in Q4. We reduced the total buybacks for the year by that amount.

Analysts expect earnings to grow 4% a year for the next 5 years. We will assume that dividends & buybacks will keep pace..
Last year's cashflow (52.58) growing at 4% a year

After year 5, we will assume that earnings on the index will grow at 2.21%, the same rate as the entire economy (= riskfree rate).

54.69 56.87 59.15 61.52 63.98

January 1, 2009
S&P 500 is at 903.25
Adjusted Dividends &
Buybacks for 2008 = 52.58

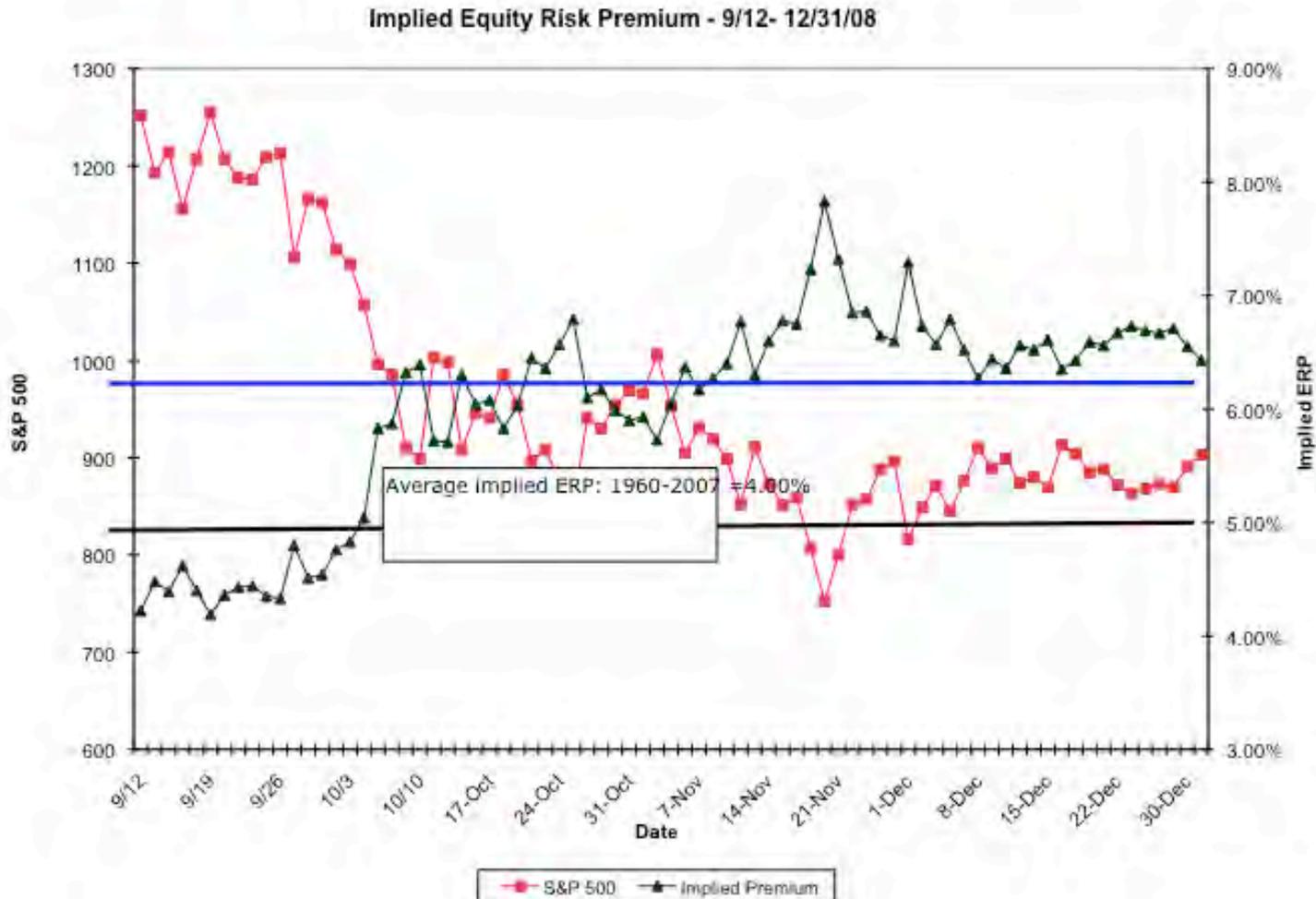
$$903.25 = \frac{54.69}{(1+r)} + \frac{56.87}{(1+r)^2} + \frac{59.15}{(1+r)^3} + \frac{61.52}{(1+r)^4} + \frac{63.98}{(1+r)^5} + \frac{63.98(1.0221)}{(r-.0221)(1+r)^5}$$

Expected Return on Stocks (1/1/09) = 8.64%
Riskfree rate = 2.21%
Equity Risk Premium = 6.43%

Aswath Damodaran

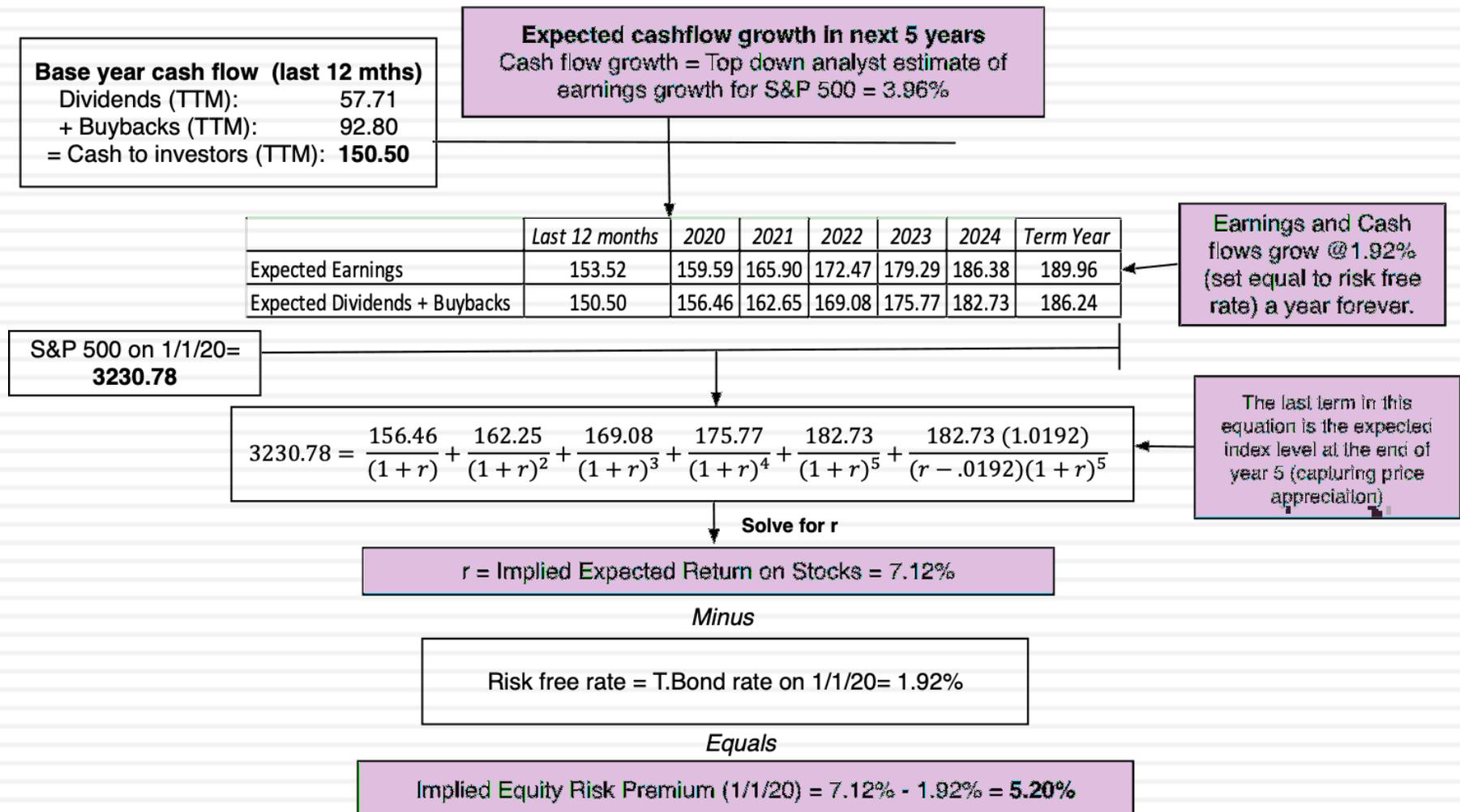
The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

68

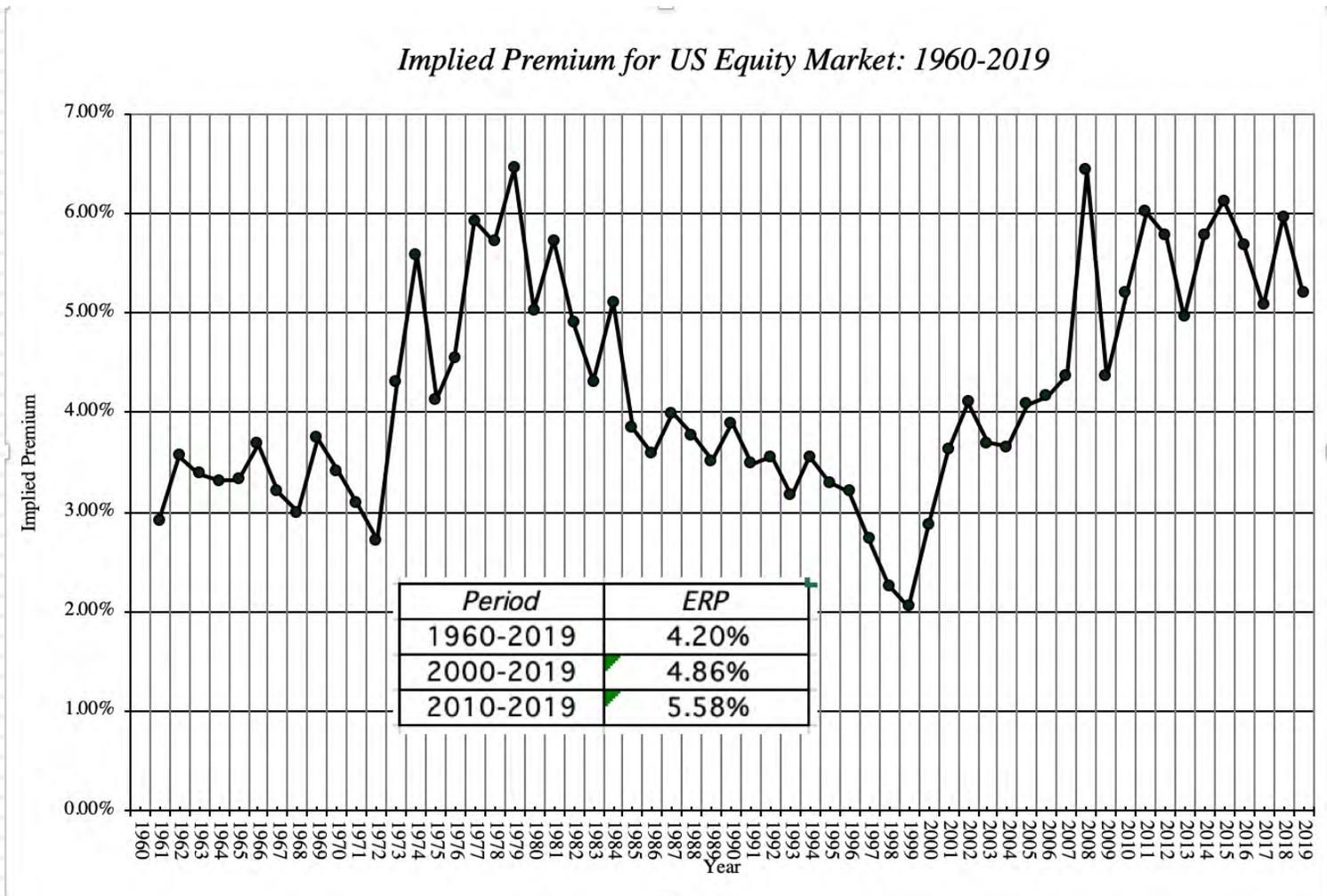


An Updated Equity Risk Premium: January 2020

69

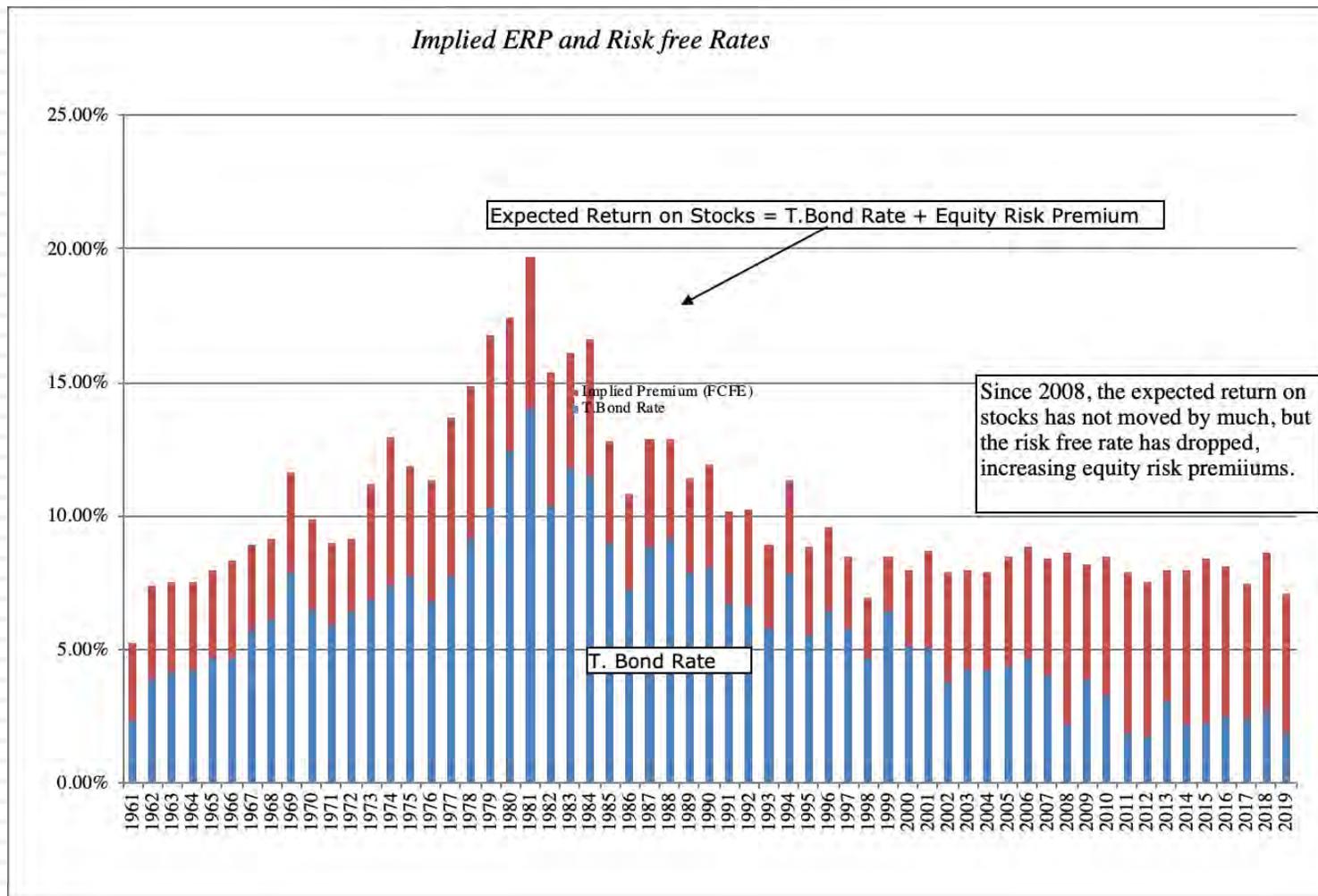


Implied Premiums in the US: 1960-2019



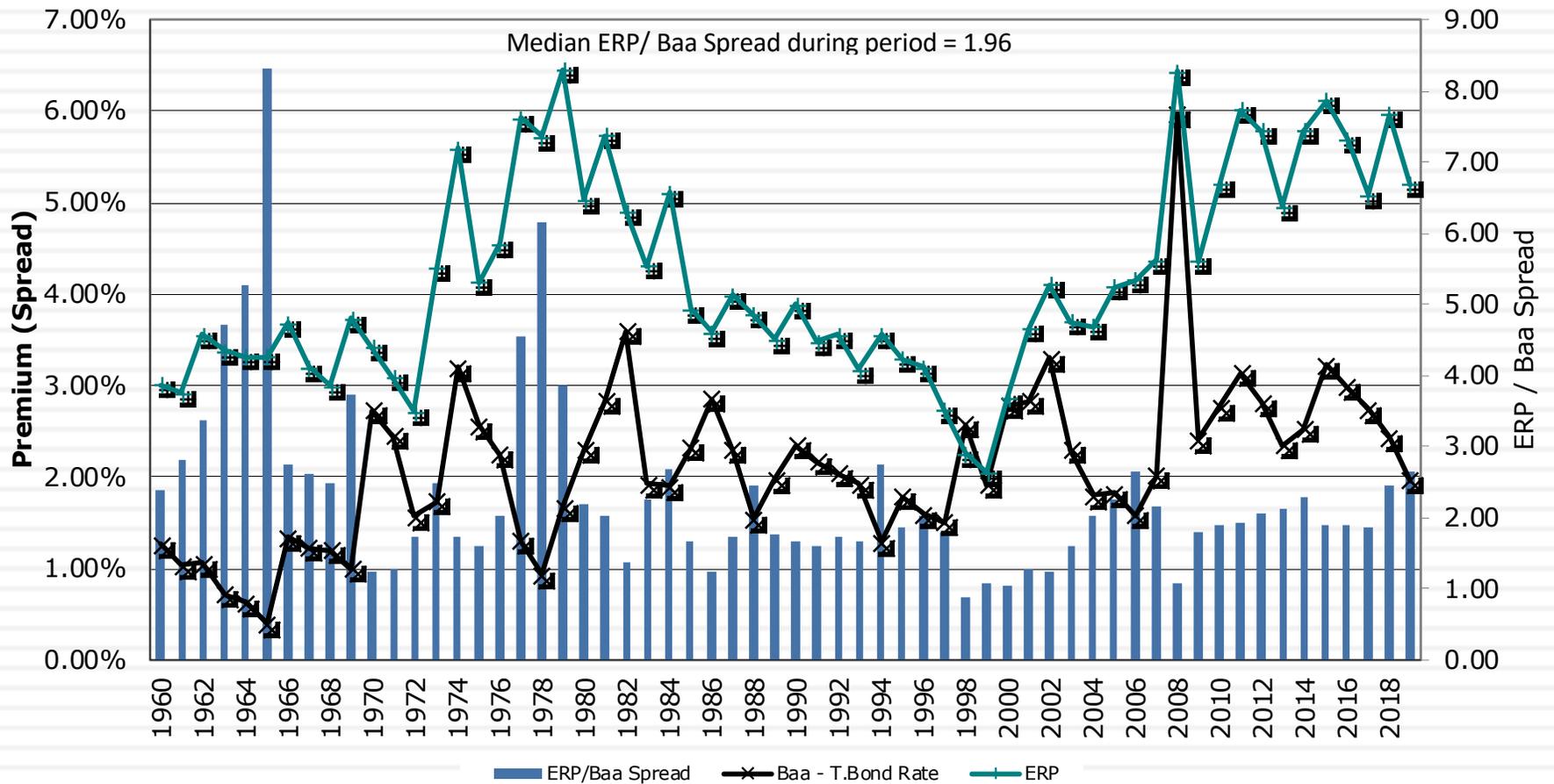
Implied Premium versus Risk Free Rate

71



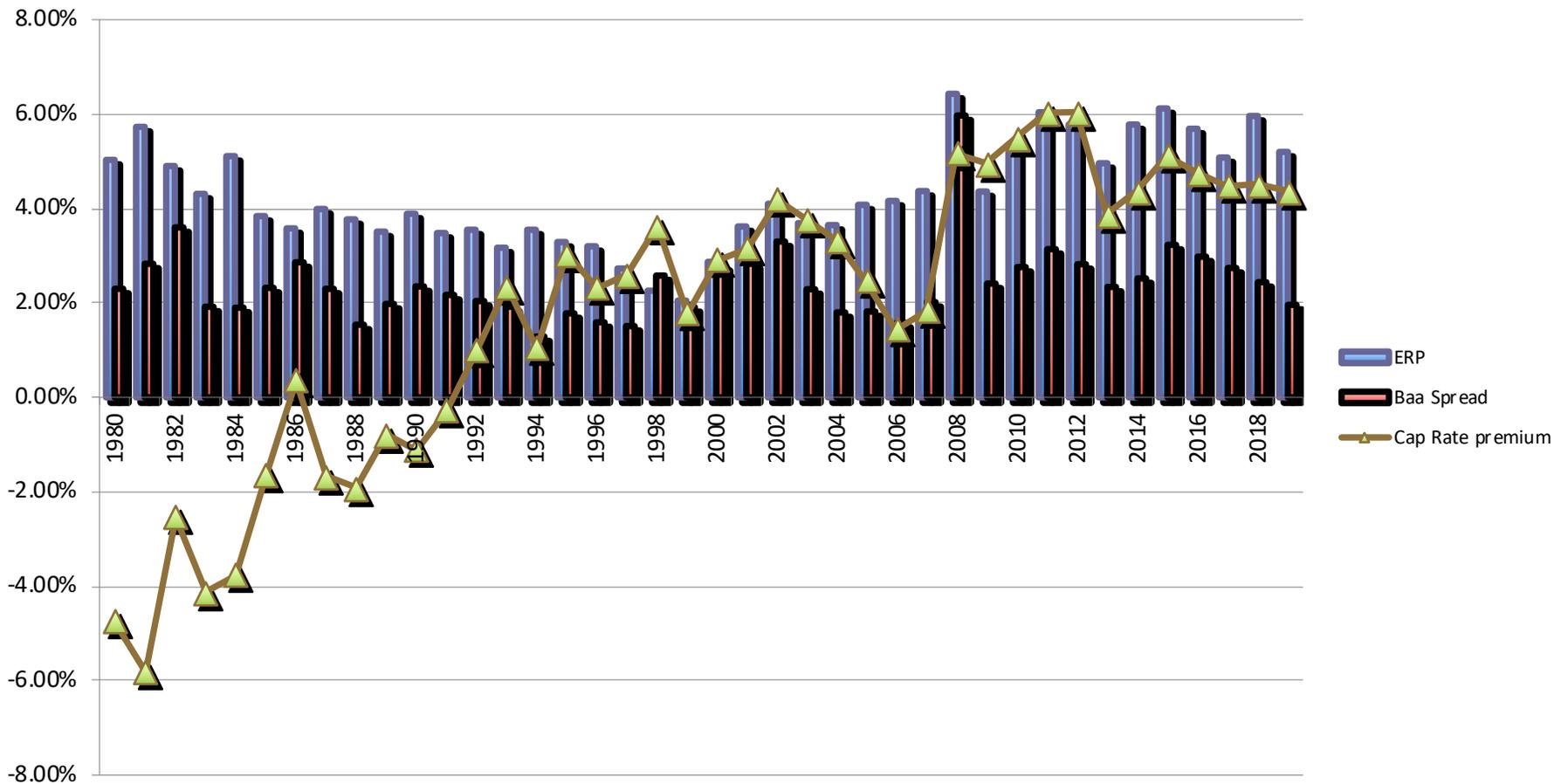
Equity Risk Premiums and Bond Default Spreads

Equity Risk Premiums and Bond Default Spreads



Equity Risk Premiums and Cap Rates (Real Estate)

Figure 18: Equity Risk Premiums, Cap Rates and Bond Spreads



Why implied premiums matter?

74

- 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 the department used the arithmetic average premium (for stocks over T.Bills) for 1928-2019 of 8.18% to value stocks in January 2019, given the implied premium of 5.20%, 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 undervalued)
 - c. There should be no systematic bias as long as they use the same premium to value all stocks.
- What if analysts are using the historical geometric average premium of 4.83% from 1928 to 2019 as their ERP?

Which equity risk premium should you use?

75

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

76

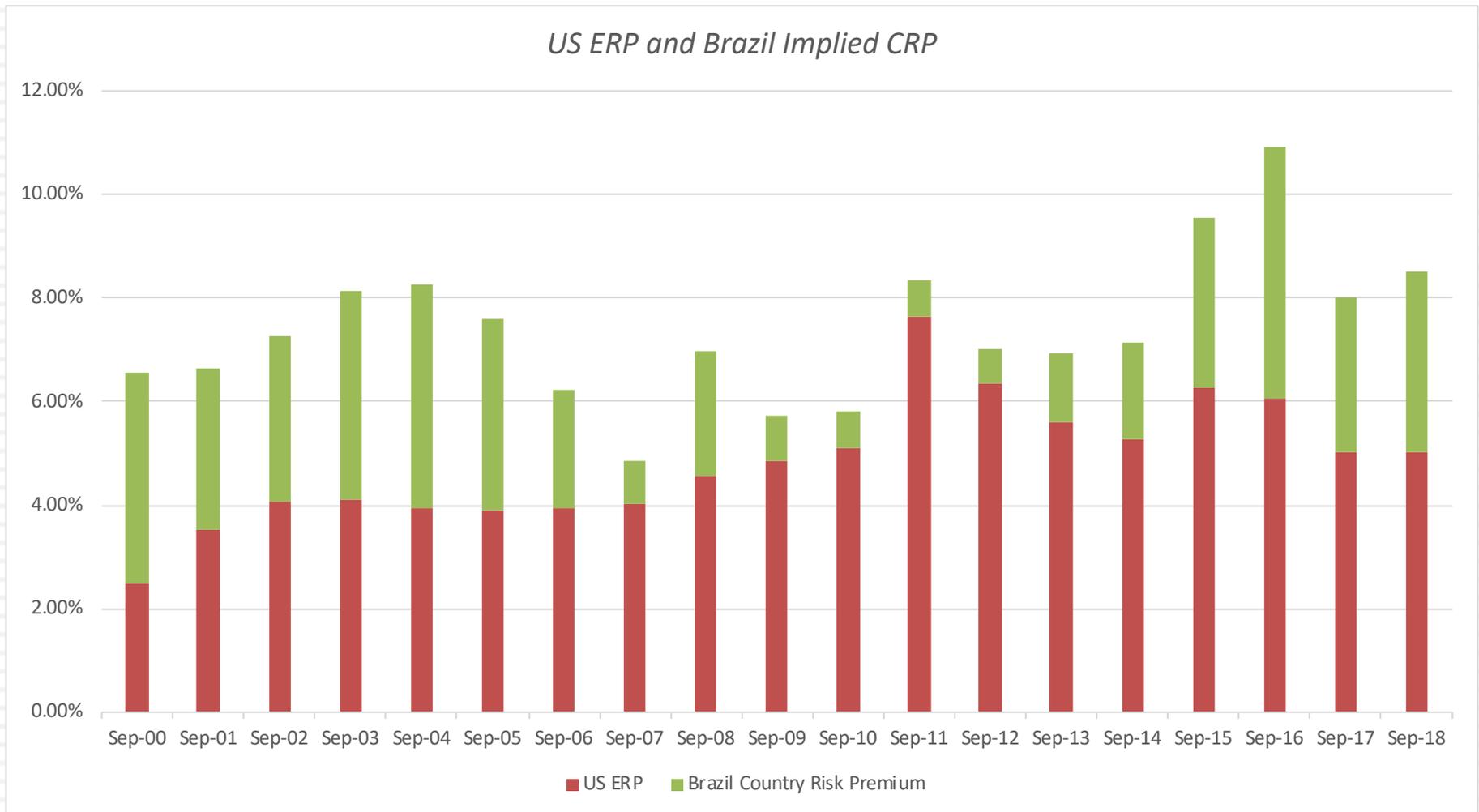
- Inputs for the computation
 - ▣ Sensex on 9/5/07 = 15446
 - ▣ Dividend yield on index = 3.05%
 - ▣ Expected growth rate - next 5 years = 14%
 - ▣ Growth rate beyond year 5 = 6.76% (set equal to riskfree rate)
- Solving for the expected return:

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

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

Changing Country Risk: Brazil CRP & Total ERP from 2000 to 2018

77



The evolution of Emerging Market Risk

78

| <i>Start of year</i> | <i>PBV (Developed)</i> | <i>PBV (Emerging)</i> | <i>ROE (Developed)</i> | <i>ROE (Emerging)</i> | <i>US T.Bond Rate</i> | <i>Growth Rate (Developed)</i> | <i>Growth Rate (Emerging)</i> | <i>Cost of Equity (Developed)</i> | <i>Cost of Equity (Emerging)</i> | <i>Differential</i> |
|----------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|--------------------------------|-------------------------------|-----------------------------------|----------------------------------|---------------------|
| 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% |

79

Discount Rates: III

Relative Risk Measures

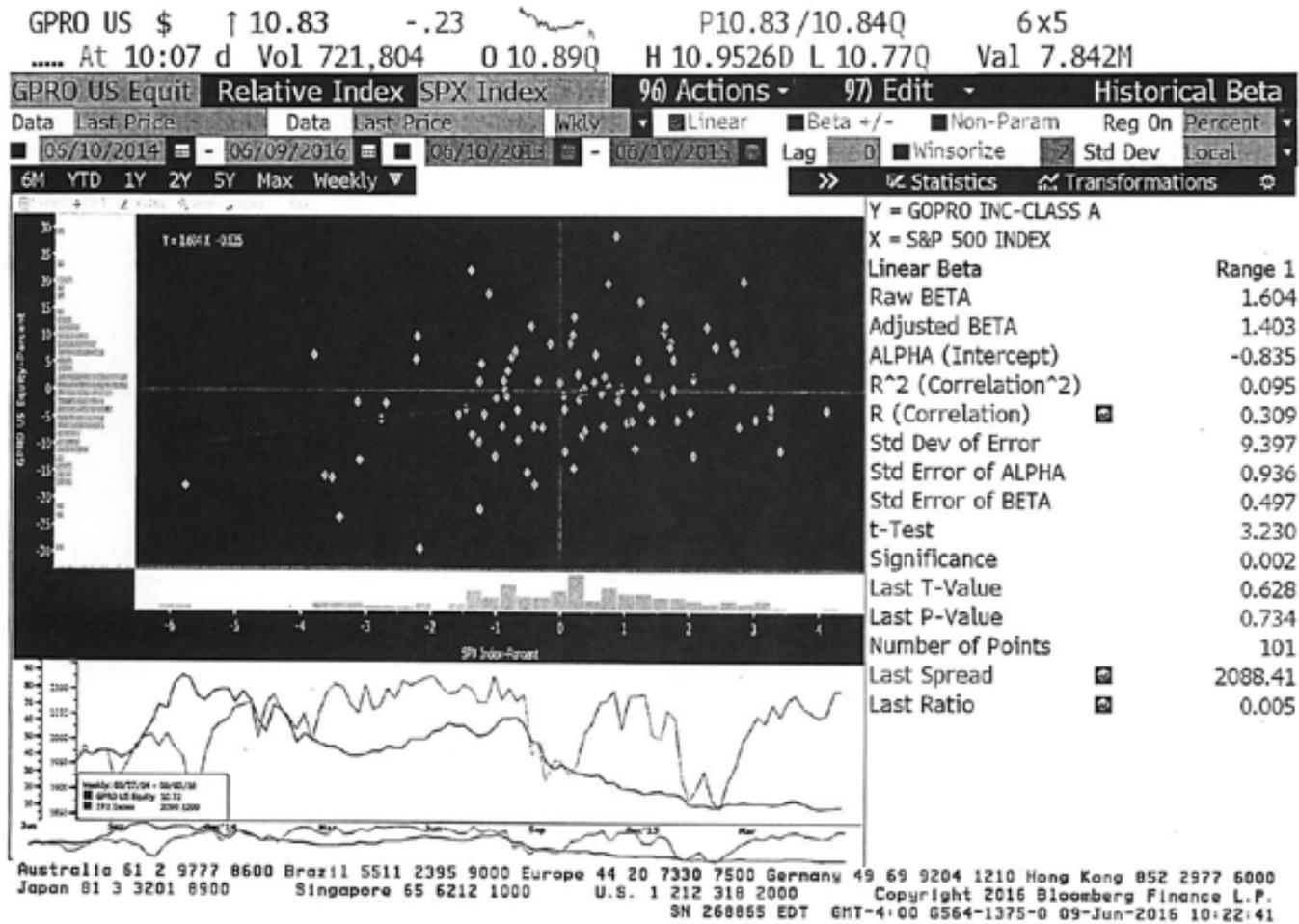
The CAPM Beta: The Most Used (and Misused) Risk Measure

80

- 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.

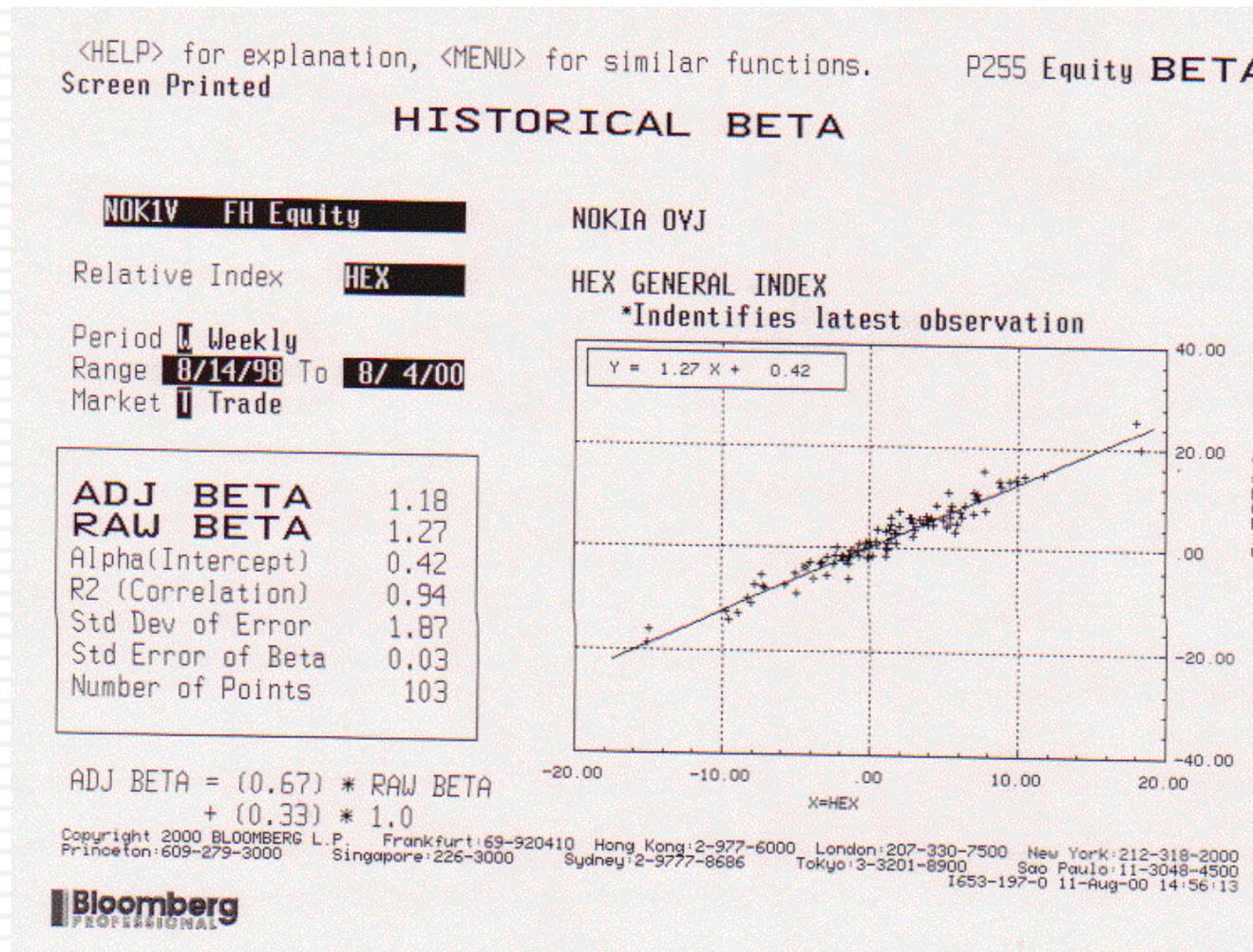
Unreliable, when it looks bad..

81



Or when it looks good..

82

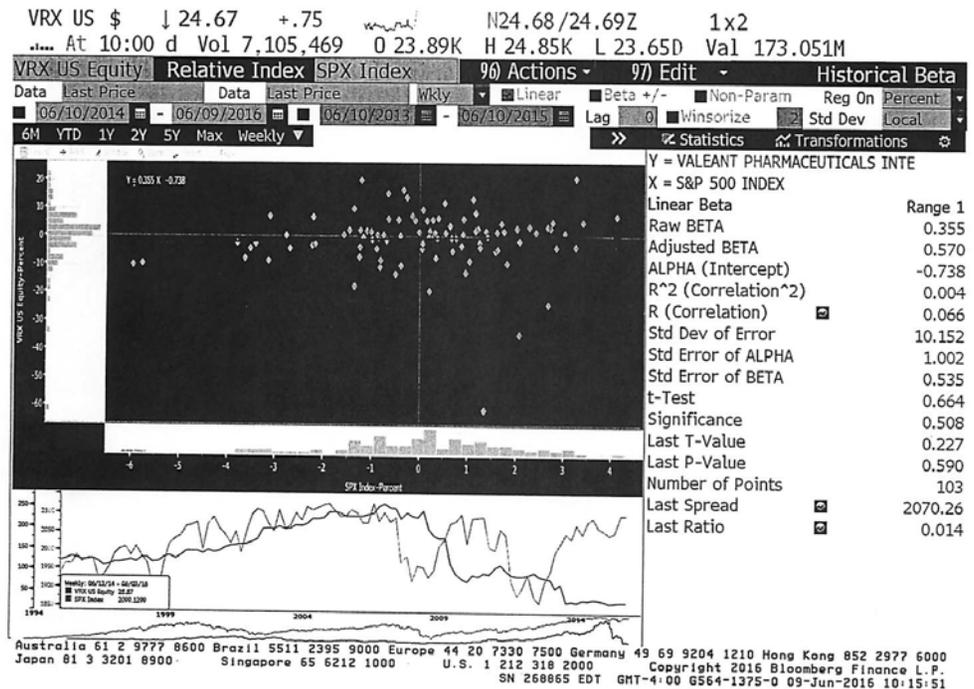


One slice of history..

83



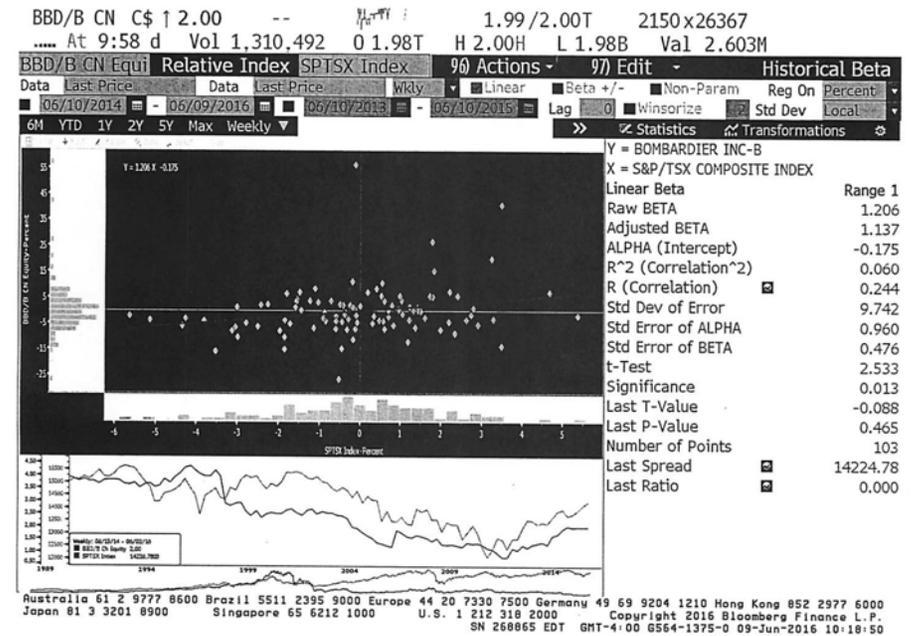
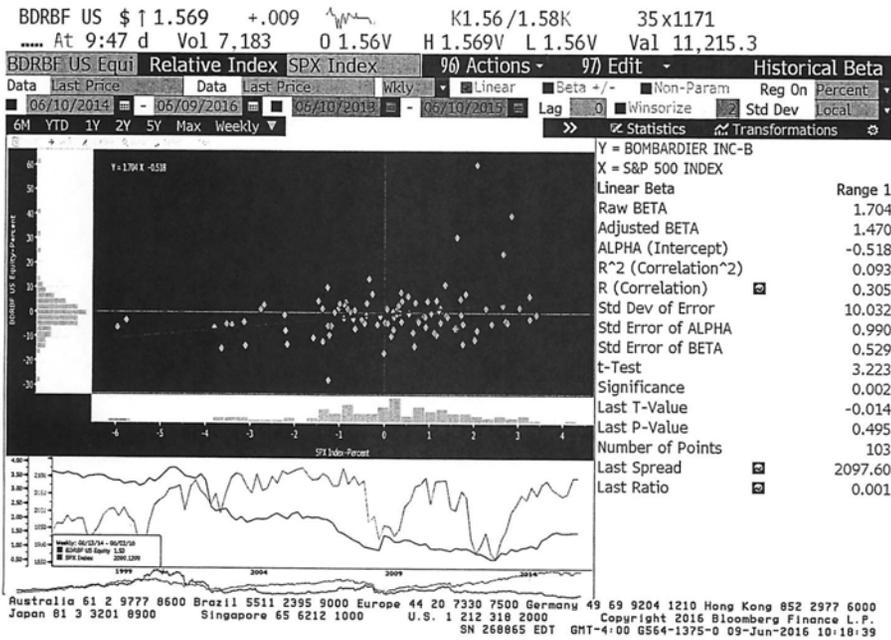
During this time period, Valeant was a stock under siege, without a CEO, under legal pressure & lacking financials.



Aswath Damodaran

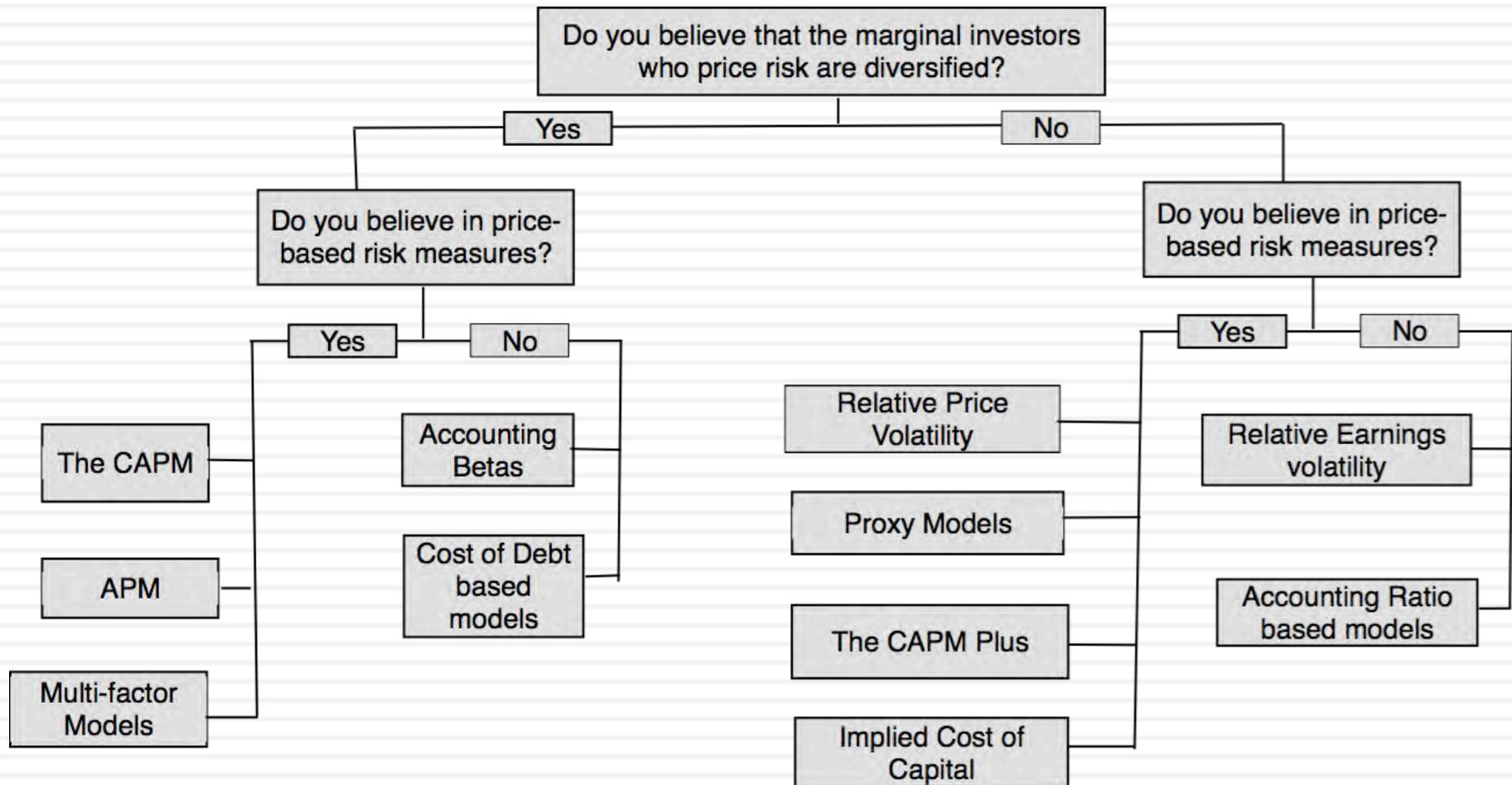
And subject to game playing

84



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

85



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

86

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.

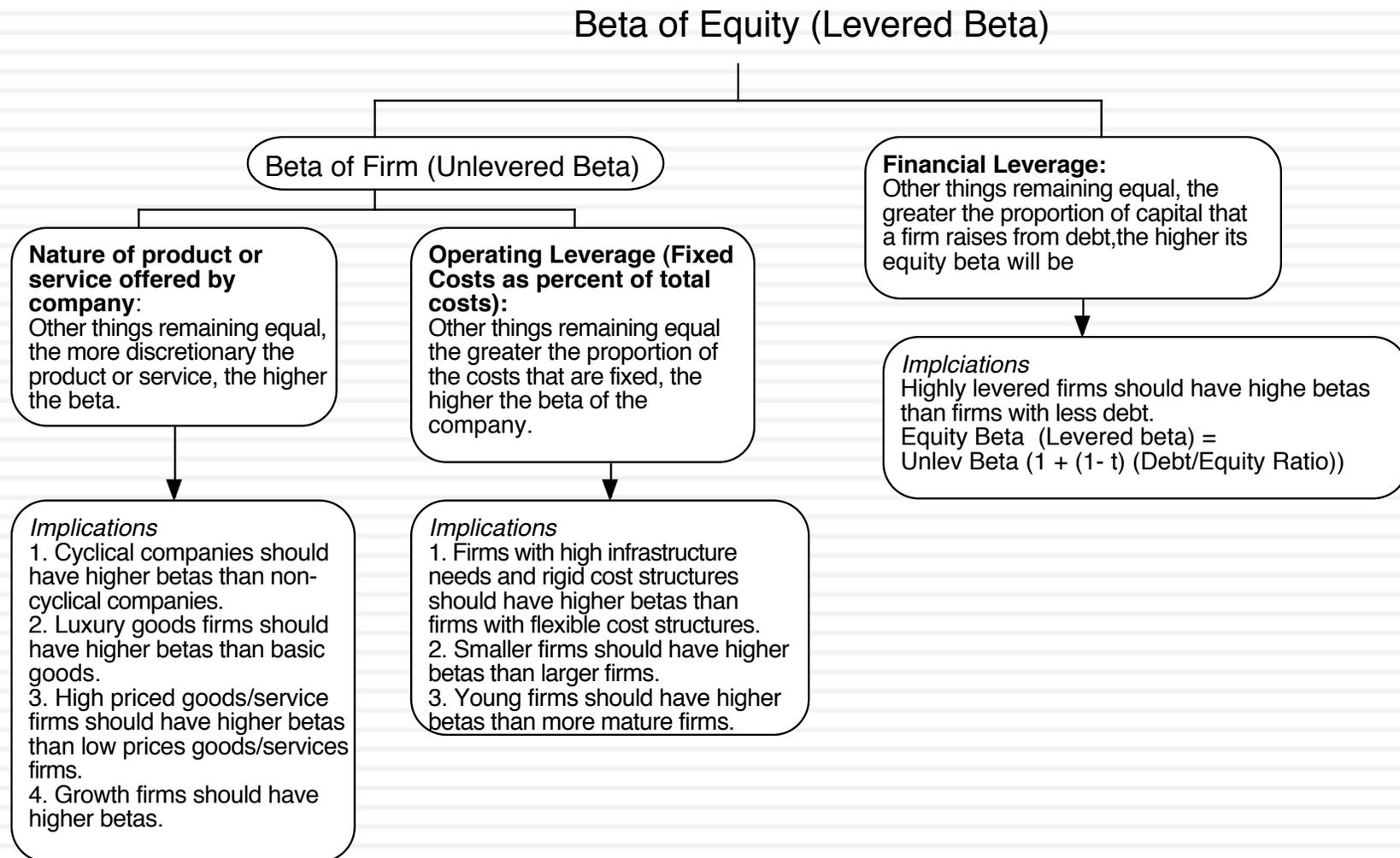
Don't like the price-based approach..

87

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.

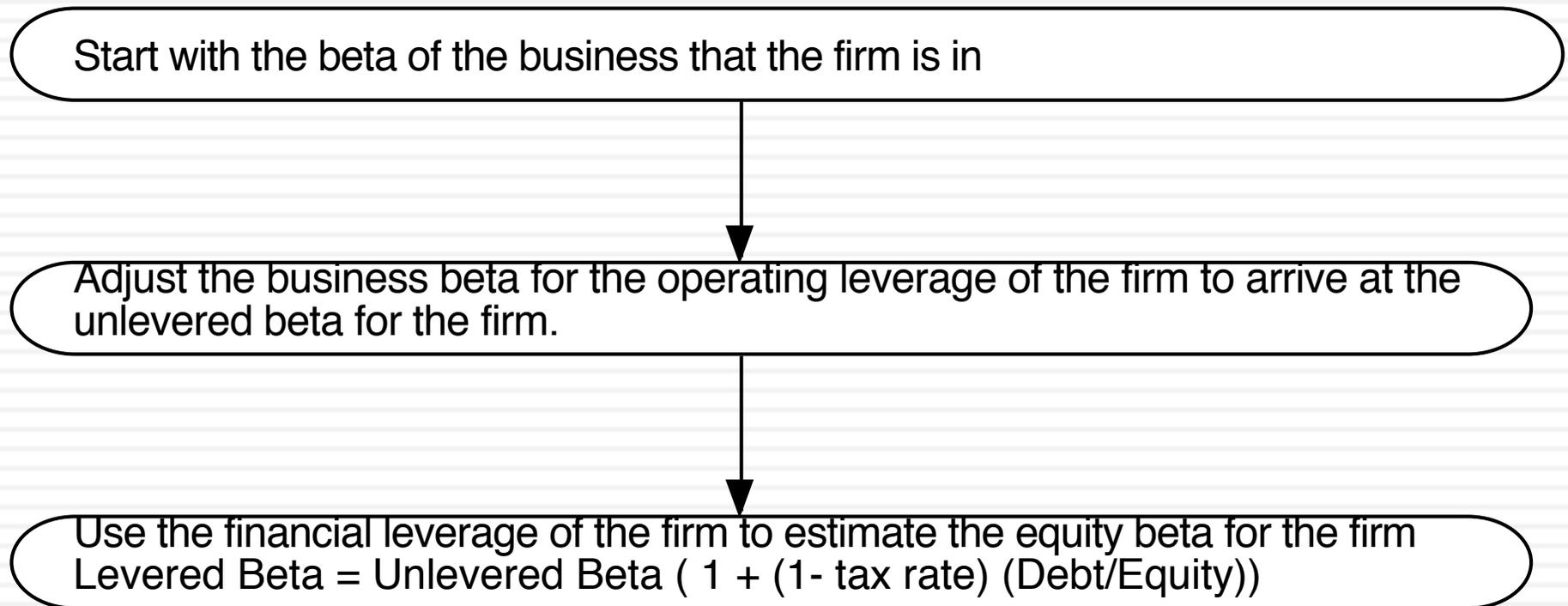
Determinants of Betas & Relative Risk

88



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

89



Adjusting for operating leverage...

90

- 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.
 - ▣ Unlevered beta = Pure business beta * (1 + (Fixed costs/ 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...

91

- 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.

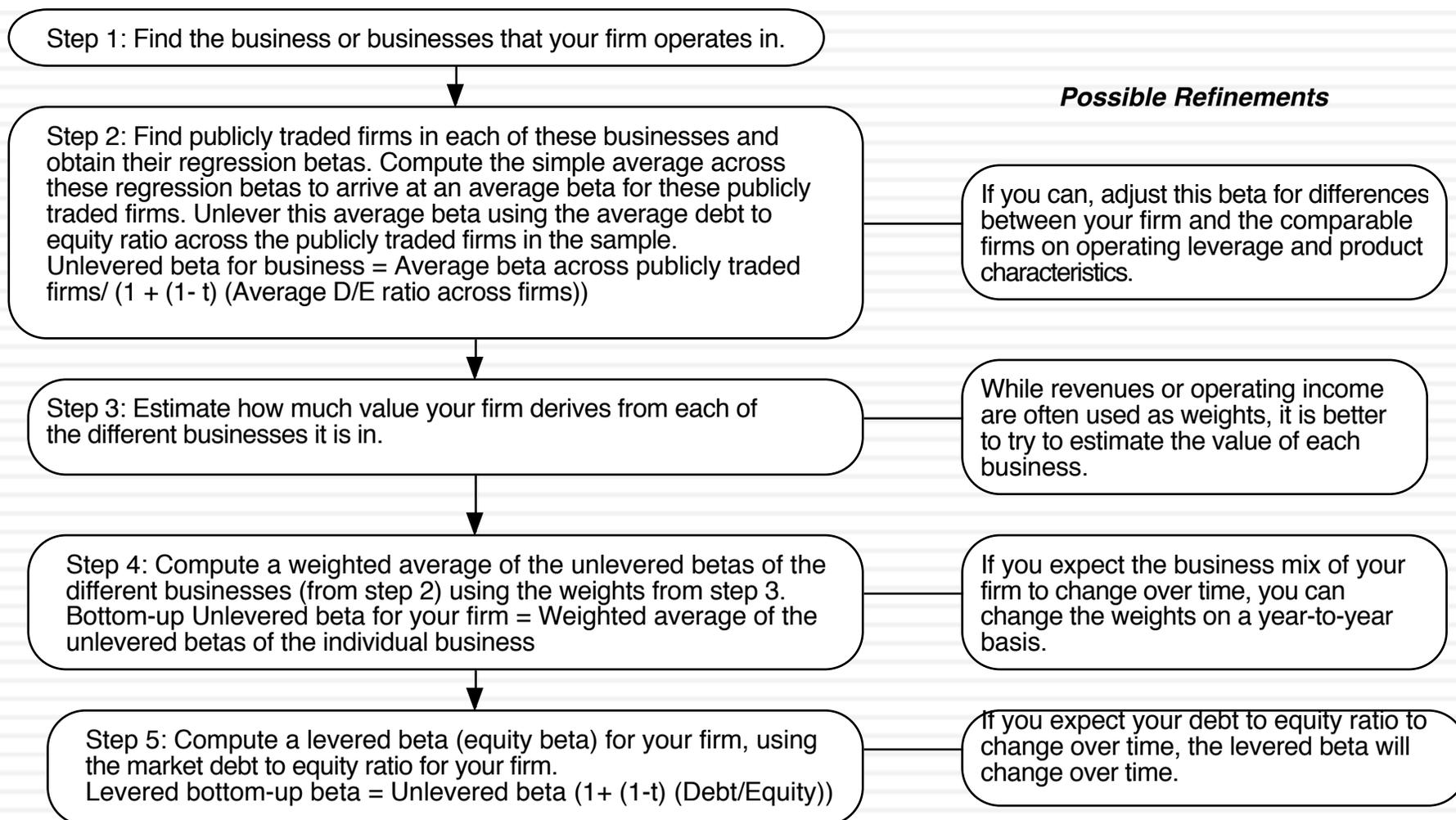
- Debt Adjusted Approach: If beta carries market risk and you can estimate the beta of debt, you can estimate the levered beta as follows:

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

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

Bottom-up Betas

92



Why bottom-up betas?

93

- 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:

$$\text{Std error of bottom-up beta} = \frac{\text{Average Std Error across Betas}}{\sqrt{\text{Number of firms in sample}}}$$

- The bottom-up beta can be adjusted to reflect changes in the firm's business mix and financial leverage. Regression betas reflect the past.
- 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

95

| 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?

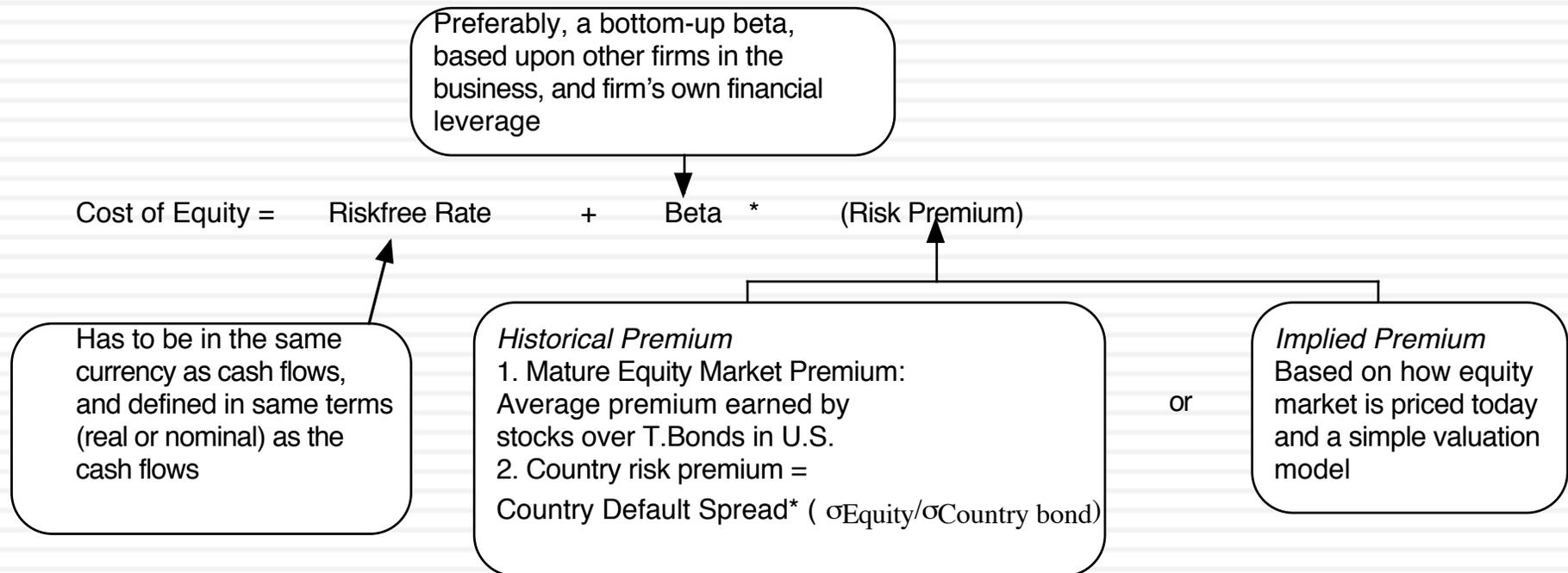
Gross Debt versus Net Debt Approaches

96

- 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

97



98

Discount Rates: IV

Mopping up

Estimating the Cost of Debt

99

- 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

100

- 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

101

| 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

102

- 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

103

- 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: The effect of the crisis of 2008.. And the aftermath

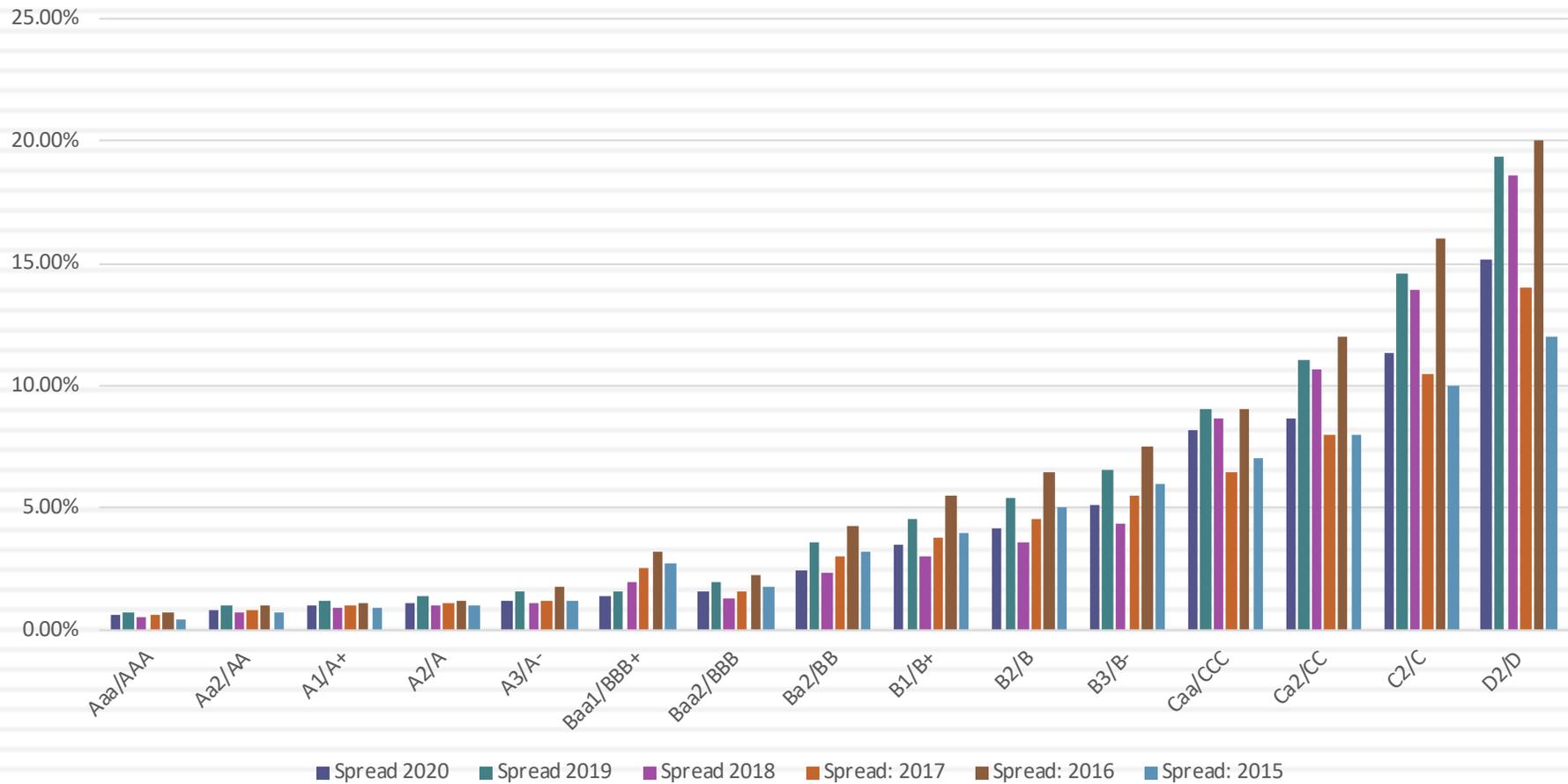
104

| Rating | <i>Default spread over treasury</i> | | | | | |
|-----------|-------------------------------------|-----------|-----------|----------|----------|----------|
| | 1-Jan-08 | 12-Sep-08 | 12-Nov-08 | 1-Jan-09 | 1-Jan-10 | 1-Jan-11 |
| Aaa/AAA | 0.99% | 1.40% | 2.15% | 2.00% | 0.50% | 0.55% |
| Aa1/AA+ | 1.15% | 1.45% | 2.30% | 2.25% | 0.55% | 0.60% |
| Aa2/AA | 1.25% | 1.50% | 2.55% | 2.50% | 0.65% | 0.65% |
| Aa3/AA- | 1.30% | 1.65% | 2.80% | 2.75% | 0.70% | 0.75% |
| A1/A+ | 1.35% | 1.85% | 3.25% | 3.25% | 0.85% | 0.85% |
| A2/A | 1.42% | 1.95% | 3.50% | 3.50% | 0.90% | 0.90% |
| A3/A- | 1.48% | 2.15% | 3.75% | 3.75% | 1.05% | 1.00% |
| Baa1/BBB+ | 1.73% | 2.65% | 4.50% | 5.25% | 1.65% | 1.40% |
| Baa2/BBB | 2.02% | 2.90% | 5.00% | 5.75% | 1.80% | 1.60% |
| Baa3/BBB- | 2.60% | 3.20% | 5.75% | 7.25% | 2.25% | 2.05% |
| Ba1/BB+ | 3.20% | 4.45% | 7.00% | 9.50% | 3.50% | 2.90% |
| Ba2/BB | 3.65% | 5.15% | 8.00% | 10.50% | 3.85% | 3.25% |
| Ba3/BB- | 4.00% | 5.30% | 9.00% | 11.00% | 4.00% | 3.50% |
| B1/B+ | 4.55% | 5.85% | 9.50% | 11.50% | 4.25% | 3.75% |
| B2/B | 5.65% | 6.10% | 10.50% | 12.50% | 5.25% | 5.00% |
| B3/B- | 6.45% | 9.40% | 13.50% | 15.50% | 5.50% | 6.00% |
| Caa/CCC+ | 7.15% | 9.80% | 14.00% | 16.50% | 7.75% | 7.75% |
| ERP | 4.37% | 4.52% | 6.30% | 6.43% | 4.36% | 5.20% |

104

Default Spreads – January 2020

Corporate Default Spreads over time



Subsidized Debt: What should we do?

106

- 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

107

- 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

108

□ 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

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

- 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

109

- 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

- 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).

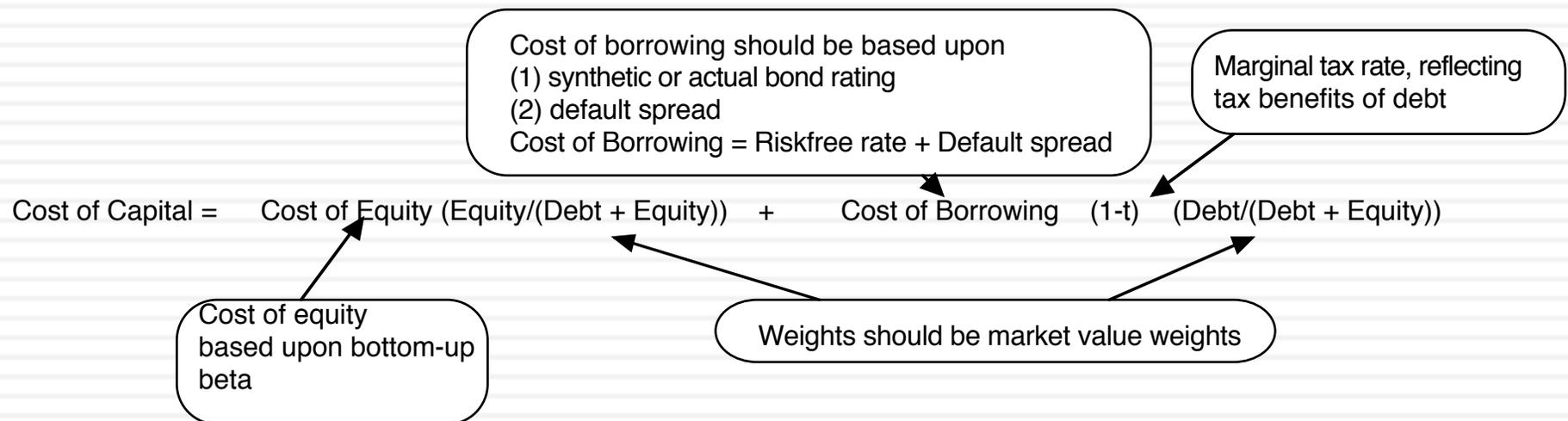
Decomposing a convertible bond...

111

- 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.
 - ▣ Straight debt = (4% of \$125 million) (PV of annuity, 10 years, 8%) + 125 million/ 1.08^{10} = \$91.45 million
 - ▣ Equity portion = \$140 million - \$91.45 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

112





ESTIMATING CASH FLOWS

Cash is king...

Steps in Cash Flow Estimation

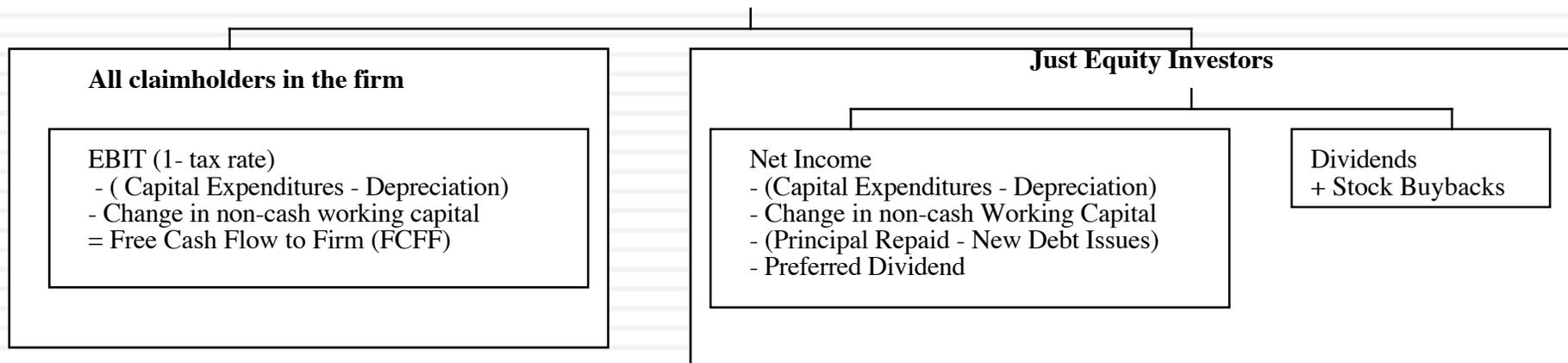
114

- 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 Cash Flows

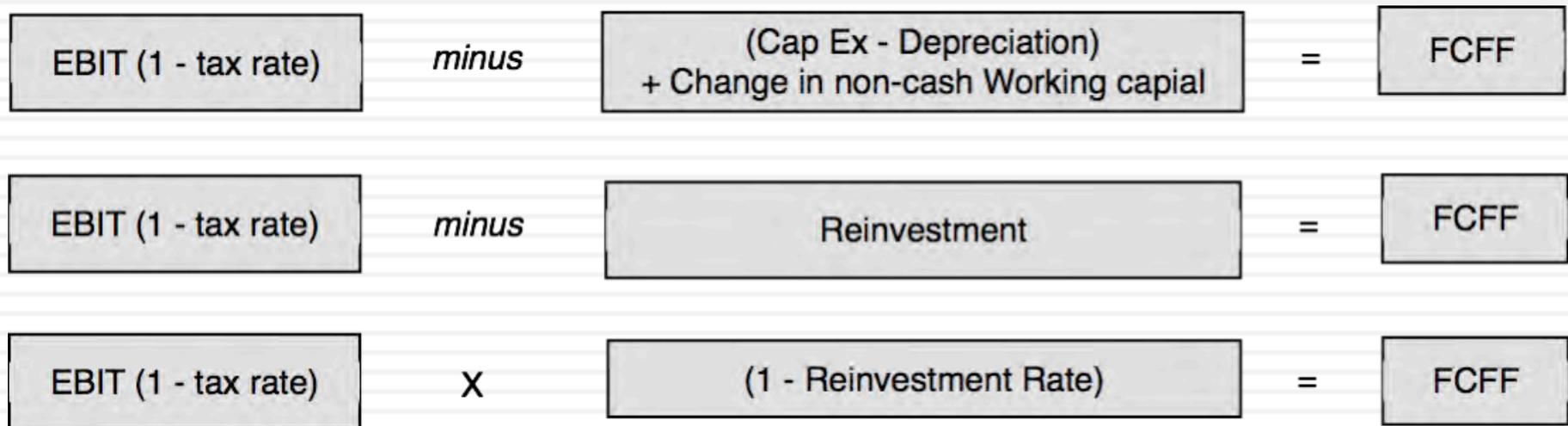
115

Cash flows can be measured to



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

116



Where are the tax savings from interest expenses?

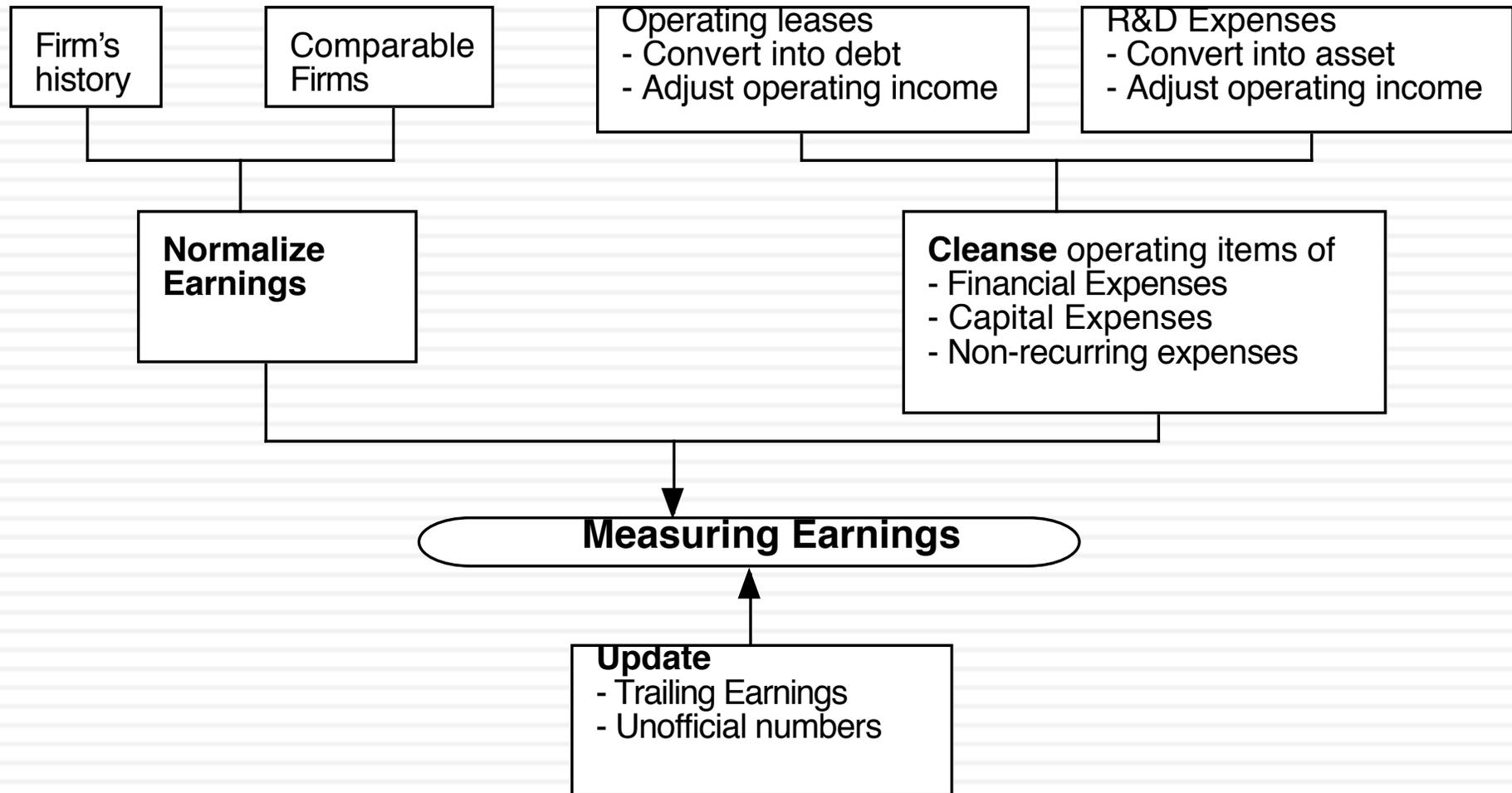
117

Cash Flows I

Accounting Earnings, Flawed but Important

From Reported to Actual Earnings

118



I. Update Earnings

119

- 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). Use the Year to date numbers from the 10Q. For example, to get trailing revenues from a third quarter 10Q:
 - ▣ $\text{Trailing 12-month Revenue} = \text{Revenues (in last 10K)} - \text{Revenues from first 3 quarters of last year} + \text{Revenues from first 3 quarters of this year.}$

II. Correcting Accounting Earnings

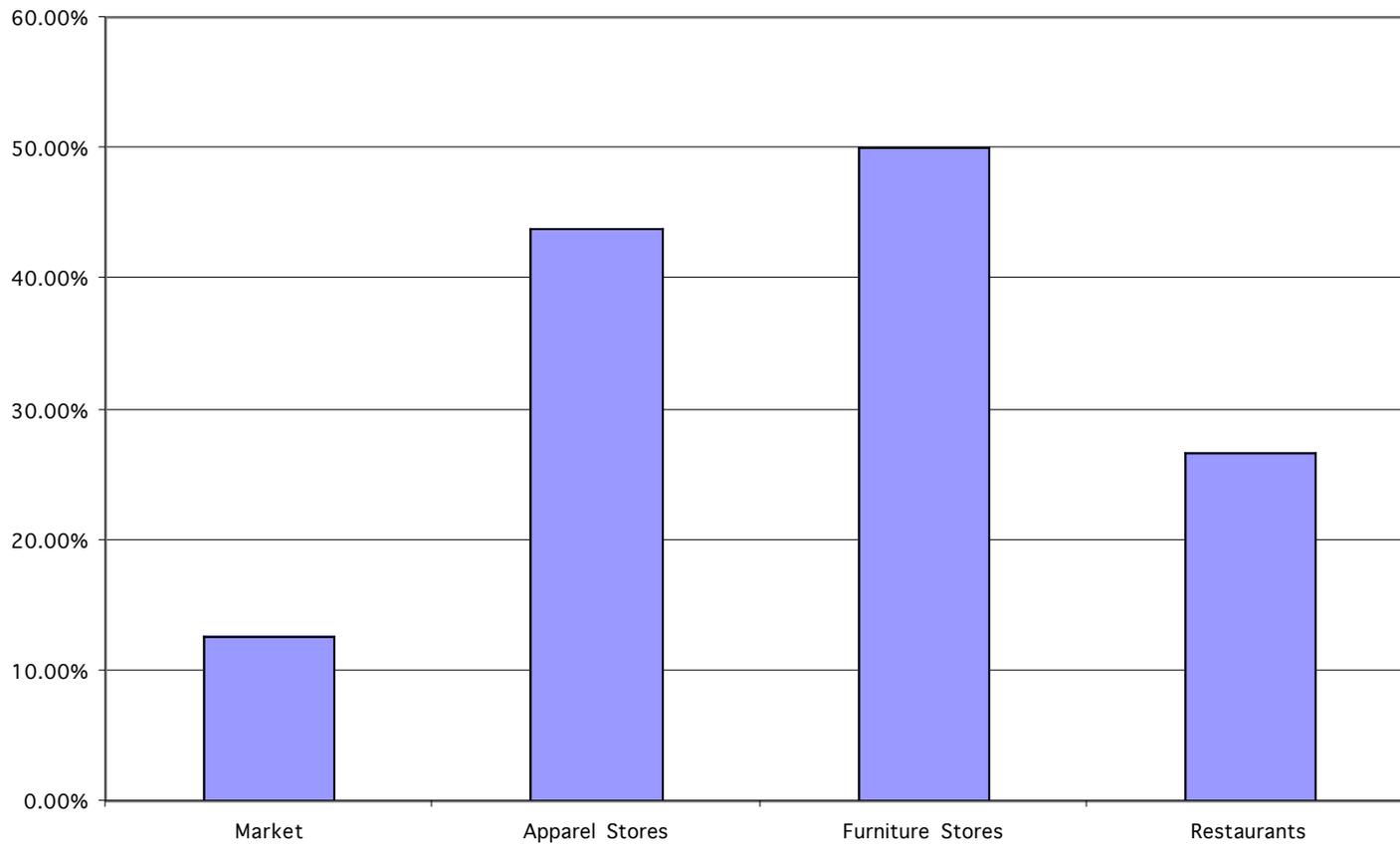
120

- 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.
 - ▣ Example: Operating Leases: While accounting convention treats operating leases as operating expenses, they are really financial expenses and need to be reclassified as such. This has no effect on equity earnings but does change the operating earnings
- 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.
 - ▣ R & D Adjustment: Since R&D is a capital expenditure (rather than an operating expense), the operating income has to be adjusted to reflect its treatment.

The Magnitude of Operating Leases

121

Operating Lease expenses as % of Operating Income



Dealing with Operating Lease Expenses

122

- Operating Lease Expenses are treated as operating expenses in computing operating income. In reality, 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
 - When you convert operating leases into debt, you also create an asset to counter it of exactly the same value.
 - Adjusted Operating Earnings
 - 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:

| Year | Commitment (millions) | Present Value (at 6%) |
|------|-----------------------|-----------------------|
| 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 - Op Leases = 978 EBIT = 1,012</p> | <p><i>Income Statement</i></p> <p>EBIT& Leases = 1,990 - Deprecn: OL= 628 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></td> <td>Liability</td> <td></td> </tr> <tr> <td>OL Asset</td> <td>4397</td> <td>OL Debt</td> <td>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> | | | | | | | | |

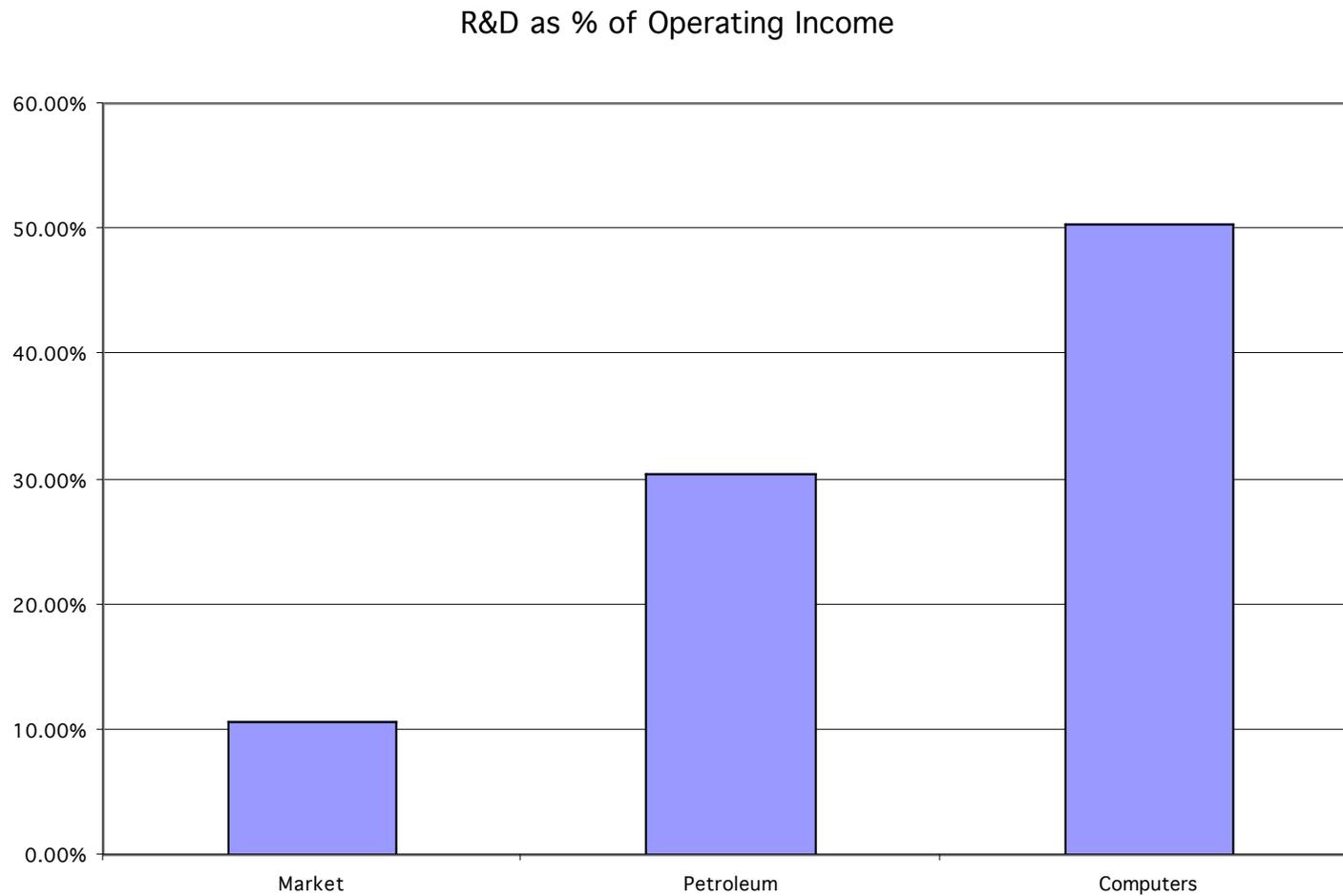
Accounting comes to its senses on operating leases

125

- 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.

The Magnitude of R&D Expenses

126



R&D Expenses: Operating or Capital Expenses

127

- 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 $1/5$ th of the R&D expense from five years ago, $2/5$ th of the R&D expense from four years ago...:

Capitalizing R&D Expenses: SAP

128

- 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

129

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

III. One-Time and Non-recurring Charges

130

- 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

IV. Accounting Malfeasance....

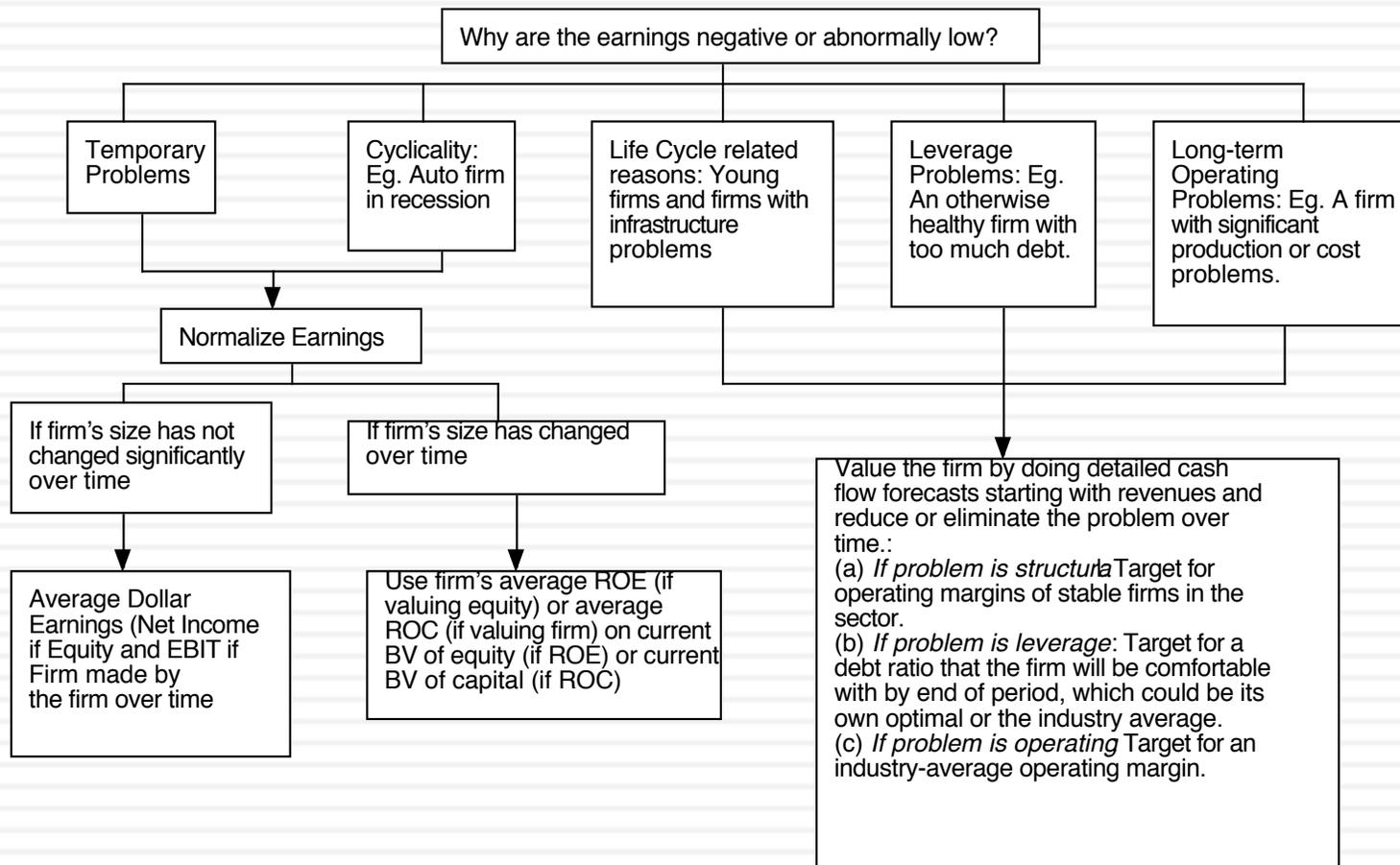
131

- 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

V. Dealing with Negative or Abnormally Low Earnings

132

A Framework for Analyzing Companies with Negative or Abnormally Low Earnings



133

Cash Flows II

Taxes and Reinvestment

What tax rate?

134

- 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

135

- The choice really is between the effective and the marginal tax rate. In doing projections, it is far safer to use the marginal tax rate since the effective tax rate is really a reflection of the difference between the accounting and the tax books.
- 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
- If you choose to use the effective tax rate, adjust the tax rate towards the marginal tax rate over time.
 - ▣ While an argument can be made for using a weighted average marginal tax rate, it is safest to use the marginal tax rate of the country

A Tax Rate for a Money Losing Firm

136

- 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 | | | |

Net Capital Expenditures

137

- Net capital expenditures represent the difference between capital expenditures and 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 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

138

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

139

| 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

140

| | |
|---|----------------|
| 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)

Working Capital Investments

141

- In accounting terms, the 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)
- 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)
- For firms in some sectors, it is the investment in working capital that is the bigger part of reinvestment.

Working Capital: General Propositions

142

1. Working Capital Detail: While some analysts break down working capital into detail (inventory, deferred taxes, payables etc.), 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. So, building of the change in the most recent year is dangerous. 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.

Volatile Working Capital?

143

| | <i>Amazon</i> | <i>Cisco</i> | <i>Motorola</i> |
|-----------------------|----------------------|--------------|-----------------|
| Revenues | \$ 1,640 | \$12,154 | \$30,931 |
| Non-cash WC | -\$419 | -\$404 | \$2547 |
| % of Revenues | -25.53% | -3.32% | 8.23% |
| Change from last year | \$ (309) | (\$700) | (\$829) |
| Average: last 3 years | -15.16% | -3.16% | 8.91% |
| Average: industry | 8.71% | -2.71% | 7.04% |
| | <i>My Prediction</i> | | |
| WC as % of Revenue | 3.00% | 0.00% | 8.23% |

144

Cash Flows III

From the firm to equity

Dividends and Cash Flows to Equity

145

- In the strictest sense, the only cash flow that an investor will receive 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 than potential dividends, using a model that focuses only on dividends will understate the true value of the equity in a firm.

Measuring Potential Dividends

146

- 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

147

□ Cash flows to Equity for a Levered Firm

Net Income

- (Capital Expenditures - Depreciation)

- Changes in non-cash Working Capital

- (Principal Repayments - New Debt Issues)

= Free Cash flow to Equity

- I have ignored preferred dividends. If preferred stock exist, preferred dividends will also need to be netted out

Estimating FCFE when Leverage is Stable

148

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.

FCFE from the statement of cash flows

149

- 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:
 - $FCFE - Dividends + Stock\ Buybacks - Stock\ Issuances + Change\ in\ Cash\ Balance$

Dividends versus FCFE: Across the globe

| <i>Sub Group</i> | <i>FCFE</i> | <i>Dividends</i> | <i>Buybacks</i> | <i>Dividends + Buybacks</i> | <i>% of dividend paying firms</i> |
|------------------------|-------------|------------------|-----------------|-----------------------------|-----------------------------------|
| Africa and Middle East | \$85,659 | \$114,879 | \$3,083 | \$117,963 | 54.64% |
| Australia & NZ | \$14,445 | \$31,975 | \$9,846 | \$41,821 | 27.63% |
| Canada | \$5,499 | \$36,040 | \$31,425 | \$67,466 | 12.41% |
| China | \$50,327 | \$299,196 | \$19,147 | \$318,342 | 73.63% |
| EU & Environs | \$167,899 | \$290,900 | \$117,861 | \$408,762 | 43.67% |
| E. Europe & Russia | \$34,187 | \$27,491 | \$5,546 | \$33,037 | 43.01% |
| India | \$44,762 | \$24,602 | \$6,669 | \$31,271 | 29.41% |
| Japan | (\$42,357) | \$110,331 | \$70,847 | \$181,178 | 69.68% |
| Latin America | (\$13,487) | \$35,631 | \$5,068 | \$40,700 | 60.00% |
| Small Asia | (\$43,076) | \$116,261 | \$10,655 | \$126,916 | 54.69% |
| UK | \$11,429 | \$70,864 | \$35,382 | \$106,245 | 51.60% |
| United States | \$290,411 | \$499,570 | \$700,425 | \$1,199,995 | 21.95% |
| Global | \$605,699 | \$1,657,741 | \$1,015,955 | \$2,673,696 | 46.66% |

Estimating FCFE: Disney

151

- 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):

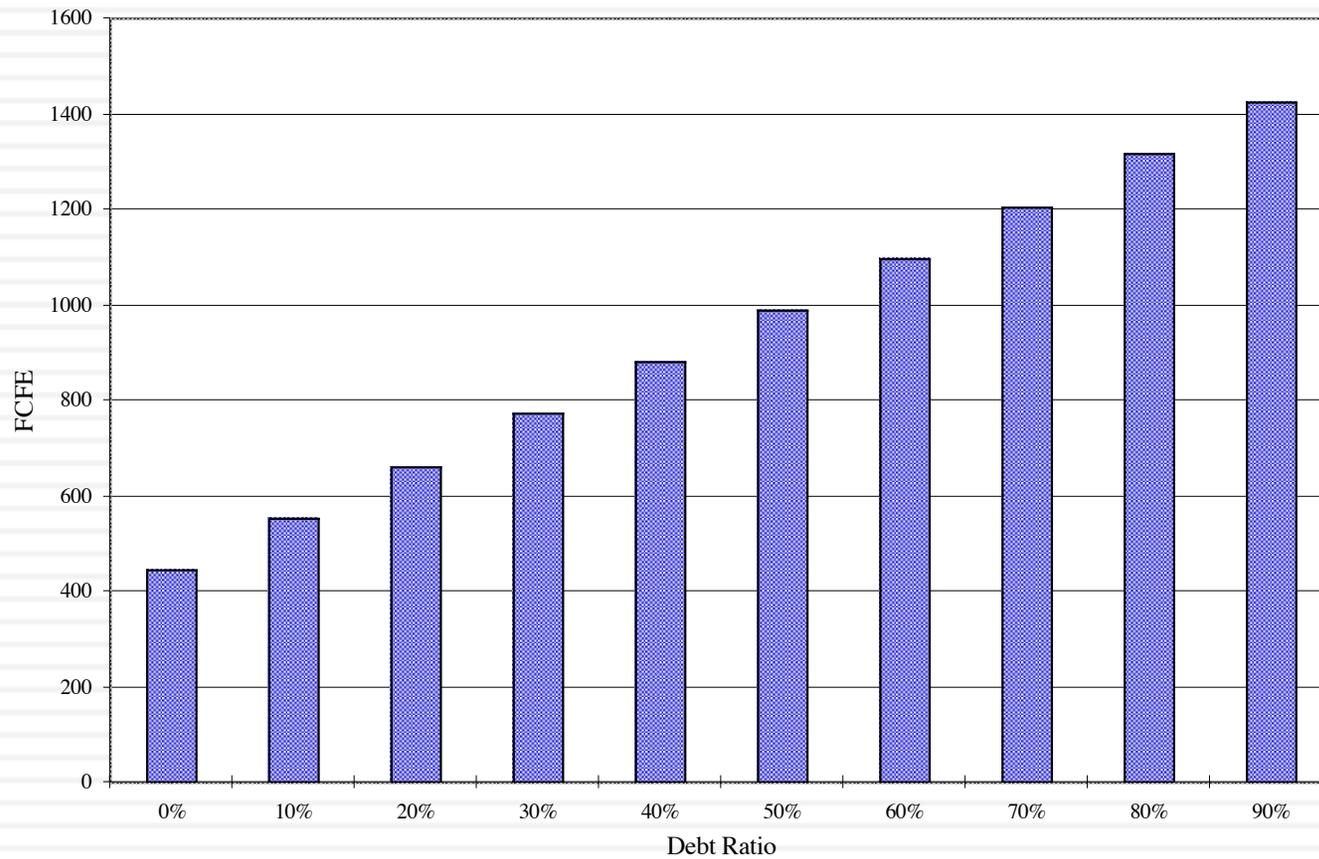
| | |
|-----------------------------|---------------------------------|
| Net Income | \$1,533 Mil |
| - (Cap. Exp - Depr)*(1-DR) | \$465.90 [(1746-1134)(1-.2383)] |
| Chg. Working Capital*(1-DR) | \$363.33 [477(1-.2383)] |
| = Free CF to Equity | \$ 704 Million |

| | |
|----------------|----------------|
| Dividends Paid | \$ 345 Million |
|----------------|----------------|

FCFE and Leverage: Is this a free lunch?

152

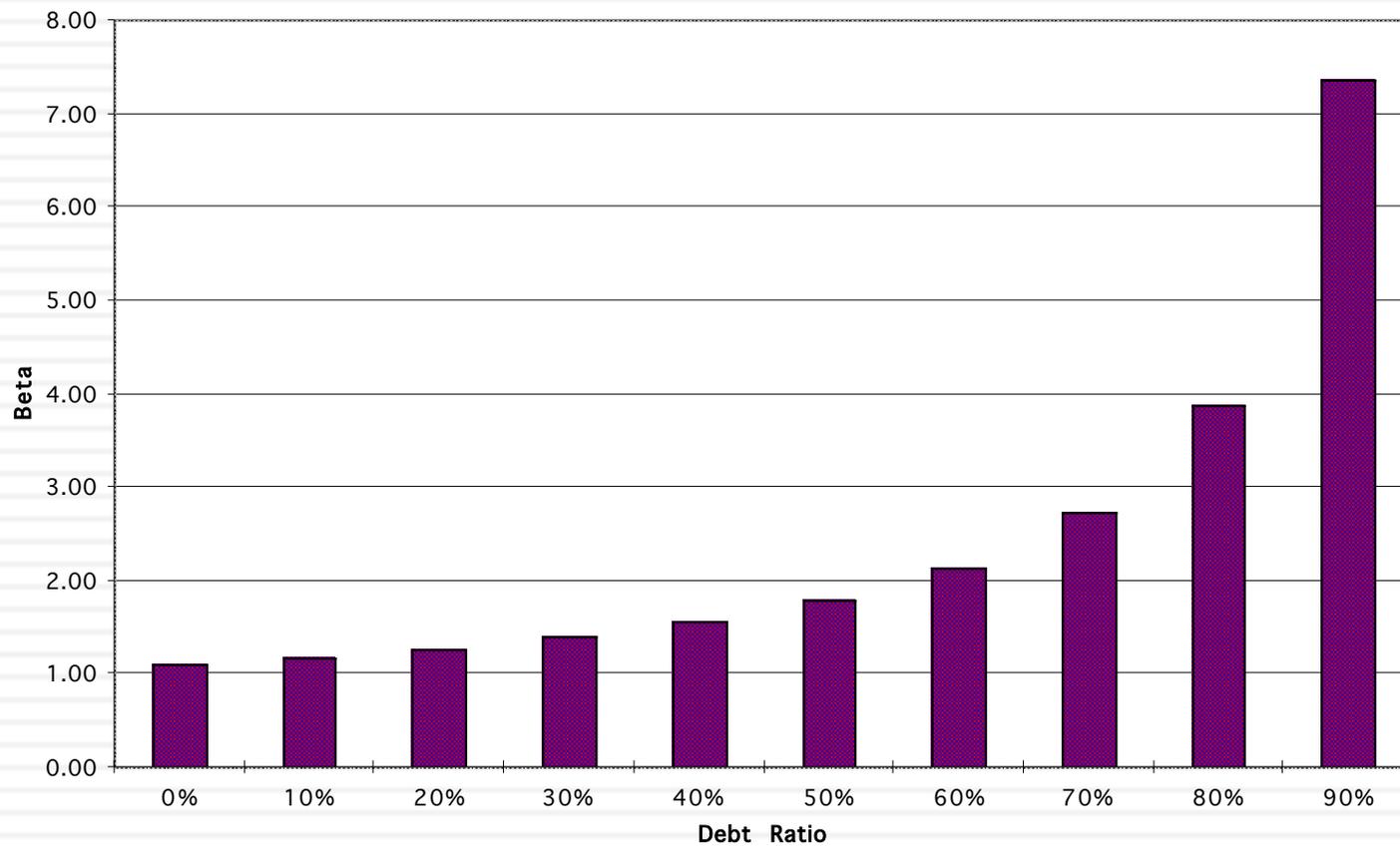
Debt Ratio and FCFE: Disney



FCFE and Leverage: The Other Shoe Drops

153

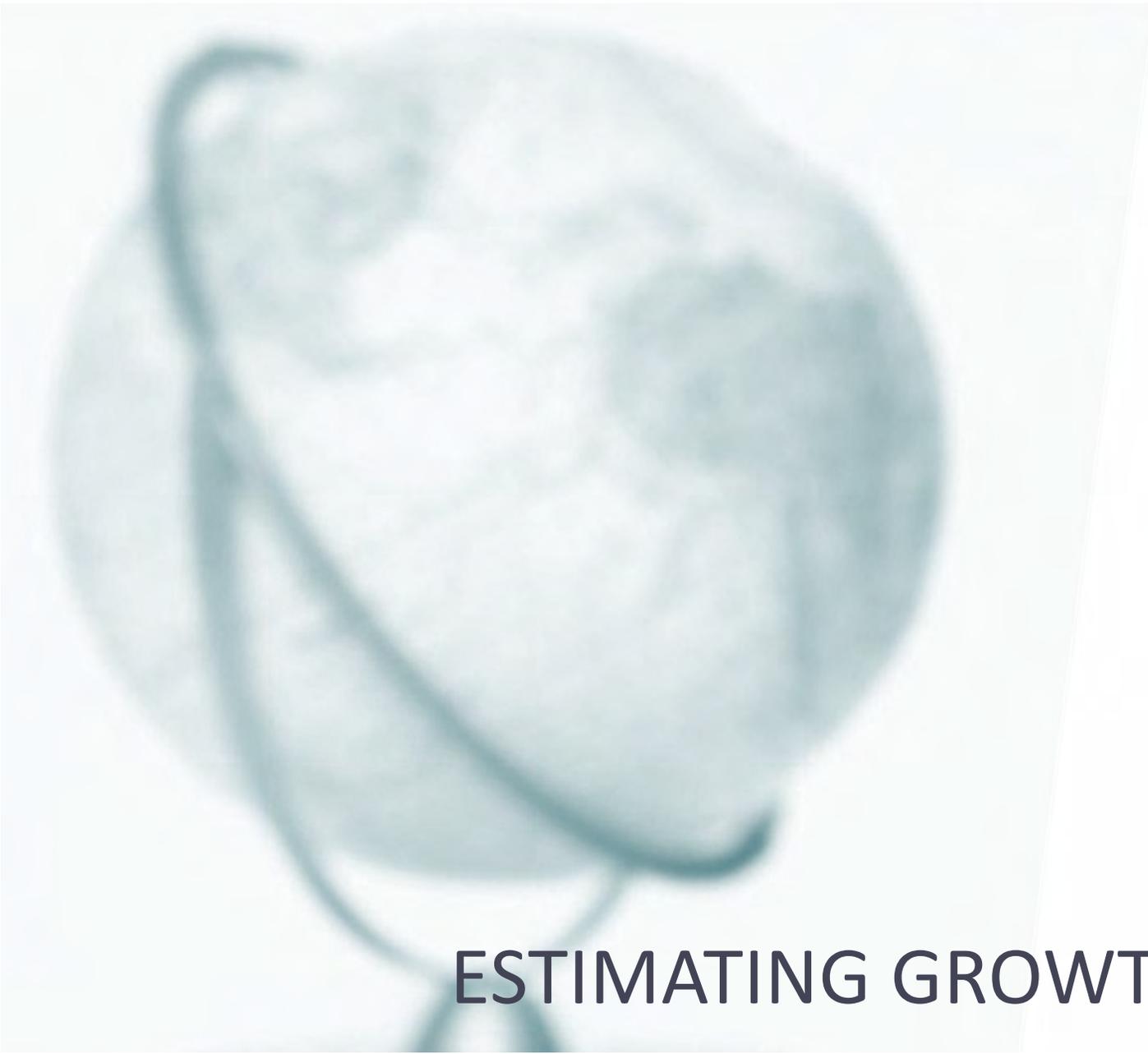
Debt Ratio and Beta



Leverage, FCFE and Value

154

- 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

156

- 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

157

- 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
 - ▣ Ultimately, all growth in earnings can be traced to two fundamentals - how much the firm is investing in new projects, and what returns these projects are making for the firm.

158

Growth I

Historical Growth

Historical Growth

159

- 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

160

| | 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

161

- 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

162

- 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

163

| 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

164

| 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.

165

Growth II

Analyst Estimates

Analyst Forecasts of Growth

166

- 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?

167

- 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?

168

- 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

169

- 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

170

- 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).

171

Growth III

It's all in the fundamentals

Fundamental Growth Rates

172

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

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

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

Growth Rate Derivations

173

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:

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

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

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

Estimating Fundamental Growth from new investments: Three variations

174

| 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

175

- 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
$$\begin{aligned}g_{\text{EPS}} &= \text{Retained Earnings}_{t-1} / \text{NI}_{t-1} * \text{ROE} \\ &= \text{Retention Ratio} * \text{ROE} \\ &= b * \text{ROE}\end{aligned}$$
- Proposition 1: The expected growth rate in earnings for a company cannot exceed its return on equity in the long term.

Estimating Expected Growth in EPS: Wells Fargo in 2008

176

- 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.

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

Regulatory Effects on Expected EPS growth

177

- Assume now that the banking crisis of 2008 will have an impact on the capital ratios and profitability of banks. In particular, you can expect that the book capital (equity) needed by banks to do business will increase 30%, starting now.
- Assuming that Wells continues with its existing businesses, estimate the expected growth rate in earnings per share for the future.

New Return on Equity =

Expected growth rate =

One way to pump up ROE: Use more debt

178

$$\text{ROE} = \text{ROC} + \text{D/E} (\text{ROC} - i (1-t))$$

where,

$$\text{ROC} = \text{EBIT}_t (1 - \text{tax rate}) / \text{Book value of Capital}_{t-1}$$

$$\text{D/E} = \text{BV of Debt} / \text{BV of Equity}$$

$$i = \text{Interest Expense on Debt} / \text{BV of Debt}$$

$$t = \text{Tax rate on ordinary income}$$

- Note that Book value of capital = Book Value of Debt + Book value of Equity- Cash.

Decomposing ROE: Brahma in 1998

179

- 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 = $ROC + D/E (ROC - i(1-t))$
 $= 19.91\% + 0.77 (19.91\% - 5.61\%) = 30.92\%$
- This seems like an easy way to deliver higher growth in earnings per share. What (if any) is the downside?

Decomposing ROE: Titan Watches (India) in 2000

180

- Return on Capital = 9.54%
- Debt/Equity Ratio = 191% (book value terms)
- After-tax Cost of Debt = 10.125%
- Return on Equity = $ROC + D/E (ROC - i(1-t))$
= $9.54\% + 1.91 (9.54\% - 10.125\%) = 8.42\%$

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

181

- The limitation of the EPS fundamental growth equation is that it focuses on per share earnings and assumes that reinvested earnings are invested in projects earning the return on equity. To the extent that companies retain money in cash balances, the effect on net income can be muted.
- A more general version of expected growth in earnings can be obtained by substituting in the equity reinvestment into real investments (net capital expenditures and working capital) and modifying the return on equity definition to exclude cash:
 - ▣ Net Income from non-cash assets = Net income – Interest income from cash (1- t)
 - ▣ Equity Reinvestment Rate = (Net Capital Expenditures + Change in Working Capital) (1 - Debt Ratio)/ Net Income from non-cash assets
 - ▣ Non-cash ROE = Net Income from non-cash assets/ (BV of Equity – Cash)
 - ▣ Expected Growth_{Net Income} = Equity Reinvestment Rate * Non-cash ROE

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.
- Coca Cola had capital expenditures of \$2,215 million, depreciation of \$1,443 million and reported an increase in working capital of \$335 million. Coca Cola's total debt increased by \$150 million during 2010.
 - ▣ Equity Reinvestment = $2215 - 1443 + 335 - 150 = \957 million
 - ▣ Non-cash Net Income = $\$11,809 - \$105 = \$11,704$ million
 - ▣ Non-cash book equity = $\$25,346 - \$7,021 = \$18,325$ million
 - ▣ Reinvestment Rate = $\$957 \text{ million} / \$11,704 \text{ million} = 8.18\%$
 - ▣ Non-cash ROE = $\$11,704 \text{ million} / \$18,325 \text{ million} = 63.87\%$
 - ▣ Expected growth rate = $8.18\% * 63.87\% = 5.22\%$

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
 - = $(\text{Net Capital Expenditures} + \text{Change in WC}) / \text{EBIT}(1-t) * \text{ROC}$
 - = Reinvestment Rate * ROC
- Proposition: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.

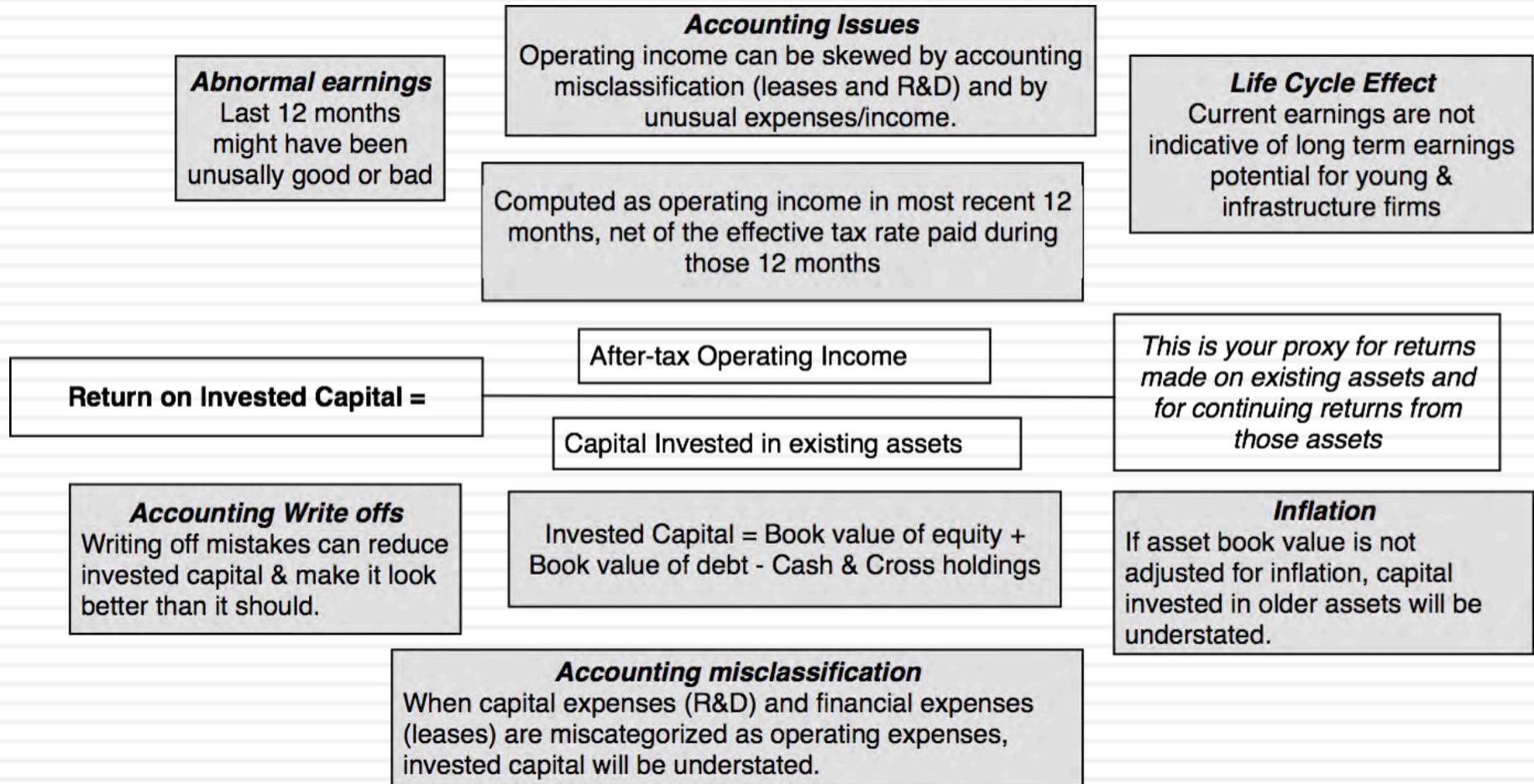
Estimating Growth in Operating Income, if fundamentals stay unchanged

184

- Cisco's Fundamentals
 - ▣ Reinvestment Rate = 106.81%
 - ▣ Return on Capital = 34.07%
 - ▣ Expected Growth in EBIT = $(1.0681)(.3407) = 36.39\%$
- Motorola's Fundamentals
 - ▣ Reinvestment Rate = 52.99%
 - ▣ Return on Capital = 12.18%
 - ▣ Expected Growth in EBIT = $(.5299)(.1218) = 6.45\%$
- Cisco's expected growth rate is clearly much higher than Motorola's sustainable growth rate. 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

185



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:

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

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

Motorola's Growth Rate

187

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

Expected Growth Rate

$$\begin{aligned} &= \text{ROC}_{\text{Current}}^{\text{New Investments}} * \text{Reinvestment Rate}_{\text{Current}} + \{ [1 + (\text{ROC}_{\text{In 5 years}} - \text{ROC}_{\text{Current}}) / \text{ROC}_{\text{Current}}]^{1/5} - 1 \} \\ &= .1722 * .5299 + \{ [1 + (.1722 - .1218) / .1218]^{1/5} - 1 \} \\ &= .1629 \text{ or } 16.29\% \end{aligned}$$

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

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

The Value of Growth

188

| | 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.

189

Growth IV

Top Down Growth

Estimating Growth when Operating Income is Negative or Margins are changing

190

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

Tesla in July 2015: Growth and Profitability

191

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

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

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

Tesla: Reinvestment and Profitability

192

Operating losses carried forward save taxes in years 3 & 4

Sales/Capital measures revenues generated for every dollar of investment

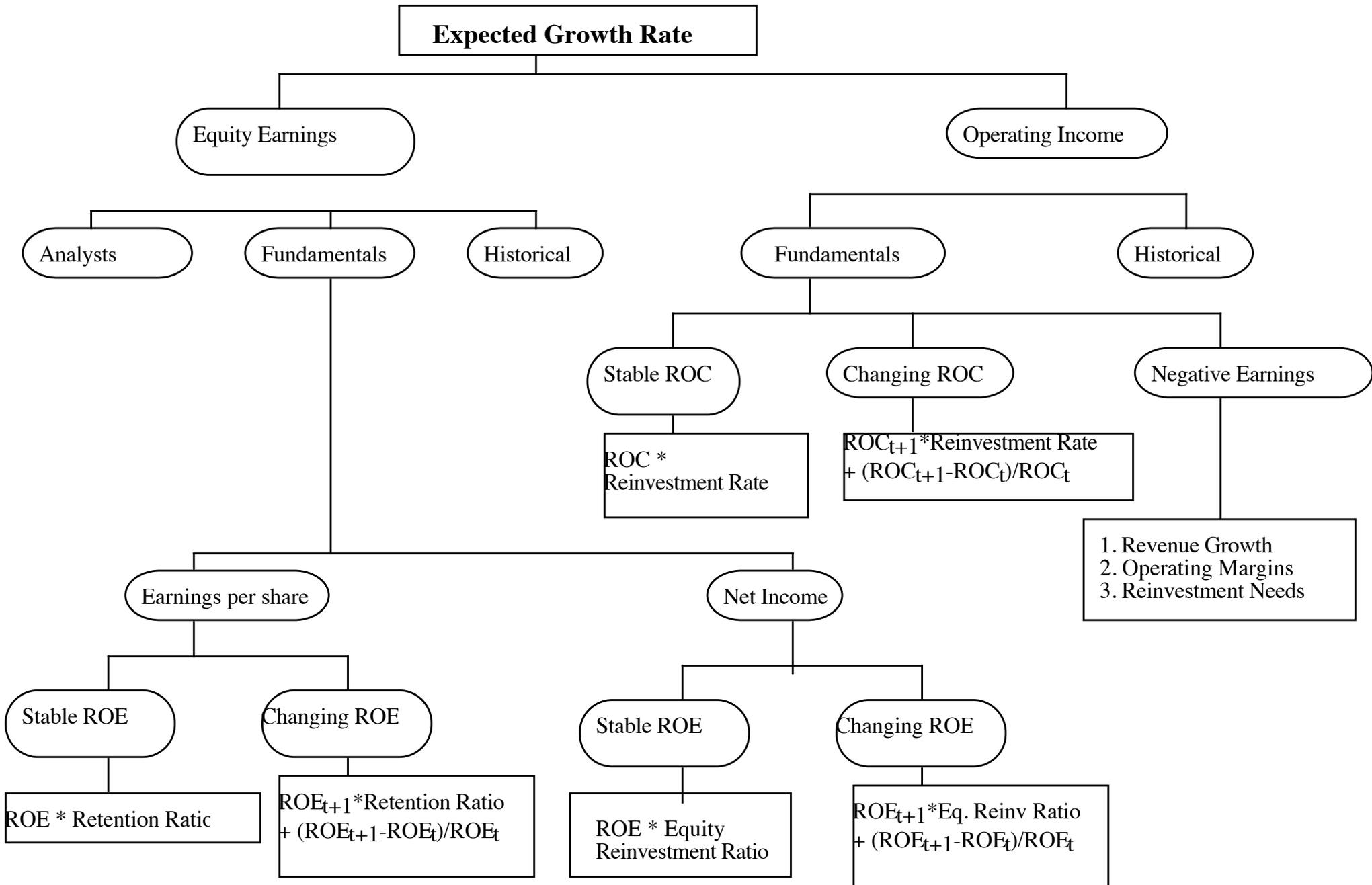
Reinvestment = Change in Revenue/ Sales to capital

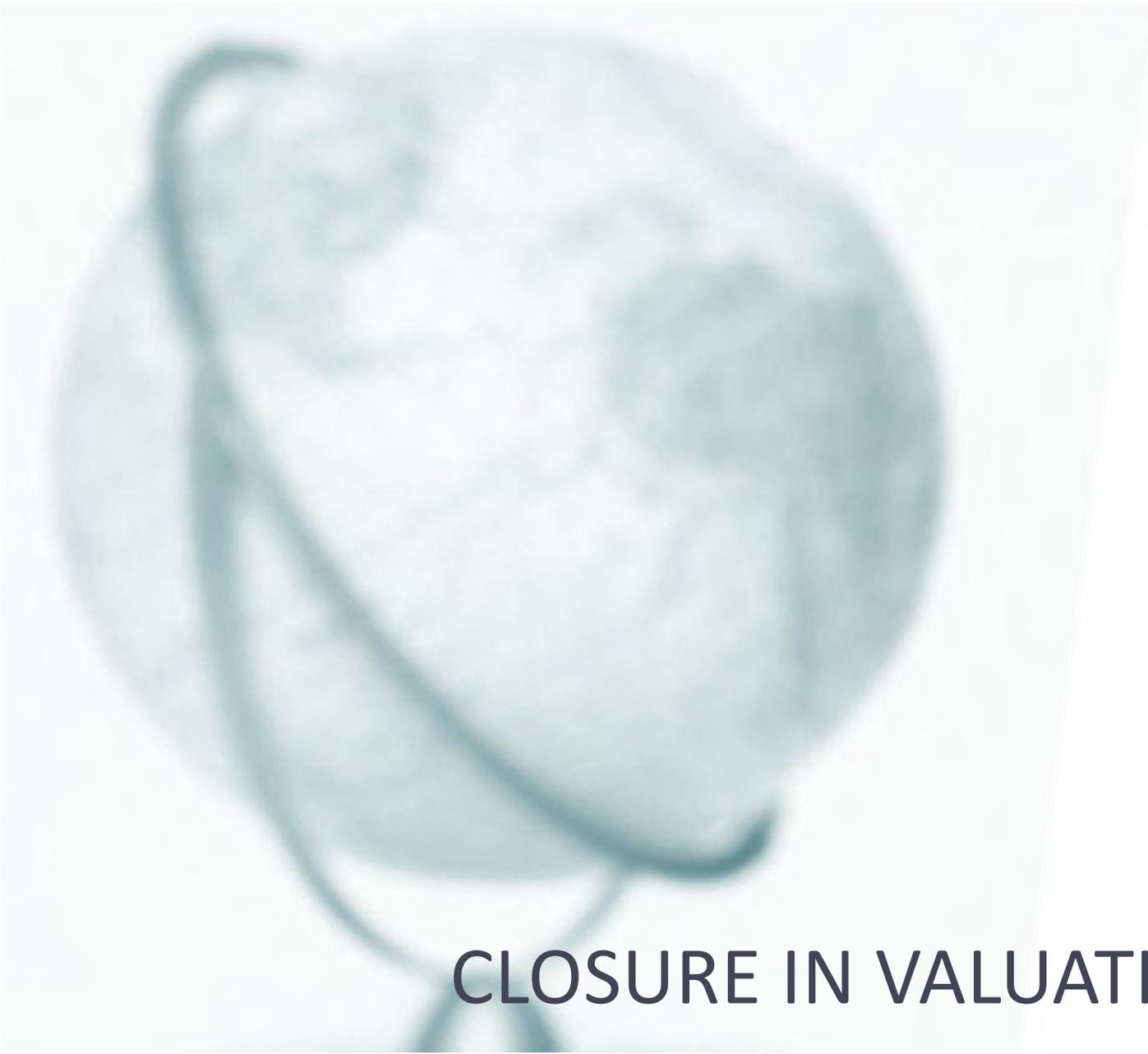
| Year | Revenues | EBIT | EBIT (1-t) | Change in Revenues | Sales/Capital | Reinvestment | FCFF | Invested Capital | ROIC | Cost of Capital |
|------|--------------|-------------|-------------|--------------------|---------------|--------------|---------------|------------------|--------|-----------------|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

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

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

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





CLOSURE IN VALUATION

The Big Enchilada

Getting Closure in Valuation

195

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

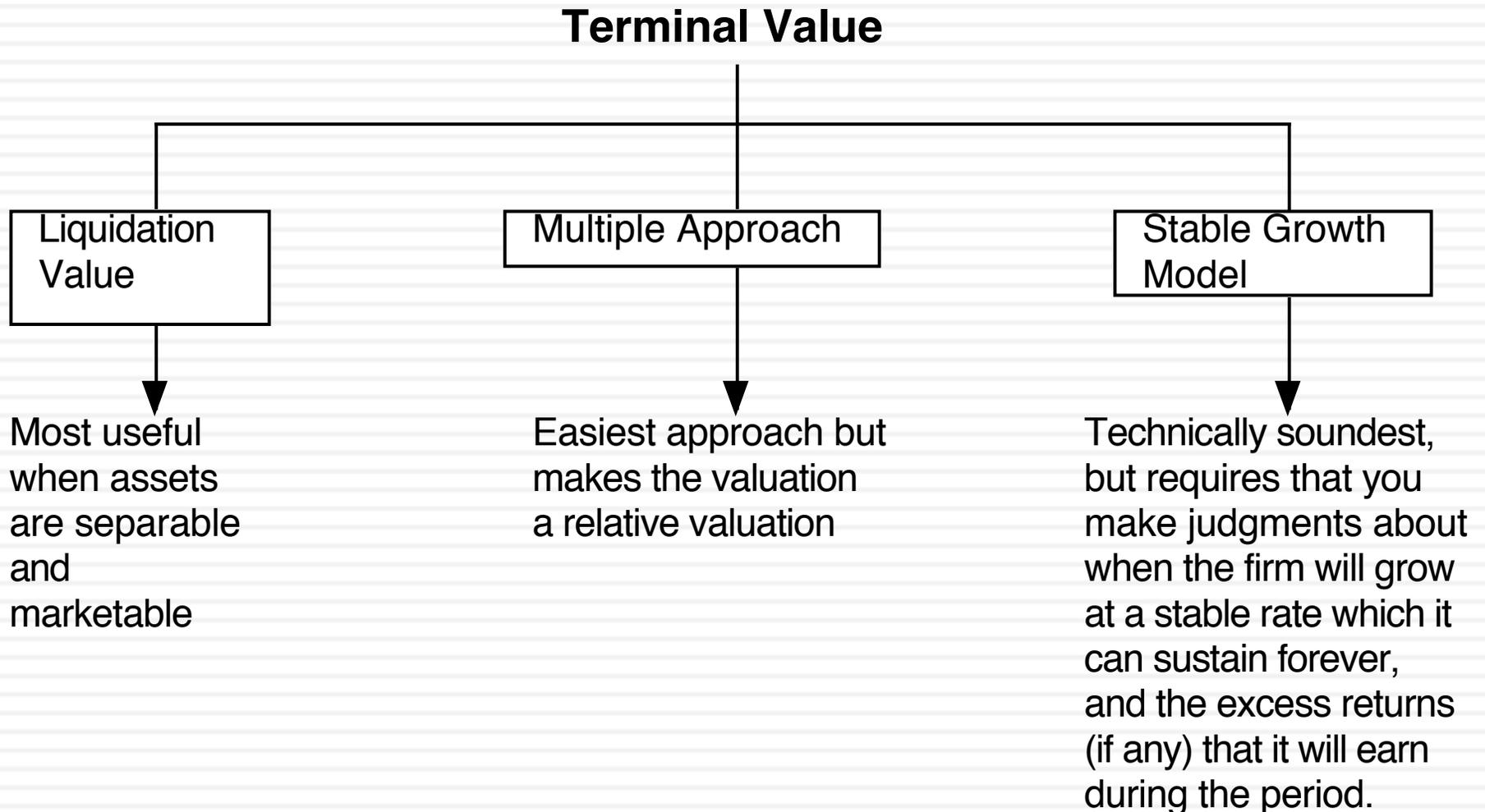
$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+r)^t}$$

- 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

196



1. Obey the growth cap

197

- When a firm's cash flows grow at a “constant” rate forever, the present value of those cash flows can be written as:
Value = Expected Cash Flow Next Period / (r - g)
where,
 - r = Discount rate (Cost of Equity or Cost of Capital)
 - g = Expected growth rate
- The stable growth rate cannot exceed the growth rate of the economy but it can be set lower.
 - If you assume that the economy is composed of high growth and stable growth firms, the growth rate of the latter will probably be lower than the growth rate of the economy.
 - The stable growth rate can be negative. The terminal value will be lower and you are assuming that your firm will disappear over time.
 - If you use nominal cashflows and discount rates, the growth rate should be nominal in the currency in which the valuation is denominated.
- One simple proxy for the nominal growth rate of the economy is the riskfree rate.

Risk free Rates and Nominal GDP Growth

- **Risk free Rate** = Expected Inflation + Expected Real Interest Rate
- **Nominal GDP Growth** = Expected Inflation + Expected Real Growth
- The real interest rate is what borrowers agree to return to lenders in real goods/services.
- 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.

| <i>Period</i> | <i>10-Year T.Bond Rate</i> | <i>Inflation Rate</i> | <i>Real GDP Growth</i> | <i>Nominal GDP growth rate</i> | <i>Nominal GDP - T.Bond Rate</i> |
|---------------|----------------------------|-----------------------|------------------------|--------------------------------|----------------------------------|
| 1954-2015 | 5.93% | 3.61% | 3.06% | 6.67% | 0.74% |
| 1954-1980 | 5.83% | 4.49% | 3.50% | 7.98% | 2.15% |
| 1981-2008 | 6.88% | 3.26% | 3.04% | 6.30% | -0.58% |
| 2009-2015 | 2.57% | 1.66% | 1.47% | 3.14% | 0.57% |

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

199

- 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.

2. Don't wait too long...

200

- Assume that you are valuing a young, high growth firm with great potential, just after its initial public offering. How long would you set your high growth period?
 - a. < 5 years
 - b. 5 years
 - c. 10 years
 - d. >10 years
- While analysts routinely assume very long high growth periods (with substantial excess returns during the periods), the evidence suggests that they are much too optimistic. Most growth firms have difficulty sustaining their growth for long periods, especially while earning excess returns.

And tie to competitive advantages

201

- 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..

202

- In the section on expected growth, we laid out the fundamental equation for growth:
Growth rate = Reinvestment Rate * Return on invested capital
+ Growth rate from improved efficiency
- In stable growth, you cannot count on efficiency delivering growth and you have to reinvest to deliver the growth rate that you have forecast.
- Consequently, your reinvestment rate in stable growth will be a function of your stable growth rate and what you believe the firm will earn as a return on capital in perpetuity:
 - ▣ Reinvestment Rate = Stable growth rate / Stable period ROC = g / ROC
- Your terminal value equation can then be rewritten as:

$$\text{Terminal Value in year } n = \frac{\text{EBIT}_{n+1} (1-t) \left(1 - \frac{g}{\text{ROC}}\right)}{(\text{Cost of Capital} - g)}$$

The Big Assumption

203

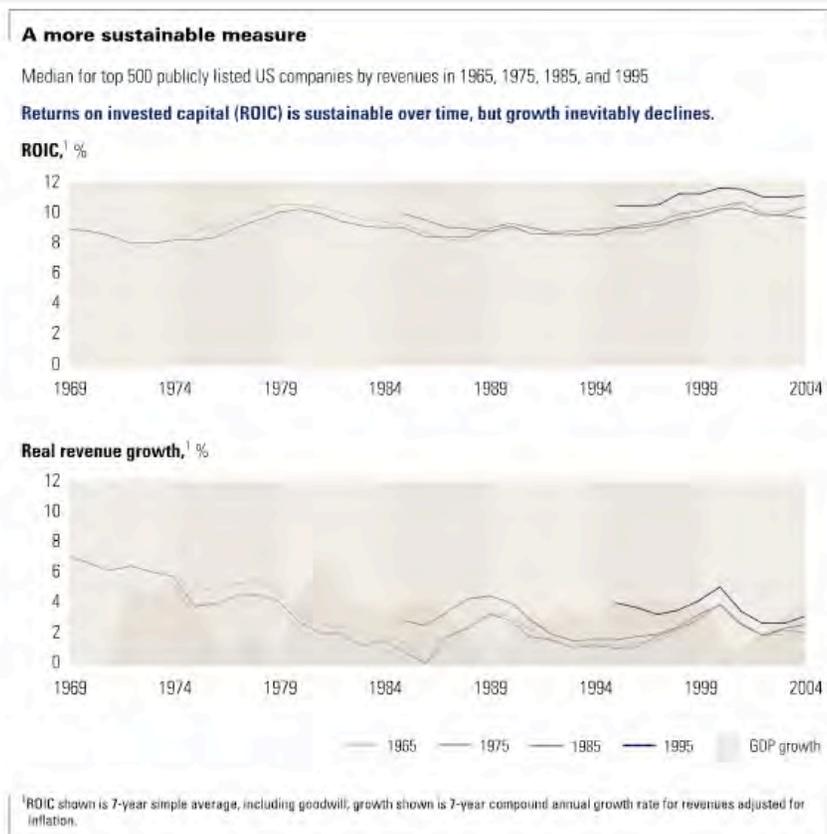
| | | Return on capital in perpetuity | | | | |
|---------------------|------|---------------------------------|---------|---------|---------|---------|
| | | 6% | 8% | 10% | 12% | 14% |
| Growth rate forever | 0.0% | \$1,000 | \$1,000 | \$1,000 | \$1,000 | \$1,000 |
| | 0.5% | \$965 | \$987 | \$1,000 | \$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 |

Terminal value for a firm with expected after-tax operating income of \$100 million in year $n+1$ and a cost of capital of 10%.

Excess Returns to Zero?

204

- 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.



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

205

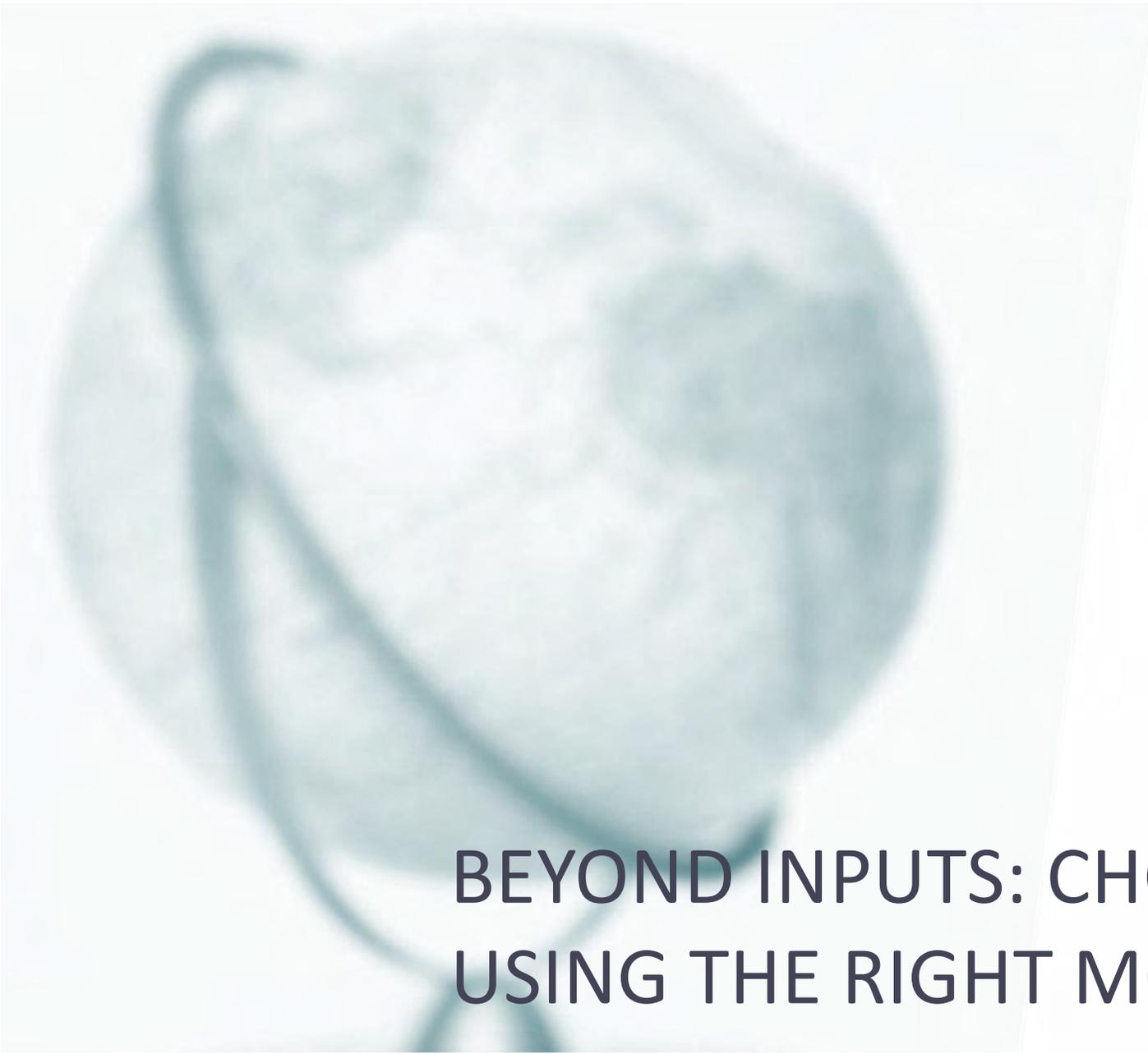
- A typical assumption in many DCF valuations, when it comes to stable growth, is that capital expenditures offset depreciation and there are no working capital needs. Stable growth firms, we are told, just have to make maintenance cap ex (replacing existing assets) to deliver growth. If you make this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

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

4. Be internally consistent

206

- Risk and costs of equity and capital: Stable growth firms tend to
 - ▣ Have betas closer to one
 - ▣ Have debt ratios closer to industry averages (or mature company averages)
 - ▣ Country risk premiums (especially in emerging markets should evolve over time)
- The excess returns at stable growth firms should approach (or become) zero. ROC → Cost of capital and ROE → Cost of equity
- The reinvestment needs and dividend payout ratios should reflect the lower growth and excess returns:
 - ▣ Stable period payout ratio = $1 - g / \text{ROE}$
 - ▣ Stable period reinvestment rate = g / ROC



BEYOND INPUTS: CHOOSING AND USING THE RIGHT MODEL

Choosing the right model

Summarizing the Inputs

208

- 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?

209

□ 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?

210

- 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 an 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?

211

- 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?

212

- 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)

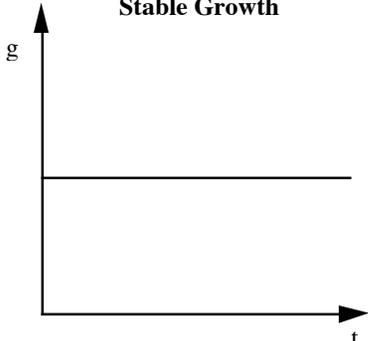
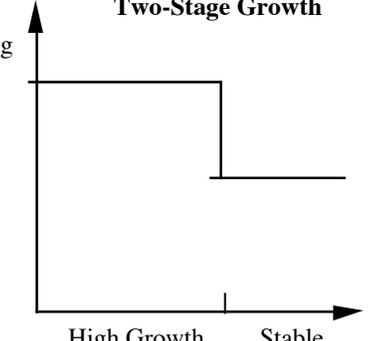
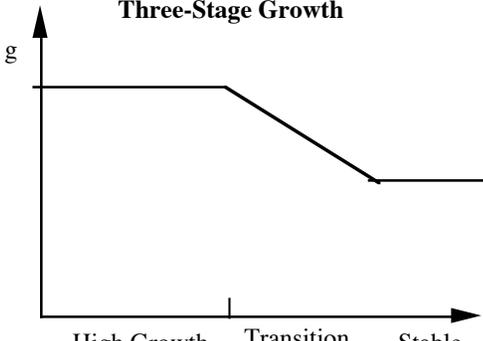
Use a 2-Stage Growth Model

- 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

213

| | | | |
|--------------------|--|--|--|
| Choose a | | | |
| Cash Flow | <p style="text-align: center;"><i>Dividends</i></p> <p>Expected Dividends to Stockholders</p> | <p style="text-align: center;"><i>Cashflows to Equity</i></p> <p>Net Income - (1 - δ) (Capital Exp. - Deprec'n) - (1 - δ) Change in Work. Capital = Free Cash flow to Equity (FCFE) [δ = Debt Ratio]</p> | <p style="text-align: center;"><i>Cashflows to Firm</i></p> <p>EBIT (1- tax rate) - (Capital Exp. - Deprec'n) - Change in Work. Capital = Free Cash flow to Firm (FCFF)</p> |
| & A Discount Rate | <p style="text-align: center;"><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 + Σ Beta_j (Risk Premium_j): <i>n factors</i> | | <p style="text-align: center;"><i>Cost of Capital</i></p> <p>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 | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Stable Growth</p>  </div> <div style="text-align: center;"> <p>Two-Stage Growth</p>  <p>High Growth Stable</p> </div> <div style="text-align: center;"> <p>Three-Stage Growth</p>  <p>High Growth Transition Stable</p> </div> </div> | | |



TYING UP LOOSE ENDS

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

But what comes next?

215

| | |
|---|--|
| 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

216

- 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

217

| | <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?

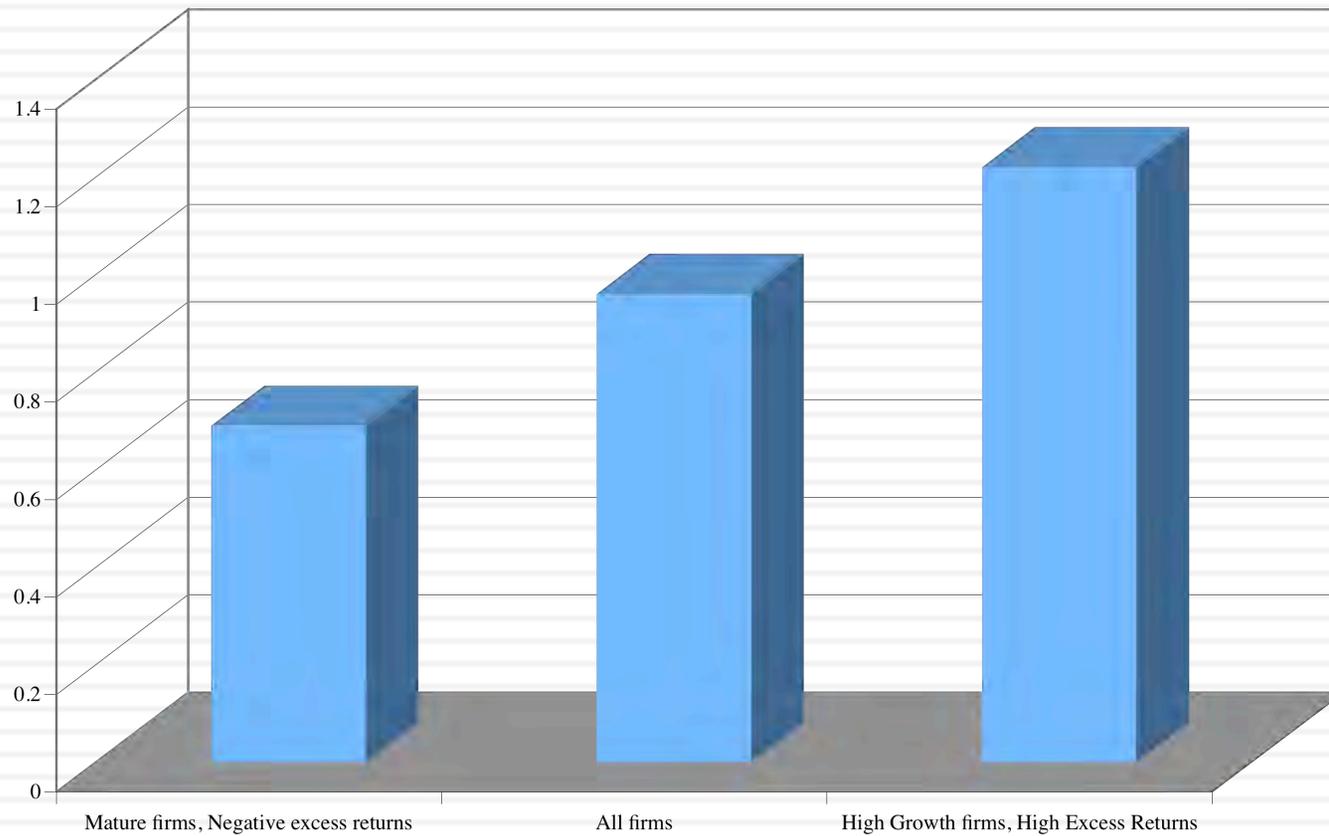
218

- 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?

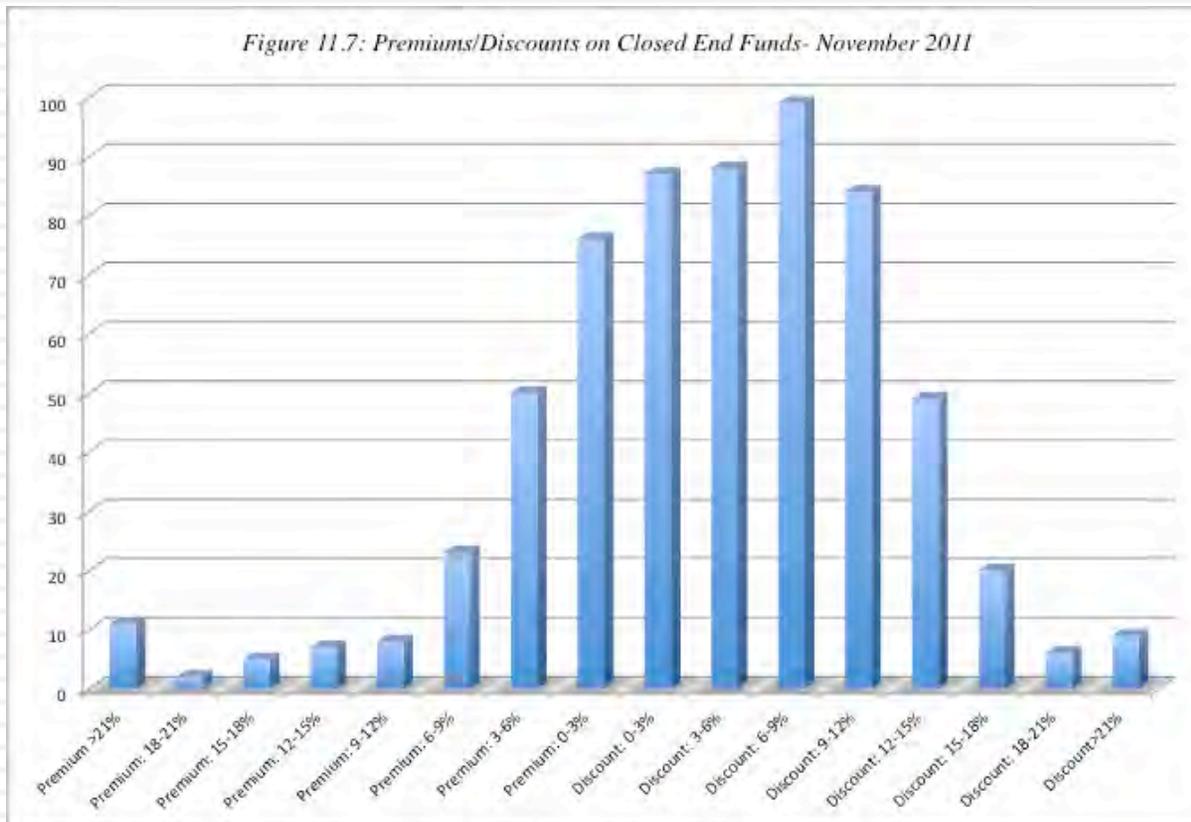
219

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



A Detour: Closed End Mutual Funds

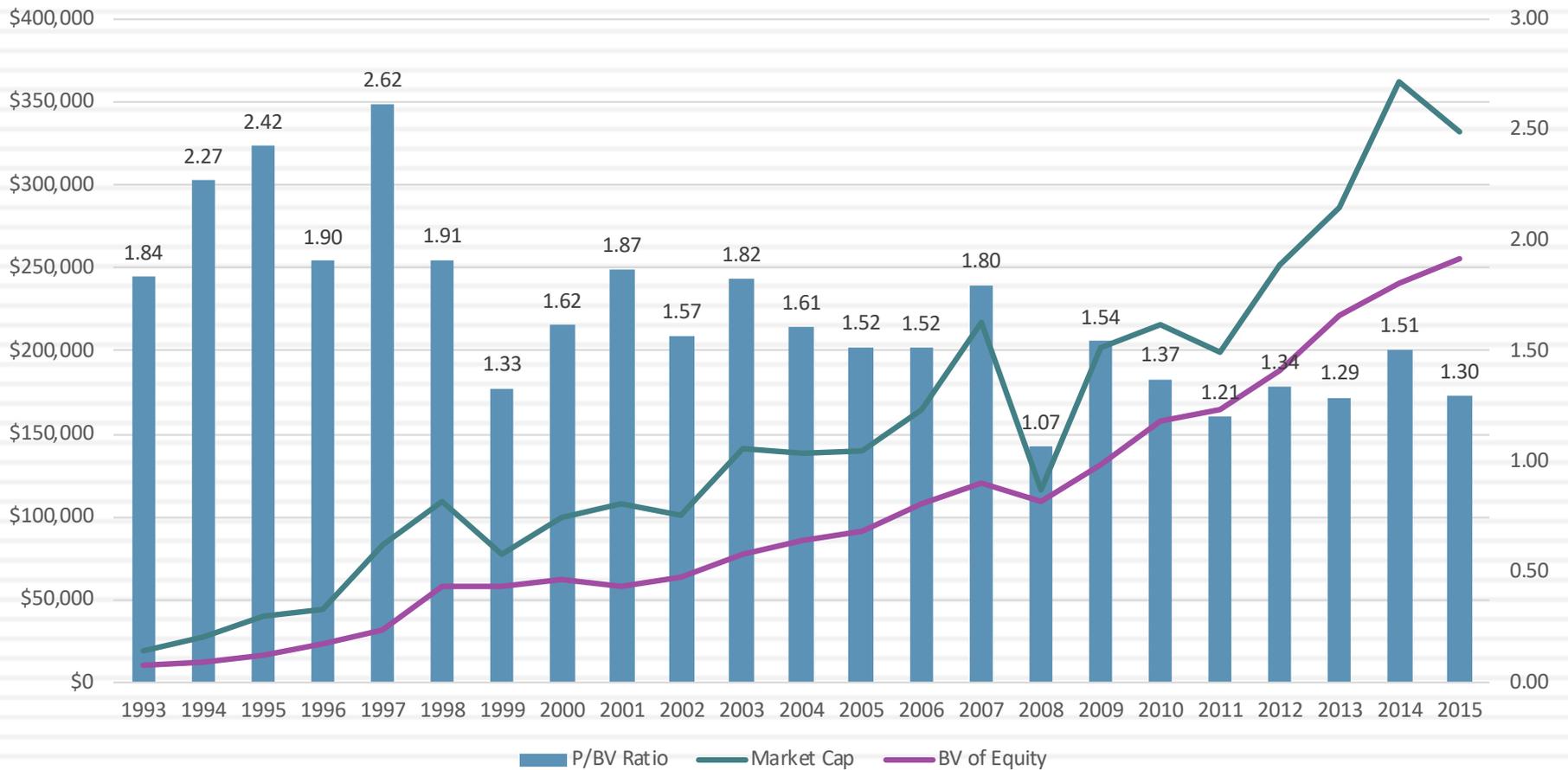
220



- 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?

Berkshire Hathaway: The Fading Buffett Premium



2. Dealing with Holdings in Other firms

222

- 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.

An Exercise in Valuing Cross Holdings

223

- Assume that you have valued Company A using consolidated financials for \$ 1 billion (using FCFF and cost of capital) and that the firm has \$ 200 million in debt. How much is the equity in Company A worth?
- Now assume that you are told that Company A owns 10% of Company B and that the holdings are accounted for as passive holdings. If the market cap of company B is \$ 500 million, how much is the equity in Company A worth?
- Now add on the assumption that Company A owns 60% of Company C and that the holdings are fully consolidated. The minority interest in company C is recorded at \$ 40 million in Company A's balance sheet. How much is the equity in Company A worth?

More on Cross Holding Valuation

224

- Building on the previous example, assume that
 - You have valued equity in company B at \$ 250 million (which is half the market's estimate of value currently)
 - Company A is a steel company and that company C is a chemical company. Furthermore, assume that you have valued the equity in company C at \$250 million.
 - Estimate the value of equity in company A.

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

225

- 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 un-consolidated parent company
 - ▣ – Debt of un-consolidated 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

226

| 100% of Yahoo! US Equity | + 35% of Yahoo! Japan Equity | + 22.1% of Alibaba Equity | - Loose Ends = | Equity value= \$41,571 Per share = \$41.19 |
|---------------------------|---|---|-------------------------|---|
| Operating assets = \$4383 | Operating assets = \$17,884 | Operating assets = \$127,484 | - Taxes due = \$5,017 | |
| + Cash = \$4,571 | + Cash = \$3,113 | + Cash = \$27,963 | - Yahoo options = \$298 | |
| - Debt = \$1,591 | - Debt = \$0 | - Debt = \$6,670 | | |
| =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...

227

- 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?

228

| 100% of Yahoo! US Equity | + 35% of Yahoo! Japan Equity | + 22.1% of Alibaba Equity | - Loose Ends = | Equity value= \$39,580 Per share = \$39.19 |
|---|--|---|------------------------|---|
| 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 | |
| + Cash = \$4,571 | + Cash = \$3,113 | + Cash = \$27,963 | Yahoo options \$298 | |
| - Debt = \$1,591 | - Debt = \$0 | - Debt = \$6,670 | | |
| =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..

229

- 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. Thus, you should not be counting the real estate on which your offices stand, the PP&E representing your factories and other productive assets, any values attached to brand names or customer lists and definitely no non-assets (such as goodwill).
- 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?

230

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

231

| | 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

232

| <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

233

| 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 |
| Working capital | 1. Unspecified current assets and current liabilities | Yes or No | Yes | Yes=3 | 3 |
| | 2. 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

234

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

Pages in 10K

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

235

- 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

236

- 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

237

- 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

240

- 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...

241

- 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

242

- 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:

$$\text{Value of firm} = 100 / (.08 - .03) = 2000$$

$$\text{Debt} = 1000$$

$$= \text{Equity} = 1000$$

$$\text{Number of diluted shares} = 110$$

$$\text{Value per share} = 1000 / 110 = \$9.09$$

- 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

243

- 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

244

- 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

245

- 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

246

- 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

247

- 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)

To tax adjust or not to tax adjust...

248

- In the example above, we have assumed that the options do not provide any tax advantages. To the extent that the exercise of the options creates tax advantages, the actual cost of the options will be lower by the tax savings.
- One simple adjustment is to multiply the value of the options by $(1 - \text{tax rate})$ to get an after-tax option cost.

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.

When options affect equity value per share the most...

250

- Option grants affect value more
 - ▣ The lower the strike price is set relative to the stock price
 - ▣ The longer the term to maturity of the option
 - ▣ The more volatile the stock price
- The effect on value will be magnified if companies are allowed to revisit option grants and reset the exercise price if the stock price moves down.

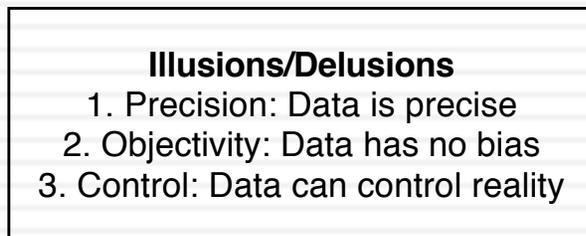
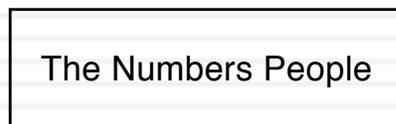
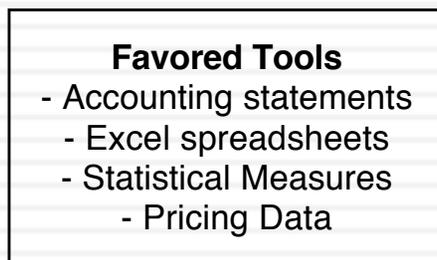


NARRATIVE AND NUMBERS: VALUATION AS A BRIDGE

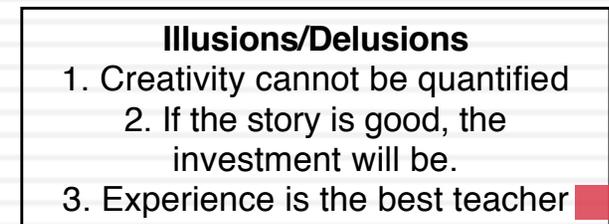
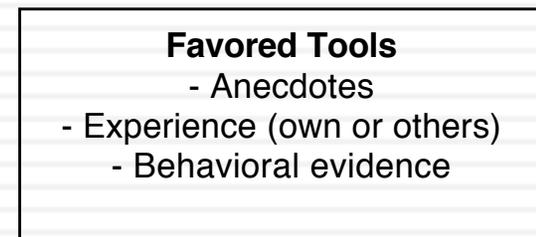
Tell me a story..

Valuation as a bridge

Number Crunchers

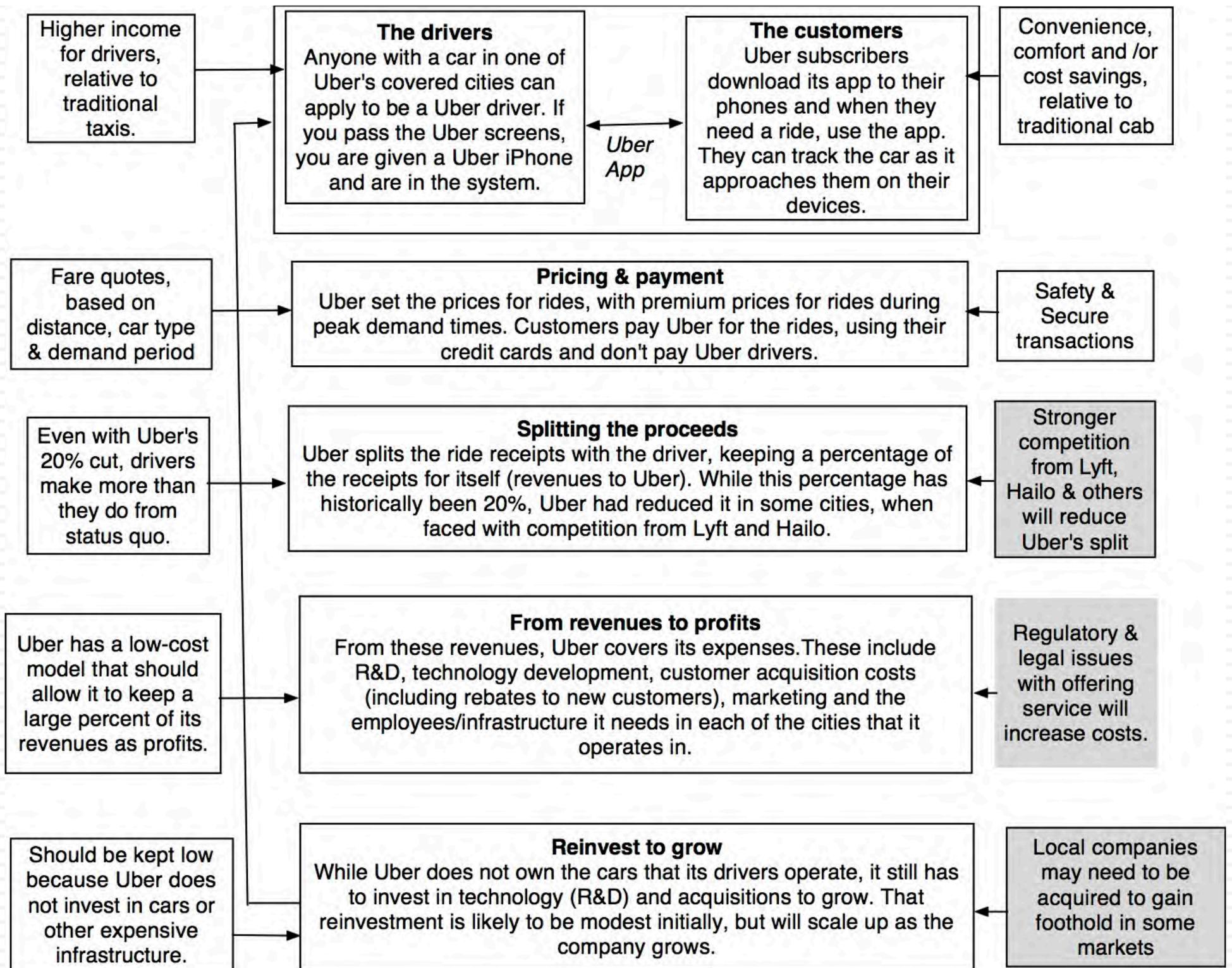


Story Tellers



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.

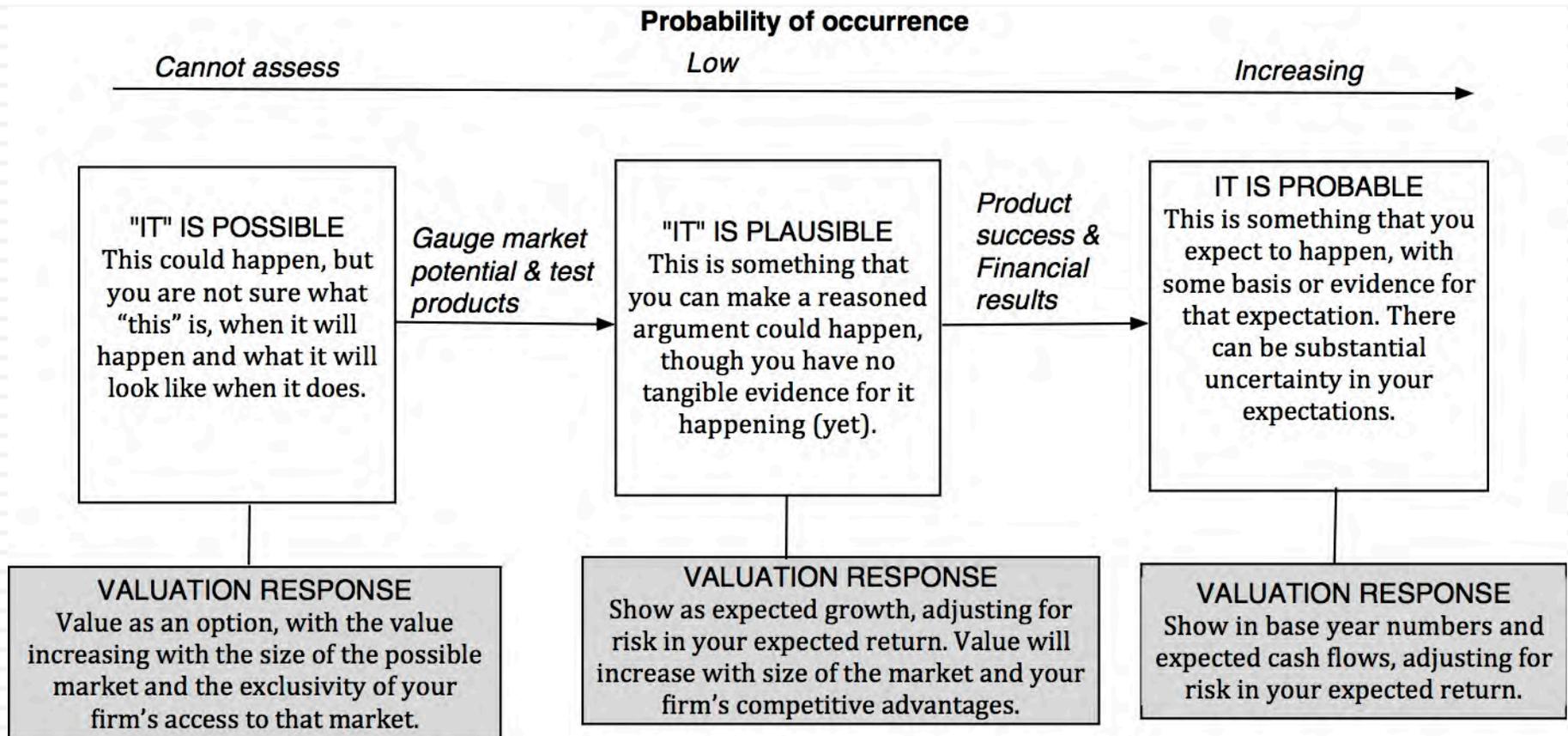
The Uber Narrative

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

257



The Impossible, The Implausible and the Improbable

258

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.

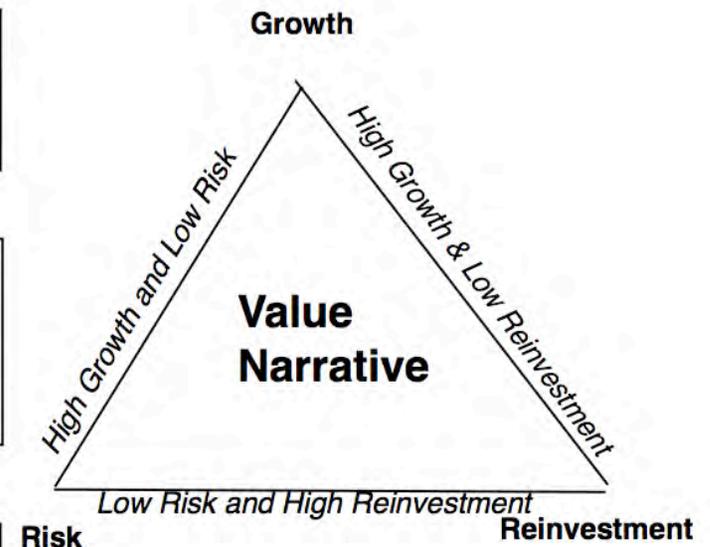
The Implausible

Growth without reinvestment
Assuming growth forever without reinvestment.

Profits without competition
Assuming that your company will grow and earn higher profits, with no competition.

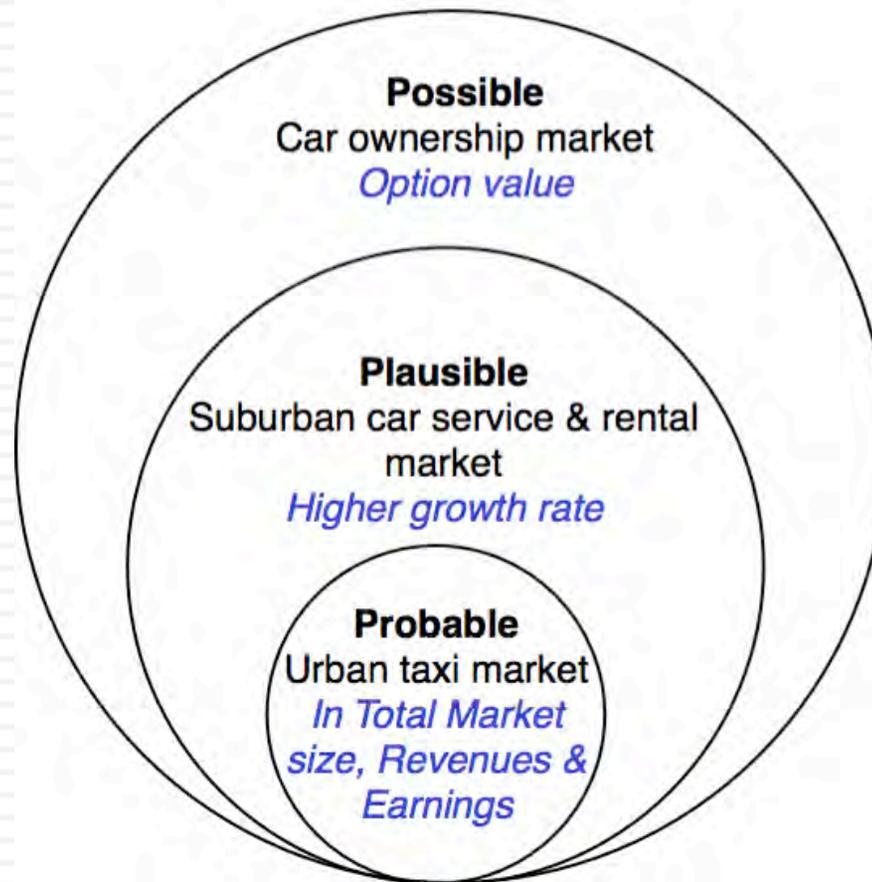
Returns without risk
Assuming that you can generate high returns in a business with no risk.

The Improbable



Uber: Possible, Plausible and Probable

Uber (My narrative))



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 (?)

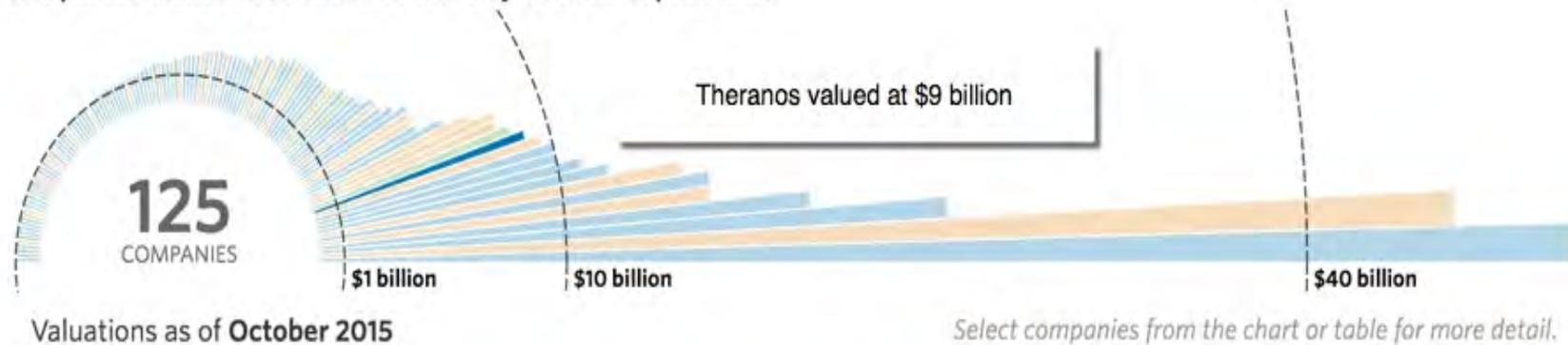
| Board Member | Designation | Age |
|------------------|-------------------------------|-----|
| Henry Kissinger | Former Secretary of State | 92 |
| Bill Perry | Former Secretary of Defense | 88 |
| George Schultz | Former Secretary of State | 94 |
| Bill Frist | Former Senate Majority Leader | 63 |
| 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..

262

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.

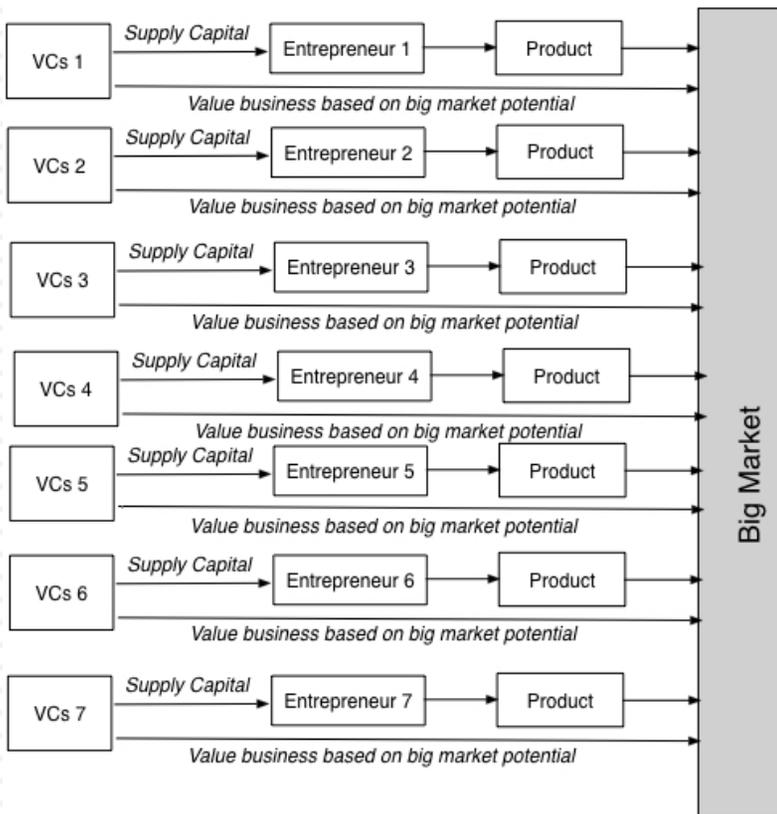
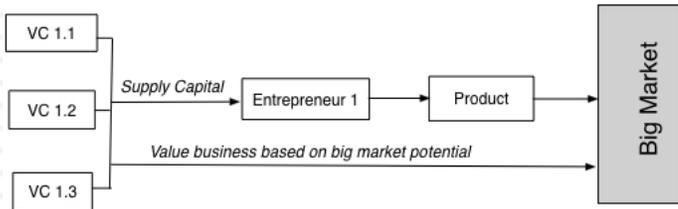
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Bad Business Model
The business model has a fundamental flaw that can affect either future profitability or survival, but the management is either in denial about the flaw or opaque in how it plans to deal with it.

=

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

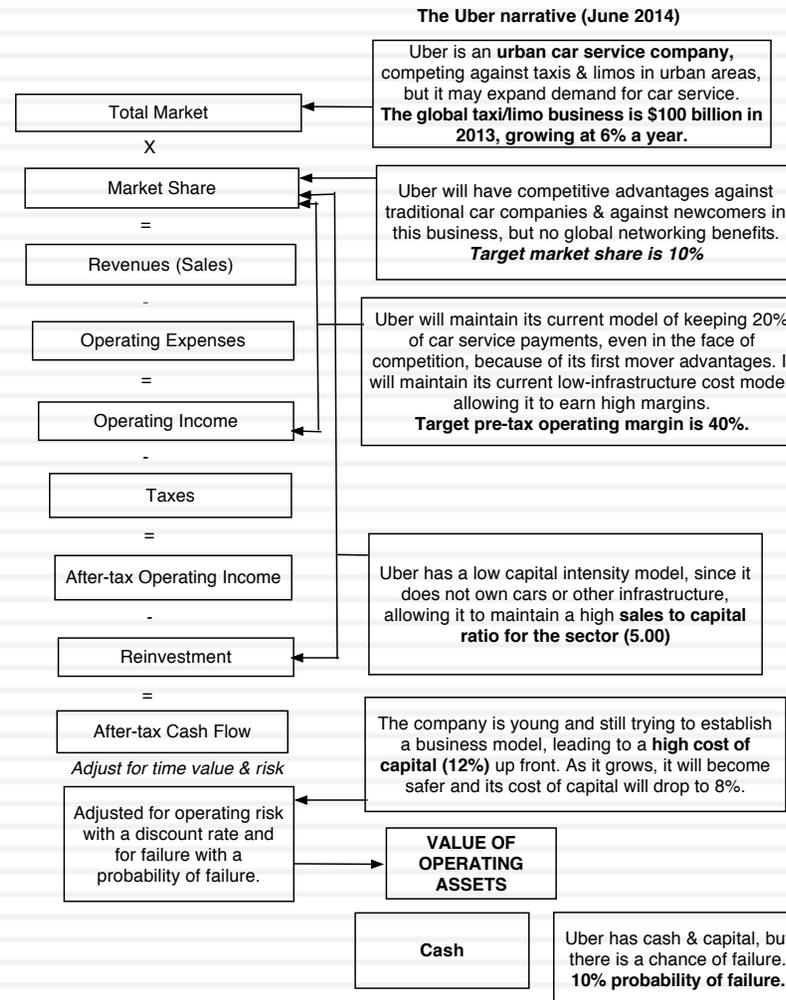
The Implausible: The Big Market Delusion



| 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 |



Step 4: Connect your narrative to key drivers of value



Step 4: Value the company (Uber)

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

Stable Growth (after year 10)
 Expected growth rate = 2.50%
 Cost of capital = 8%
 Return on capital = 25%
 Reinvestment Rate = 2.5%/25% = 10%

Terminal Value₁₀ = 793 / (.08 - 0.025) = \$14,418

Term yr
 EBIT (1-t) \$881
 - Reinv 88
 FCF \$793

Uber's market share of this market will increase to 10% over the next 10 years.

Global taxi market is \$100 billion currently, expected to grow 6% a year for next ten years.

Uber will keep 20% of the gross cab receipts as its revenues

Uber's operating expenses will amount to 60% of its revenues. (Operating margin=40%)

Uber will pay a tax rate of 30% on its income, increasing to 40% over the next 10 years

Uber will generate \$5 in incremental revenues for every dollar of incremental capital.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Overall market | \$106,000 | \$112,360 | \$119,102 | \$126,248 | \$133,823 | \$141,852 | \$150,363 | \$159,385 | \$168,948 | \$179,085 |
| Share of market (gross) | 3.63% | 5.22% | 6.41% | 7.31% | 7.98% | 8.49% | 8.87% | 9.15% | 9.36% | 10.00% |
| Revenues as percent of gross | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |
| Annual Revenue | \$769 | \$1,173 | \$1,528 | \$1,846 | \$2,137 | \$2,408 | \$2,666 | \$2,916 | \$3,163 | \$3,582 |
| Operating margin | 7.00% | 10.67% | 14.33% | 18.00% | 21.67% | 25.33% | 29.00% | 32.67% | 36.33% | 40.00% |
| Operating Income | \$54 | \$125 | \$219 | \$332 | \$463 | \$610 | \$773 | \$953 | \$1,149 | \$1,433 |
| Effective tax rate | 31% | 32% | 33% | 34% | 35% | 36% | 37% | 38% | 39% | 40% |
| - Taxes | \$17 | \$40 | \$72 | \$113 | \$162 | \$220 | \$286 | \$362 | \$448 | \$573 |
| After-tax operating income | \$37 | \$85 | \$147 | \$219 | \$301 | \$390 | \$487 | \$591 | \$701 | \$860 |
| Sales/Capital Ratio | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| - Reinvestment | \$94 | \$81 | \$71 | \$64 | \$58 | \$54 | \$52 | \$50 | \$49 | \$84 |
| Free Cash Flow to the Firm | -\$57 | \$4 | \$76 | \$156 | \$243 | \$336 | \$435 | \$541 | \$652 | \$776 |

Based on the investment of \$1.2 billion made by investors, the imputed value for Uber's operating assets, in June 2014, was \$17 billion.

Discount back the cash flows (including terminal value) at the cumulated cost of capital.

Value of operating assets = \$6,595

Adjust for probability of failure (10%)
 Expected value = \$6,595 (.9) = \$5,895

Cost of capital for first 5 years = Top decile of US companies = 12%

Cost of capital declines from 12% to 8% from years 6 to 10.

Step 5: Keep the feedback loop

267

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

270

| 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

272

- 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: In 2010, I reverted back to a mature market premium of 4.5%, reflecting the drop in equity risk premiums during 2009. In 2011, I used 5%, reflecting again the change in implied premium over the year. In 2012 and 2013, stayed with 6%, reverted to 5% in 2014 and will be using 5.75% in 2015.

The Valuation Set up

273

- 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.

274

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

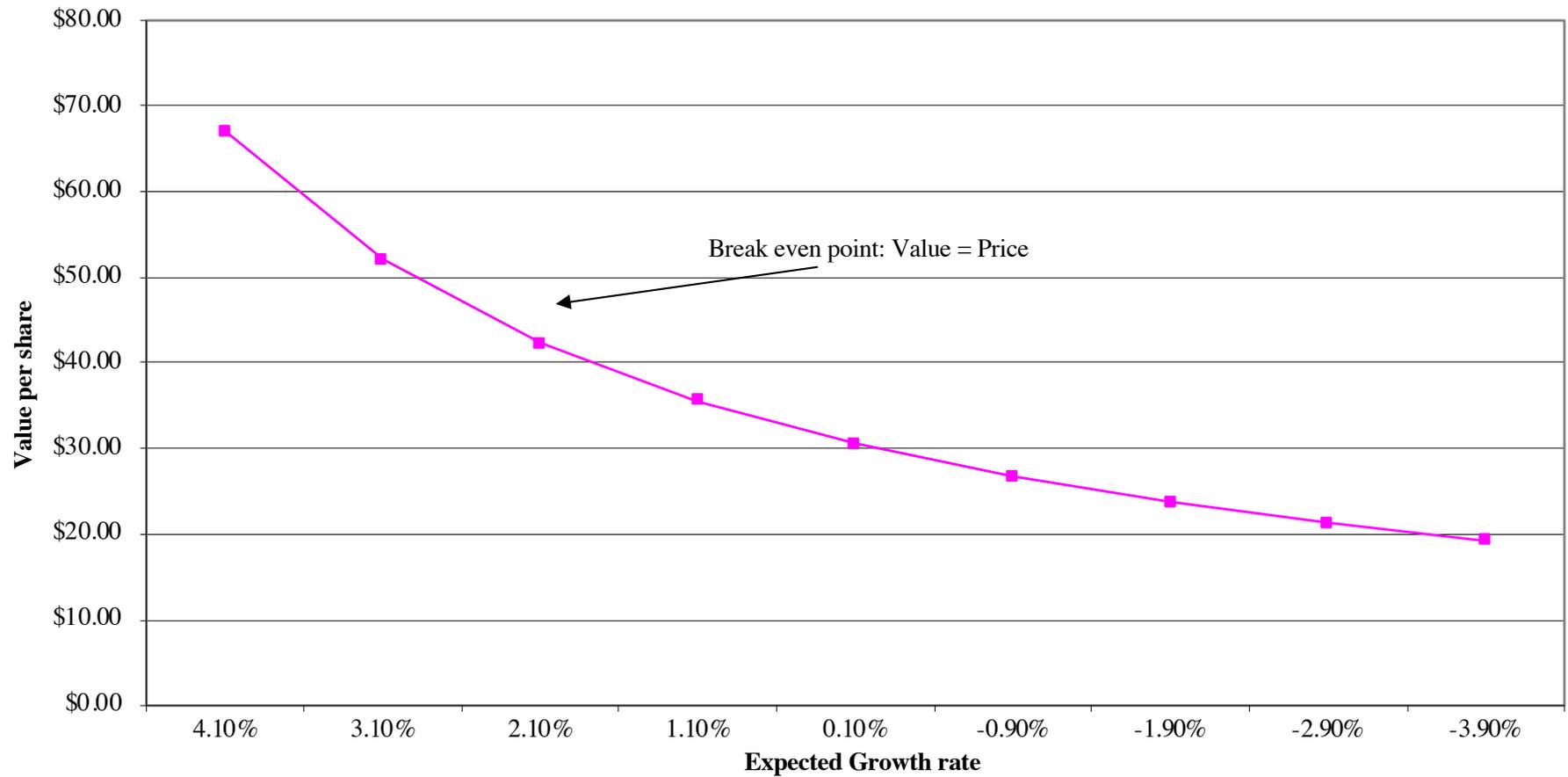
Why a stable growth dividend discount model?

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.

A breakeven growth rate to get to market price...

276

Con Ed: Value versus Growth Rate



From DCF value to target price and returns...

277

- 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%

Return on Capital
25%

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

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%

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

Op. Assets 60607
 + Cash: 3253
 - Debt 4920
 =Equity 58400
 Value/Share \$ 83.55

| Year | 1 | 2 | 3 | 4 | 5 | Term Yr |
|----------------|---------|---------|---------|---------|---------|---------|
| EBIT (1-t) | \$3,734 | \$4,014 | \$4,279 | \$4,485 | \$4,619 | \$4,758 |
| - Reinvestment | \$1,120 | \$1,204 | \$1,312 | \$1,435 | \$1,540 | \$2,113 |
| = FCFF | \$2,614 | \$2,810 | \$2,967 | \$3,049 | \$3,079 | \$2,645 |

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

Reduced growth rate to 5%

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%

Return on Capital
20%

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

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%

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

| | |
|-------------|----------|
| Op. Assets | 43,975 |
| + Cash: | 3253 |
| - Debt | 4920 |
| =Equity | 42308 |
| Value/Share | \$ 60.53 |

First 5 years

| 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% |

From a Company to the Market: Valuing the S&P 500: Dividend Discount Model in January 2020

Rationale for model

Why dividends? Because it is the only tangible cash flow, right?

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

Dividends
\$ Dividends in trailing 12 months = 58.80

Expected Growth
Analyst estimate for growth over next 5 years = 3.96%

$g = \text{Riskfree rate} = 1.92\%$
Assume that earnings on the index will grow at same rate as economy.

Terminal Value = $\text{DPS in year 6} / (r-g)$
 $= (71.39 * 1.0192) / (.0692 - .0192) = 1455.21$

Dividends

61.13 63.55 66.06 68.67 71.39

Forever

Discount at Cost of Equity

Value of Equity per share = PV of Dividends & Terminal value at 6.92% = 1311.87

On January 1, 2020, the S&P 500 index was trading at 3230.78

Cost of Equity
 $1.92\% + 1.00 (5.00\%) = 6.92\%$

Riskfree Rate:
Treasury bond rate
1.92%

+

Beta
1.00

X

Risk Premium

5.00%
Set at slightly above the average ERP over the last 20 years

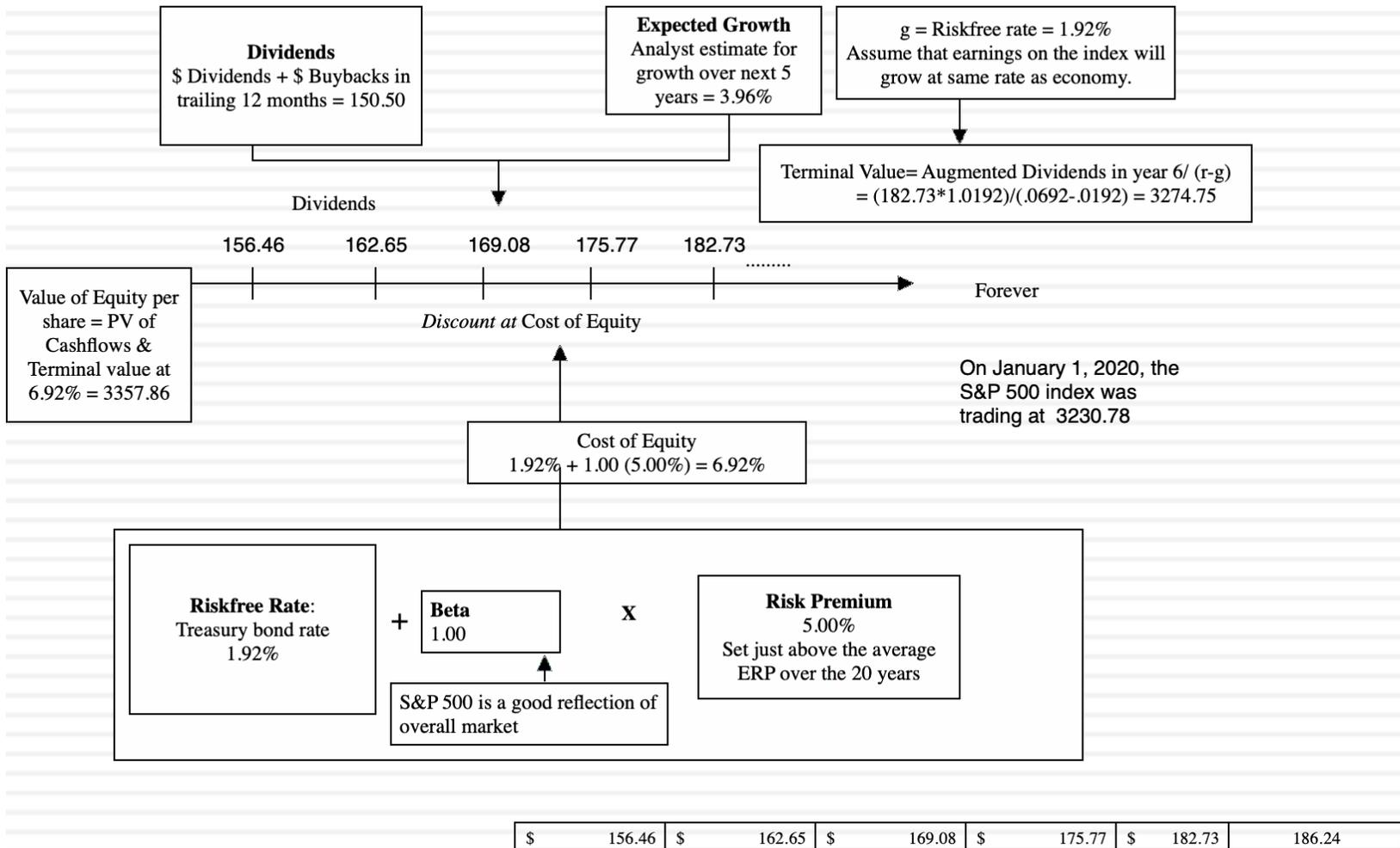
S&P 500 is a good reflection of overall market

From a Company to the Market: Valuing the S&P 500: Augmented Dividend Discount Model in January 2020

Rationale for model

Why augmented dividends? Because companies are increasing returning cash in the form of stock buybacks

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

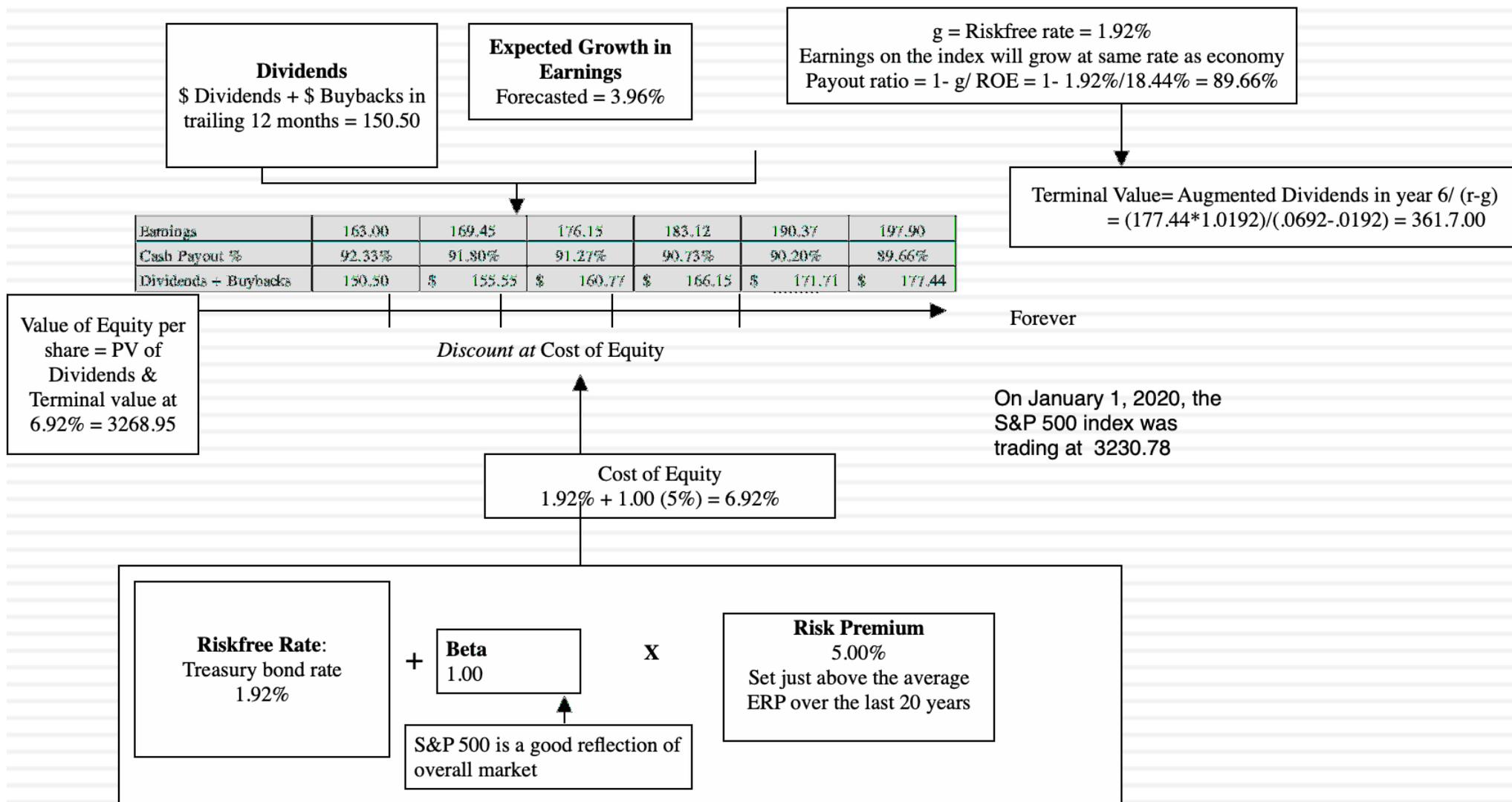


Valuing the S&P 500: Augmented Dividends and Fundamental Growth January 2020

Rationale for model

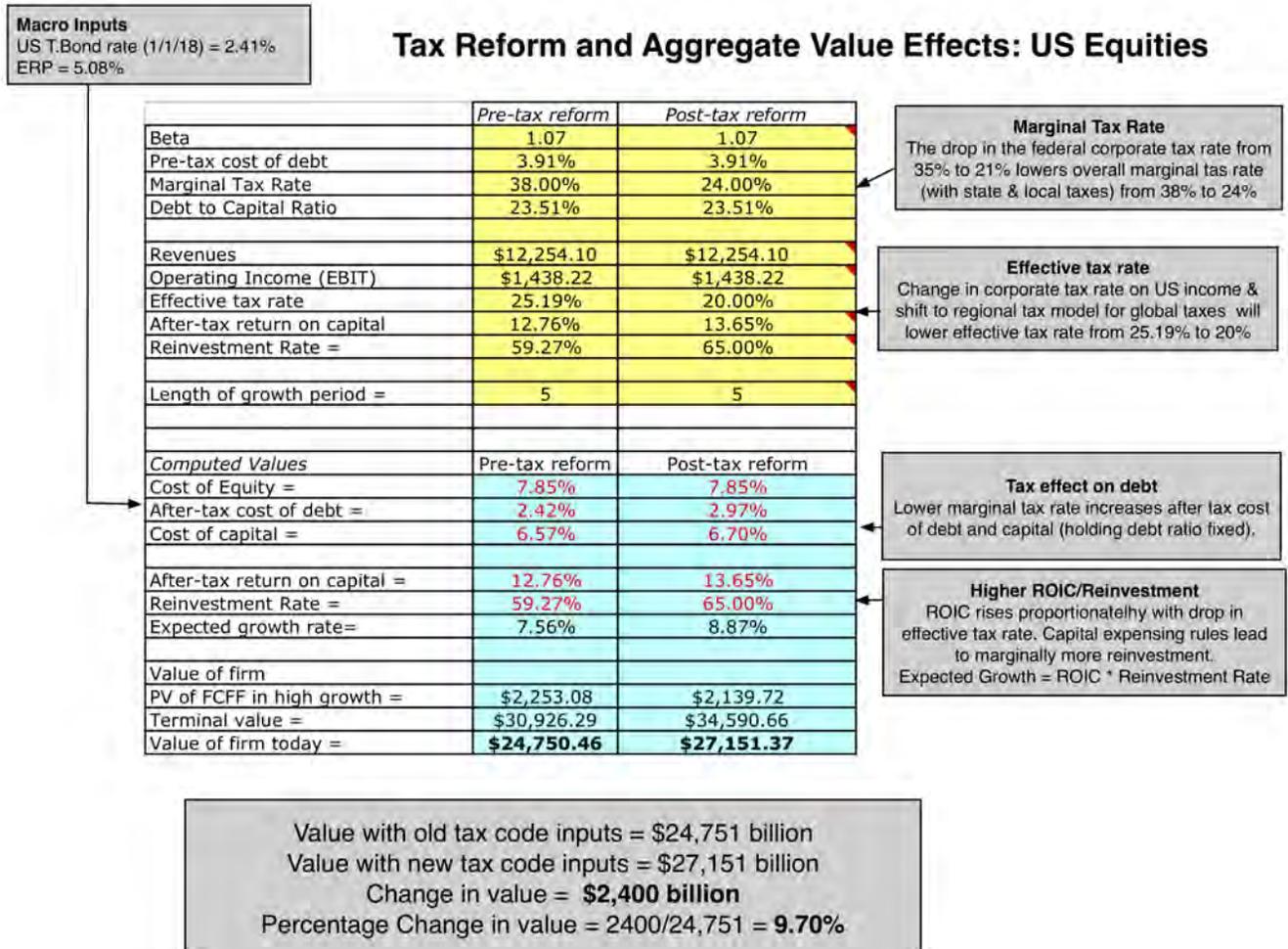
Why augmented dividends? Because companies are increasing returning cash in the form of stock buybacks

Why 2-stage? Why not?



Evaluating the Effect of Tax Reform on January 1, 2018

283



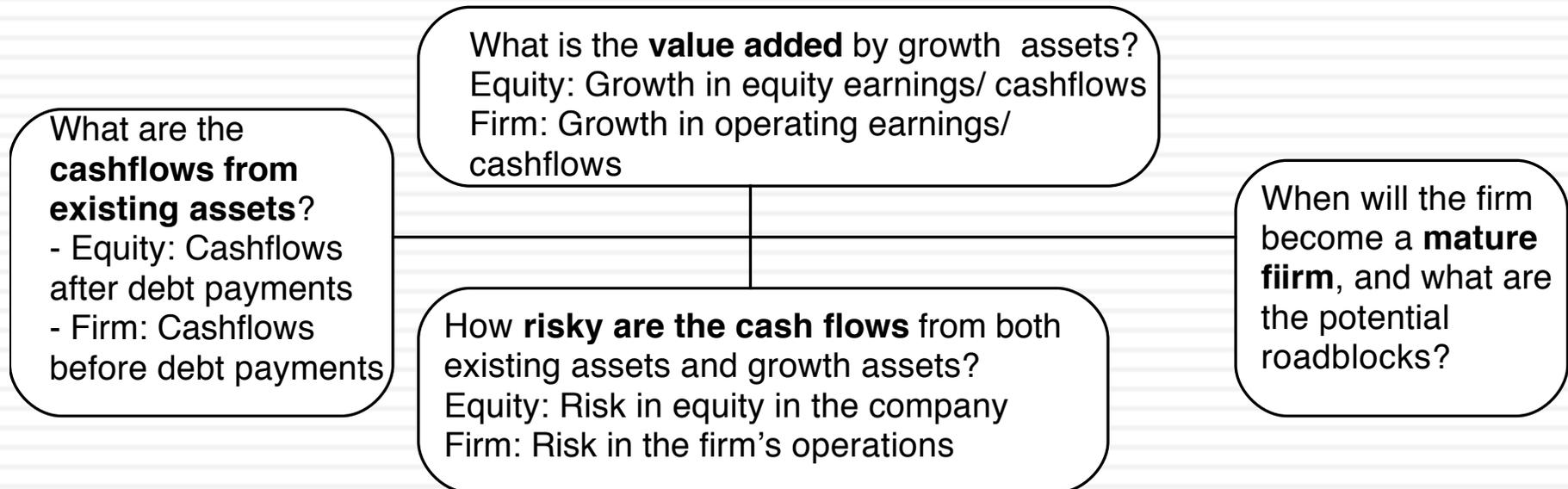
284

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...

285



The Dark Side of Valuation...

286

- 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...

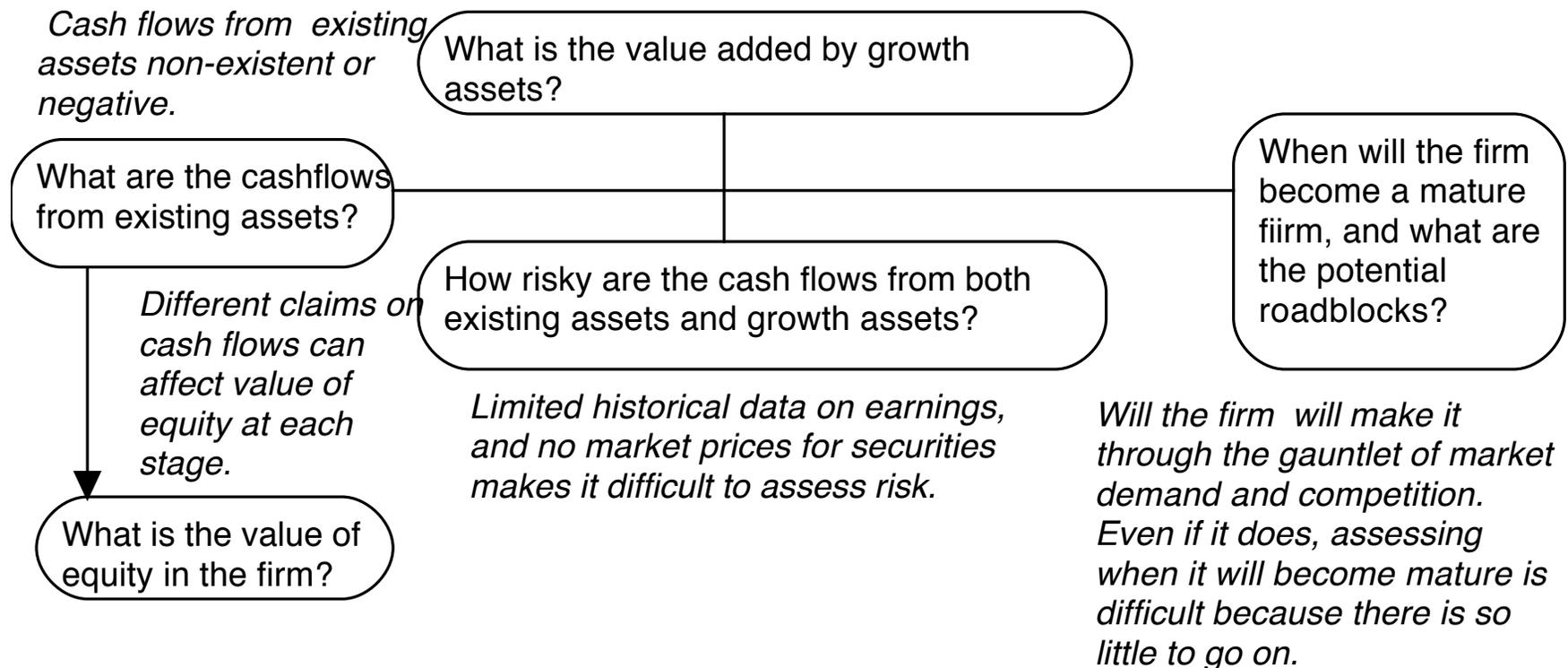
287

- 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...

288

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.



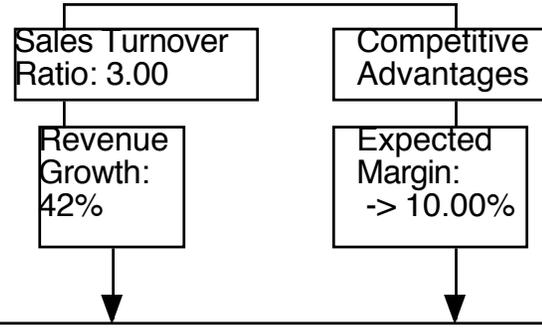
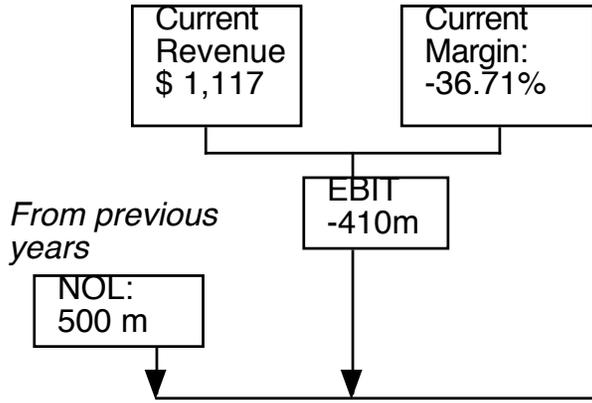
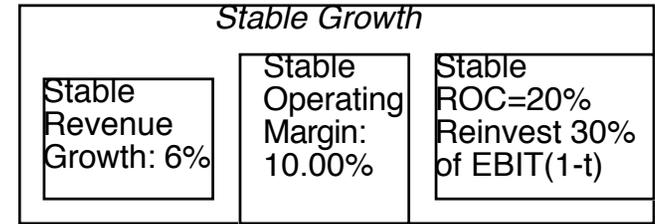
Upping the ante.. Young companies in young businesses...

289

- 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...

9a. Amazon in January 2000

Sales to capital ratio and expected margin are retail industry average numbers



Terminal Value = $1881 / (.0961 - .06)$
= 52,148

| | |
|------------|----------|
| Term. Year | \$41,346 |
| | 10.00% |
| | 35.00% |
| | \$2,688 |
| | \$ 807 |
| | \$1,881 |

| | |
|--------------------|-----------|
| Value of Op Assets | \$ 14,910 |
| + Cash | \$ 26 |
| = Value of Firm | \$14,936 |
| - Value of Debt | \$ 349 |
| = Value of Equity | \$14,587 |
| - Equity Options | \$ 2,892 |
| Value per share | \$ 34.32 |

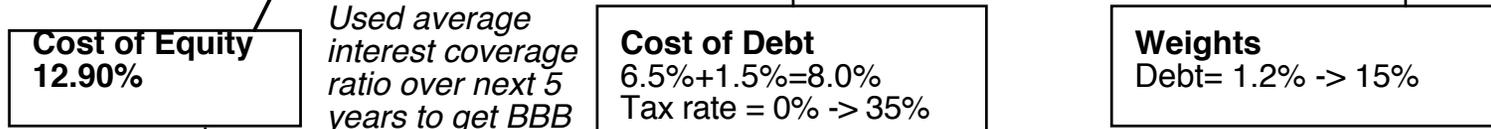
| | | | | | | | | | | |
|----------------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Revenues | \$2,793 | 5,585 | 9,774 | 14,661 | 19,059 | 23,862 | 28,729 | 33,211 | 36,798 | 39,006 |
| EBIT | -\$373 | -\$94 | \$407 | \$1,038 | \$1,628 | \$2,212 | \$2,768 | \$3,261 | \$3,646 | \$3,883 |
| EBIT (1-t) | -\$373 | -\$94 | \$407 | \$871 | \$1,058 | \$1,438 | \$1,799 | \$2,119 | \$2,370 | \$2,524 |
| - Reinvestment | \$559 | \$931 | \$1,396 | \$1,629 | \$1,466 | \$1,601 | \$1,623 | \$1,494 | \$1,196 | \$736 |
| FCFF | -\$931 | -\$1,024 | -\$989 | -\$758 | -\$408 | -\$163 | \$177 | \$625 | \$1,174 | \$1,788 |

| | | | | | | | | | | |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Cost of Equity | 12.90% | 12.90% | 12.90% | 12.90% | 12.90% | 12.42% | 12.30% | 12.10% | 11.70% | 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% |
| AT 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% | 11.96% | 11.69% | 11.15% | 9.61% |

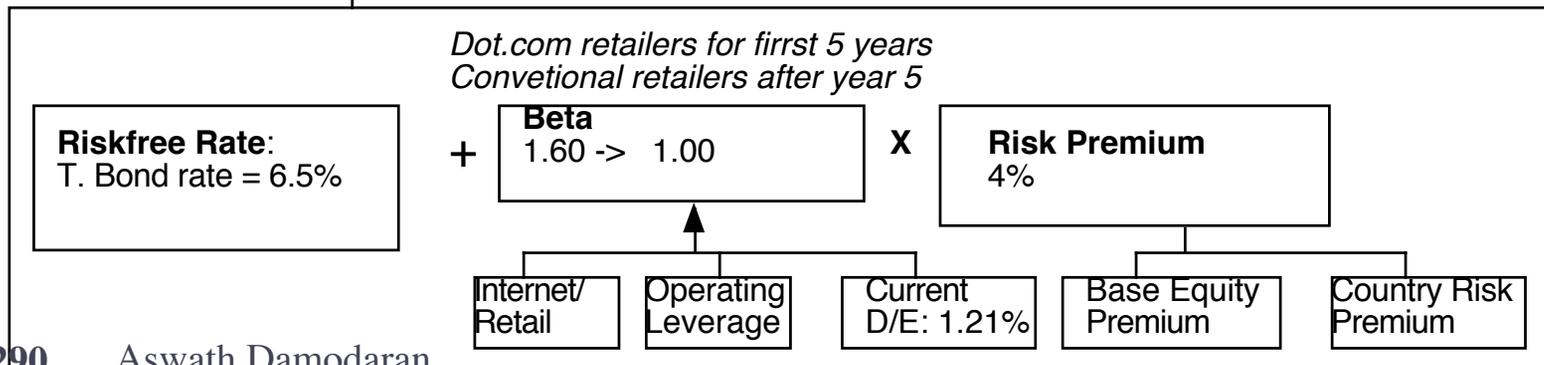
All existing options valued as options, using current stock price of \$84.

Forever

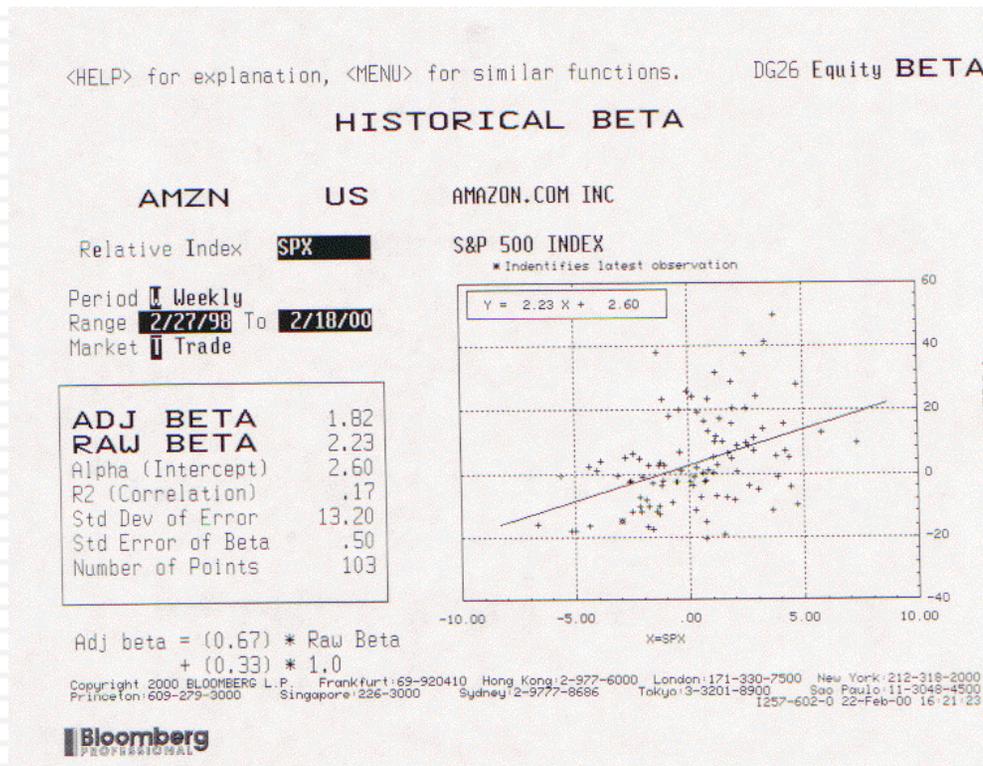
Amazon was trading at \$84 in January 2000.



Pushed debt ratio to retail industry average of 15%.



Lesson 1: Don't sweat the small stuff



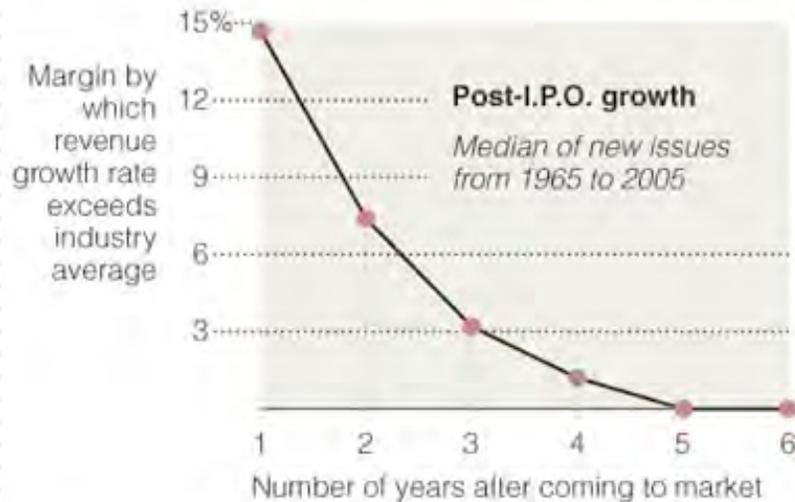
- Spotlight the business the company is in & use the beta of that business.
- Don't try to incorporate failure risk into the discount rate.
- Let the cost of capital change over time, as the company changes.
- If you are desperate, use the cross section of costs of capital to get your estimation going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

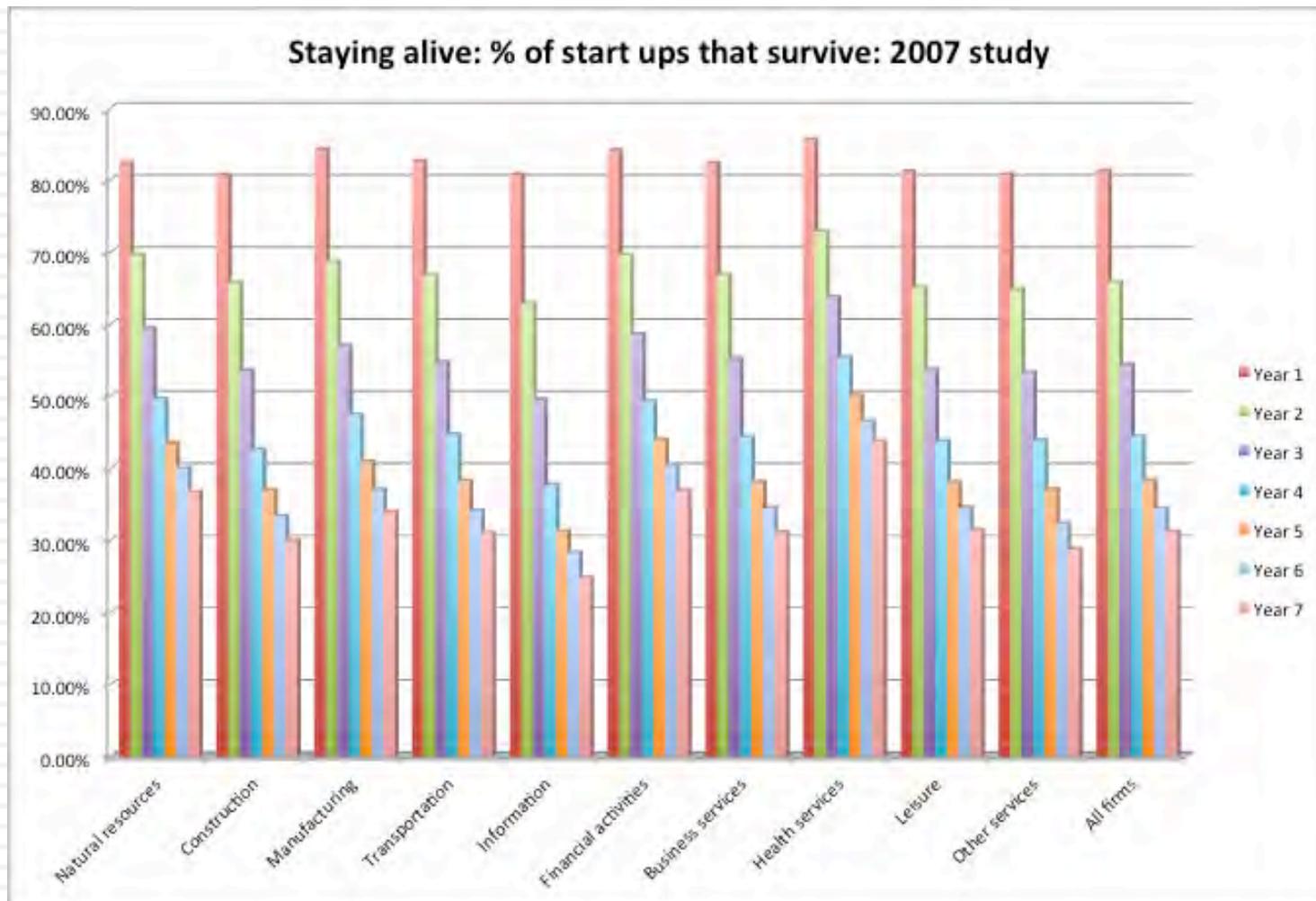
Lesson 4: Don't forget to pay for growth...

| 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.
- In DCF valuation, 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.
 - ▣ The options are valued and netted out against the current value. Using an option pricing model allows you to incorporate the expected likelihood that they will be exercised and the price at which they will be exercised.

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

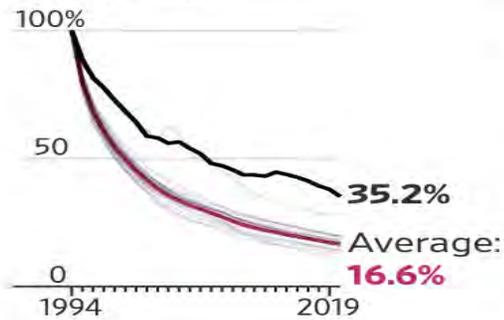


A 2019 Update: Sector Comparison

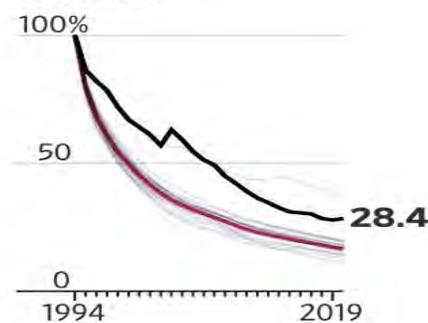
297

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

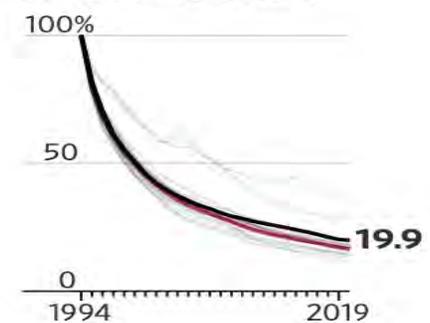
Management of companies and enterprises



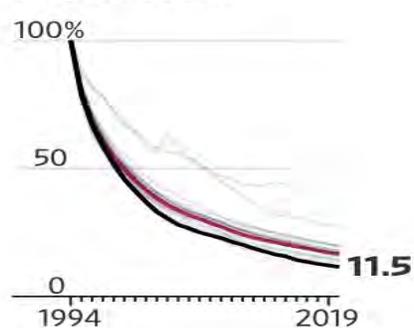
Utilities



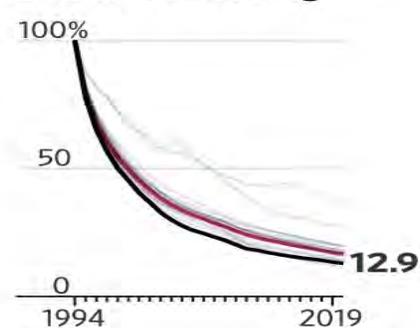
Health care and social assistance



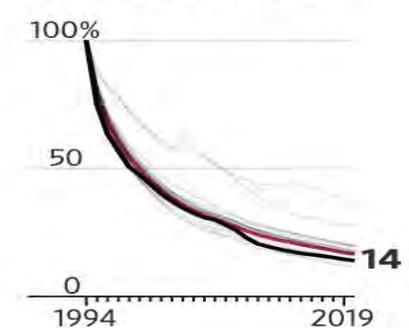
Information



Transportation and warehousing



Wholesale trade



Source: Bureau of Labor Statistics, Business Employment Dynamics data

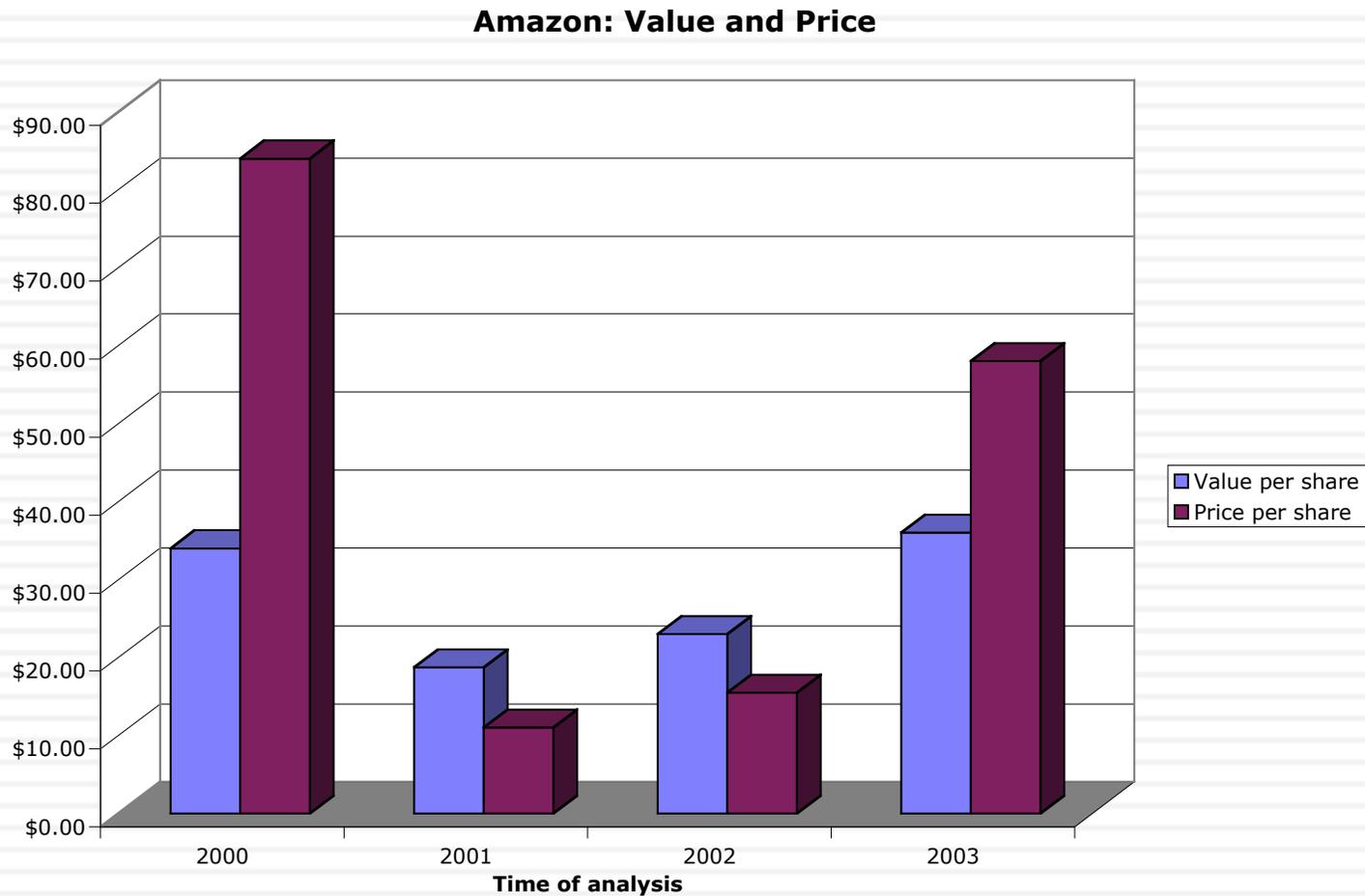
Lesson 7: There are always scenarios where the market price can be justified...

| | 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

301

| 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 metamorphosis 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 |

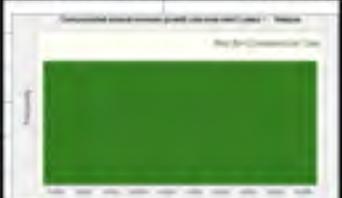
The Cash Flows

| | 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 |

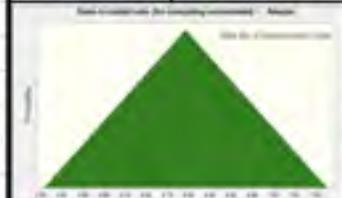
| Revenue Growth Rate | |
|---------------------|--------|
| Minimum | 5.00% |
| Maximum | 25.00% |



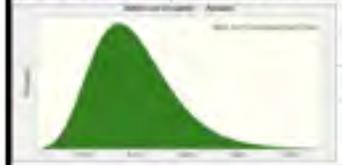
| Operating Margin | |
|------------------|--------|
| Mean | 12.50% |
| Std Dev | 2.00% |



| Sales/Invested Capital | |
|------------------------|------|
| Minimum | 3.95 |
| Likeliest | 5.95 |
| Maximum | 7.95 |



| Cost of Capital | |
|-----------------|-------|
| Location | 5.00% |
| Mean | 7.97% |
| Std. Dev. | 0.80% |

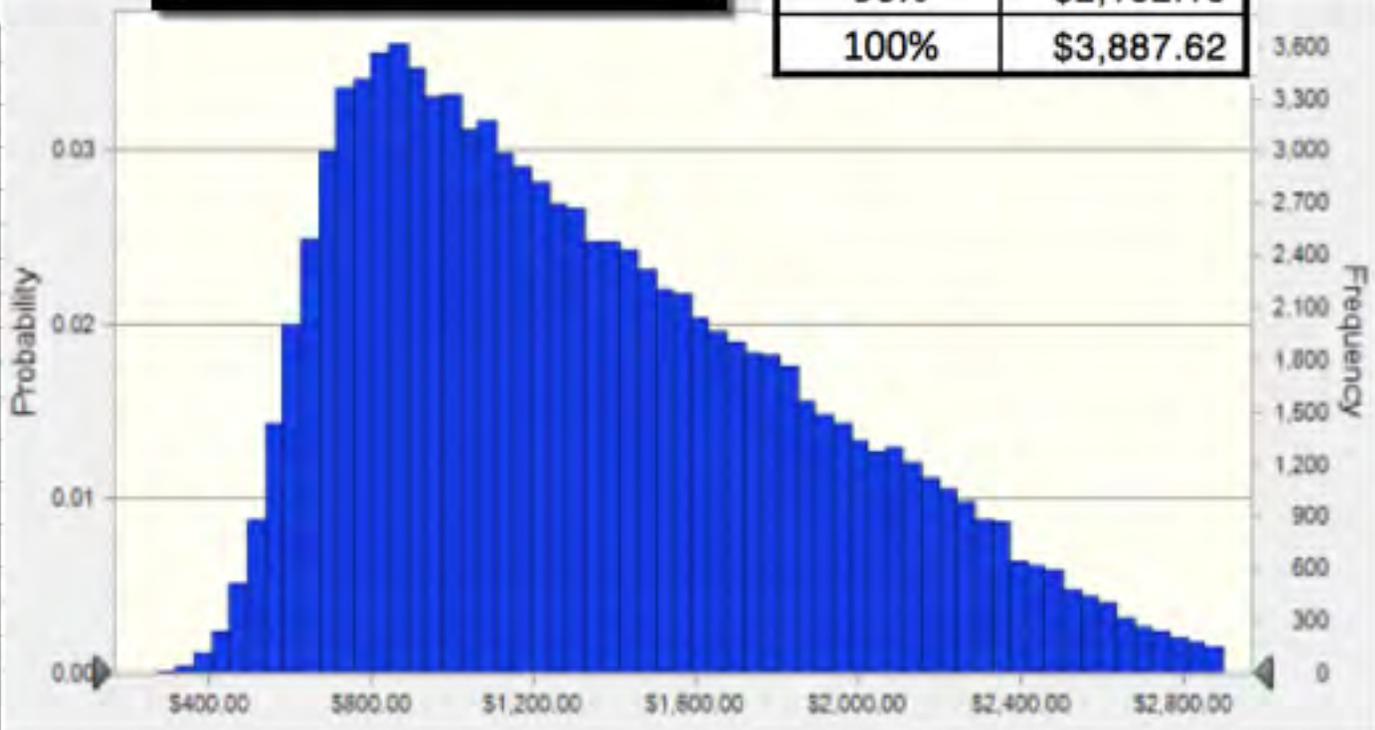


Correlation = 0.40

| | |
|-----------|------------|
| Base Case | \$1,255.09 |
| Mean | \$1,343.67 |
| Median | \$1,241.98 |

| Percentiles | Value/Share |
|-------------|-------------|
| 0% | \$234.29 |
| 10% | \$705.19 |
| 20% | \$832.65 |
| 30% | \$957.69 |
| 40% | \$1,092.41 |
| 50% | \$1,241.97 |
| 60% | \$1,411.82 |
| 70% | \$1,605.37 |
| 80% | \$1,837.98 |
| 90% | \$2,152.15 |
| 100% | \$3,887.62 |

Amazon: Simulated Values in September 2018



II. Mature Companies in transition..

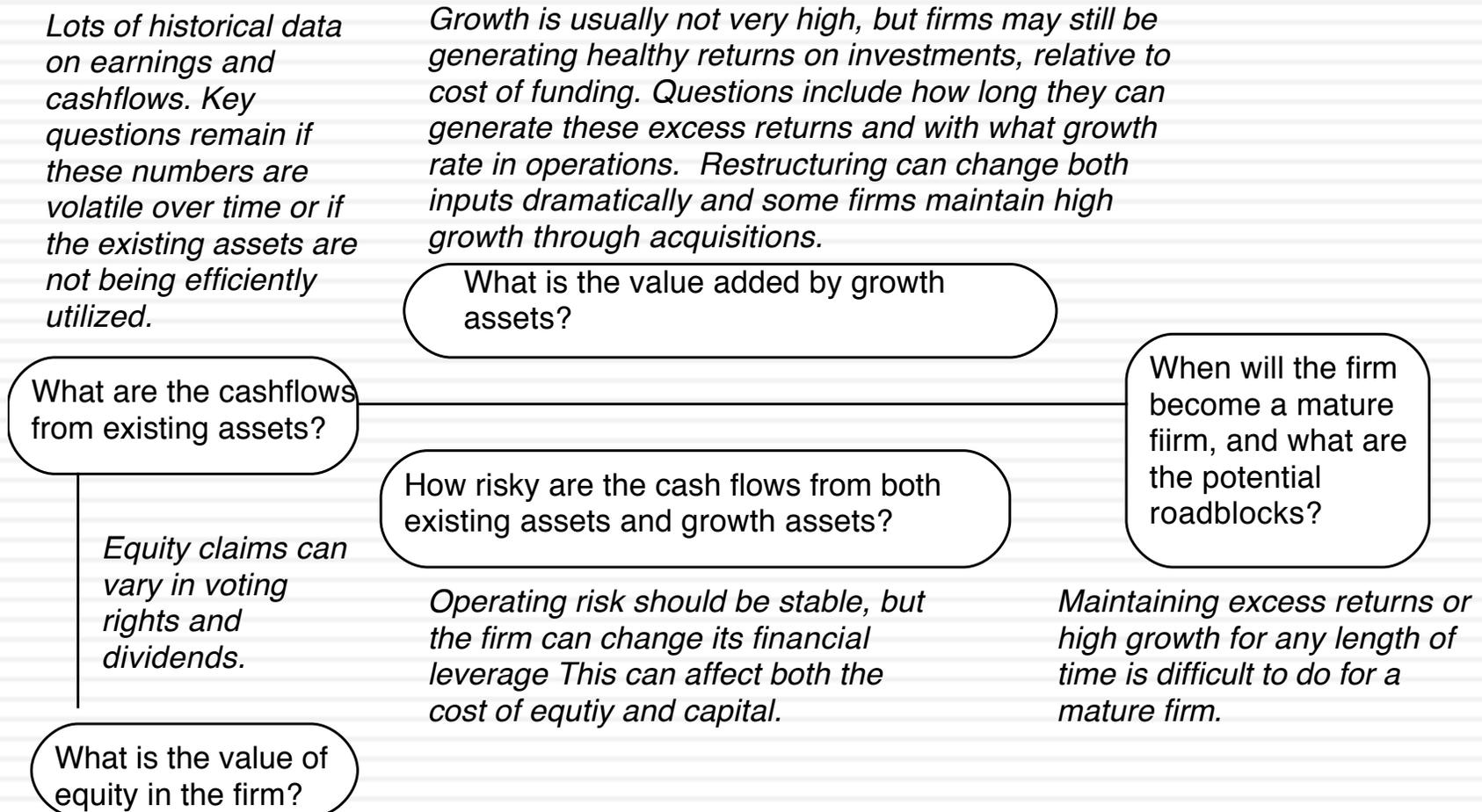
304

- 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...

305

Figure 7.1: Estimation Issues - Mature Companies



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 * Reinvestment Rate
 Expected growth rate (status quo) = 14.34% * 19.14% = 2.75%
 Expected growth rate (optimal) = 14.00% * 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 |

Lesson 1: Cost cutting and increased efficiency are easier accomplished on paper than in practice... and require commitment

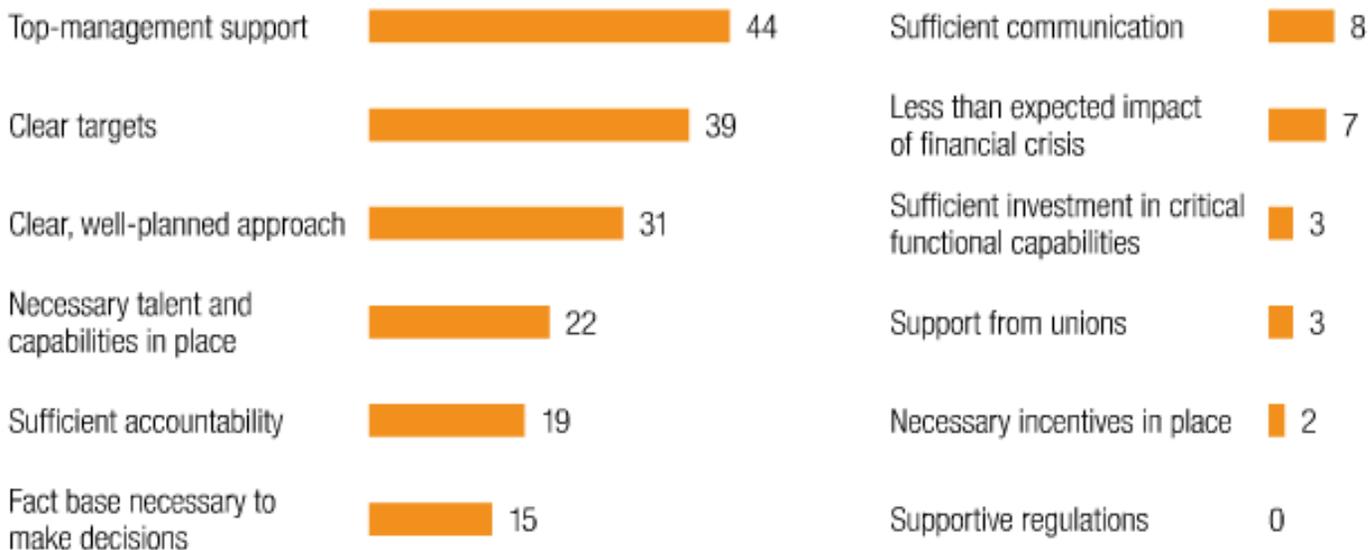
307

Exhibit 4: Top factors for meeting targets

expand 

% of respondents whose companies have met their cost reduction strategies,¹ n = 178

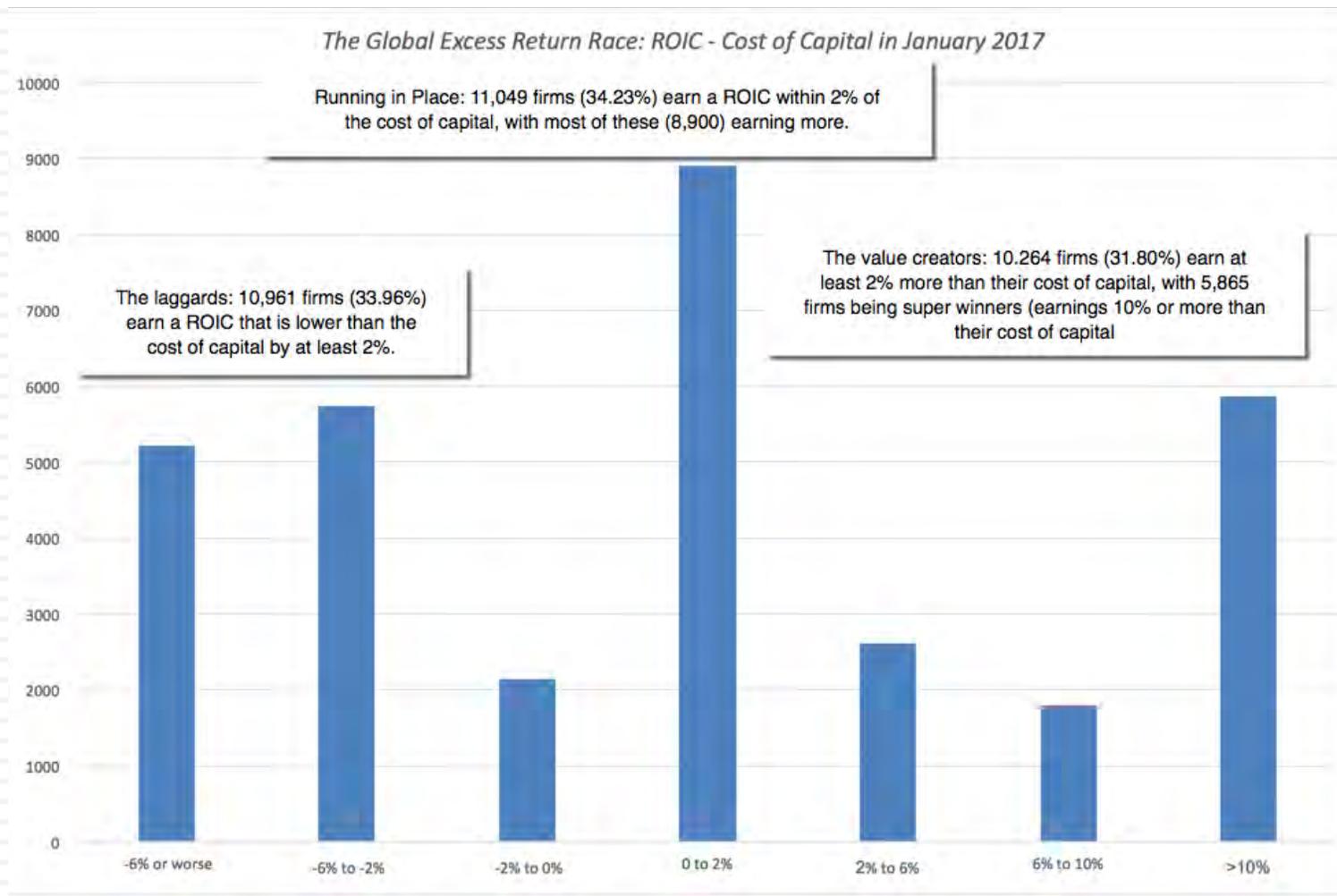
Top two factors most responsible for companies meeting cost targets or goals



¹ Respondents who answered "don't know" are not shown.

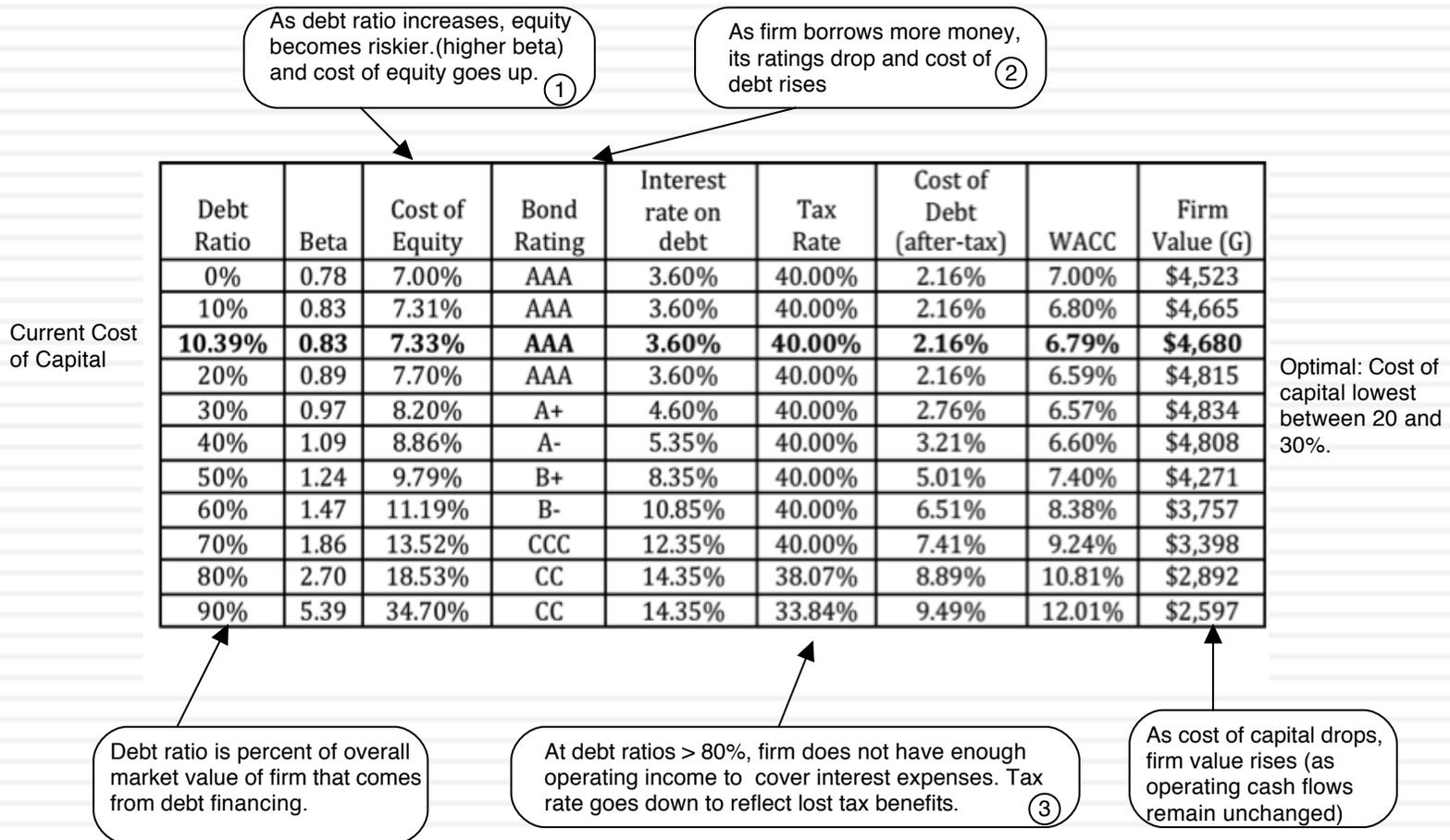
Lesson 2: Increasing growth is not always a value creating option.. And it may destroy value at times..

308



Lesson 3: Financial leverage is a double-edged sword..

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



III. Dealing with decline and distress...

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

311

- 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.

Figure 14.5: A Valuation of JC Penney

Declining business: Revenues expected to drop by 3% a year for next 5 years

| | Base year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------------------|-----------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Revenue growth rate | | -3.00% | -3.00% | -3.00% | -3.00% | -3.00% | -2.00% | -1.00% | 0.00% | 1.00% | 2.00% |
| Revenues | \$ 12,522 | \$12,146 | \$11,782 | \$11,428 | \$11,086 | \$10,753 | \$10,538 | \$10,433 | \$10,433 | \$10,537 | \$10,748 |
| EBIT (Operating) margin | 1.32% | 1.82% | 2.31% | 2.80% | 3.29% | 3.79% | 4.28% | 4.77% | 5.26% | 5.76% | 6.25% |
| EBIT (Operating income) | \$ 166 | \$ 221 | \$ 272 | \$ 320 | \$ 365 | \$ 407 | \$ 451 | \$ 498 | \$ 549 | \$ 607 | \$ 672 |
| Tax rate | 35.00% | 35.00% | 35.00% | 35.00% | 35.00% | 35.00% | 36.00% | 37.00% | 38.00% | 39.00% | 40.00% |
| EBIT(1-t) | \$ 108 | \$ 143 | \$ 177 | \$ 208 | \$ 237 | \$ 265 | \$ 289 | \$ 314 | \$ 341 | \$ 370 | \$ 403 |
| - Reinvestment | | \$ (188) | \$ (182) | \$ (177) | \$ (171) | \$ (166) | \$ (108) | \$ (53) | \$ - | \$ 52 | \$ 105 |
| FCFF | | \$ 331 | \$ 359 | \$ 385 | \$ 409 | \$ 431 | \$ 396 | \$ 366 | \$ 341 | \$ 318 | \$ 298 |
| Cost of capital | | 9.00% | 9.00% | 9.00% | 9.00% | 9.00% | 8.80% | 8.60% | 8.40% | 8.20% | 8.00% |
| PV(FCFF) | | \$ 304 | \$ 302 | \$ 297 | \$ 290 | \$ 280 | \$ 237 | \$ 201 | \$ 173 | \$ 149 | \$ 129 |
| Terminal value | \$ 5,710 | | | | | | | | | | |
| PV(Terminal value) | \$ 2,479 | | | | | | | | | | |
| PV (CF over next 10 years) | \$ 2,362 | | | | | | | | | | |
| Sum of PV | \$ 4,841 | | | | | | | | | | |
| Probability of failure = | 20.00% | <div data-bbox="525 1149 1163 1320" data-label="Text"> <p>High debt load and poor earnings put survival at risk. Based on bond rating, 20% chance of failure and liquidation will bring in 50% of book value</p> </div> | | | | | | | | | |
| Proceeds if firm fails = | \$2,421 | | | | | | | | | | |
| Value of operating assets = | \$4,357 | | | | | | | | | | |

Margins improve gradually to median for US retail sector (6.25%)

As stores shut down, cash released from real estate.

The cost of capital is at 9%, higher because of high cost of debt.

b. Dealing with the “downside” of Distress

313

- 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.
- Value of Equity= DCF value of equity (1 - Probability of distress) + Distress sale value of equity (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).

Current Revenue
\$ 4,390

Current Margin:
4.76%

EBIT
\$ 209m

Reinvestment:
Capital expenditures include cost of new casinos and working capital

Extended reinvestment break, due to investment in past

Industry average

Expected Margin:
-> 17%

Stable Growth

Stable Revenue Growth: 3%

Stable Operating Margin: 17%

Stable ROC=10%
Reinvest 30% of EBIT(1-t)

Terminal Value = $758 \cdot (0.0743 - 0.03)$
= \$ 17,129

Value of Op Assets \$ 9,793
+ Cash & Non-op \$ 3,040
= Value of Firm \$ 12,833
- Value of Debt \$ 7,565
= Value of Equity \$ 5,268

Value per share \$ 8.12

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Term. Year |
|-----------------|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------|
| Revenues | | \$4,434 | \$4,523 | \$5,427 | \$6,513 | \$7,815 | \$8,206 | \$8,616 | \$9,047 | \$9,499 | \$9,974 | \$10,273 |
| Oper margin | | 5.81% | 6.86% | 7.90% | 8.95% | 10% | 11.40% | 12.80% | 14.20% | 15.60% | 17% | 17% |
| EBIT | | \$258 | \$310 | \$429 | \$583 | \$782 | \$935 | \$1,103 | \$1,285 | \$1,482 | \$1,696 | \$1,746 |
| Tax rate | | 26.0% | 26.0% | 26.0% | 26.0% | 26.0% | 28.4% | 30.8% | 33.2% | 35.6% | 38.00% | 38% |
| EBIT * (1 - t) | | \$191 | \$229 | \$317 | \$431 | \$578 | \$670 | \$763 | \$858 | \$954 | \$1,051 | \$1,083 |
| - Reinvestment | | -\$19 | -\$11 | \$0 | \$22 | \$58 | \$67 | \$153 | \$215 | \$286 | \$350 | \$325 |
| FCFF | | \$210 | \$241 | \$317 | \$410 | \$520 | \$603 | \$611 | \$644 | \$668 | \$701 | \$758 |
| Beta | | 3.14 | 3.14 | 3.14 | 3.14 | 3.14 | 2.75 | 2.36 | 1.97 | 1.59 | 1.20 | |
| Cost of equity | | 21.82% | 21.82% | 21.82% | 21.82% | 21.82% | 19.50% | 17.17% | 14.85% | 12.52% | 10.20% | |
| Cost of debt | | 9% | 9% | 9% | 9% | 9% | 8.70% | 8.40% | 8.10% | 7.80% | 7.50% | |
| Debt/ratio | | 73.50% | 73.50% | 73.50% | 73.50% | 73.50% | 68.80% | 64.10% | 59.40% | 54.70% | 50.00% | |
| Cost of capital | | 9.88% | 9.88% | 9.88% | 9.88% | 9.88% | 9.79% | 9.50% | 9.01% | 8.32% | 7.43% | |

Term. Year
\$10,273
17%
\$1,746
38%
\$1,083
\$325
\$758

Forever

Cost of Equity
21.82%

Cost of Debt
 $3\% + 6\% = 9\%$
 $9\% (1 - 0.38) = 5.58\%$

Weights
Debt = 73.5% -> 50%

Riskfree Rate:
T. Bond rate = 3%

+ **Beta**
3.14 -> 1.20 X

Risk Premium
6%

Casino
1.15

Current
D/E: 277%

Base Equity
Premium

Country Risk
Premium

Las Vegas Sands
February 2009
Trading @ \$4.25

Adjusting the value of LVS for distress..

315

- 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:

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

- Solving for the probability of bankruptcy, we get:
 - π_{istress} = 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 = $\$8.12 (1 - .7666) + \$0.00 (.7666) = \$1.92$

IV. Emerging Market Companies

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

317

- 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.

A \$ Valuation of Embraer

Avg Reinvestment rate =40%

Current Cashflow to Firm

| | |
|------------------------------|--------|
| EBIT(1-t) : | \$ 434 |
| - Nt CpX | - 11 |
| - Chg WC | 178 |
| = FCFF | \$ 267 |
| Reinvestment Rate = 167/289= | 56% |
| Effective tax rate = | 19.5% |

Reinvestment Rate
40%

Expected Growth in
EBIT (1-t)
.40*.181=.072
7.2%

Return on Capital
18.1%

Stable Growth
g = 3.8%; Beta = 1.00;
Country Premium= 1.5%
Cost of capital = 7.38%
ROC= 7.38%; Tax rate=34%
Reinvestment Rate=g/ROC
=3.8/7.38 = 51.47%

Terminal Value₅ = 254(.0738-.038) = 8,371

| | |
|---------------|--------|
| Op. Assets \$ | 6,239 |
| + Cash: | 3,068 |
| - Debt | 2,070 |
| - Minor. Int. | 177 |
| =Equity | 7,059 |
| -Options | 4 |
| Value/Share | \$9.53 |
| R\$ | 15.72 |

| Year | 2 | 3 | 4 | 5 | |
|----------------|-------|-------|-------|-------|-------|
| EBIT (1-t) | \$465 | \$499 | \$535 | \$574 | \$615 |
| - Reinvestment | \$186 | \$200 | \$214 | \$229 | \$246 |
| FCFF | \$279 | \$299 | \$321 | \$344 | \$369 |

| | |
|---------|-----|
| Term Yr | 524 |
| | 270 |
| = | 254 |

Discount at \$ Cost of Capital (WACC) = 8.31% (.788) + 4.36% (0.212) = 7.47%

Cost of Equity
8.31%

Cost of Debt
(3.8%+1.7%+1.1%)(1-.34)
= 4.36%

Weights
E = 78.8% D = 21.2%

On May 22, 2008
Embraer Price = R\$ 17.2

Riskfree Rate:
US\$ Riskfree Rate=
3.8%

+ Beta 0.88 X Mature market premium 4%

+ Lambda 0.27 X Country Equity Risk Premium 3.66%

Unlevered Beta for Sectors: 0.75

Firm's D/E Ratio: 26.84%

Country Default Spread 2.2%

X Rel Equity Mkt Vol 1.64

Lesson 2: Currency should not matter

319

- 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).

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 = $-0.5\%/5\% = -10\%$

| | |
|-----------------------------|-------------|
| PV(Terminal value) | € 36,390.85 |
| PV (CF over next 10 years) | € 15,300.34 |
| Value of operating assets = | € 51,691.19 |
| - Debt | € 19,709.52 |
| - Minority interests | € 1,069.00 |
| + Cash | € 1,751.60 |
| + Non-operating assets | € 1,401.00 |
| Value of equity | € 34,065.26 |
| Number of shares | 571.10 |
| Estimated value /share | € 59.65 |
| Price | € 93.25 |
| Price as % of value | 56.33% |

Euro Cashflows

| | 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 |

Terminal Value = $2972 / (.05 - (-0.005)) = 54,034$

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

Firm's D/E Ratio: 66.98%

Unlevered beta of alcoholic beverage business = 0.80

| 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% |

Lesson 3: The “corporate governance” drag

321

- 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.

6a. Tube Investments: Status Quo (in Rs)

| | |
|---------------------------------|----------|
| Current Cashflow to Firm | |
| EBIT(1-t) : | 4,425 |
| - Nt CpX | 843 |
| - Chg WC | 4,150 |
| = FCFF | - 568 |
| Reinvestment Rate | =112.82% |

Reinvestment Rate
60%

**Expected Growth
in EBIT (1-t)**
.60*.092=- .0552
5.52%

Return on Capital
9.20%

Stable Growth
g = 5%; Beta = 1.00;
Debt ratio = 44.2%
Country Premium= 3%
ROC= 9.22%
Reinvestment Rate=54.35%

Terminal Value₅ = 2775 / (.1478 - .05) = 28,378

Firm Value: 19,578
+ Cash: 13,653
- Debt: 18,073
= Equity 15,158
- Options 0
Value/Share
Rs **61.57**

| | | | | | |
|----------------|---------|---------|---------|---------|---------|
| EBIT(1-t) | \$4,670 | \$4,928 | \$5,200 | \$5,487 | \$5,790 |
| - Reinvestment | \$2,802 | \$2,957 | \$3,120 | \$3,292 | \$3,474 |
| FCFF | \$1,868 | \$1,971 | \$2,080 | \$2,195 | \$2,316 |

Term Yr
6,079
3,304
2,775

Discount at Cost of Capital (WACC) = 22.8% (.558) + 9.45% (0.442) = 16.90%

Cost of Equity
22.80%

Cost of Debt
(12% + 1.50%)(1 - .30)
= 9.45%

Weights
E = 55.8% D = 44.2%

In 2000, the stock was trading at 102 Rupees/share.

Riskfree Rate:
Rs riskfree rate = 12%

+ **Beta**
1.17

Risk Premium
9.23%

Unlevered Beta for Sectors: 0.75

Firm's D/E Ratio: 79%

Mature risk premium 4%

Country Risk Premium 5.23%

6b. Tube Investments: Higher Marginal Return(in Rs)

Company earns higher returns on new projects

Return on Capital
12.20%

Stable Growth
g = 5%; Beta = 1.00;
Debt ratio = 44.2%
Country Premium = 3%
ROC = 12.2%
Reinvestment Rate = 40.98%

Terminal Value₅ = 3904 / (.1478 - .05) = 39.921

Current Cashflow to Firm
EBIT(1-t) : 4,425
- Nt CpX 843
- Chg WC 4,150
= FCFF - 568
Reinvestment Rate = 112.82%

Reinvestment Rate
60%

Expected Growth in EBIT (1-t)
.60 * .122 = .0732
7.32%

Existing assets continue to generate negative excess returns.

Firm Value: 25,185
+ Cash: 13,653
- Debt: 18,073
= Equity 20,765
- Options 0
Value/Share **84.34**

| | | | | | |
|----------------|---------|---------|---------|---------|---------|
| EBIT(1-t) | \$4,749 | \$5,097 | \$5,470 | \$5,871 | \$6,300 |
| - Reinvestment | \$2,850 | \$3,058 | \$3,282 | \$3,522 | \$3,780 |
| FCFF | \$1,900 | \$2,039 | \$2,188 | \$2,348 | \$2,520 |

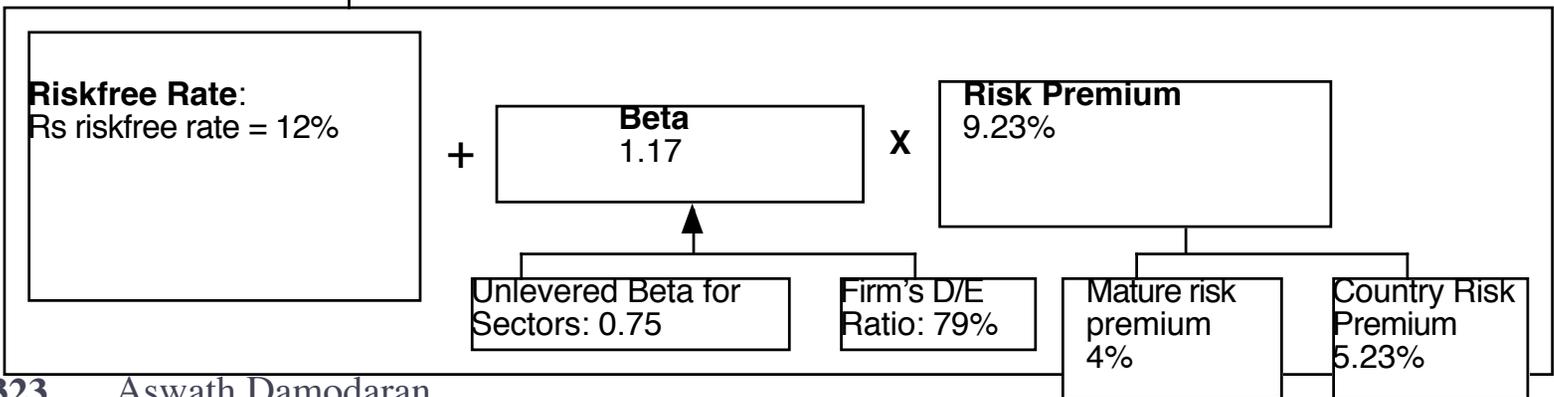
Term Yr
6,615
2,711
3,904

Discount at Cost of Capital (WACC) = 22.8% (.558) + 9.45% (0.442) = 16.90%

Cost of Equity 22.80%

Cost of Debt
(12% + 1.50%)(1 - .30)
= 9.45%

Weights
E = 55.8% D = 44.2%



6c. Tube Investments: Higher Average Return

Current Cashflow to Firm

| | |
|---------------------|---------|
| EBIT(1-t) : | 4,425 |
| - Nt CpX | 843 |
| - Chg WC | 4,150 |
| = FCFF | - 568 |
| Reinvestment Rate = | 112.82% |

Reinvestment Rate
60%

Expected Growth
 $60 \cdot .122 + .0581 = .1313$
13.13%

Return on Capital
12.20%

Improvement on existing assets
 $\{ (1 + (.122 - .092) / .092)^{1/5} - 1 \}$

Stable Growth
g = 5%; Beta = 1.00;
Debt ratio = 44.2%
Country Premium = 3%
ROC = 12.2%
Reinvestment Rate = 40.98%

Terminal Value₅ = $5081 / (.1478 - .05) = 51,956$

Firm Value: 31,829
+ Cash: 13,653
- Debt: 18,073
= Equity 27,409
- Options 0
Value/Share **111.3**

| | | | | | |
|----------------|---------|---------|---------|---------|---------|
| EBIT(1-t) | \$5,006 | \$5,664 | \$6,407 | \$7,248 | \$8,200 |
| - Reinvestment | \$3,004 | \$3,398 | \$3,844 | \$4,349 | \$4,920 |
| FCFF | \$2,003 | \$2,265 | \$2,563 | \$2,899 | \$3,280 |

Term Yr
8,610
3,529
5,081

Discount at Cost of Capital (WACC) = 22.8% (.558) + 9.45% (0.442) = 16.90%

Cost of Equity
22.80%

Cost of Debt
 $(12\% + 1.50\%)(1 - .30)$
= 9.45%

Weights
E = 55.8% D = 44.2%

Riskfree Rate:
Rsl riskfree rate = 12%

Beta
1.17

Risk Premium
9.23%

Unlevered Beta for Sectors: 0.75

Firm's D/E Ratio: 79%

Mature risk premium 4%

Country Risk Premium 5.23%

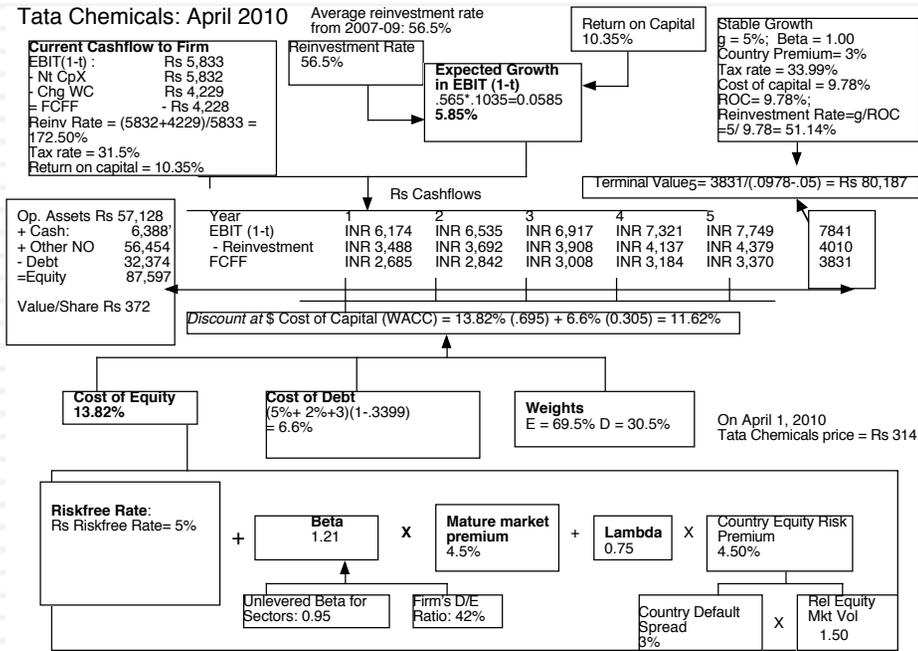
Lesson 4: Watch out for cross holdings...

325

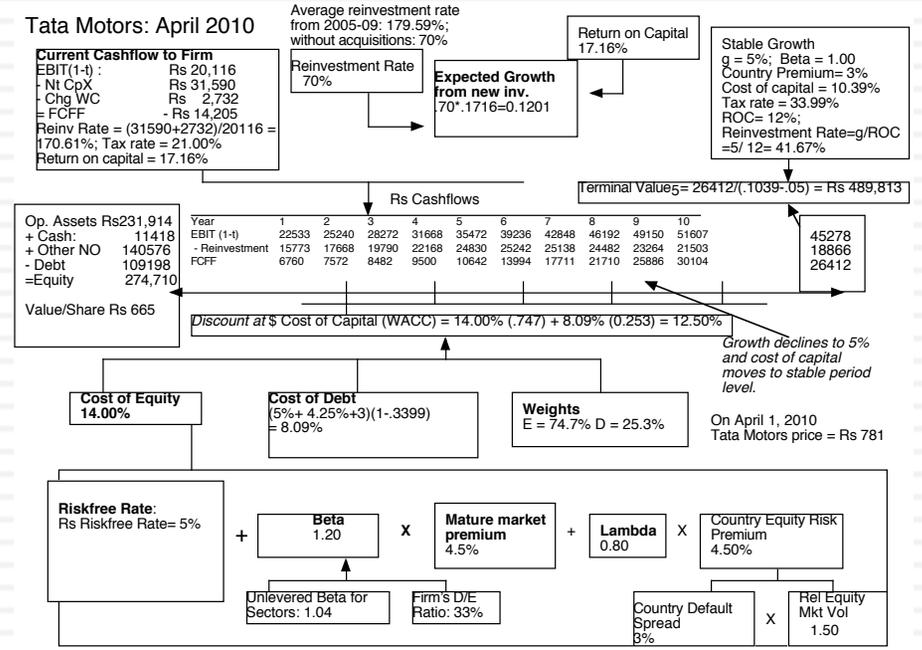
- Emerging market companies are more prone to having cross holdings than companies in developed markets. This is partially the result of history (since many of the larger public companies used to be family owned businesses until a few decades ago) and partly because those who run these companies value 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.

8. The Tata Group – April 2010

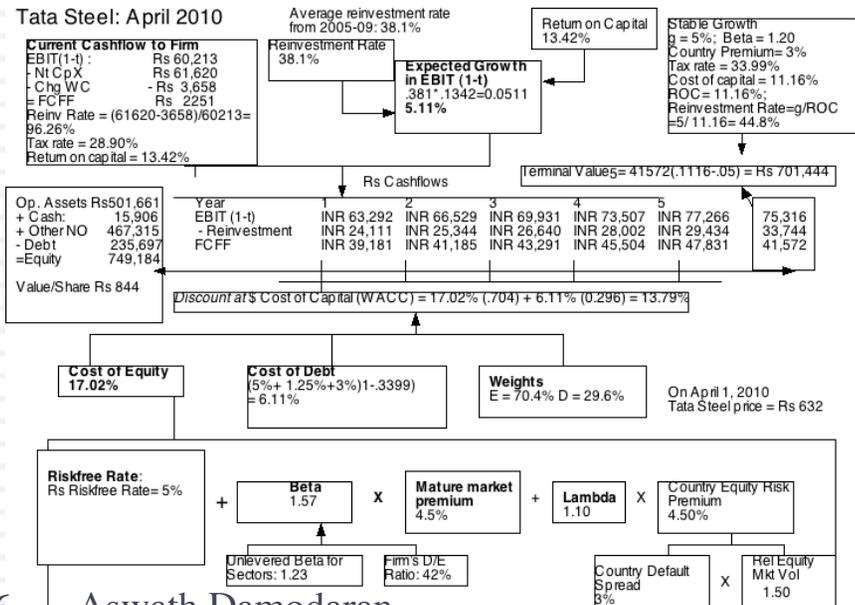
Tata Chemicals: April 2010



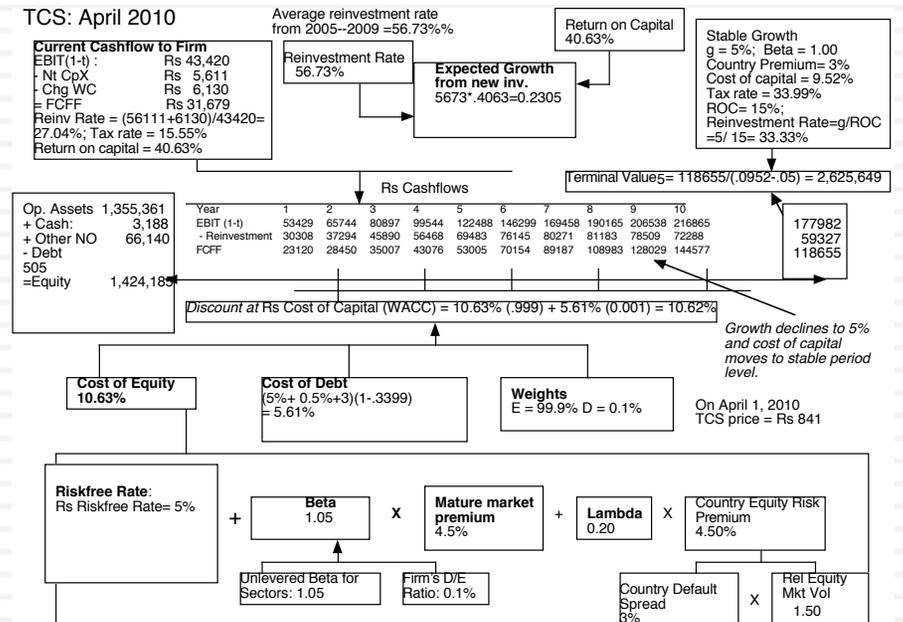
Tata Motors: April 2010



Tata Steel: April 2010

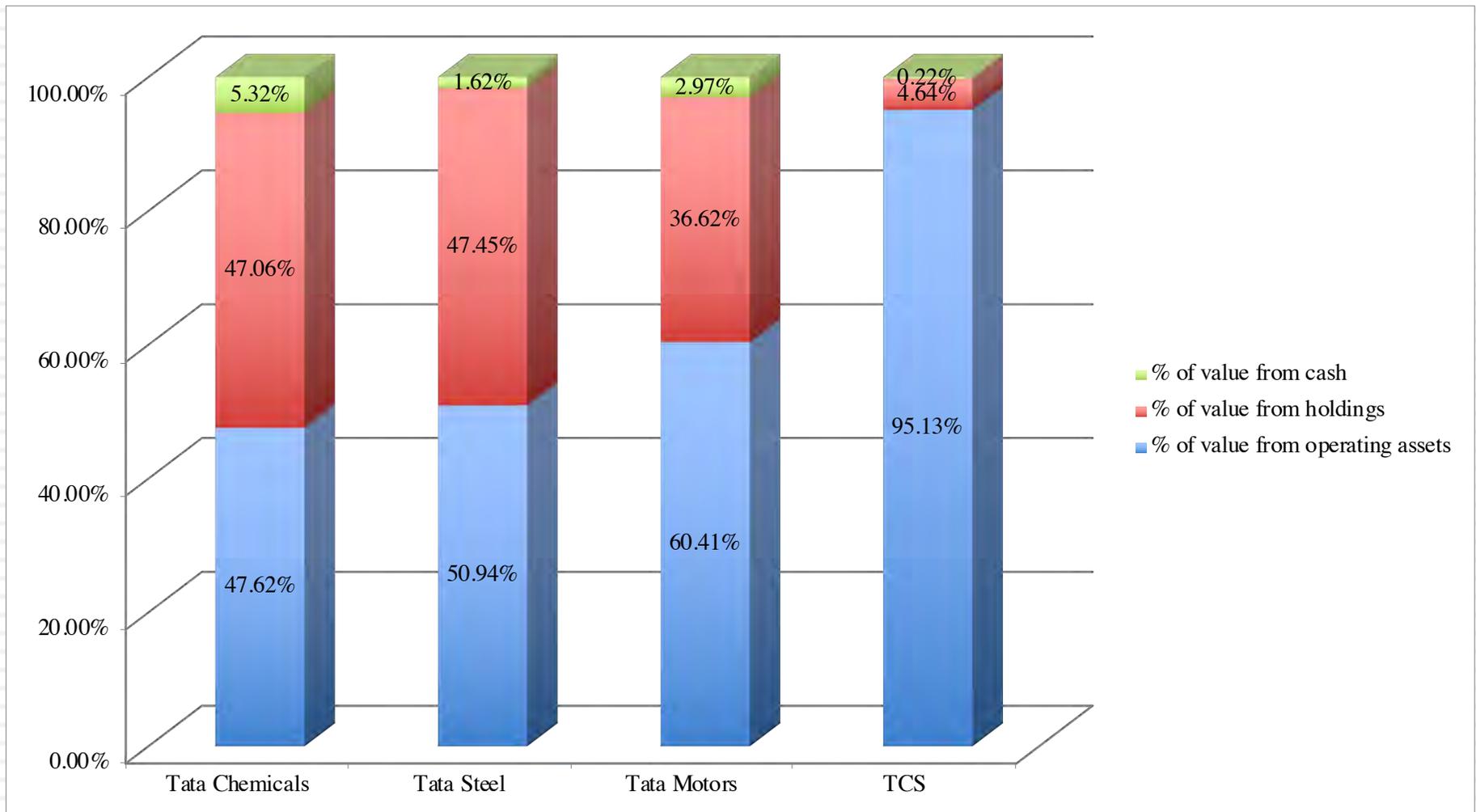


TCS: April 2010



Tata Companies: Value Breakdown

327



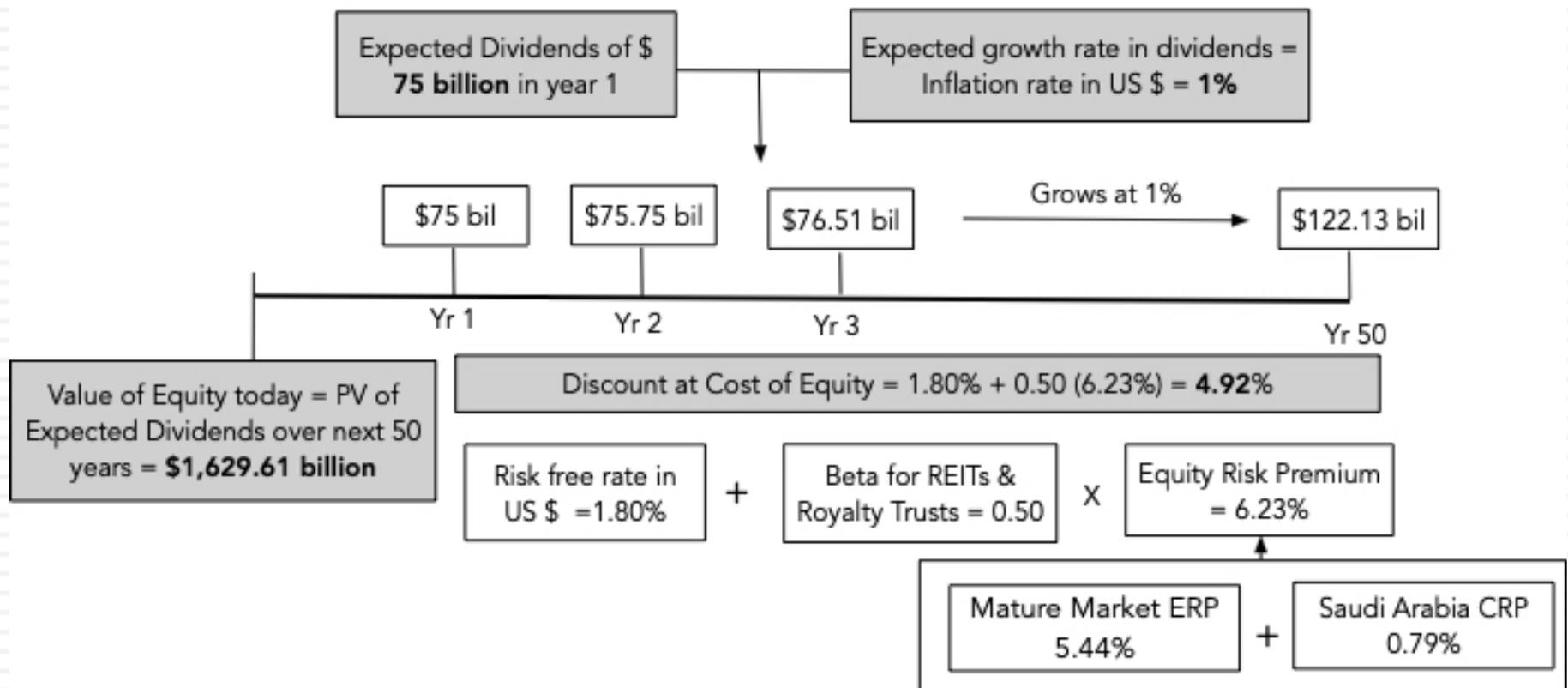
Lesson 5: Truncation risk can come in many forms...

328

- 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.

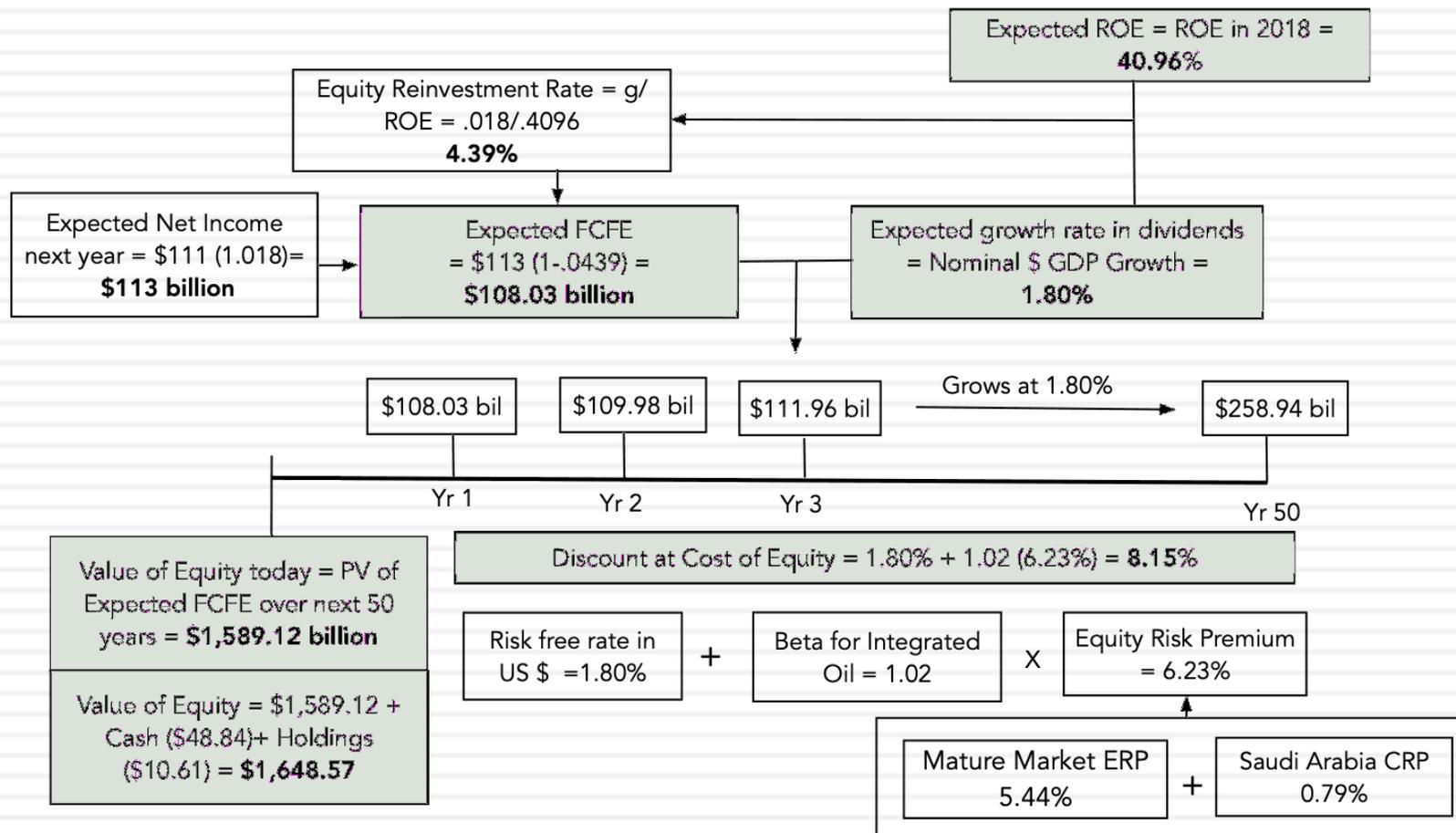
Valuing Aramco: Promised Dividends

A Dividend Discount Model Valuation of Aramco



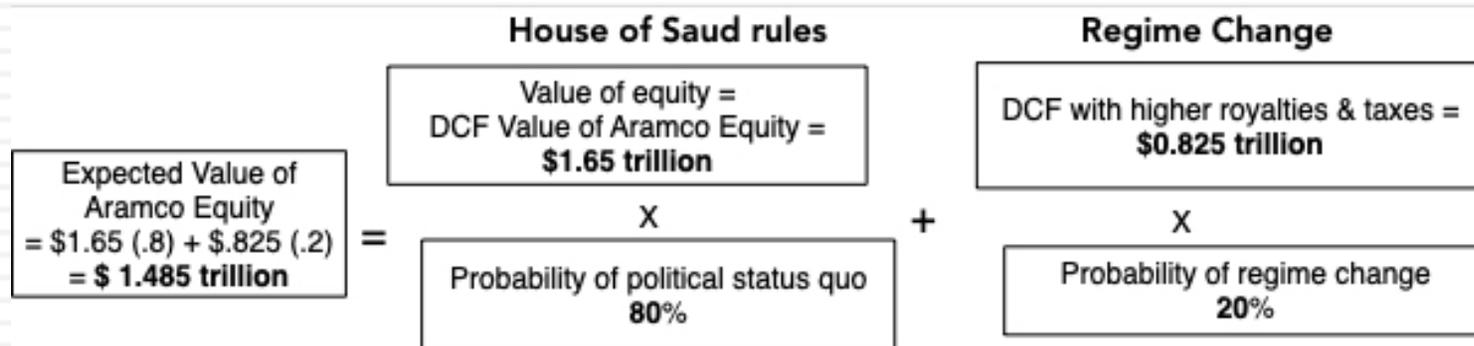
Valuing Aramco: Potential Dividends

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

332

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?

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

Preferred stock is a significant source of capital.

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

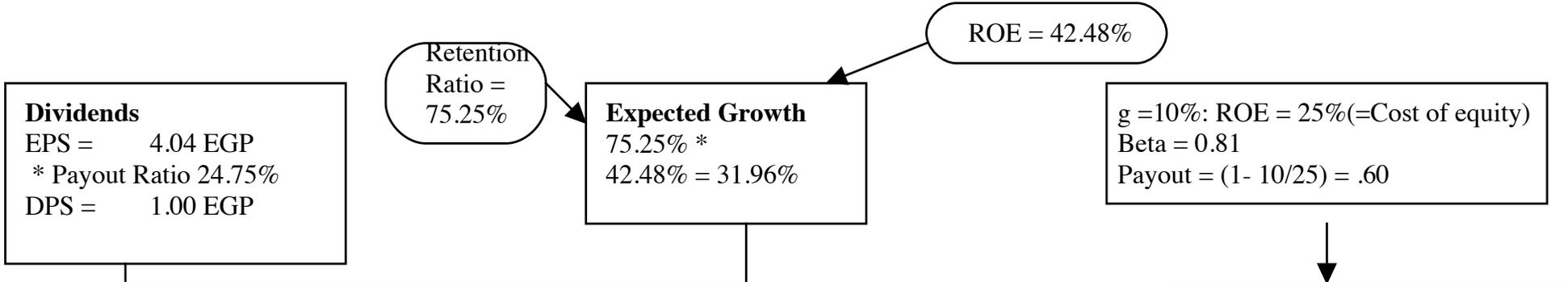
What is the value of equity in the firm?

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.

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.

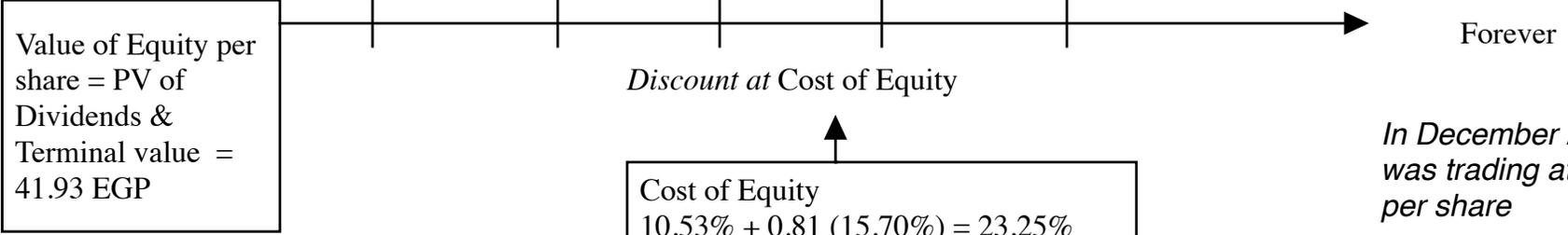
CIB Egypt in December 2015

Valuation in Egyptian Pounds

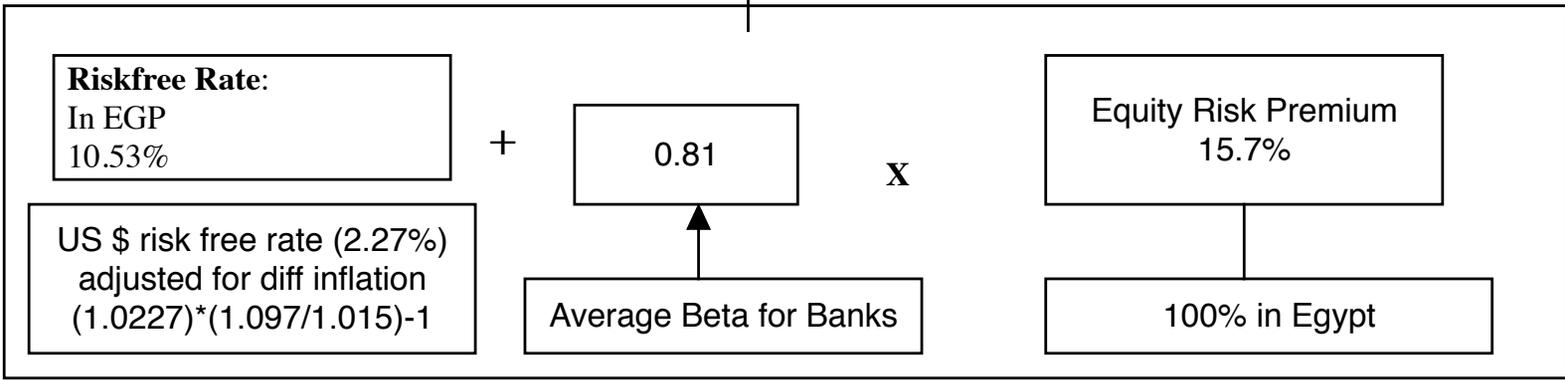


| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------------------------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Expected Growth Rate | 31.96% | 31.96% | 31.96% | 31.96% | 31.96% | 27.57% | 23.18% | 18.79% | 14.39% | 10.00% |
| Earnings per share | 5.33 ج.م | 7.04 ج.م | 9.28 ج.م | 12.25 ج.م | 16.17 ج.م | 20.63 ج.م | 25.41 ج.م | 30.18 ج.م | 34.52 ج.م | 37.97 ج.م |
| Payout ratio | 24.75% | 24.75% | 24.75% | 24.75% | 24.75% | 31.80% | 38.85% | 45.90% | 52.95% | 60.00% |
| Dividends per share | 1.32 ج.م | 1.74 ج.م | 2.30 ج.م | 3.03 ج.م | 4.00 ج.م | 6.56 ج.م | 9.87 ج.م | 13.85 ج.م | 18.28 ج.م | 22.78 ج.م |
| Cost of Equity | 23.25% | 23.25% | 23.25% | 23.25% | 23.25% | 23.25% | 23.25% | 23.25% | 23.25% | 23.25% |
| Cumulative Cost of Equity | 123.25% | 151.90% | 187.21% | 230.73% | 284.37% | 350.48% | 431.95% | 532.37% | 656.13% | 808.66% |
| Present Value | 1.07 ج.م | 1.15 ج.م | 1.23 ج.م | 1.31 ج.م | 1.41 ج.م | 1.87 ج.م | 2.29 ج.م | 2.60 ج.م | 2.79 ج.م | 2.82 ج.م |

Terminal Value
 = $EPS_6 * Payout / (r - g)$
 = $(37.97 * .6) / (.2325 - .10) = 189.20$



In December 2015, CIB was trading at 36 EGP per share



Lesson 1: Financial service companies are opaque...

334

- 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.

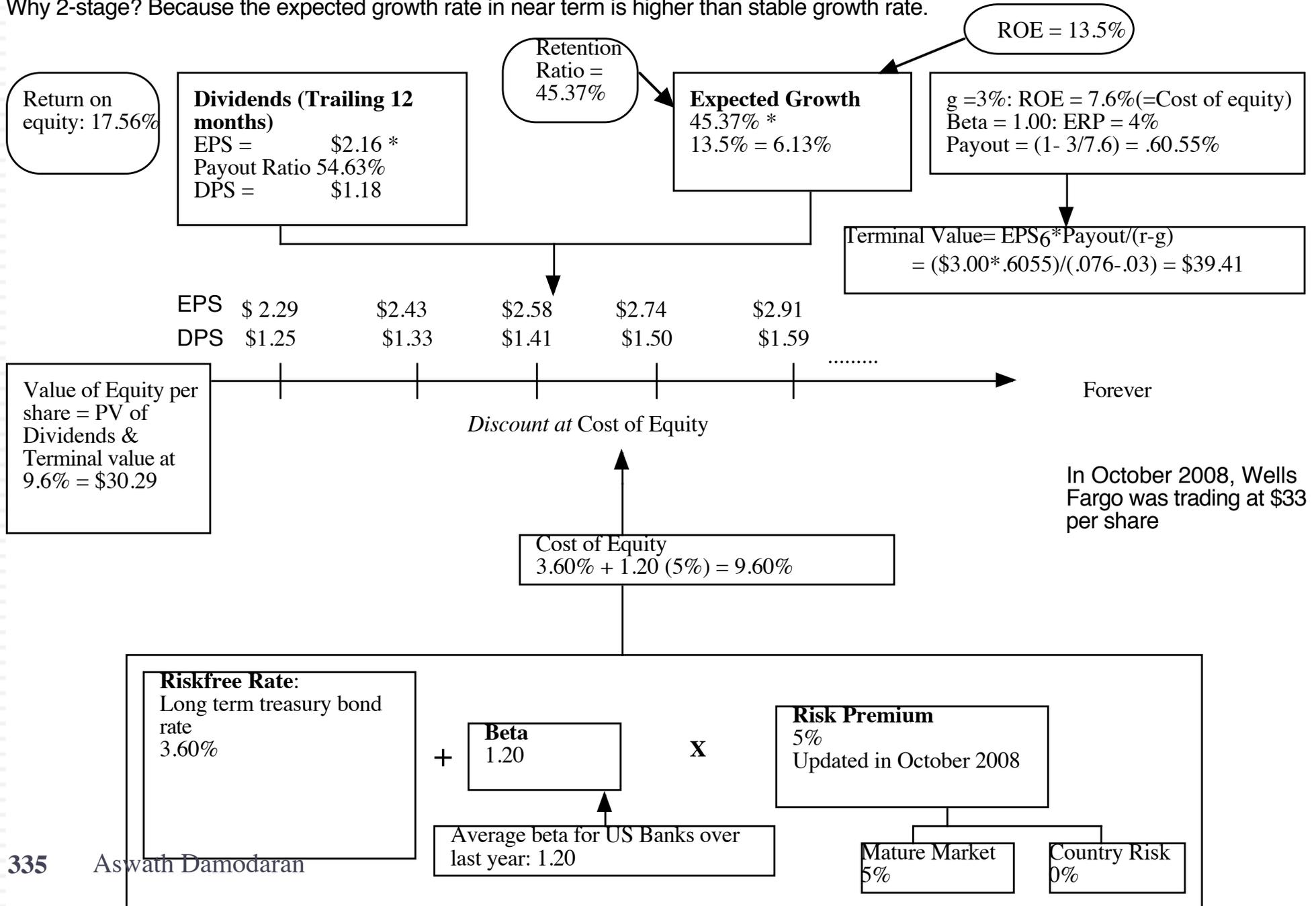
2c. Wells Fargo: Valuation on October 7, 2008

Assuming that Wells will have to increase its capital base by about 30% to reflect tighter regulatory concerns. $(.1756/1.3 = .135)$

Rationale for model

Why dividends? Because FCFE cannot be estimated

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.



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

336

- 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 | | | | | | | | | | |

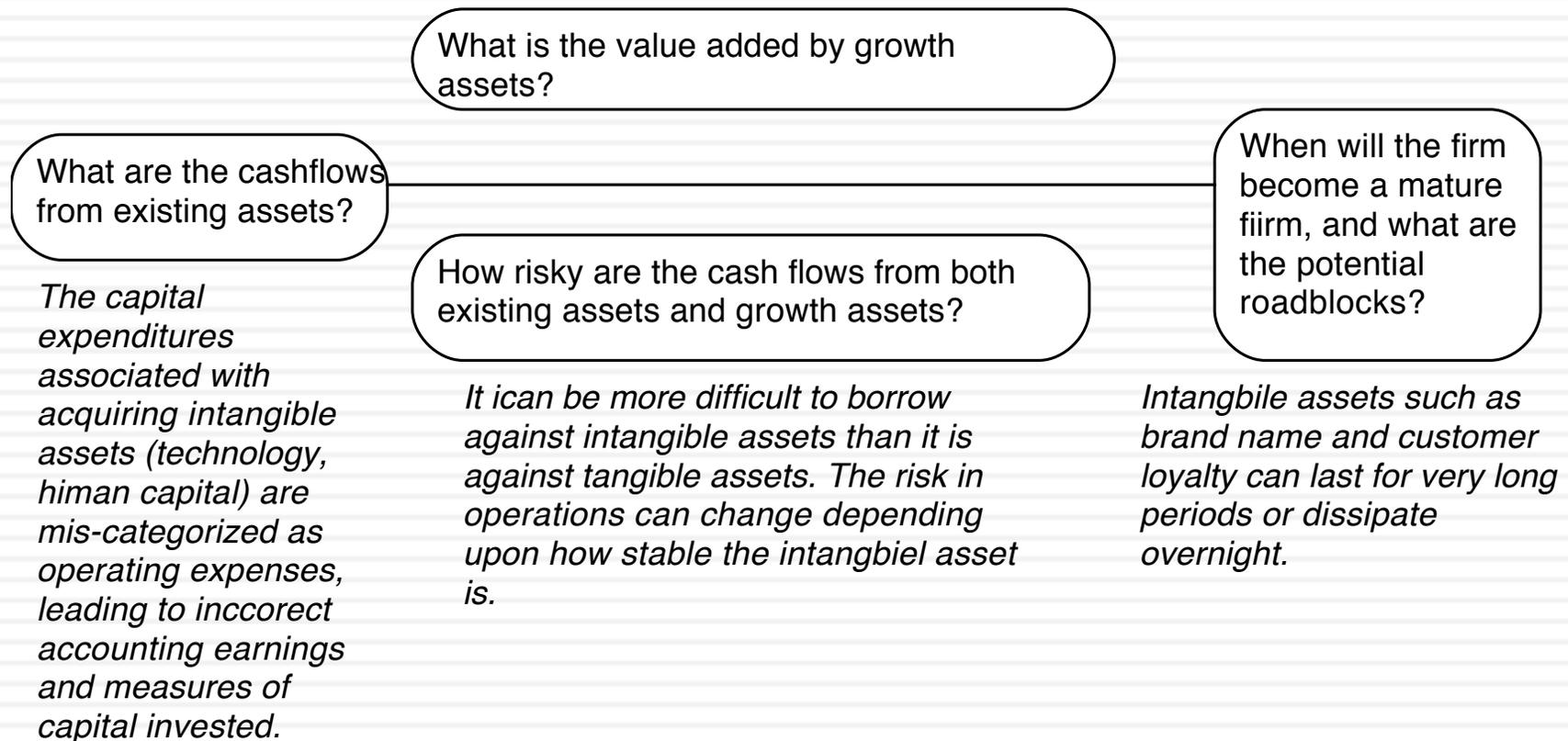
Value per share adjusted for probability of catastrophic failure (bailout) resulting in complete loss of equity.

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

VI. Valuing Companies with “intangible” assets

338

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.



Lesson: Accounting rules are cluttered with inconsistencies...

339

- 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.

Exhibit 11.1: Converting R&D expenses to R&D assets - Amgen

Step 1: Determining an amortizable life for R & D expenses. ^①

How long will it take, on an expected basis, for research to pay off at Amgen? Given the length of the approval process for new drugs by the Food and Drugs Administration, we will assume that this amortizable life is 10 years.

Step 2: Capitalize historical R&D expense

| Year | R&D Expense | Unamortized portion | Amortization this year |
|---------|-------------|---------------------|------------------------|
| Current | 3030.00 | 1.00 | 3030.00 |
| -1 | 3266.00 | 0.90 | 2939.40 |
| -2 | 3366.00 | 0.80 | 2692.80 |
| -3 | 2314.00 | 0.70 | 1619.80 |
| -4 | 2028.00 | 0.60 | 1216.80 |
| -5 | 1655.00 | 0.50 | 827.50 |
| -6 | 1117.00 | 0.40 | 446.80 |
| -7 | 864.00 | 0.30 | 259.20 |
| -8 | 845.00 | 0.20 | 169.00 |
| -9 | 823.00 | 0.10 | 82.30 |
| -10 | 663.00 | 0.00 | 0.00 |
| | | | |
| | | \$13283.60 | \$1,694.10 |

④

Current year's R&D expense = Cap ex = \$3,030 million
 R&D amortization = Depreciation = \$ 1,694 million
 Unamortized R&D = Capital invested (R&D) = \$13,284 million

Step 3: Restate earnings, book value and return numbers

| | Unadjusted | Adjusted for R&D | Comments |
|--------------------------------|--------------------------------|--------------------------------|---|
| Net Income | \$4,196 | 4,196 + 3030 - 1694 = \$ 5,532 | Add current year's R&D and subtract R&D amortization |
| Book value of equity | \$17,869 | 17,869 + 13,284 = \$ 31,153 | Add unamortized R&D from prior years |
| Return on Equity | $\frac{4196}{17869} = 23.48\%$ | $\frac{5532}{31153} = 17.75\%$ | Return on equity drops when book equity is augmented by R&D, even though net income rises. |
| Pre-tax Operating Income | \$5,594 | 5,594 + 3030 - 1694 = \$ 6,930 | Add current year's R&D and subtract R&D amortization |
| Book value of invested capital | \$21,985 | \$21,985 + \$13,284 = \$35,269 | Add unamortized R&D from prior years |
| Pre-tax Return on Capital | $\frac{5594}{21985} = 25.44\%$ | $\frac{6930}{35269} = 19.65\%$ | Return on capital drops when capital is augmented by R&D, even though operating income rises. |

10. Amgen: Status Quo

Cap Ex = Acc net Cap Ex(255) + Acquisitions (3975) + R&D (2216)

Current Cashflow to Firm

EBIT(1-t) = :7336(1-.28) = 6058
 - Nt CpX = 6443
 - Chg WC 37
 = FCFF - 423
 Reinvestment Rate = 6480/6058 = 106.98%
 Return on capital = 16.71%

Reinvestment Rate 60%

Expected Growth in EBIT (1-t)
 $.60 * .16 = .096$
9.6%

Return on Capital 16%

Stable Growth
 g = 4%; Beta = 1.10;
 Debt Ratio = 20%; Tax rate = 35%
 Cost of capital = 8.08%
 ROC = 10.00%;
 Reinvestment Rate = 4/10 = 40%

Terminal Value₁₀ = 7300 / (.0808 - .04) = 179,099

Op. Assets 94214
 + Cash: 1283
 - Debt 8272
 = Equity 87226
 - Options 479
 Value/Share \$ 74.33

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| EBIT | \$9,221 | \$10,106 | \$11,076 | \$12,140 | \$13,305 | \$14,433 | \$15,496 | \$16,463 | \$17,306 | \$17,998 |
| EBIT (1-t) | \$6,639 | \$7,276 | \$7,975 | \$8,741 | \$9,580 | \$10,392 | \$11,157 | \$11,853 | \$12,460 | \$12,958 |
| - Reinvestment | \$3,983 | \$4,366 | \$4,785 | \$5,244 | \$5,748 | \$5,820 | \$5,802 | \$5,690 | \$5,482 | \$5,183 |
| = FCFF | \$2,656 | \$2,911 | \$3,190 | \$3,496 | \$3,832 | \$4,573 | \$5,355 | \$6,164 | \$6,978 | \$7,775 |

Term Yr
 18718
 12167
 4867
 7300

Cost of Capital (WACC) = 11.7% (0.90) + 3.66% (0.10) = 10.90%

Debt ratio increases to 20%
 Beta decreases to 1.10

On May 1, 2007, Amgen was trading at \$ 55/share

Cost of Equity 11.70%

Cost of Debt
 $(4.78\% + .85\%)(1 - .35) = 3.66\%$

Weights
 E = 90% D = 10%

Riskfree Rate:
 Riskfree rate = 4.78%

+ Beta 1.73 x Risk Premium 4%

Unlevered Beta for Sectors: 1.59

D/E = 11.06%

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

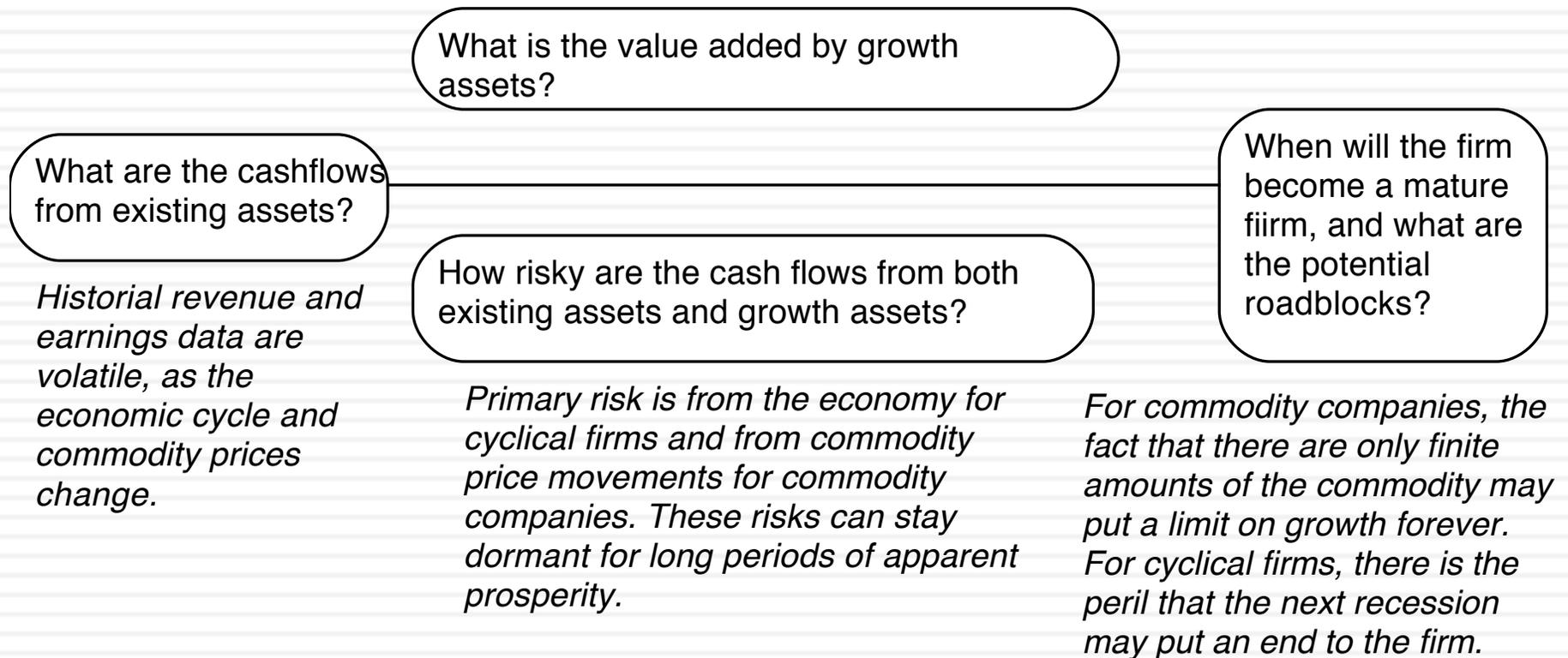
342

| | 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 |

VII. Valuing cyclical and commodity companies

343

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...

344

- 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...

345

- 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 = $39992.77 + 4039.40 * \$40$
 = \$201,569

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

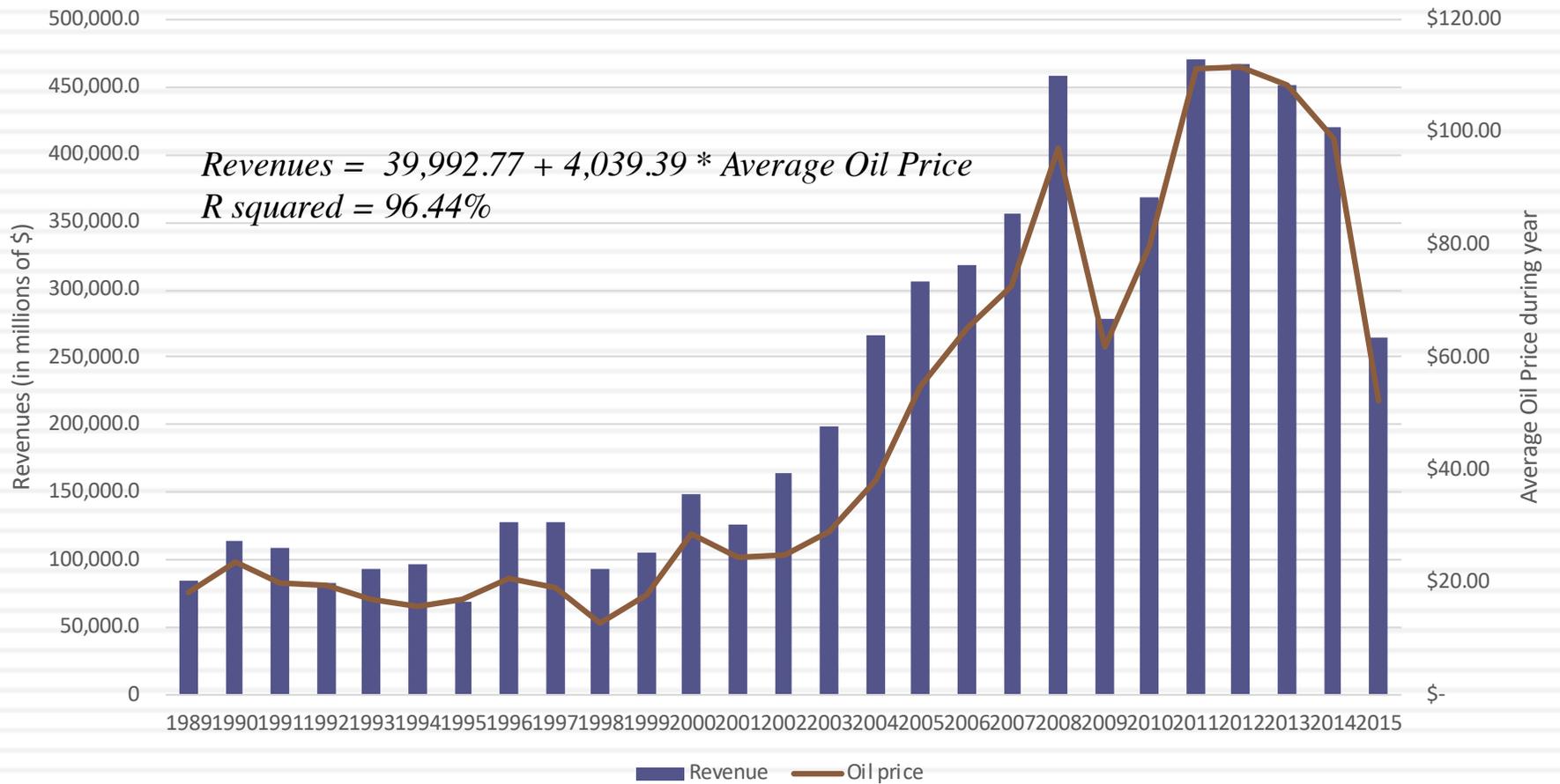
Operating margin converges on Shell's historical average margin of 9.35% from 200-2015

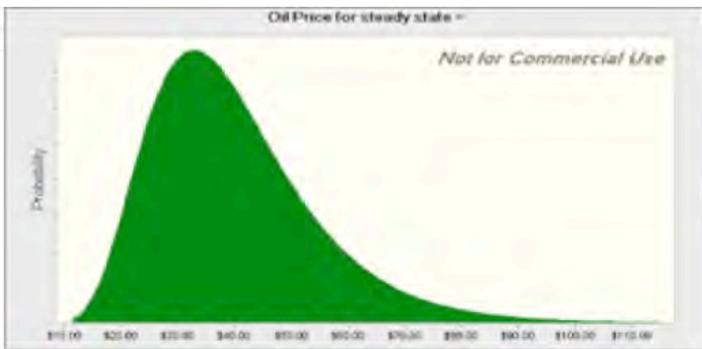
Return on capital reverts and stays at Shell's historic average of 12.37% from 200-2015

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

Shell's Revenues & Oil Prices

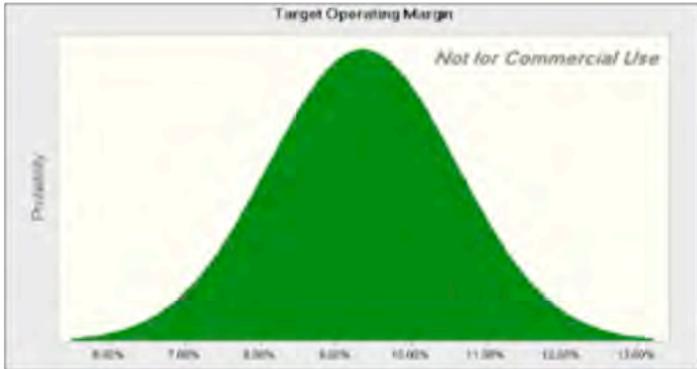
Shell: Revenues vs Oil Price





Revenue calculated from the oil price drawn from distribution
 $Revenue = 39992.77 + 4039.40 * Oil\ Price/Barrel$

Pre-tax Operating Income based on revenue & selected margin
 $Pre-tax\ Operating\ Income = Revenues * Operating\ Margin$



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?

350

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

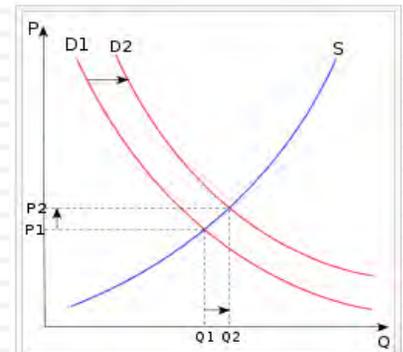
INTRINSIC
VALUE

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

Test 1: Are you pricing or valuing?

351

 **5369 La Jolla Mesa Dr**
La Jolla, CA 92037
Status: Active

\$995,000
Price

3
Beds

2.5
Baths

1,440 Sq. Ft.
\$691 / Sq. Ft.

Built: 1955 Lot Size: 3,000 Sq. Ft. On Redfin: 12 days

Favorite X-Out Share... Tour Home

Overview Property Details Tour Insights Property History Public Records Activity Schools Neighborhood & Offer Insights Similar Homes



1 of 25  [Play Video](#)

Lisa Padilla
REDFIN Real Estate Agent

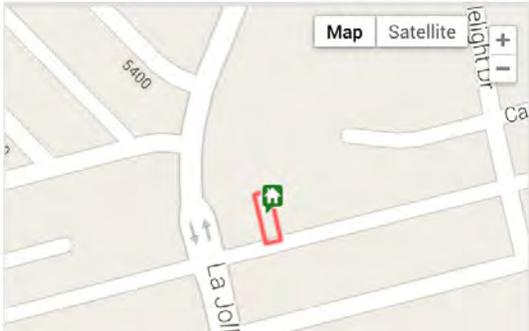
★★★★★
47 client reviews

\$8,726 commission refund

 [Go Tour This Home](#)

[Ask Lisa a Question](#) or [Start an Offer](#)

1 of 4 Redfin Agents in this area



Test 2: Are you pricing or valuing?

352

Rating
Buy

Europe
Switzerland

Biotechnology
Biotechnology

Company
BB BIOTECH

Reuters
BION.S

Bloomberg
BION SW

Exchange
SWX

Ticker
BION

Date
13 August 2013

Forecast Change

| | |
|----------------------------|----------------|
| Price at 12 Aug 2013 (CHF) | 124.00 |
| Price Target (CHF) | 164.50 |
| 52-week range (CHF) | 128.40 - 84.90 |

Strong sector and stock-picking continue

Impressive performance

Over the past two years, BB Biotech shares have roughly tripled, which could tempt investors to take profits. However, this performance has been well backed by a deserved revival of the biotech industry, encouraging fundamental news, M&A, and increased money flow into health care stocks. In addition, BBB returned to index outperformance by modifying its stock-picking approach. Hence, despite excellent performance, the shares still trade at a 23% discount to the net asset value of the portfolio. Hence, the shares are an attractive value vehicle to capture growth opportunities in an attractive sector.

Biotech industry remains attractive

With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money and high liquidity. BB Biotech remains an attractive vehicle to capture the future potential of the biotech sector. In addition, investors benefit from a 23% discount to NAV and attractive cash distribution policy of 5% yield p.a. Hence, we reiterate our Buy on BB Biotech shares.

BB Biotech shares remain attractive

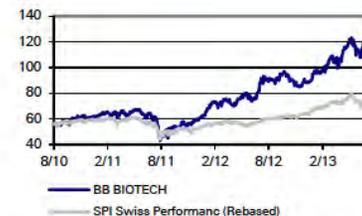
In the first 6M of 2013, BB Biotech increased its NAV by 36%, which marks good outperformance against the Nasdaq Biotech Index (NBI)'s 27%. This is a remarkable performance after 2012 when BBB's NAV increase of 45% also

Key changes

Target Price 106.50 to 164.50 ↑ 54.5%

Source: Deutsche Bank

Price/price relative

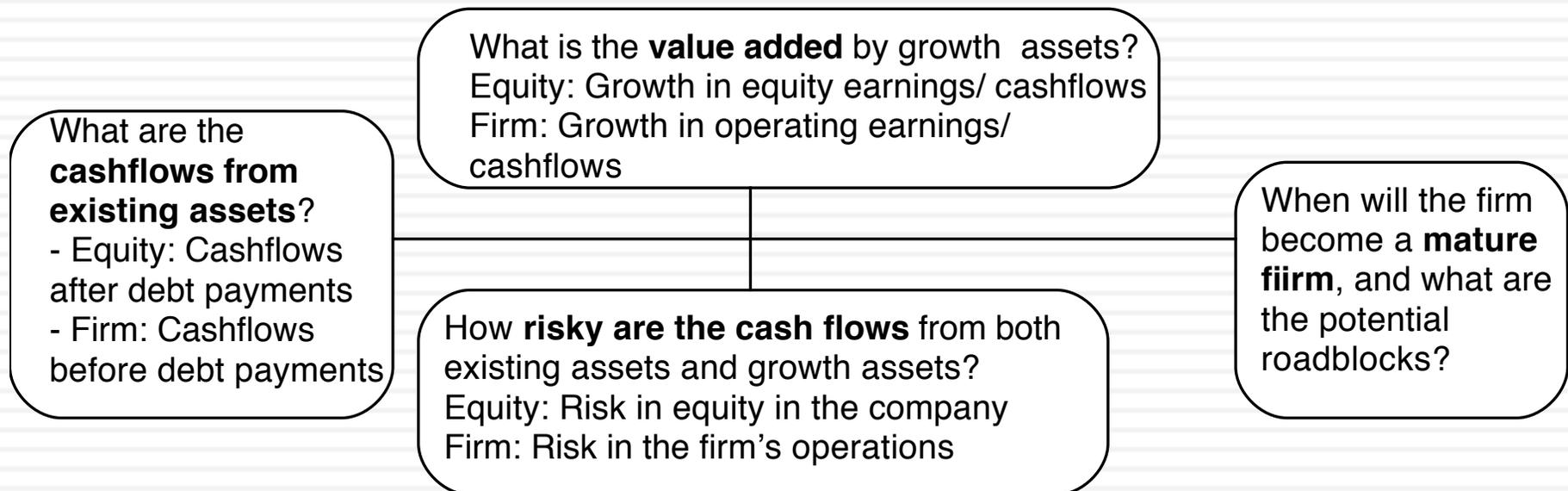


| Performance (%) | 1m | 3m | 12m |
|--------------------------|------|------|------|
| Absolute | -1.4 | 5.4 | 37.4 |
| SPI Swiss Performance IX | 0.5 | -1.4 | 26.4 |

Source: Deutsche Bank

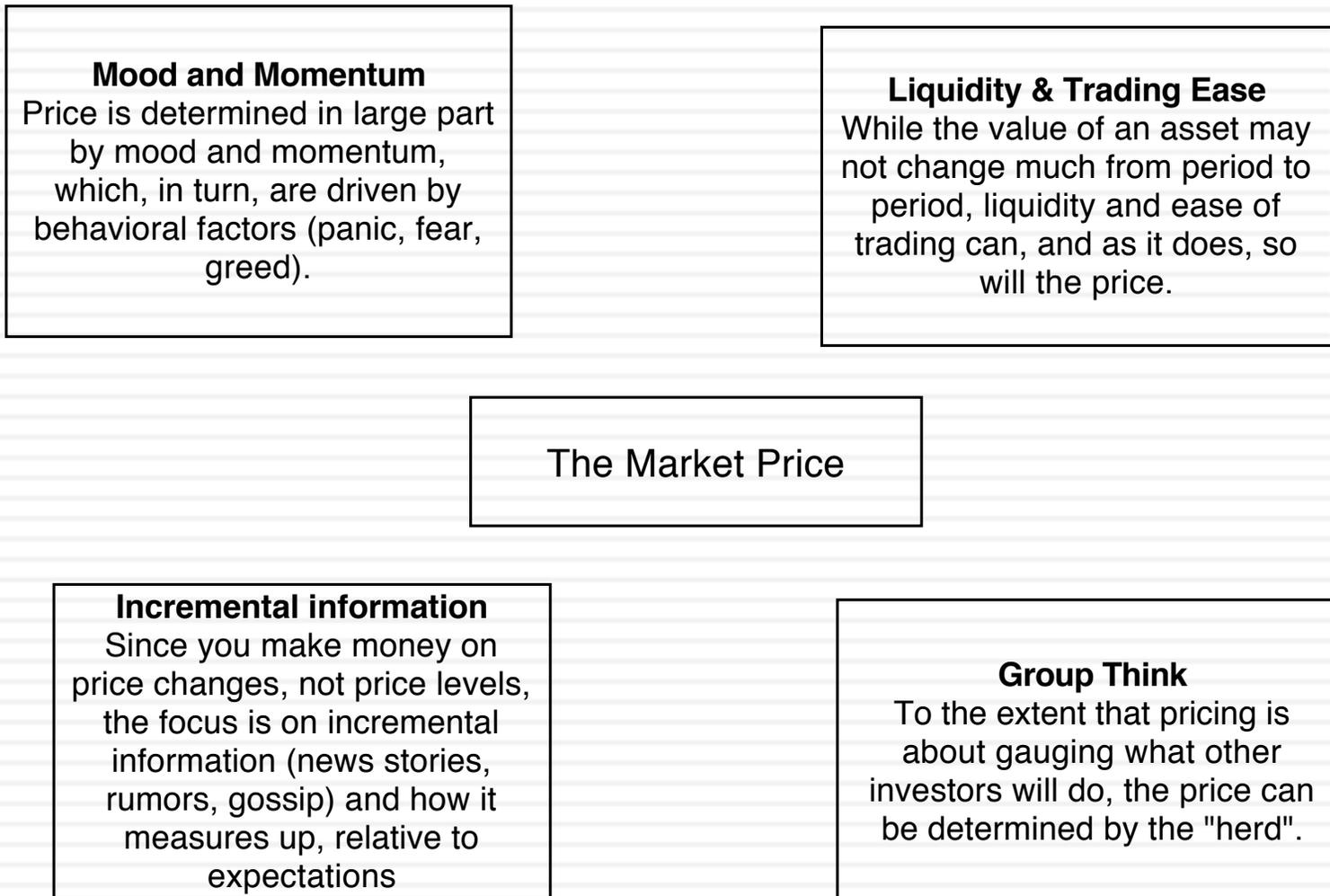
The drivers of value

353



The determinants of price

354



Three views of “the gap”

| | 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 “pricers” dilemma..

- No anchor: If you do not believe in intrinsic value and make no attempt to estimate it, you have no moorings when you invest. You will therefore be pushed back and forth as the price moves from high to low. In other words, everything becomes relative and you can lose perspective.
- Reactive: Without a core measure of value, your investment strategy will often be reactive rather than proactive.
- Crowds are fickle and tough to get a read on: The key to being successful as a pricer is to be able to read the crowd mood and to detect shifts in that mood early in the process. By their nature, crowds are tough to read and almost impossible to model systematically.

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

359



A closing thought...

360

