Valuation Inferno: Dante meets DCF…

“Abandon every hope, ye who enter here”

Aswath Damodaran
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## DCF Choices: Equity versus Firm

**Firm Valuation:** Value the entire business by discounting cash flow to the firm at cost of capital.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Investments</strong></td>
<td><strong>Debt</strong></td>
</tr>
<tr>
<td>Generate cashflows today</td>
<td>Fixed Claim on cash flows</td>
</tr>
<tr>
<td>Includes long lived (fixed)</td>
<td>Little or No role in management</td>
</tr>
<tr>
<td>and short-lived (working</td>
<td><em>Fixed Maturity</em></td>
</tr>
<tr>
<td>capital) assets</td>
<td><em>Tax Deductible</em></td>
</tr>
<tr>
<td><strong>Expected Value that will be</strong></td>
<td><strong>Equity</strong></td>
</tr>
<tr>
<td>created by future investments</td>
<td>Residual Claim on cash flows</td>
</tr>
<tr>
<td></td>
<td>Significant Role in management</td>
</tr>
<tr>
<td></td>
<td><em>Perpetual Lives</em></td>
</tr>
<tr>
<td><strong>Assets in Place</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Growth Assets</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Equity valuation:** Value just the equity claim in the business by discounting cash flows to equity at the cost of equity.
The Value of a business rests on..

DISCOUNTED CASHFLOW VALUATION

Cash flows
Firm: Pre-debt cash flow
Equity: After debt cash flows

Expected Growth
Firm: Growth in Operating Earnings
Equity: Growth in Net Income/EPS

Firm is in stable growth: Grows at constant rate forever

Value
Firm: Value of Firm
Equity: Value of Equity

Length of Period of High Growth

Discount Rate
Firm: Cost of Capital
Equity: Cost of Equity

Terminal Value
Forever

CF₁ CF₂ CF₃ CF₄ CF₅ CF₆... CFₙ
DISCOUNTED CASHFLOW VALUATION

Cashflow to Firm
EBIT (1-t)
- (Cap Ex - Depr)
- Change in WC
= FCFF

Expected Growth
Reinvestment Rate
* Return on Capital
Firm is in stable growth:
Grows at constant rate forever

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

Value of Operating Assets
+ Cash & Non-op Assets
= Value of Firm
- Value of Debt
= Value of Equity

Discount at
WACC = Cost of Equity (Equity/(Debt + Equity)) + Cost of Debt (Debt/(Debt + Equity))

Cost of Equity
Cost of Debt
(Riskfree Rate + Default Spread) (1-t)
Weights
Based on Market Value

Riskfree Rate:
- No default risk
- No reinvestment risk
- In same currency and in same terms (real or nominal as cash flows)

Beta
- Measures market risk

Risk Premium
- Premium for average risk investment

Type of Business
Operating Leverage
Financial Leverage
Base Equity Premium
Country Risk Premium

Aswath Damodaran
The nine circles of valuation hell.. With a special bonus circle…
Illustration 1: Base Year fixation…. 

You are valuing Exxon Mobil, using the financial statements of the firm from 2007. The following provides the key numbers:

- Revenues: $377 billion
- EBIT (1-t): $42 billion
- Net Cap Ex: $3 billion
- Chg WC: $1 billion

The cost of capital for the firm is 8% and you use a very conservative stable growth rate of 2% to value the firm. The market cap for the firm is $466 billion and it has $9 billion in debt outstanding.

a. How under or over valued is the equity in the firm?
b. Would you buy the stock based on this valuation? Why or why not?
Normalization… not easy to do… but…

![Oil Prices, Exxon Earnings and Value chart]

- **After-tax Operating Income**
- **Firm Value**
Vale: A Case for Normalization?

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$27,544</td>
<td>$33,993</td>
<td>$45,291</td>
<td>$64,764</td>
</tr>
<tr>
<td>Operating Income</td>
<td>$10,857</td>
<td>$14,854</td>
<td>$20,088</td>
<td>$29,315</td>
</tr>
<tr>
<td>Net Income</td>
<td>$6,460</td>
<td>$10,443</td>
<td>$13,431</td>
<td>$20,006</td>
</tr>
<tr>
<td>Earnings per share</td>
<td>$1.40</td>
<td>$2.27</td>
<td>$2.78</td>
<td>$4.14</td>
</tr>
<tr>
<td>CRB Metals Index</td>
<td>357.69</td>
<td>440.85</td>
<td>693.88</td>
<td>811.85</td>
</tr>
<tr>
<td>Deflated Revenues</td>
<td>$27,544.00</td>
<td>$27,580.71</td>
<td>$23,347.18</td>
<td>$28,534.13</td>
</tr>
</tbody>
</table>

1. If you use current earnings as your base, are you likely to find the firm to be under or over valued?
2. Would you normalize earnings?
3. If so, how would you do it?
Embraer: A case for normalization?

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>R$ 6,571</td>
<td>R$ 10,231</td>
<td>R$ 9,133</td>
<td>R$ 8,342</td>
<td>R$ 9,983</td>
<td>R$ 44,260</td>
</tr>
<tr>
<td>EBIT</td>
<td>R$ 1,243</td>
<td>R$ 1,740</td>
<td>R$ 794</td>
<td>R$ 546</td>
<td>R$ 527</td>
<td>R$ 4,850</td>
</tr>
<tr>
<td>Operating Margin</td>
<td>18.92%</td>
<td>17.01%</td>
<td>8.69%</td>
<td>6.55%</td>
<td>5.28%</td>
<td>10.96%</td>
</tr>
</tbody>
</table>

**Three ways to normalize:**

1. Average operating income between 2003-2007 = R$ 970 million
2. Average operating margin between 2003-2007 = 10.96% -> Applied to current revenues of R$9,983 million yields R$ 1,094 million
3. Apply industry average margin of 10.68% (US aerospace & defense) to current revenues of R$9,983 million yields R$ 1,066 million.
Illustration 2: Taxes and Value

Assume that you have been asked to value a company and have been provided with the most recent year’s financial statements:

EBITDA 140
- DA 40
EBIT 100
- Interest exp 20
Taxable income 80
Taxes 32
Net Income 48

Assume also that cash flows will be constant and that there is no growth in perpetuity. What is the free cash flow to the firm?
Lesson 2.1: Don’t double count the tax benefit

- **Taxes paid**: When computing the after-tax operating income, using taxes paid (24) will give you a higher cash flow but will result in double counting the tax benefit - once in the cash flow and again in the cost of capital (when you use the after-tax cost of debt).

- **Cap Ex**: Though nothing is mentioned about cap ex, the fact that these earnings can be maintained in perpetuity requires us to be consistent in our reinvestment assumptions. If you do not set cap ex = depreciation, the assets of the firm will deplete over time to zero but earnings will continue at current levels.

Ignoring a relevant variable, because you are not given the facts or feel uncertain about it, is just as much an assumption (and often less defensible and more dangerous) than making an explicit assumption.
2.2: Dueling Tax Rates

<table>
<thead>
<tr>
<th></th>
<th>Vale</th>
<th>Embraer</th>
<th>Gerdau</th>
<th>Petrobras</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating income</td>
<td>$29,315.00</td>
<td>$527.00</td>
<td>$4,796.00</td>
<td>$36,432.00</td>
</tr>
<tr>
<td>Interest expense</td>
<td>$806.00</td>
<td>$276.00</td>
<td>$0.00</td>
<td>$2,160.00</td>
</tr>
<tr>
<td>Taxable Income</td>
<td>$28,646.00</td>
<td>$828.00</td>
<td>$5,295.00</td>
<td>$34,528.00</td>
</tr>
<tr>
<td>Taxes paid</td>
<td>$7,086.00</td>
<td>$162.00</td>
<td>$970.00</td>
<td>$11,273.00</td>
</tr>
<tr>
<td>Effective tax rate</td>
<td>24.74%</td>
<td>19.57%</td>
<td>18.32%</td>
<td>32.65%</td>
</tr>
<tr>
<td>Taxes/ EBIT</td>
<td>24.17%</td>
<td>30.74%</td>
<td>20.23%</td>
<td>30.94%</td>
</tr>
<tr>
<td>Marginal tax rate</td>
<td>34%</td>
<td>34%</td>
<td>34%</td>
<td>34%</td>
</tr>
</tbody>
</table>

1. Why is the effective tax rate different from the marginal tax rate?
2. Why is the effective tax rate different from taxes as a % of EBIT?
3. Which tax rate should you use in computing your after-tax operating income?
Illustration 3: High Growth for how long…

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

- < 5 years
- 5 years
- 10 years
- >10 years
Lesson 3.1: Maintaining high growth is difficult…

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. A study of revenue growth at firms that make IPOs in the years after the IPO shows the following:
Lesson 3.2: Scaling up growth is hard to do..
Given that growth becomes more difficult to maintain as firms get larger and the market stagnates, what type of growth period would you assign the following firms?

- Embraer: 0 years, 5 years, 10 years, > 10 years
- Vale: 0 years, 5 years, 10 years, > 10 years
- Petrobras: 0 years, 5 years, 10 years, > 10 years
- Gerdau Steel: 0 years, 5 years, 10 years, > 10 years
Illustration 4: Regression betas and Debt Cost

The US $ cost of capital for Embraer has been computed using the following inputs:

- The cost of equity was estimated from the ten-year dollar denominated Brazilian government bond rate of 6%, a Bloomberg “adjusted” beta for the Embraer ADR of 1.01 and an equity risk premium for Brazil of 6.2% (based on the US historical risk premium of 4% and an additional risk premium of 2.2% for Brazil).

  Cost of equity = Brazilian Government Bond rate + Beta * Risk Premium
  = 6% + 1.01 (6.2%) = 12.26%

- The cost of debt was computed by dividing the interest expenses (276 mil R$) by the book value of debt (3,127 mil R$); the effective tax rate for the firm is 19.5%.
  - Cost of debt = Interest expenses / Book Debt = 276 / 3127 = 8.82%
  - After-tax cost of debt = Cost of debt (1 - Effective tax rate) = 8.82% (1-.195) = 7.10%

- The cost of capital was computed using the market value of equity (12729 million R$) and the book value of all liabilities (10260) as weights for debt and equity

  Cost of capital = 13.87% (12729/(12729+10260)) + 7.1% (10260/(12729+10260)) = 9.96%

Do you agree with the computation?
4.1: Government bonds are not always riskless..

These are all US dollar denominated. Why are the rates different?

R$ rate. Local currency rating is A3., with default spread of 0.85%
4.2: Betas don’t come from regressions..
But from a firm’s business mix as well as operating and financing choices…

**Beta of Firm (Unlevered Beta)**

**Nature of product or service offered by company:**
Other things remaining equal, the more discretionary the product or service, the higher the beta.

**Implications**
1. Cyclical companies should have higher betas than non-cyclical companies.
2. Luxury goods firms should have higher betas than basic goods.
3. High priced goods/service firms should have higher betas than low prices goods/services firms.
4. Growth firms should have higher betas.

**Operating Leverage (Fixed Costs as percent of total costs):**
Other things remaining equal, the greater the proportion of the costs that are fixed, the higher the beta of the company.

**Implications**
1. Firms with high infrastructure needs and rigid cost structures should have higher betas than firms with flexible cost structures.
2. Smaller firms should have higher betas than larger firms.
3. Young firms should have higher betas than more mature firms.

**Financial Leverage:**
Other things remaining equal, the greater the proportion of capital that a firm raises from debt, the higher its equity beta will be.

**Implications**
Highly levered firms should have higher betas than firms with less debt.

Equity Beta (Levered beta) = Unlev Beta \( (1 + (1 - t) \times \text{Debt/Equity Ratio}) \)
Which yields an alternative to regression betas…

Step 1: Find the business or businesses that your firm operates in.

Step 2: Find publicly traded firms in each of these businesses and obtain their regression betas. Compute the simple average across these regression betas to arrive at an average beta for these publicly traded firms. Unlever this average beta using the average debt to equity ratio across the publicly traded firms in the sample.

Unlevered beta for business = Average beta across publicly traded firms/ (1 + (1 - t) (Average D/E ratio across firms))

Possible Refinements

If you can, adjust this beta for differences between your firm and the comparable firms on operating leverage and product characteristics.

Step 3: Estimate how much value your firm derives from each of the different businesses it is in.

While revenues or operating income are often used as weights, it is better to try to estimate the value of each business.

Step 4: Compute a weighted average of the unlevered betas of the different businesses (from step 2) using the weights from step 3.

Bottom-up Unlevered beta for your firm = Weighted average of the unlevered betas of the individual business

If you expect the business mix of your firm to change over time, you can change the weights on a year-to-year basis.

Step 5: Compute a levered beta (equity beta) for your firm, using the market debt to equity ratio for your firm.

Unlevered bottom-up beta = Unlevered beta (1 + (1-t) (Debt/Equity))

If you expect your debt to equity ratio to change over time, the levered beta will change over time.

Levered bottom-up beta = Unlevered bottom-up beta (1 + (1-t) (Debt/Equity))
## Bottom-up Betas…

<table>
<thead>
<tr>
<th>Company</th>
<th>Business</th>
<th>Unlevered beta</th>
<th>D/E Ratio</th>
<th>Weights</th>
<th>Levered Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embraer</td>
<td>Aerospace</td>
<td>0.75</td>
<td>25.84%</td>
<td>100%</td>
<td>0.88</td>
</tr>
<tr>
<td>Ambev</td>
<td>Alcoholic beverages</td>
<td>0.75</td>
<td>19.43%</td>
<td>80%</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Soft Drinks</td>
<td>0.85</td>
<td>19.43%</td>
<td>20%</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>Company</td>
<td>0.77</td>
<td>19.43%</td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td>Vale</td>
<td>Mining</td>
<td>0.98</td>
<td>25.66%</td>
<td>71%</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>Aluminum</td>
<td>0.72</td>
<td>25.66%</td>
<td>9%</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Steel</td>
<td>0.63</td>
<td>25.66%</td>
<td>14%</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Transportation</td>
<td>0.73</td>
<td>25.66%</td>
<td>5%</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0.74</td>
<td>25.66%</td>
<td>1%</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>Company</td>
<td>0.89</td>
<td>25.66%</td>
<td>100%</td>
<td>1.04</td>
</tr>
<tr>
<td>Petrobras</td>
<td>Integrated Oil</td>
<td>0.60</td>
<td>49.58%</td>
<td>100%</td>
<td>0.79</td>
</tr>
</tbody>
</table>
4.3: Equity risk premiums matter... The US example...

<table>
<thead>
<tr>
<th>Historical Period</th>
<th>ARITHMETIC AVERAGE</th>
<th>GEOMETRIC AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T.Bills</td>
<td>T.Bonds</td>
</tr>
<tr>
<td>1928-2007</td>
<td>7.78%</td>
<td>6.42%</td>
</tr>
<tr>
<td>1967-2007</td>
<td>5.94%</td>
<td>4.33%</td>
</tr>
<tr>
<td>1997-2007</td>
<td>5.26%</td>
<td>2.68%</td>
</tr>
</tbody>
</table>

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.

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

Jan 1, 2008
S&P 500 is at 1468.36
4.02% of 1468.36 = 59.03

Implied Expected Return on Equity = 8.39%
Riskfree Rate = 4.02%
**Implied ERP = 8.39% - 4.02% = 4.37%**
For emerging markets, one alternative is to build off US risk premiums.

- 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 in 2003:
  - Country risk premium = Default spread on country bond* $\sigma_{\text{Country Equity}} / \sigma_{\text{Country Bond}}$
    - Standard Deviation in Bovespa (Equity) = 29.24%
    - Standard Deviation in Brazil C-Bond = 24.15%
    - Default spread on C-Bond = 6.50%
  - Country Risk Premium for Brazil = 6.50% (29.24%/24.15%) = 7.87%
- Using the same approach in 2008 would yield a much lower country risk premium:
  - Country risk premium = 2.20% (25%/15%) = 3.66%
And the other is to compute an implied equity premium…

- Using the Bovespa as our measure of Brazilian equity, we estimated the following:
  - Level of index = 73512
  - FCFE for stocks in index in 2005 = 3.56% of index level
  - Expected growth rate (in US $) in earnings & FCFE for next 5 years = 9.00%
  - Growth rate beyond year 5 = 3.80%
  - Risk free rate= 3.80%
- Solving for the level of the index, we get
  - Expected return on Brazilian stocks = 8.43%
  - Implied equity risk premium for Brazil = 8.43% - 3.80% = 4.63%
4.4: Not all companies are equally exposed to country risk…

- **Source of revenues**: Other things remaining equal, a company should be more exposed to risk in a country if it generates more of its revenues from that country. A Brazilian firm that generates the bulk of its revenues in Brazil should be more exposed to country risk than one that generates a smaller percent of its business within Brazil.

- **Manufacturing facilities**: Other things remaining equal, a firm that has all of its production facilities in Brazil should be more exposed to country risk than one which has production facilities spread over multiple countries. The problem will be accentuated for companies that cannot move their production facilities (mining and petroleum companies, for instance).

- **Use of risk management products**: Companies can use both options/futures markets and insurance to hedge some or a significant portion of country risk.
A simplistic measure of country risk exposure…

- The easiest and most accessible data is on revenues. Most companies break their revenues down by region. One simplistic solution would be to do the following:
  \[ \lambda = \frac{\% \text{ of revenues domestically}_{\text{firm}}}{\% \text{ of revenues domestically}_{\text{avg firm}}} \]

- Consider, for instance, Embraer and Embratel, both of which are incorporated and traded in Brazil. Embraer gets 3% of its revenues from Brazil whereas Embratel gets almost all of its revenues in Brazil. The average Brazilian company gets about 77% of its revenues in Brazil:
  - \( \lambda_{\text{Embraer}} = \frac{3\%}{77\%} = 0.04 \)
  - \( \lambda_{\text{Embratel}} = \frac{100\%}{77\%} = 1.30 \)

- There are two implications
  - A company’s risk exposure is determined by where it does business and not by where it is located
  - Firms might be able to actively manage their country risk exposures
And a slightly more sophisticated one…

\[
\begin{align*}
\text{Return}_{\text{Embraer}} &= 0.0195 + 0.2681 \text{ Return}_{\text{C Bond}} \\
\text{Return}_{\text{Ambev}} &= 0.0290 + 0.4136 \text{ Return}_{\text{C Bond}} \\
\text{Return}_{\text{Vale}} &= 0.02169 + 0.3760 \text{ Return}_{\text{C Bond}} \\
\text{Return}_{\text{Embratel}} &= -0.0308 + 2.0030 \text{ Return}_{\text{C Bond}} \\
\text{Return}_{\text{Petrobras}} &= -0.0308 + 0.6600 \text{ Return}_{\text{C Bond}} \\
\end{align*}
\]
4.5: Not everything is debt…

To be treated as debt, there are three conditions that have to be met:

- The liability must give rise to contractual obligations that have to be met no matter how the firm’s operations are doing.
- These obligations are usually tax deductible
- Failing to meet these obligations can lead to loss of control of the business.

When defining debt for cost of capital purposes, there are two rules to follow:

- Use market values for debt, rather than book value, even if you have to estimate the market value.
- Define debt narrowly to include only interest bearing debt and lease commitments, rather than everything on the balance sheet
4.6: The Cost of Debt

The cost of debt is the rate at which a firm can borrow money, long term and today, corrected for the tax benefits of debt.

- Take all debt, short term as well as long term, and attach one long term cost of debt to it.
- That long term cost of debt will be based upon the level of riskless rates today and the default risk of the company today (based on either an actual or a synthetic rating).
- Interest saves you taxes at the margin. Consequently, the marginal tax rate should be used to compute the tax benefit.

As a general rule, it is dangerous to start breaking debt down into individual pieces (senior, subordinated, unsecured...) and attaching different costs to each one.
A synthetic rating from an interest coverage ratio...

**EBIT/ Interest expenses**

<table>
<thead>
<tr>
<th>Coverage Ratio</th>
<th>Estimated Rating</th>
<th>Default Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 8.50 (&gt;12.50)</td>
<td>AAA</td>
<td>0.75%</td>
</tr>
<tr>
<td>6.50 - 8.50 (9.5-12.5)</td>
<td>AA</td>
<td>1.25%</td>
</tr>
<tr>
<td>5.50 - 6.50 (7.5-9.5)</td>
<td>A+</td>
<td>1.40%</td>
</tr>
<tr>
<td>4.25 - 5.50 (6-7.5)</td>
<td>A</td>
<td>1.50%</td>
</tr>
<tr>
<td>3.00 - 4.25 (4.5-6)</td>
<td>A–</td>
<td>1.70%</td>
</tr>
<tr>
<td>2.50 - 3.00 (4-4.5)</td>
<td>BBB</td>
<td>2.50%</td>
</tr>
<tr>
<td>2.25- 2.50 (3.5-4)</td>
<td>BB+</td>
<td>3.20%</td>
</tr>
<tr>
<td>2.00 - 2.25 (3-3.5)</td>
<td>BB</td>
<td>3.65%</td>
</tr>
<tr>
<td>1.75 - 2.00 (2.5-3)</td>
<td>B+</td>
<td>4.50%</td>
</tr>
<tr>
<td>1.50 - 1.75 (2-2.5)</td>
<td>B</td>
<td>5.65%</td>
</tr>
<tr>
<td>1.25 - 1.50 (1.5-2)</td>
<td>B –</td>
<td>6.50%</td>
</tr>
<tr>
<td>0.80 - 1.25 (1.25-1.5)</td>
<td>CCC</td>
<td>7.50%</td>
</tr>
<tr>
<td>0.65 - 0.80 (0.8-1.25)</td>
<td>CC</td>
<td>10.00%</td>
</tr>
<tr>
<td>0.20 - 0.65 (0.5-0.8)</td>
<td>C</td>
<td>12.00%</td>
</tr>
<tr>
<td>&lt; 0.20 (&lt;0.5)</td>
<td>D</td>
<td>20.00%</td>
</tr>
</tbody>
</table>

The first number under interest coverage ratios is for larger market cap companies (> $ 5 billion) and the second in brackets is for smaller market cap companies.
Estimating the cost of debt for Embraer

**Step 1:** Estimate the interest coverage ratio for Embraer. We used the interest expenses and the average operating income from 2003-2007.

Interest Coverage Ratio = 970/ 271 = 3.58

**Step 2:** Estimate the synthetic rating for Embraer. Given its market cap, we assigned it to the large market cap group and assigned it a rating of A-, based on the rating.

**Step 3:** Estimate the default spread, based upon the rating.
Default spread for A- rated bond in May 2008 = 1.7%

**Step 4:** Determine how much of the country default spread your firm will carry when it borrows money. We assumed that Embraer would carry half the default spread for Brazil (2.2%).

**Step 5:** Estimate the cost of debt
Riskfree Rate + Default Spread for company + Default spread for country
= 3.8% + 1.7% + 1.1% = 6.6%
A Corrected (US $) Cost of Capital: Embraer

- **Equity**
  - Cost of Equity = 3.80% + 0.88 (4%) + 0.27 (3.66%) = 8.31%
  - Market Value of Equity = R$ 12,729 million ( $ 7.715 billion)

- **Debt**
  - Cost of debt = 3.8% + 1.7% +1.1% = 6.6%
  - Market Value of Debt = R$ 3,416 million ( $2.070 billion)

- **Cost of Capital**
  
  Cost of Capital = 8.31 % (.7884) + 6.6% (1- .34) (0.2116)) = 7.47%

  ✓ The book value of equity at Embraer is 5,402 million BR.
  ✓ The book value of debt at Embraer is 3,128 million BR; Interest expense is 276 mil; Average maturity of debt = 5 years
  ✓ Estimated market value of debt = 276 million (PV of annuity, 5 years, 6.6%) + $3,128 million/1.066^4 = 3,416 million BR
4.7: Be “currency” and “risk” consistent

- Assume that you are doing the analysis in Nominal Brazilian Reais. How would your inputs have been different?
  - Riskfree Rate
  - Beta
  - Risk Premium

- If you value the company in nominal Reais, what effect would you have on the valuation?
  - The value will go down, because the discount rate will be higher
  - The value will go up, because the cash flows will be higher
  - The value should remain unchanged.
A Quick (and consistent) Conversion from one currency to another

- **Approach 1**: Use a BR riskfree rate in all of the calculations above. For instance, if the BR riskfree rate was 10%, the cost of capital would be computed as follows:
  - Cost of Equity = 10% + 0.88(4%) + 0.27 (3.66%) = 14.51%
  - Cost of Debt = 10% + 1.7% = 11.7%
  - Cost of capital = 14.51% (0.7884) + 11.7% (1-.34) (.2116) = 13.07%

- **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%

Cost of capital = 

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

= 1.0747 (1.08/1.02)-1 = 0.1379 or 13.79%
4.8: Don’t let your macro views color your valuation

- The country risk premium for Brazil today is about half what it was a few years ago and treasury bond rates in the US today are far lower than they were a few years ago. If you believe that both interest rates and the country risk premium will go up (down), that exchange rates will move adversely (in your favor) and that the economy will weaken (strengthen), should you try to bring them into your company valuation?
  - Yes
  - No
- If you do, and you conclude that a stock is overvalued (undervalued), how should I read this conclusion?
Illustration 5: The price of growth..

- You are looking at the projected cash flows provided by the management of the firm, for use in valuation

<table>
<thead>
<tr>
<th>Year</th>
<th>Current</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth rate</td>
<td>$100.00</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Revenues</td>
<td>$100.00</td>
<td>$110.00</td>
<td>$121.00</td>
<td>$133.10</td>
<td>$146.41</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$30.00</td>
<td>$33.00</td>
<td>$36.30</td>
<td>$39.93</td>
<td>$43.92</td>
</tr>
<tr>
<td>+ Depreciation</td>
<td>$15.00</td>
<td>$16.50</td>
<td>$18.15</td>
<td>$19.97</td>
<td>$21.96</td>
</tr>
<tr>
<td>- Cap Ex</td>
<td>$18.00</td>
<td>$19.80</td>
<td>$21.78</td>
<td>$23.96</td>
<td>$26.35</td>
</tr>
<tr>
<td>- Chg in WC</td>
<td>$3.00</td>
<td>$3.30</td>
<td>$3.63</td>
<td>$3.99</td>
<td>$4.39</td>
</tr>
<tr>
<td>FCFF</td>
<td>$24.00</td>
<td>$26.40</td>
<td>$29.04</td>
<td>$31.94</td>
<td>$35.14</td>
</tr>
</tbody>
</table>

What are the key questions that you would ask the management about its projections?
5.1. Is the growth feasible?

If the growth in a firm is coming from revenues increasing over time, the key question to ask is whether this growth is feasible. There a couple of tests that you can use to make this determination.

**The Max Test:** The revenues that you are projecting in the terminal year cannot exceed the overall market for the products and services produced by your company.
- Define the market potential before you start forecasting.
- Keep track of market share

**The Big Player test:** The revenues that you are projecting in your terminal year should be comparable to the revenues of the largest player in the market today, adjusted for inflation.
- Identify the biggest companies in your market and their revenues
- Forecast out their revenues in your terminal year.
5.2: Are you paying for growth?

- Growth from “new” investments (sustainable growth)
  
  - Expected Growth
  
  - Net Income
    - Retention Ratio = 1 - Dividends/Net Income
    - Return on Equity = Net Income/Book Value of Equity
  
  - Operating Income
    - Reinvestment Rate = (Net Cap Ex + Chg in WC/EBIT(1-t))
    - Return on Capital = EBIT(1-t)/Book Value of Capital

- Growth from efficiency
  
  - When a company generates higher returns on its existing investments, this can create efficiency growth, measured as follows:
    - With equity income: \( \frac{\text{ROE}_t - \text{ROE}_{t-1}}{\text{ROE}_{t-1}} \)
    - With operating income: \( \frac{\text{ROC}_t - \text{ROC}_{t-1}}{\text{ROC}_{t-1}} \)
  
  - This growth can last for the short term but not forever. (Why?)
The Value of Growth

Expected growth = Growth from new investments + Efficiency growth
= Reinv Rate * ROC + (ROC_t-ROC_{t-1})/ROC_{t-1}

Assume that your cost of capital is 10%. As an investor, rank these firms in the order of most value growth to least value growth.
Measuring Return on Capital (Equity)

\[
\text{ROC} = \frac{\text{EBIT} (1 - \text{tax rate})}{\text{Book Value of Equity} + \text{Book value of debt} - \text{Cash}}
\]

- Adjust EBIT for:
  a. Extraordinary or one-time expenses or income
  b. Operating leases and R&D
  c. Cyclicality in earnings (Normalize)
  d. Acquisition Debris (Goodwill amortization etc.)

- Use a marginal tax rate to be safe. A high ROC created by paying low effective taxes is not sustainable.

- Adjust book equity for:
  1. Capitalized R&D
  2. Acquisition Debris (Goodwill)

- Adjust book value of debt for:
  a. Capitalized operating leases

- Use end of prior year numbers or average over the year but be consistent in your application.
### 5.4: The Revenue/Margin Trap

**Sirius Radio: Revenues and Margins.**

| Year | Revenue Growth rate | Current Revenue | Year 1 Revenue | Year 2 Revenue | Year 3 Revenue | Year 4 Revenue | Year 5 Revenue | Year 6 Revenue | Year 7 Revenue | Year 8 Revenue | Year 9 Revenue | Year 10 Revenue | Operating Margin  | Operating Income |
|------|---------------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------|--------------------|
|      |                     | Current         | 1              | 2              | 3              | 4              | 5              | 6              | 7              | 8              | 9              | 10             |                    |                    |
|      |                     | $187            | $562           | $1,125         | $2,025         | $3,239         | $4,535         | $5,669         | $6,803         | $7,823         | $8,605         | $9,035         | -419.92%         | -$787             |
|      |                     | Operating Income| -199.96%       | -89.98%        | -34.99%        | -7.50%         | 6.25%          | 13.13%         | 16.56%         | 18.28%         | 19.14%         | 19.57%         | $284            | $744              |
|      |                     | Target margin   | based upon     | Clear Channel  |                |                |                |                |                |                |                |                |                |                    |                    |
And one way to avoid it..

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

Check revenues against total market potential and largest firms in sector.

Industry average Sales/Cap Ratio

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

Is ending ROC a reasonable number?
### Growth and Reinvestment at Embraer

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT (1-t)</td>
<td>R$ 1,242</td>
<td>R$ 1,740</td>
<td>R$ 794</td>
<td>R$ 546</td>
<td>R$ 527</td>
<td>R$ 4,849</td>
</tr>
<tr>
<td>BV of debt</td>
<td>R$ 1,953</td>
<td>R$ 3,016</td>
<td>R$ 3,554</td>
<td>R$ 3,637</td>
<td>R$ 2,897</td>
<td>R$ 15,057</td>
</tr>
<tr>
<td>BV of equity</td>
<td>R$ 3,350</td>
<td>R$ 3,768</td>
<td>R$ 4,480</td>
<td>R$ 4,863</td>
<td>R$ 5,192</td>
<td>R$ 21,653</td>
</tr>
<tr>
<td>Cash holdings</td>
<td>R$ 2,321</td>
<td>R$ 3,659</td>
<td>R$ 3,588</td>
<td>R$ 4,479</td>
<td>R$ 3,774</td>
<td>R$ 17,821</td>
</tr>
<tr>
<td>Invested Capital</td>
<td>R$ 2,982</td>
<td>R$ 3,125</td>
<td>R$ 4,446</td>
<td>R$ 4,021</td>
<td>R$ 4,315</td>
<td>R$ 18,889</td>
</tr>
<tr>
<td>ROIC</td>
<td>41.65%</td>
<td>55.68%</td>
<td>17.86%</td>
<td>13.58%</td>
<td>12.21%</td>
<td>25.67%</td>
</tr>
<tr>
<td>Cap ex</td>
<td>R$ 743</td>
<td>R$ 400</td>
<td>R$ 1,544</td>
<td>-R$ 11</td>
<td>R$ 330</td>
<td>R$ 3,006</td>
</tr>
<tr>
<td>Depreciation</td>
<td>R$ 161</td>
<td>R$ 222</td>
<td>R$ 284</td>
<td>R$ 330</td>
<td>R$ 361</td>
<td>R$ 1,358</td>
</tr>
<tr>
<td>Chg in WC</td>
<td>R$ 37</td>
<td>-R$ 35</td>
<td>R$ 61</td>
<td>-R$ 84</td>
<td>R$ 325</td>
<td>R$ 304</td>
</tr>
<tr>
<td>Reinvestment</td>
<td>R$ 619</td>
<td>R$ 143</td>
<td>R$ 1,321</td>
<td>-R$ 425</td>
<td>R$ 294</td>
<td>R$ 1,952</td>
</tr>
<tr>
<td>Reinvestment Rate</td>
<td>49.84%</td>
<td>8.22%</td>
<td>166.37%</td>
<td>-77.84%</td>
<td>55.79%</td>
<td>40.26%</td>
</tr>
</tbody>
</table>

In forecasting growth for the next 5 years, we used:
- a return on capital of about 18.10% (based on normalized operating income of R$ 970 million – average over the last 5 years)
- a reinvestment rate of 40% (close to average of the last 5 years)

Expected Growth rate = Return on capital * Reinvestment Rate
= 18.1% * .40 = 7.24%
Illustration 6: The “fixed debt ratio” assumption

You have been asked to value a company that currently has the following cost of capital:

\[
\text{Cost of capital} = 10\% \times 0.9 + 4\% \times 0.1 = 9.4\%
\]

a. You believe that the target debt ratio for this firm should be 30%. What will the cost of capital be at the target debt ratio?

b. Which debt ratio (and cost of capital) should you use in valuing this company?
6.1: Cost of Capital and Debt Ratios:
Embraer in 2008

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Bond Rating</th>
<th>Interest rate on debt</th>
<th>Tax Rate</th>
<th>Cost of Debt (after-tax)</th>
<th>WACC</th>
<th>Firm Value (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.75</td>
<td>7.63%</td>
<td>AAA</td>
<td>5.65%</td>
<td>34.00%</td>
<td>3.73%</td>
<td>7.63%</td>
<td>$12,045</td>
</tr>
<tr>
<td>10%</td>
<td>0.80</td>
<td>7.91%</td>
<td>AA</td>
<td>5.90%</td>
<td>34.00%</td>
<td>3.89%</td>
<td>7.51%</td>
<td>$12,457</td>
</tr>
<tr>
<td>20%</td>
<td>0.87</td>
<td>8.26%</td>
<td>A-</td>
<td>6.90%</td>
<td>34.00%</td>
<td>4.55%</td>
<td>7.52%</td>
<td>$12,418</td>
</tr>
<tr>
<td>30%</td>
<td>0.97</td>
<td>8.76%</td>
<td>CCC</td>
<td>14.90%</td>
<td>30.97%</td>
<td>10.29%</td>
<td>9.22%</td>
<td>$8,332</td>
</tr>
<tr>
<td>40%</td>
<td>1.15</td>
<td>9.69%</td>
<td>C</td>
<td>17.60%</td>
<td>19.42%</td>
<td>14.18%</td>
<td>11.48%</td>
<td>$5,695</td>
</tr>
<tr>
<td>50%</td>
<td>1.38</td>
<td>10.86%</td>
<td>C</td>
<td>17.60%</td>
<td>15.54%</td>
<td>14.86%</td>
<td>12.86%</td>
<td>$4,735</td>
</tr>
<tr>
<td>60%</td>
<td>1.72</td>
<td>12.63%</td>
<td>C</td>
<td>17.60%</td>
<td>12.95%</td>
<td>15.32%</td>
<td>14.24%</td>
<td>$4,028</td>
</tr>
<tr>
<td>70%</td>
<td>2.30</td>
<td>15.57%</td>
<td>C</td>
<td>17.60%</td>
<td>11.10%</td>
<td>15.65%</td>
<td>15.62%</td>
<td>$3,486</td>
</tr>
<tr>
<td>80%</td>
<td>3.45</td>
<td>21.46%</td>
<td>C</td>
<td>17.60%</td>
<td>9.71%</td>
<td>15.89%</td>
<td>17.00%</td>
<td>$3,058</td>
</tr>
<tr>
<td>90%</td>
<td>6.89</td>
<td>39.12%</td>
<td>C</td>
<td>17.60%</td>
<td>8.63%</td>
<td>16.08%</td>
<td>18.38%</td>
<td>$2,711</td>
</tr>
</tbody>
</table>
### 6.2: Changing Debt Ratios and Costs of Capital over time - Sirius

<table>
<thead>
<tr>
<th>Year</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Cost of Debt</th>
<th>Tax Rate</th>
<th>After-tax cost of debt</th>
<th>Debt Ratio</th>
<th>Cost of Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>1.80</td>
<td>11.70%</td>
<td>7.50%</td>
<td>0.00%</td>
<td>7.50%</td>
<td>6.23%</td>
<td>11.44%</td>
</tr>
<tr>
<td>1</td>
<td>1.80</td>
<td>11.70%</td>
<td>7.50%</td>
<td>0.00%</td>
<td>7.50%</td>
<td>6.23%</td>
<td>11.44%</td>
</tr>
<tr>
<td>2</td>
<td>1.80</td>
<td>11.70%</td>
<td>7.50%</td>
<td>0.00%</td>
<td>7.50%</td>
<td>6.23%</td>
<td>11.44%</td>
</tr>
<tr>
<td>3</td>
<td>1.80</td>
<td>11.70%</td>
<td>7.50%</td>
<td>0.00%</td>
<td>7.50%</td>
<td>6.23%</td>
<td>11.44%</td>
</tr>
<tr>
<td>4</td>
<td>1.80</td>
<td>11.70%</td>
<td>7.50%</td>
<td>0.00%</td>
<td>7.50%</td>
<td>6.23%</td>
<td>11.44%</td>
</tr>
<tr>
<td>5</td>
<td>1.80</td>
<td>11.70%</td>
<td>7.50%</td>
<td>0.00%</td>
<td>7.50%</td>
<td>6.23%</td>
<td>11.44%</td>
</tr>
<tr>
<td>6</td>
<td>1.64</td>
<td>11.06%</td>
<td>7.00%</td>
<td>0.00%</td>
<td>7.00%</td>
<td>9.99%</td>
<td>10.65%</td>
</tr>
<tr>
<td>7</td>
<td>1.48</td>
<td>10.42%</td>
<td>6.88%</td>
<td>0.00%</td>
<td>6.88%</td>
<td>13.74%</td>
<td>9.93%</td>
</tr>
<tr>
<td>8</td>
<td>1.32</td>
<td>9.78%</td>
<td>6.67%</td>
<td>0.00%</td>
<td>6.67%</td>
<td>17.49%</td>
<td>9.24%</td>
</tr>
<tr>
<td>9</td>
<td>1.16</td>
<td>9.14%</td>
<td>6.25%</td>
<td>28.05%</td>
<td>4.50%</td>
<td>21.25%</td>
<td>8.15%</td>
</tr>
<tr>
<td>10</td>
<td>1.00</td>
<td>8.50%</td>
<td>5.00%</td>
<td>35.00%</td>
<td>3.25%</td>
<td>25.00%</td>
<td>7.19%</td>
</tr>
</tbody>
</table>
Illustration 7: The Terminal Value

- The best way to compute terminal value is to
  - Use a stable growth model and assume cash flows grow at a fixed rate forever
  - Use a multiple of EBITDA or revenues in the terminal year
  - Use the estimated liquidation value of the assets

You have been asked to value a business. The business expects to $120 million in after-tax earnings (and cash flow) next year and to continue generating these earnings in perpetuity. The firm is all equity funded and the cost of equity is 10%; the riskfree rate is 4% and the ERP is 5%. What is the value of the business?
7.1: Limits to stable growth..

- Assume now that you were told that the firm can grow earnings at 2% a year forever. Estimate the value of the business.

- Now what if you were told that the firm can grow its earnings at 4% a year forever?

- What if the growth rate were 6% a year forever?
To grow, a company has to reinvest. How much it will have to reinvest depends in large part on how fast it wants to grow and what type of return it expects to earn on the reinvestment.

- Reinvestment rate = Growth Rate / Return on Capital

Assume in the previous example that you were told that the return on capital was 10%. Estimate the reinvestment rate and the value of the business (with a 2% growth rate).

What about with a 4% growth rate?
7.3: The terminal value of Embraer...

Current Estimate of terminal value
- Expected growth rate in perpetuity = 3.80% (= Riskfree rate)
- EBIT (1 -t) in year 6 = $618.11
- Return on capital = Cost of capital = 7.38%
- Reinvestment Rate = g/ Reinvestment Rate = 3.8%/7.38% = 51.47%
- Terminal Value = $618.11 (1- 0.5147)/ (.0738 - .038) = $8,371.39

<table>
<thead>
<tr>
<th>Growth Rate</th>
<th>Reinvestment Rate</th>
<th>FCFF</th>
<th>Terminal value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.00%</td>
<td>$618</td>
<td>$8,371</td>
</tr>
<tr>
<td>1%</td>
<td>13.54%</td>
<td>$534</td>
<td>$8,371</td>
</tr>
<tr>
<td>2%</td>
<td>27.09%</td>
<td>$451</td>
<td>$8,371</td>
</tr>
<tr>
<td>3%</td>
<td>40.63%</td>
<td>$367</td>
<td>$8,371</td>
</tr>
<tr>
<td>4%</td>
<td>54.17%</td>
<td>$283</td>
<td>$8,371</td>
</tr>
</tbody>
</table>
8. From firm value to equity value: Not so trivial…

- For a firm with consolidated financial statements, you have discounted free cashflows to the firm at the cost of capital to arrive at a firm value of $100 million. The firm has
  - A cash balance of $15 million
  - Debt outstanding of $20 million
  - A 5% holding in another company: the book value of this holding is $5 million. (Market value of equity in this company is $200 million)
  - Minority interests of $10 million on the balance sheet

- What is the value of equity in this firm?

- How would your answer change if you knew that the firm was the target of a lawsuit it is likely to win but where the potential payout could be $100 million if it loses?
8.1: The left out assets…

- When you discount cash flows to the firm at the cost of capital, you are valuing only those assets that contribute to operating income (operating assets). Assets whose earnings are not part of operating income have not been valued yet and need to be explicitly valued and brought into the equation.

- In general, we can categorize these non-operating assets as follows (from easiest to value to most difficult)
  - Cash and marketable securities (current value is usually a given)
  - Unused assets that are marketable (vacant land, unutilized buildings)
  - Cross holdings in publicly traded companies
  - Cross holdings in private businesses
  - Other unspecified (and undisclosed) assets
8.2: The double counted assets

- In the zeal to be comprehensive, analysts often add on value for assets that have already been valued through the cash flows. In the process, these assets get double counted.

- Examples of double counted assets include
  - Goodwill (which represents the excess of market value over book value in an acquired target company)
  - Intangibles (Brand name, customer loyalty)
  - Physical assets (Real estate in use for operations)
8.3: The missed liabilities

- When going from the value of the firm to the value of equity, we usually subtract out the debt of the firm. Since equity investors have a residual claim on the firm, after all other claim holders have been paid, this is our last chance to deal with claims on the firm.

- While almost all analysts bring in long-term interest bearing debt into their analysis, the claims that get missed most often include:
  - Short term interest bearing debt (often shown in current liabilities)
  - Lease and rental commitments
  - Underfunded pension obligations
  - Potential claims from lawsuits
8.4: The double counted liabilities…

- In getting from firm value to equity, conservative analysts sometimes reach too far to detect claims against the firm that have already been considered elsewhere (often implicitly) in their valuation.

- Common examples of double counted liabilities include
  - Accounts payable, supplier credit and other non-interest bearing debt (which are not only treated as part of working capital but also have no explicit interest expense effect on income)
  - Expected debt issues from future years. Note that when we keep the debt ratio of a firm fixed over time, we are implicitly already assuming that dollar debt will increase at the same growth rate as the value of the firm is increasing by.
9. From equity value to equity value per share

You have valued the equity in a firm at $200 million. Estimate the value of equity per share if there are 10 million shares outstanding.

How would your answer change if you were told that there are 2 million employee options outstanding, with a strike price of $20 a share and 5 years left to expiration?
Value per share… as a function of stock price volatility and option maturity
10. The final circle of hell…
**Current Cashflow to Firm**

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT (1-t)</td>
<td>$434</td>
</tr>
<tr>
<td>- Nt CpX</td>
<td>-11</td>
</tr>
<tr>
<td>- Chg WC</td>
<td>178</td>
</tr>
<tr>
<td>FCFF</td>
<td>$267</td>
</tr>
<tr>
<td>Reinvestment Rate</td>
<td>40%</td>
</tr>
<tr>
<td>Effective tax rate</td>
<td>19.5%</td>
</tr>
</tbody>
</table>

**Expected Growth in EBIT (1-t)**

\[ \text{Expected Growth} = 0.40 \times 0.181 = 0.072 \]

\[ 10.09\% \]

**Reinvestment Rate**

\[ \frac{167}{289} = 56\% \]

**Effective tax rate**

\[ 19.5\% \]

**Terminal Value**

\[ \text{Terminal Value} = 254 \times (0.0738 - 0.038) = 7,091 \]

**Cost of Equity**

\[ 8.31\% \]

**Cost of Debt**

\[ (3.8\% + 1.7\% + 1.1\%)(1 - 0.34) = 4.36\% \]

**Weights**

\[ E = 78.8\% \]

\[ D = 21.2\% \]

**Riskfree Rate**

\[ \text{US$ Riskfree Rate} = 3.8\% \]

**Beta**

\[ 0.88 \]

**Mature market premium**

\[ 4\% \]

**Country Equity Risk Premium**

\[ 3.66\% \]

**Unlevered Beta for Sectors**

\[ 0.75 \]

**Country Default Spread**

\[ 2.2\% \]

**Ref Equity Mkt Vol**

\[ 1.64 \]

**On May 22, 2008**

Embraer Price = R$ 17.2
With uncertainty…
Loose Ends in Valuation: From firm value to value of equity per share
So, you’ve valued a firm…

Free Cashflow to Firm
EBIT (1 - tax rate)
- (Cap Ex - Depreciation)
- Change in non-cash WC
= Free Cashflow to firm

Expected Growth during high growth

Length of high growth period: PV of FCFF during high growth

Value of Operating Assets today

Stable Growth

Cost of Capital
Cost of Equity  Cost of Debt
But what comes next?

<table>
<thead>
<tr>
<th>Value of Operating Assets</th>
<th>Since this is a discounted cashflow valuation, should there be a real option premium?</th>
</tr>
</thead>
</table>
| + 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? |
I. The Value of Cash  
An Exercise in Cash Valuation

<table>
<thead>
<tr>
<th></th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise Value</td>
<td>$1 bil</td>
<td>$1 bil</td>
<td>$1 bil</td>
</tr>
<tr>
<td>Cash</td>
<td>$100 mil</td>
<td>$100 mil</td>
<td>$100 mil</td>
</tr>
<tr>
<td>Return on Capital</td>
<td>10%</td>
<td>5%</td>
<td>22%</td>
</tr>
<tr>
<td>Cost of Capital</td>
<td>10%</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>Trades in</td>
<td>US</td>
<td>US</td>
<td>Argentina</td>
</tr>
</tbody>
</table>
Cash: Discount or Premium?

*Market Value of $1 in cash:*

*Estimates obtained by regressing Enterprise Value against Cash Balances*
2. Dealing with Holdings in Other firms

- 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.

- We tend to be sloppy in practice in dealing with cross holdings. After valuing the operating assets of a firm, using consolidated statements, it is common to add on the balance sheet value of minority holdings (which are in book value terms) and subtract out the minority interests (again in book value terms), representing the portion of the consolidated company that does not belong to the parent company.
How to value holdings in other firms.. In a perfect world..

- In a perfect world, we would strip the parent company from its subsidiaries and value each one separately. The value of the combined firm will be:
  - Value of parent company + Proportion of value of each subsidiary
- To do this right, you will need to be provided detailed information on each subsidiary to estimated cash flows and discount rates.
Example: Cross holdings at Gerdau Steel
Two compromise solutions…

- **The market value solution**: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.

- **The relative value solution**: When there are too many cross holdings to value separately or when there is insufficient information provided on cross holdings, you can convert the book values of holdings that you have on the balance sheet (for both minority holdings and minority interests in majority holdings) by using the average price to book value ratio of the sector in which the subsidiaries operate.
Valuing Gerdau’s Cross Holdings…

- Minority interests on balance sheet = R$ 8,110 million
- Holdings are primarily in steel companies. The average price to book ratio for steel companies is 1.80. To estimate the market value of the minority interests, we apply this multiple to the book value of minority interests.
- Estimated market value of minority interests = 8,110 * 1.80 = 14,598 million BR
- In US$ terms, the minority interests is worth $7,525 million.
3. Other Assets that have not been counted yet..

- **Unutilized assets**: If you have assets or property that are not being utilized (vacant land, for example), you have not valued it yet. You can assess a market value for these assets and add them on to the value of the firm.

- **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.
### 4. A Discount for Complexity: An Experiment

<table>
<thead>
<tr>
<th></th>
<th>Company A</th>
<th>Company B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Income</td>
<td>$1 billion</td>
<td>$1 billion</td>
</tr>
<tr>
<td>Tax rate</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>ROIC</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Expected Growth</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Business Mix</td>
<td>Single Business</td>
<td>Multiple Businesses</td>
</tr>
<tr>
<td>Holdings</td>
<td>Simple</td>
<td>Complex</td>
</tr>
<tr>
<td>Accounting</td>
<td>Transparent</td>
<td>Opaque</td>
</tr>
</tbody>
</table>

Which firm would you value more highly?
### Measuring Complexity: Volume of Data in Financial Statements

<table>
<thead>
<tr>
<th>Company</th>
<th>Number of pages in last 10Q</th>
<th>Number of pages in last 10K</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Electric</td>
<td>65</td>
<td>410</td>
</tr>
<tr>
<td>Microsoft</td>
<td>63</td>
<td>218</td>
</tr>
<tr>
<td>Wal-mart</td>
<td>38</td>
<td>244</td>
</tr>
<tr>
<td>Exxon Mobil</td>
<td>86</td>
<td>332</td>
</tr>
<tr>
<td>Pfizer</td>
<td>171</td>
<td>460</td>
</tr>
<tr>
<td>Citigroup</td>
<td>252</td>
<td>1026</td>
</tr>
<tr>
<td>Intel</td>
<td>69</td>
<td>215</td>
</tr>
<tr>
<td>AIG</td>
<td>164</td>
<td>720</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>63</td>
<td>218</td>
</tr>
<tr>
<td>IBM</td>
<td>85</td>
<td>353</td>
</tr>
</tbody>
</table>
# Measuring Complexity: A Complexity Score

<table>
<thead>
<tr>
<th>Item</th>
<th>Factors</th>
<th>Follow-up Question</th>
<th>Answer</th>
<th>Weighting factor</th>
<th>Gerdau Score</th>
<th>GE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Multiple Businesses</td>
<td>Number of businesses (with more than 10% of revenues)</td>
<td>1</td>
<td>2.00</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>2.</td>
<td>One-time income and expenses</td>
<td>Percent of operating income</td>
<td>10%</td>
<td>10.00</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>3.</td>
<td>Income from unspecified sources</td>
<td>Percent of operating income</td>
<td>0%</td>
<td>10.00</td>
<td>0</td>
<td>1.2</td>
</tr>
<tr>
<td>4.</td>
<td>Items in income statement that are volatile</td>
<td>Percent of operating income</td>
<td>15%</td>
<td>5.00</td>
<td>0.75</td>
<td>1</td>
</tr>
<tr>
<td><strong>Tax Rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Income from multiple locales</td>
<td>Percent of revenues from non-domestic locales</td>
<td>70%</td>
<td>3.00</td>
<td>2.1</td>
<td>1.8</td>
</tr>
<tr>
<td>2.</td>
<td>Different tax and reporting books</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Headquarters in tax havens</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Volatile effective tax rate</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Capital Expenditures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Volatile capital expenditures</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Frequent and large acquisitions</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Stock payment for acquisitions and investments</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>Working capital</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Unspecified current assets and current liabilities</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Volatile working capital items</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Expected Growth rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Off-balance sheet assets and liabilities (operating leases and R&amp;D)</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Substantial stock buybacks</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Changing return on capital over time</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Unsustainably high return</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Cost of capital</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Multiple businesses</td>
<td>Number of businesses (more than 10% of revenues)</td>
<td>1</td>
<td>1.00</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Operations in emerging markets</td>
<td>Percent of revenues</td>
<td>50%</td>
<td>5.00</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3.</td>
<td>Is the debt market traded?</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Does the company have a rating?</td>
<td>Yes or No</td>
<td>Yes</td>
<td>Yes=2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5.</td>
<td>Does the company have off-balance sheet debt?</td>
<td>Yes or No</td>
<td>No</td>
<td>Yes=2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>No-operating assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Minority holdings as percent of book assets</td>
<td>Minority holdings as percent of book assets</td>
<td>0%</td>
<td>20.00</td>
<td>0</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Firm to Equity value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Consolidation of subsidiaries</td>
<td>Minority interest as percent of book value of equity</td>
<td>63%</td>
<td>20.00</td>
<td>12.6</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>Per share value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Shares with different voting rights</td>
<td>Does the firm have shares with different voting rights?</td>
<td>Yes</td>
<td>Yes = 10</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Equity options outstanding</td>
<td>Options outstanding as percent of shares</td>
<td>0%</td>
<td>10.00</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Complexity Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Complexity Score | 48.95 | 90.55 |
Dealing with Complexity

In Discounted Cashflow Valuation

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

In relative valuation

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

With the hundred largest market cap firms, for instance:

PBV = 0.65 + 15.31 ROE − 0.55 Beta + 3.04 Expected growth rate − 0.003 # Pages in 10K
5. The Value of Synergy

- Synergy can be valued. In fact, if you want to pay for it, it should be valued.
- To value synergy, you need to answer two questions:
  (a) What **form** is the synergy expected to take? Will it **reduce costs** as a percentage of sales and increase profit margins (as is the case when there are economies of scale)? Will it **increase future growth** (as is the case when there is increased market power)?
  (b) **When can the synergy be reasonably expected to start** affecting cashflows? (Will the gains from synergy show up instantaneously after the takeover? If it will take time, when can the gains be expected to start showing up?)
- If you cannot answer these questions, you need to go back to the drawing board…
Sources of Synergy

Synergy is created when two firms are combined and can be either financial or operating.

Operating Synergy accrues to the combined firm as:

- Strategic Advantages:
  - Higher returns on new investments
  - Higher ROC
  - Higher Growth Rate

- More new Investments
- More sustainable excess returns
- Longer Growth Period

Economies of Scale:
- Cost Savings in current operations
- Higher Margin
- Higher Base-year EBIT

Financial Synergy:
- Tax Benefits:
  - Lower taxes on earnings due to - higher depreciation - operating loss carryforwards
- Added Debt Capacity
- Higher debt ratio and lower cost of capital
- May reduce cost of equity for private or closely held firm

Diversification?
Valuing Synergy

(1) the firms involved in the merger are valued independently, by discounting expected cash flows to each firm at the weighted average cost of capital for that firm.

(2) the value of the combined firm, with no synergy, is obtained by adding the values obtained for each firm in the first step.

(3) The effects of synergy are built into expected growth rates and cashflows, and the combined firm is re-valued with synergy.

Value of Synergy = Value of the combined firm, with synergy - Value of the combined firm, without synergy
J.P. Morgan’s estimate of annual operating synergies in Ambev/Labatt Merger

<table>
<thead>
<tr>
<th>Costs</th>
<th>Annual synergies $US mm</th>
<th>Action Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin. Expenses</td>
<td>29.9</td>
<td>- Reduction of corporate expenses such as travel and office expenses</td>
</tr>
<tr>
<td>Var. prod. costs</td>
<td>55.9</td>
<td>- Rationalization of corporate HQ</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>7.7</td>
<td>- Optimization of IT systems</td>
</tr>
<tr>
<td>Capex</td>
<td>11.4</td>
<td>- Efficiency improvement in the use of variable production inputs such as water, malt, hops, energy in line with Ambev standards</td>
</tr>
<tr>
<td>Distribution</td>
<td>17.3</td>
<td>- Usage of assets available at Ambev Brazil</td>
</tr>
<tr>
<td></td>
<td>Total $190.2</td>
<td>- Optimization of current distribution systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Annual synergies $US mm</th>
<th>Action Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margin</td>
<td>68.1</td>
<td>- Commercialization of Ambev brands in Canada and the US by Labatt and vice versa</td>
</tr>
</tbody>
</table>

Build-up of annual synergies $US mm
- Admin. expenses: 30
- Var. prod. costs: 56
- Fixed costs: 8
- Capex: 11
- Distribution: 17
- Commercial: 68
- Total operational synergies: 190
J.P. Morgan’s estimate of total synergies in Labatt/Ambev Merger

Valuation methodology for synergies

Cost synergies
- Achievement of full synergies by 2008
  - Synergies are gradually phased in over four years with 0%, 30%, 30%, 40% and 100% being realized in 2004 through 2008
  - Realization of synergies requires cash outlays in the 2005-2007 period which are reflected in the net present value
  - Capex synergies only begin in 2008
- Decreased tax shield taken into account at full statutory tax rate, does not take into account potential additional upside as a result of lower effective historical tax rate
- Synergies realized in Canada discounted at Labatt Canada’s WACC (6.5%) while synergies realized in Brazil discounted at AmBev’s WACC (12.4%)

Revenue synergies
- Achievement of full synergies by 2008
  - Synergies are gradually phased in over four years with 0%, 30%, 30%, 40% and 100% being realized in 2004 through 2008
- Discounted at 14.4%, reflecting AmBev’s WACC plus an additional spread to reflect higher risk of realizing such synergies

Interest on own capital
- Tax benefits generated through increased interest on AmBev’s capital payments due to AmBev’s increased shareholders’ equity after acquisition of Labatt
- Discounted at AmBev’s cost of equity (13.6%)

Present value of potential synergies (US$ mm)
Labatt DCF valuation

- Labatt is the Canadian subsidiary of Interbrew and is a mature firm with sold brand names. It can be valued using a stable growth firm valuation model.

- Base Year inputs
  - EBIT (1-t) = $411 million
  - Expected Growth Rate = 3%
  - Return on capital = 9%
  - Cost of capital = 7%

- Valuation
  - Reinvestment Rate = g/ ROC = 3/9 = 33.33%
  - Value of Labatt = 411 (1-.333)/ (.07-.03) = $6.85 billion

- Ambev is paying for Labatt with 23.3 billion shares (valued at about $5.8 billion) and is assuming $1.5 billion in debt, resulting in a value for the firm of about $7.3 billion.
Who gets the benefits of synergy?

Total Synergy = $2 billion

- Premium paid to Labatt Stockholders = $7.3 billion - $6.85 billion = $450 million
- Voting Shares in Ambev
- Non-voting Shares in Ambev

$1.55 billion to be shared?
5. Brand name, great management, superb product …Are we short changing the intangibles?

- There is often a temptation to add on premiums for intangibles. Among them are:
  - Brand name
  - Great management
  - Loyal workforce
  - Technological prowess
- There are two potential dangers:
  - For some assets, the value may already be in your value and adding a premium will be double counting.
  - For other assets, the value may be ignored but incorporating it will not be easy.
# Categorizing Intangibles

<table>
<thead>
<tr>
<th></th>
<th>Independent and Cash flow generating intangibles</th>
<th>Not independent and cash flow generating to the firm</th>
<th>No cash flows now but potential for cashflows in future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Examples</strong></td>
<td>Copyrights, trademarks, licenses, franchises, professional practices (medical, dental)</td>
<td>Brand names, Quality and Morale of work force, Technological expertise, Corporate reputation</td>
<td>Undeveloped patents, operating or financial flexibility (to expand into new products/markets or abandon existing ones)</td>
</tr>
</tbody>
</table>
| **Valuation approach**               | Estimate expected cashflows from the product or service and discount back at appropriate discount rate. | • Compare DCF value of firm with intangible with firm without (if you can find one)  
• Assume that all excess returns of firm are due to intangible.  
• Compare multiples at which firm trades to sector averages. | Option valuation  
• Value the undeveloped patent as an option to develop the underlying product.  
• Value expansion options as call options  
• Value abandonment options as put options. |
| **Challenges**                       | • Life is usually finite and terminal value may be small.  
• Cashflows and value may be person dependent (for professional practices) | With multiple intangibles (brand name and reputation for service), it becomes difficult to break down individual components. | • Need exclusivity.  
• Difficult to replicate and arbitrage (making option pricing models dicey) |
## Valuing Brand Name

<table>
<thead>
<tr>
<th></th>
<th>Coca Cola</th>
<th>With Cott Margins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Revenues =</td>
<td>$21,962.00</td>
<td>$21,962.00</td>
</tr>
<tr>
<td>Length of high-growth period</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Reinvestment Rate =</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Operating Margin (after-tax)</td>
<td>15.57%</td>
<td>5.28%</td>
</tr>
<tr>
<td>Sales/Capital (Turnover ratio)</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td>Return on capital (after-tax)</td>
<td>20.84%</td>
<td>7.06%</td>
</tr>
<tr>
<td>Growth rate during period (g) =</td>
<td>10.42%</td>
<td>3.53%</td>
</tr>
<tr>
<td>Cost of Capital during period =</td>
<td>7.65%</td>
<td>7.65%</td>
</tr>
<tr>
<td>Stable Growth Period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth rate in steady state =</td>
<td>4.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td>Return on capital =</td>
<td>7.65%</td>
<td>7.65%</td>
</tr>
<tr>
<td>Reinvestment Rate =</td>
<td>52.28%</td>
<td>52.28%</td>
</tr>
<tr>
<td>Cost of Capital =</td>
<td>7.65%</td>
<td>7.65%</td>
</tr>
<tr>
<td><strong>Value of Firm =</strong></td>
<td><strong>$79,611.25</strong></td>
<td><strong>$15,371.24</strong></td>
</tr>
</tbody>
</table>
6. Be circumspect about defining debt for cost of capital purposes...

- **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
But should consider other potential liabilities when getting to equity value…

- 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
7. The Value of Control

- The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -
  - **Probability that control of firm will change:** This refers to the probability that incumbent management will be replaced. This can be either through acquisition or through existing stockholders exercising their muscle.
  - **Value of Gaining Control of the Company:** The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control.

\[
\text{Value of Gaining Control} = \text{Present Value (Value of Company with change in control - Value of company without change in control)} + \text{Side Benefits of Control}
\]
8. The Value of Control

The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -

- **Probability that control of firm will change**: This refers to the probability that incumbent management will be replaced. This can be either through acquisition or through existing stockholders exercising their muscle.

- **Value of Gaining Control of the Company**: The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control.

**Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control**
Assessing the Probability of Control Change at Gerdau

- On the minus side, the company has voting and non-voting shares and the Gerdau family is firmly in control of the firm (as attested to by their holding of the voting shares and their presence in top management and the board of directors).
- On the plus side, the non-voting shareholders have been provided with full tag-along rights in a takeover, entitling them to a fair share of the gains.

**Bottom line:** The probability of control changing in a hostile takeover is close to zero. The probability of control changing in a friendly takeover is much higher.
**Increase Cash Flows**

- More efficient operations and cost cutting: Higher Margins
- Divest assets that have negative EBIT
- Reduce tax rate: - moving income to lower tax locales - transfer pricing - risk management

**Revenues**

- Operating Margin = EBIT
- Tax Rate * EBIT
- EBIT (1-t)
- Depreciation
- Capital Expenditures
- Chg in Working Capital

= FCFF

**Reduce the cost of capital**

- Make your product/service less discretionary
- Reduce Operating leverage

**Cost of Equity** * (Equity/Capital) + Pre-tax Cost of Debt (1- tax rate) * Debt/Capital

**Reduce beta**

- Match your financing to your assets: Reduce your default risk and cost of debt
- Shift interest expenses to higher tax locales
- Change financing mix to reduce cost of capital

**Firm Value**

**Increase Expected Growth**

- Reinvest more in projects
- Increase operating margins

**Reinvestment Rate**

* Return on Capital

= Expected Growth Rate

**Do acquisitions**

**Increase length of growth period**

- Build on existing competitive advantages
- Create new competitive advantages

**Increase capital turnover ratio**
Current Cashflow to Firm

- EBIT(1-t) : $1423
- Nt CpX 465
- Chg WC 240
FCFF $717

Reinvestment Rate = 705/1423 = 49.6%

EBIT(1-t) + Nt CpX + Chg WC = FCFF

Expected Growth in EBIT (1-t)

.60*.1681 = .1009
10.09%

Stable Growth

g = 4%; Beta = 0.80;
Country Premium = 1.5%
Cost of capital = 7.82%
ROC = 7.82%; Tax rate = 34%
Reinvestment Rate = g/ROC = 4/7.82 = 51.18%

Terminal Value = 1168/(.0782 - .04) = 30,603

Discount at Cost of Capital (WACC) = 9.34% (.76) + 4.98% (0.24) = 8.31%

On June 1, 2007
Gerdau Price = R$ 36.5
The Optimal Financing Mix for Gerdau…

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Bond Rating</th>
<th>Interest rate on debt</th>
<th>Tax Rate</th>
<th>Cost of Debt (after-tax)</th>
<th>WACC</th>
<th>Firm Value (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.63</td>
<td>9.82%</td>
<td>AAA</td>
<td>6.80%</td>
<td>34.00%</td>
<td>4.49%</td>
<td>9.82%</td>
<td>$25,205</td>
</tr>
<tr>
<td>10%</td>
<td>0.68</td>
<td>10.01%</td>
<td>AAA</td>
<td>6.80%</td>
<td>34.00%</td>
<td>4.49%</td>
<td>9.46%</td>
<td>$26,280</td>
</tr>
<tr>
<td>20%</td>
<td>0.73</td>
<td>10.24%</td>
<td>AA</td>
<td>7.05%</td>
<td>34.00%</td>
<td>4.65%</td>
<td>9.12%</td>
<td>$27,341</td>
</tr>
<tr>
<td>30%</td>
<td>0.81</td>
<td>10.54%</td>
<td>A</td>
<td>7.85%</td>
<td>34.00%</td>
<td>5.18%</td>
<td>8.93%</td>
<td>$27,990</td>
</tr>
<tr>
<td>40%</td>
<td>0.91</td>
<td>10.93%</td>
<td>A-</td>
<td>8.05%</td>
<td>34.00%</td>
<td>5.31%</td>
<td>8.69%</td>
<td>$28,864</td>
</tr>
<tr>
<td>50%</td>
<td>1.05</td>
<td>11.49%</td>
<td>BBB</td>
<td>8.30%</td>
<td>34.00%</td>
<td>5.48%</td>
<td>8.48%</td>
<td>$29,626</td>
</tr>
<tr>
<td>60%</td>
<td>1.26</td>
<td>12.32%</td>
<td>B-</td>
<td>14.05%</td>
<td>34.00%</td>
<td>9.27%</td>
<td>10.49%</td>
<td>$23,453</td>
</tr>
<tr>
<td>70%</td>
<td>1.60</td>
<td>13.71%</td>
<td>CC</td>
<td>17.55%</td>
<td>34.00%</td>
<td>11.58%</td>
<td>12.22%</td>
<td>$19,875</td>
</tr>
<tr>
<td>80%</td>
<td>2.31</td>
<td>16.54%</td>
<td>CC</td>
<td>17.55%</td>
<td>33.45%</td>
<td>11.68%</td>
<td>12.65%</td>
<td>$19,144</td>
</tr>
<tr>
<td>90%</td>
<td>4.62</td>
<td>25.78%</td>
<td>CC</td>
<td>17.55%</td>
<td>29.73%</td>
<td>12.33%</td>
<td>13.68%</td>
<td>$17,603</td>
</tr>
</tbody>
</table>
Current Cashflow to Firm

EBIT(1-t) : $1423
- Nt CpX 465
- Chg WC 240
= FCFF $ 717
Reinvestment Rate = 705/1423 = 49.6%

Expected Growth in EBIT (1-t)

70% * .15 = .105
10.50%

Reinvestment Rate = 705/1423 = 49.6%

Expected Growth
in EBIT (1-t)

.70*.15=.105
10.50%

Stable Growth

g = 4%; Beta = 0.80;
Country Premium= 1.5%
Cost of capital = 7.85%
ROC= 7.85%; Tax rate=34%
Reinvestment Rate=g/ROC
=4/7.85= 50.96%

Cost of Equity

10.50%

Cost of Debt

(4.8%+1.25%+2.25%)(1-.34)
= 5.48%

Weights

E = 50%  D = 50%

Riskfree Rate:

$ Riskfree Rate= 4.8%

Beta

1.05

Mature market premium

4 %

Lambda

0.60

Country Equity Risk Premium

2.50%

Country Default Spread

1.25%

Rel Equity Mkt Vol

2.00

Unlevered Beta for Sectors: 0.64
Firm’s D/E Ratio: 31%

On June 1, 2007
Gerdau Price = R$ 36.5
Minority Discounts and Voting Shares

- Assume that a firm has a value of $100 million run by incumbent managers and $150 million run optimally.
- Proposition 1: The market price will reflect the expected value of control
  - The firm has 10 million voting shares outstanding.
  - Since the potential for changing management is created by this offering, the value per share will fall between $10 and $15, depending upon the probability that is attached to the management change. Thus, if the probability of the management change is 60%, the value per share will be $13.00.

  \[
  \text{Value/Share} = \frac{(150 \times 0.6 + 100 \times 0.4)}{10} = 13
  \]

- Proposition 2: If you have shares with different voting rights, the voting shares will get a disproportionate share of the value of control…

- Proposition 3: The value of a minority interest (49%) of a private business will be significantly lower than the value of a majority stake in the same business if control has value.
Empirical Studies on Voting versus Non-Voting Shares

- Studies that compare the prices of traded voting shares against the prices of traded non-voting shares, to examine the value of the voting rights conclude that while the voting shares generally trade at a premium over the non-voting shares, the premium is small.

  - Lease, McConnell and Mikkelson (1983) find an average premium of only 5.44% for the voting shares. (There are similar findings in DeAngelo and DeAngelo (1985) and Megginson (1990))

  - These studies have been critiqued for underestimating the value of control, because the probability of gaining control by acquiring these voting shares is considered low for two reasons - first, a substantial block of the voting shares is often still held by one or two individuals in many of these cases, and second, the prices used in these studies are based upon small block trades, which are unlikely to give the buyer majority control.
8. Distress and the Going Concern Assumption

- Traditional valuation techniques are built on the assumption of a going concern, i.e., a firm that has continuing operations and there is no significant threat to these operations.
  - In discounted cashflow valuation, this going concern assumption finds its place most prominently in the terminal value calculation, which usually is based upon an infinite life and ever-growing cashflows.
  - In relative valuation, this going concern assumption often shows up implicitly because a firm is valued based upon how other firms - most of which are healthy - are priced by the market today.
- When there is a significant likelihood that a firm will not survive the immediate future (next few years), traditional valuation models may yield an over-optimistic estimate of value.
Cost of Equity: 16.80%

Cost of Debt: 4.8% + 8.0% = 12.8%

Risk Premium: 4%

Beta: 3.00 > 1.10

Weight: Debt = 74.91% -> 40%

Global Crossing
November 2001
Stock price = $1.86
Valuing Global Crossing with Distress

- **Probability of distress**
  - \[
  P_{\text{653}} = \sum_{t=1}^{8} \frac{120(1 - \pi_{\text{Distress}})^t}{(1.05)^t} + \frac{1000(1 - \pi_{\text{Distress}})^8}{(1.05)^8} \]
  - Probability of distress = 13.53% a year (Riskfree rate = 5%)
  - Cumulative probability of survival over 10 years = \( (1-0.1353)^{10} = 23.37\% \)

- **Distress sale value of equity**
  - Book value of capital = $14,531 million
  - Distress sale value = 15% of book value = 0.15*14531 = $2,180 million
  - Book value of debt = $7,647 million
  - Distress sale value of equity = $0

- **Distress adjusted value of equity**
  - Value of Global Crossing = $3.22 (.2337) + $0.00 (.7663) = $0.75
9. Equity to Employees: Effect on Value

In recent years, firms have turned to giving employees (and especially top managers) equity option packages as part of compensation. These options are usually:

- Long term
- At-the-money when issued
- On volatile stocks

Are they worth money? And if yes, who is paying for them?

Two key issues with employee options:

- How do options granted in the past affect equity value per share today?
- How do expected future option grants affect equity value today?
Equity Options and Value

- Options outstanding
  - Step 1: List all options outstanding, with maturity, exercise price and vesting status.
  - Step 2: Value the options, taking into account accounting dilution, vesting and early exercise considerations.
  - Step 3: Subtract from the value of equity and divide by the actual number of shares outstanding (not diluted or partially diluted).

- Expected future option and restricted stock issues
  - Step 1: Forecast value of options that will be granted each year as percent of revenues that year. (As firm gets larger, this should decrease)
  - Step 2: Treat as operating expense and reduce operating income and cash flows.
  - Step 3: Take present value of cashflows to value operations or equity.
10. Analyzing the Effect of Illiquidity on Value

- Investments which are less liquid should trade for less than otherwise similar investments which are more liquid.
- The size of the illiquidity discount should vary across firms and also across time. The conventional practice of relying upon studies of restricted stocks or IPOs will fail sooner rather than later.
  - Restricted stock studies are based upon small samples of troubled firms
  - The discounts observed in IPO studies are too large for these to be arms length transactions. They just do not make sense.
Illiquidity Discounts from Bid-Ask Spreads

- Using data from the end of 2000, for instance, we regressed the bid-ask spread against annual revenues, a dummy variable for positive earnings (DERN: 0 if negative and 1 if positive), cash as a percent of firm value and trading volume.

\[
\text{Spread} = 0.145 - 0.0022 \ln (\text{Annual Revenues}) - 0.015 \times \text{DERN} - 0.016 \left( \frac{\text{Cash}}{\text{Firm Value}} \right) - 0.11 \left( \frac{\$ \text{ Monthly trading volume}}{\text{Firm Value}} \right)
\]

- We could substitute in the revenues of Kristin Kandy ($5 million), the fact that it has positive earnings and the cash as a percent of revenues held by the firm (8%):

\[
\text{Spread} = 0.145 - 0.0022 \ln (5) - 0.015 (1) - 0.016 (0.08) - 0.11 (0) = 12.52\%
\]

- Based on this approach, we would estimate an illiquidity discount of 12.52% for Kristin Kandy.
Some closing thoughts on valuation…

- View “paradigm shifts” with skepticism.
- Focus on the big picture; don’t let the details trip you up.
- Keep your perspective; it is only a valuation.
- If you have to choose between valuation skills and luck….