THE DARK SIDE OF VALUATION: A JEDI GUIDE TO VALUING DIFFICULT-TO-VALUE COMPANIES

Anyone can value a money-making stable company..
The fundamental determinants of value...

What are the cashflows from existing assets?  
- Equity: Cashflows after debt payments  
- Firm: Cashflows before debt payments

What is the **value added** by growth assets?  
Equity: Growth in equity earnings/ cashflows  
Firm: Growth in operating earnings/ cashflows

How **risky are the cash flows** from both existing assets and growth assets?  
Equity: Risk in equity in the company  
Firm: Risk in the firm’s operations

When will the firm become a **mature firm**, and what are the potential roadblocks?
The Dark Side of Valuation...

- 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...

- 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...

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

- Cash flows from existing assets non-existent or negative.

- What are the cashflows from existing assets?

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

- What is the value of equity in the firm?

- What is the value added by growth assets?

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

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

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

- Will the firm will make it through the gauntlet of market demand and competition. Even if it does, assessing when it will become mature is difficult because there is so little to go on.
Upping the ante.. Young companies in young businesses...

- 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

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

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

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

Cost of Equity 12.90%

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

Riskfree Rate: T. Bond rate = 6.5%

β + 1.60 -> 1.00

Beta

Risk Premium

4%

Internet/ Retail Operating Leverage Current D/E: 1.21%

Base Equity Premium

Country Risk Premium

Amazone was trading at $84 in January 2000.

Pushed debt ratio to retail industry average of 15%.
Lesson 1: Don’t trust regression betas....

<table>
<thead>
<tr>
<th>AMZN</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Index</td>
<td>SPX</td>
</tr>
<tr>
<td>Period</td>
<td>Weekly</td>
</tr>
<tr>
<td>Range</td>
<td>2/7/79 To 2/18/00</td>
</tr>
<tr>
<td>Market</td>
<td>Trade</td>
</tr>
<tr>
<td>ADJ BETA</td>
<td>1.82</td>
</tr>
<tr>
<td>RAW BETA</td>
<td>2.23</td>
</tr>
<tr>
<td>Alpha (Intercept)</td>
<td>2.60</td>
</tr>
<tr>
<td>R2 (Correlation)</td>
<td>0.17</td>
</tr>
<tr>
<td>Std Dev of Error</td>
<td>13.20</td>
</tr>
<tr>
<td>Std Error of Beta</td>
<td>0.50</td>
</tr>
<tr>
<td>Number of Points</td>
<td>103</td>
</tr>
</tbody>
</table>

Adj beta = (0.67) * Raw Beta + (0.33) * 1.0


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

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>Operating Margin</th>
<th>EBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tr12m</td>
<td>$1,117</td>
<td>-36.71%</td>
<td>-$410</td>
</tr>
<tr>
<td>1</td>
<td>$2,793</td>
<td>-13.35%</td>
<td>-$373</td>
</tr>
<tr>
<td>2</td>
<td>$5,585</td>
<td>-1.68%</td>
<td>-$94</td>
</tr>
<tr>
<td>3</td>
<td>$9,774</td>
<td>4.16%</td>
<td>$407</td>
</tr>
<tr>
<td>4</td>
<td>$14,661</td>
<td>7.08%</td>
<td>$1,038</td>
</tr>
<tr>
<td>5</td>
<td>$19,059</td>
<td>8.54%</td>
<td>$1,628</td>
</tr>
<tr>
<td>6</td>
<td>$23,862</td>
<td>9.27%</td>
<td>$2,212</td>
</tr>
<tr>
<td>7</td>
<td>$28,729</td>
<td>9.64%</td>
<td>$2,768</td>
</tr>
<tr>
<td>8</td>
<td>$33,211</td>
<td>9.82%</td>
<td>$3,261</td>
</tr>
<tr>
<td>9</td>
<td>$36,798</td>
<td>9.91%</td>
<td>$3,646</td>
</tr>
<tr>
<td>10</td>
<td>$39,006</td>
<td>9.95%</td>
<td>$3,883</td>
</tr>
<tr>
<td>TY(11)</td>
<td>$41,346</td>
<td>10.00%</td>
<td>$4,135</td>
</tr>
</tbody>
</table>

Aswath Damodaran
Lesson 3: Scaling up is hard to do...

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

*Post-I.P.O. growth
Median of new issues from 1965 to 2005*

Source: Andrew Metrick
The New York Times
Lesson 4: Don’t forget to pay for growth... and check your reinvestment...

<table>
<thead>
<tr>
<th>Year</th>
<th>Rev growth</th>
<th>Chg in Rev</th>
<th>Reinv</th>
<th>S/Cap</th>
<th>ROC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150.00%</td>
<td>$1,676</td>
<td>$559</td>
<td>3.00</td>
<td>-76.62%</td>
</tr>
<tr>
<td>2</td>
<td>100.00%</td>
<td>$2,793</td>
<td>$931</td>
<td>3.00</td>
<td>-8.96%</td>
</tr>
<tr>
<td>3</td>
<td>75.00%</td>
<td>$4,189</td>
<td>$1,396</td>
<td>3.00</td>
<td>20.59%</td>
</tr>
<tr>
<td>4</td>
<td>50.00%</td>
<td>$4,887</td>
<td>$1,629</td>
<td>3.00</td>
<td>25.82%</td>
</tr>
<tr>
<td>5</td>
<td>30.00%</td>
<td>$4,398</td>
<td>$1,466</td>
<td>3.00</td>
<td>21.16%</td>
</tr>
<tr>
<td>6</td>
<td>25.20%</td>
<td>$4,803</td>
<td>$1,601</td>
<td>3.00</td>
<td>22.23%</td>
</tr>
<tr>
<td>7</td>
<td>20.40%</td>
<td>$4,868</td>
<td>$1,623</td>
<td>3.00</td>
<td>22.30%</td>
</tr>
<tr>
<td>8</td>
<td>15.60%</td>
<td>$4,482</td>
<td>$1,494</td>
<td>3.00</td>
<td>21.87%</td>
</tr>
<tr>
<td>9</td>
<td>10.80%</td>
<td>$3,587</td>
<td>$1,196</td>
<td>3.00</td>
<td>21.19%</td>
</tr>
<tr>
<td>10</td>
<td>6.00%</td>
<td>$2,208</td>
<td>$736</td>
<td>3.00</td>
<td>20.39%</td>
</tr>
</tbody>
</table>
Lesson 5: And don’t worry about dilution... It is already factored in

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

<table>
<thead>
<tr>
<th></th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>$ (1.94)</td>
<td>$ 2.95</td>
<td>$ 7.84</td>
<td>$ 12.71</td>
<td>$ 17.57</td>
</tr>
<tr>
<td>35%</td>
<td>$ 1.41</td>
<td>$ 8.37</td>
<td>$ 15.33</td>
<td>$ 22.27</td>
<td>$ 29.21</td>
</tr>
<tr>
<td>40%</td>
<td>$ 6.10</td>
<td>$ 15.93</td>
<td>$ 25.74</td>
<td>$ 35.54</td>
<td>$ 45.34</td>
</tr>
<tr>
<td>45%</td>
<td>$ 12.59</td>
<td>$ 26.34</td>
<td>$ 40.05</td>
<td>$ 53.77</td>
<td>$ 67.48</td>
</tr>
<tr>
<td>50%</td>
<td>$ 21.47</td>
<td>$ 40.50</td>
<td>$ 59.52</td>
<td>$ 78.53</td>
<td>$ 97.54</td>
</tr>
<tr>
<td>55%</td>
<td>$ 33.47</td>
<td>$ 59.60</td>
<td>$ 85.72</td>
<td>$ 111.84</td>
<td>$ 137.95</td>
</tr>
<tr>
<td>60%</td>
<td>$ 49.53</td>
<td>$ 85.10</td>
<td>$ 120.66</td>
<td>$ 156.22</td>
<td>$ 191.77</td>
</tr>
</tbody>
</table>
Lesson 7: You will be wrong 100% of the time... and it really is not (always) 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).
**Amazon.com January 2001**

**9b. Amazon in January 2001**

- **Current Revenue**: $2,465
- **Current Margin**: -34.60%
- **NOL**: 1,289 m
- **Value of Op Assets**: $8,789
- **Reinvestment**: Cap ex includes acquisitions
- **Working capital is 3% of revenues**
- **EBIT**: -853m
- **Revenue Growth**: 25.41%
- **Sales Turnover Ratio**: 3.02
- **Expected Margin**: -> 9.32%
- **Beta**: 2.18
- **Risk Premium**: 4%
- **Beta** + 1.10 × 4% = 10.0%
- **Cost of Equity**
- **Cost of Debt**: 6.5%+3.5%=10.0%
- **Tax rate = 0% -> 35%**

- **Value of Firm**: $10,052
  - **Value of Debt**: $1,879
  - **Value of Equity**: $8,173
  - **Equity Options**: $845
  - **Value per share**: $20.83

- **Value of Debt**: $1,879
  - **Value of Equity**: $8,173
  - **Equity Options**: $845

- **Cost of Capital**: 12.73%
- **Weights**: Debt= 27.3% -> 15%

- **Debt Ratio**: 27.27%
- **Cost of Debt**: 6.5%+3.5%=10.0%
- **Cost of Equity**: 13.81%
- **Beta**: 2.18

**Terminal Value**: $28,310

- **Stable Growth**
  - **Stable Revenue Growth**: 5%
  - **Stable Operating Margin**: 9.32%
  - **Stable ROC=16.94%
  - **Reinvest 29.5% of EBIT(1-t)**

**Riskfree Rate**: T. Bond rate = 5.1%

- **Internet/ Retail**
- **Operating Leverage**
- **Current D/E: 37.5%
- **Base Equity Premium**
- **Country Risk Premium**

**Amazon.com January 2001**

**Stock price = $1**
And the market is often “more wrong”....
II. Mature Companies in transition..

- 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...

Figure 7.1: Estimation Issues - Mature Companies

- What are the cashflows from existing assets?
  - Equity claims can vary in voting rights and dividends.
  - What is the value of equity in the firm?

- How risky are the cash flows from both existing assets and growth assets?
  - Operating risk should be stable, but the firm can change its financial leverage. This can affect both the cost of equity and capital.

- What is the value added by growth assets?
  - Growth is usually not very high, but firms may still be generating healthy returns on investments, relative to cost of funding. Questions include how long they can generate these excess returns and with what growth rate in operations. Restructuring can change both inputs dramatically and some firms maintain high growth through acquisitions.

- When will the firm become a mature firm, and what are the potential roadblocks?
  - Maintaining excess returns or high growth for any length of time is difficult to do for a mature firm.
**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**

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating income after taxes</th>
<th>Expected growth rate</th>
<th>ROC</th>
<th>Reinvestment Rate</th>
<th>Reinvestment</th>
<th>FCFF</th>
<th>Cost of capital</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trailing 12 months</td>
<td>$315</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>$324</td>
<td>2.75%</td>
<td>14.34%</td>
<td>19.14%</td>
<td>$62</td>
<td>$262</td>
<td>6.79%</td>
<td>$245</td>
</tr>
<tr>
<td>2</td>
<td>$333</td>
<td>2.75%</td>
<td>14.34%</td>
<td>19.14%</td>
<td>$64</td>
<td>$269</td>
<td>6.79%</td>
<td>$236</td>
</tr>
<tr>
<td>3</td>
<td>$342</td>
<td>2.75%</td>
<td>14.34%</td>
<td>19.14%</td>
<td>$65</td>
<td>$276</td>
<td>6.79%</td>
<td>$227</td>
</tr>
<tr>
<td>Beyond</td>
<td>$350</td>
<td>2.35%</td>
<td>7.23%</td>
<td>32.52%</td>
<td>$114</td>
<td>$4,840</td>
<td>7.23%</td>
<td>$3,974</td>
</tr>
</tbody>
</table>

Value of operating assets: $4,682

(Add) Cash: $155

(Add) Debt: $491

(Add) 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 length of growth (to 5 years), and higher debt ratio (20%).

**Operating Restructuring**

1. Expected growth rate = ROC * Reinvestment Rate
2. Expected growth rate (status quo) = 14.34% * 19.14% = 2.75%
3. Expected growth rate (optimal) = 14.00% * 40% = 5.60%

ROC drops, reinvestment rises and growth goes up.

**Financial restructuring**

1. Cost of capital = Cost of equity (1-Debt ratio) + Cost of debt (Debt ratio)
2. Status quo = 7.33% (1-.104) + 3.60% (1-.40) (.104) = 6.79%
3. Optimal = 7.75% (1-.20) + 3.60% (1-.40) (.20) = 6.63%

Cost of equity rises but cost of capital drops.

**Probability of management change = 10%**

Expected value = $31.91 (.90) + $37.80 (.10) = $32.50

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

Exhibit 4: Top factors for meeting targets

<table>
<thead>
<tr>
<th>Top two factors most responsible for companies meeting cost targets or goals</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top-management support</td>
<td>44</td>
</tr>
<tr>
<td>Clear targets</td>
<td>39</td>
</tr>
<tr>
<td>Clear, well-planned approach</td>
<td>31</td>
</tr>
<tr>
<td>Necessary talent and capabilities in place</td>
<td>22</td>
</tr>
<tr>
<td>Sufficient accountability</td>
<td>19</td>
</tr>
<tr>
<td>Fact base necessary to make decisions</td>
<td>15</td>
</tr>
<tr>
<td>Sufficient communication</td>
<td>8</td>
</tr>
<tr>
<td>Less than expected impact of financial crisis</td>
<td>7</td>
</tr>
<tr>
<td>Sufficient investment in critical functional capabilities</td>
<td>3</td>
</tr>
<tr>
<td>Support from unions</td>
<td>3</td>
</tr>
<tr>
<td>Necessary incentives in place</td>
<td>2</td>
</tr>
<tr>
<td>Supportive regulations</td>
<td>0</td>
</tr>
</tbody>
</table>

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..

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


<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>0.78</td>
<td>7.00%</td>
<td>AAA</td>
<td>3.60%</td>
<td>40.00%</td>
<td>2.16%</td>
<td>7.00%</td>
<td>$4,523</td>
</tr>
<tr>
<td>10%</td>
<td>0.83</td>
<td>7.31%</td>
<td>AAA</td>
<td>3.60%</td>
<td>40.00%</td>
<td>2.16%</td>
<td>6.80%</td>
<td>$4,665</td>
</tr>
<tr>
<td><strong>10.39%</strong></td>
<td><strong>0.83</strong></td>
<td><strong>7.33%</strong></td>
<td><strong>AAA</strong></td>
<td><strong>3.60%</strong></td>
<td><strong>40.00%</strong></td>
<td><strong>2.16%</strong></td>
<td><strong>6.79%</strong></td>
<td><strong>$4,680</strong></td>
</tr>
<tr>
<td>20%</td>
<td>0.89</td>
<td>7.70%</td>
<td>AAA</td>
<td>3.60%</td>
<td>40.00%</td>
<td>2.16%</td>
<td>6.59%</td>
<td>$4,815</td>
</tr>
<tr>
<td>30%</td>
<td>0.97</td>
<td>8.20%</td>
<td>A+</td>
<td>4.60%</td>
<td>40.00%</td>
<td>2.76%</td>
<td>6.57%</td>
<td>$4,834</td>
</tr>
<tr>
<td>40%</td>
<td>1.09</td>
<td>8.86%</td>
<td>A-</td>
<td>5.35%</td>
<td>40.00%</td>
<td>3.21%</td>
<td>6.60%</td>
<td>$4,808</td>
</tr>
<tr>
<td>50%</td>
<td>1.24</td>
<td>9.79%</td>
<td>B+</td>
<td>8.35%</td>
<td>40.00%</td>
<td>5.01%</td>
<td>7.40%</td>
<td>$4,271</td>
</tr>
<tr>
<td>60%</td>
<td>1.47</td>
<td>11.19%</td>
<td>B-</td>
<td>10.85%</td>
<td>40.00%</td>
<td>6.51%</td>
<td>8.38%</td>
<td>$3,757</td>
</tr>
<tr>
<td>70%</td>
<td>1.86</td>
<td>13.52%</td>
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- **Debt ratio** is percent of overall market value of firm that comes from debt financing.
- As debt ratio increases, equity becomes riskier (higher beta) and cost of equity goes up.
- As firm borrows more money, its ratings drop and cost of debt rises.
- At debt ratios > 80%, firm does not have enough operating income to cover interest expenses. Tax rate goes down to reflect lost tax benefits.
- As cost of capital drops, firm value rises (as operating cash flows remain unchanged).

Current Cost of Capital

Optimal: Cost of capital lowest between 20 and 30%.
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.**

**What are the cashflows from existing assets?**

**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?**

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

**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.**

Aswath Damodaran
a. Dealing with Decline

- 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.

Aswath Damodaran
11. Sears Holdings: Status Quo

Current Cashflow to Firm
- EBIT(1-t) : 1,183
- Nt CpX : -18
- Chg WC : -67
- = FCFF : 1,268
- Reinvestment Rate = -75/1183
- Return on capital = 4.99%

Expected Growth in EBIT (1-t)
- -30.00%
- -1.5%

Return on Capital
5%

Stable Growth
- g = 2%; Beta = 1.00;
- Country Premium = 0%
- Cost of capital = 7.13%
- ROC = 7.13%; Tax rate = 38%
- Reinvestment Rate = 28.05%

Terminal Value = 868/(.0713-.02) = 16,921

Op. Assets 17,634
+ Cash: 1,622
- Debt 7,726
= Equity 11,528
- Options 5
- Value/Share $87.29

EBIT (1-t) 1 2 3 4
$1,165 $1,147 $1,130 $1,113
- Reinvestment ($349) ($344) ($339) ($334)
FCFF $1,514 $1,492 $1,469 $1,447

Discount at Cost of Capital (WACC) = 9.58%(.566) + 4.80%(0.434) = 7.50%

Cost of Equity 9.58%

Riskfree Rate
Riskfree rate = 4.09%

Risk Premium
4.00%

Unlevered Beta for Sectors: 0.77
Firm’s D/E Ratio: 93.1%
Mature risk premium 4%
Country Equity Prem 0%

Beta 1.22

On July 23, 2008, Sears was trading at $76.25 a share.

Aswath Damodaran
b. Dealing with the “downside” of Distress

- 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 \( (1 - \text{Probability of distress}) + \) Distress sale value of equity \( \times \text{Probability of distress} \)

- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds.

- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).
Cost of Equity: 21.82%
Cost of Debt: 3% + 6% = 9%
Weights: Debt = 73.5% -> 50%

Beta: 3.14 -> 1.20
Risk Premium: 6%
T. Bond rate = 3%

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..

- 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:

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

- Solving for the probability of bankruptcy, we get:
  - \( \pi_{\text{Distress}} \) = Annual probability of default = 13.54%
  - Cumulative probability of surviving 10 years = (1 - .1354)10 = 23.34%
  - Cumulative probability of distress over 10 years = 1 - .2334 = .7666 or 76.66%

- If LVS is becomes distressed:
  - Expected distress sale proceeds = $2,769 million < Face value of debt
  - Expected equity value/share = $0.00
  - Expected value per share = $8.12 (1 - .7666) + $0.00 (.7666) = $1.92

Aswath Damodaran
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.

What are the cashflows from existing assets?

What is the value added by growth assets?

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?

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

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

Cross holdings can affect value of equity

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

- 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.
<table>
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<tr>
<th>Region</th>
<th>Country</th>
<th>Red: Country risk premium</th>
<th>Black: Total ERP</th>
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**Black #: Total ERP**

**Red #: Country risk premium**

**AVG: GDP weighted average**
Indofoods - April 2014

+ Cash: 18,367  
- Debt 27,492  
- Minority Int 14,725  
= Equity 47,373  
- Options 0  
Value/Share 5,395 IDR

Current Cashflow to Firm
EBIT(1-t) = 6,222(1-.263) = 4,587  
- (Cap Ex - Deprec) 4,997  
- Chg Working capital 63  
= FCFF -473  
Reinvestment Rate = 7967/4587 =175.04%  
Return on capital = 21.15%

Stable Growth
g = 6%; Beta = 1.00;  
Debt %= 30.3%; k(debt)= 7.5%  
Cost of capital =12.2%  
Tax rate=25%; ROC= 15%;  
Reinvestment Rate=6/15=40%

Terminal Value = 10,810/(.122-.06) = 174,434

Return on Capital 22.20%

Reinvestment Rate 78.03%

Expected Growth .222*.7803= .1725 or 17.25%

Expected Growth
Year 1 2 3 4 5 6 7 8 9 10
EBIT (1-t) 5388 6328 7432 8729 10252 11809 13338 14763 16008 16997
- Reinvestment 4204 4938 5799 6811 7999 8317 8378 8151 7621 6799
FCFF 1184 1390 1633 1918 2252 3493 4959 6612 8387 10198

First 5 years
Growth declines gradually to 2.75%

Cost of Capital (WACC) = 14.20% (.697) + 9.56% (0.303) = 12.79%

Cost of Debt (6.24%+4.3%+2.2%)(1-.25) = 9.56%  
Based on actual A rating

Cost of Equity 14.20

Riskfree Rate:  
Riskfree rate = 6.24%

Beta 0.97

Unlevered Beta for Sectors: 0.7323  
D/E= 43.49%

ERP for operations 8.21%

In April 2014, Indofoods was trading at 7200 IDR/share

In April 2014, Indofoods was trading at 7200 IDR/share

In April 2014, Indofoods was trading at 7200 IDR/share

In April 2014, Indofoods was trading at 7200 IDR/share

In April 2014, Indofoods was trading at 7200 IDR/share

Indonesia 92.70% 8.30%  
Other countries 7.30% Varied  
Indofood 100.00% 8.21%
Lesson 2: Currency should not matter

- 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).
Lesson 3: The “corporate governance” drag

- 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.
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 Value:
5 = 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

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:
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%

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

Rs 61.57

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

**Current Cashflow to Firm**
- EBIT(1-t): 4,425
- Nt CpX: 843
- Chg WC: 4,150
- FCFF: -568
- Reinvestment Rate: 60%

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

**Return on Capital**
- 12.20%

**Existent 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

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

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

**Terminal Value**
- 3904 / (.1478 - .05) = 39.921

**Return on Capital**
- 12.20%

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

**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**
- Rs riskfree rate = 12%

**Risk Premium**
- 9.23%

**Beta**
- 1.17

**Unlevered Beta for Sectors**
- 0.75

**Firm's D/E Ratio**
- 79%

**Mature Risk Premium**
- 4%

**Country Risk Premium**
- 5.23%

**Company earns higher returns on new projects**

**Terminal Value**
- 3904 / (.1478 - .05) = 39.921
### Current Cashflow to Firm
- **EBIT(1-t)**: $4,425
- **Nt CpX**: 843
- **Chg WC**: 4,150

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

**Reinvestment Rate** = 112.82%

### Expected Growth
- **60** * 0.122 + 0.0581 = 0.1313
- **13.13%**

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

### Terminal Value
- $5081 / (0.1478 - 0.05) = 51,956$

### Discount at Cost of Capital (WACC)
- **Cost of Equity** = 22.80%
- **Cost of Debt** = (12% + 1.50%) * (1 - 0.30) = 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%

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

### Value of Shares:
- **EBIT(1-t)**
- **Reinvestment**
- **FCFF**

**Return on Capital** = 12.20%

### Improvement on existing assets
- **(1 + (0.122 - 0.092) / 0.092)^1/5 - 1**

### Term Yrs:
- **8,610**
- **3,529**
- **5,081**

---

87 Aswath Damodaran
Lesson 4: Watch out for cross holdings...

- Emerging market companies are more prone to having cross holdings that 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**

- Debt to EBIT: Rs 5,683
- NCI: Rs 5,683
- Chg WC: Rs 4,229
- PPCC: Rs 4,228
- Reinvestment Rate = (5823 + 4222)/5833 = 72.50%

**Tata Motors: April 2010**

- Debt to EBIT: Rs 20,116
- NCI: Rs 3,188
- Chg WC: Rs 2,373
- PPCC: Rs 31,305
- Reinvestment Rate = (3,188 + 2,373)/53,429 = 70.61%

**Tata Steel: April 2010**

- Debt to EBIT: Rs 4,342
- NCI: Rs 6,130
- Chg WC: Rs 31,675
- PPCC: Rs 37,294
- Reinvestment Rate = (31,675 + 37,294)/146,299 = 70.61%

**TCS: April 2010**

- Debt to EBIT: Rs 43,420
- NCI: Rs 6,130
- Chg WC: Rs 31,675
- PPCC: Rs 37,294
- Reinvestment Rate = (31,675 + 37,294)/146,299 = 70.61%

---

**Cost of Equity**

- Riskfree Rate: 5%
- Country Equity Risk premium: 3%
- Mkt Vol: 1.50

**Cost of Debt**

- Cost of Debt = 8.45% + 3% = 11.45%

**Value/Share**

- Rs 372

---

**Return on Capital**

- 13.64%

---

**Return on Capital**

- Average reinvestment rate from 2007-09: 55.6%
- Return on Capital: 10.36%

---

**Return on Capital**

- Average reinvestment rate from 2007-09: 55.6%
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---

**Return on Capital**

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**Return on Capital**

- Average reinvestment rate from 2007-09: 55.6%
- Return on Capital: 10.36%

---

**Return on Capital**

- Average reinvestment rate from 2007-09: 55.6%
- Return on Capital: 10.36%
Tata Companies: Value Breakdown

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

- 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.
Dealing with truncation risk..

- Assume that you are valuing Gazprom, the Russian oil company and have estimated a value of US $180 billion for the operating assets. The firm has $30 billion in debt outstanding. What is the value of equity in the firm?

- Now assume that the firm has 15 billion shares outstanding. Estimate the value of equity per share.

- The Russian government owns 42% of the outstanding shares. Would that change your estimate of value of equity per share?
V. Valuing Financial Service Companies

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

What are the cashflows from existing assets?

Preferred stock is a significant source of capital.

What is the value of equity in the firm?

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?

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

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

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

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

Aswath Damodaran
2a. ABN AMRO - December 2003

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.

Dividends
EPS = 1.85 Eur
* Payout Ratio 48.65%
DPS = 0.90 Eur

Retention Ratio = 51.35%

Expected Growth
51.35% *
16% = 8.22%

EPS
2.00 Eur
2.17 Eur
2.34 Eur
2.54 Eur
2.75 Eur

DPS
0.97 Eur
1.05 Eur
1.14 Eur
1.23 Eur
1.34 Eur

Value of Equity per share = PV of Dividends & Terminal value at 8.15% = 27.62 Euros

Discount at Cost of Equity

Cost of Equity
4.95% + 0.95 (4%) = 8.15%

Riskfree Rate:
Long term bond rate in Euros
4.35%

Beta
0.95

Risk Premium
4%

Average beta for European banks = 0.95

Mature Market
4%

Country Risk
0%

Terminal Value = EPS6*Payout/(r-g)
= (2.86*.521)/(.0835-.04) = 34.20

In December 2003, Amro was trading at 18.55 Euros per share

ROE = 16%
2b. Goldman Sachs: August 2008

Rationale for model
Why dividends? Because FCFE cannot be estimated
Why 3-stage? Because the firm is behaving (reinvesting, growing) like a firm with potential.

Dividends
EPS = $16.77 *
Payout Ratio 8.35%
DPS = $1.40
(Updated numbers for 2008 financial year ending 11/08)

Expected Growth in first 5 years = 91.65% * 13.19% = 12.09%

Retention Ratio = 91.65%

Terminal Value = EPS10 * Payout/(r-g)
= (42.03 * 1.04 * 0.6) / (0.095 - 0.04) = 476.86

Value of Equity per share = PV of Dividends & Terminal value = $222.49

Discount at Cost of Equity
Between years 6-10, as growth drops to 4%, payout ratio increases and cost of equity decreases.

Cost of Equity
4.10% + 1.40(4.5%) = 10.4%

Riskfree Rate:
Treasury bond rate 4.10%

Beta
1.40

Risk Premium
4.5%
Implied Equity Risk premium in 8/08

Average beta for investment banks = 1.40

Beta
1.40

45

Aswath Damodaran
Lesson 1: Financial service companies are opaque...

- 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

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.

Return on equity: 17.56%

Dividends (Trailing 12 months)
EPS = 2.16 * Payout Ratio 54.63%
DPS = $1.18

Retention Ratio = 45.37%

Expected Growth
45.37% * 13.5% = 6.13%

EPS $ 2.29 $2.43 $2.58 $2.74 $2.91
DPS $1.25 $1.33 $1.41 $1.50 $1.59

Terminal Value= EPS6*Payout/(r-g)
= ($3.00*.6055)/(.076-.03) = $39.41

Discount at Cost of Equity

Cost of Equity
3.60% + 1.20 (5%) = 9.60%

RiskFree Rate:
Long term treasury bond rate
3.60%

Beta
1.20

Risk Premium
5%
Updated in October 2008

Average beta for US Banks over last year: 1.20

Mature Market
5%

Country Risk
0%

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

In October 2008, Wells Fargo was trading at $33 per share

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

- 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:
  - \[\text{FCFE} = \text{Net Income} - \text{Reinvestment in regulatory capital (book equity)}\]
To estimate the FCFE for a bank, we redefine reinvestment as investment in regulatory capital. Since any dividends paid deplete equity capital and retained earnings increase that capital, the FCFE is:

$$\text{FCFE}_{\text{Bank}} = \text{Net Income} - \text{Increase in Regulatory Capital (Book Equity)}$$

### Deutsche Bank: FCFE

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Steady state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Base</td>
<td>€312,882</td>
<td>€325,398</td>
<td>€338,414</td>
<td>€351,950</td>
<td>€366,028</td>
<td>€380,669</td>
<td>€392,089</td>
</tr>
<tr>
<td>Capital ratio</td>
<td>10.20%</td>
<td>10.16%</td>
<td>10.12%</td>
<td>10.08%</td>
<td>10.04%</td>
<td>10.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>Regulatory Capital</td>
<td>€31,914</td>
<td>€33,060</td>
<td>€34,247</td>
<td>€35,477</td>
<td>€36,749</td>
<td>€38,067</td>
<td>€39,244</td>
</tr>
<tr>
<td>Change in regulatory capital</td>
<td>€1,146</td>
<td>€1,187</td>
<td>€1,229</td>
<td>€1,273</td>
<td>€1,318</td>
<td>€1,177</td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>9.40%</td>
<td>9.56%</td>
<td>9.72%</td>
<td>9.88%</td>
<td>10.04%</td>
<td>10.20%</td>
<td>10.20%</td>
</tr>
<tr>
<td>Net Income</td>
<td>€3,000</td>
<td>€3,161</td>
<td>€3,329</td>
<td>€3,505</td>
<td>€3,690</td>
<td>€3,883</td>
<td>€4,003</td>
</tr>
<tr>
<td>Investment in Regulatory Capital</td>
<td>€1,146</td>
<td>€1,187</td>
<td>€1,229</td>
<td>€1,273</td>
<td>€1,318</td>
<td>€1,177</td>
<td></td>
</tr>
<tr>
<td>FCFE</td>
<td>€2,014</td>
<td>€2,142</td>
<td>€2,276</td>
<td>€2,417</td>
<td>€2,565</td>
<td>€2,826</td>
<td></td>
</tr>
</tbody>
</table>

Aswath Damodaran
Aswath Damodaran

2d. Deutsche Bank: March 2009

Last 2 years
- 2007
  - Net Income: 3,954 m
  - Dividends: 2,146 m
  - Risk adjusted assets: 312,882 m
  - Book Equity: 31,914 m
  - Regulatory Capital:
- 2008
  - Net Income: -3,855 m
  - Dividends: 285 m
  - Risk adjusted assets: 312,882 m
  - Book Equity: 31,914 m
  - Regulatory Capital:

Normalized Net Income for base year 3,000 m
- Normalized ROE: 9.4%

Expected growth in asset base 4%

Target capital ratio 10%

Target ROE 10.2%

Stable Growth
- g = 3%
- Beta = 1.00
- Cost of equity = 10.20%
- Return on equity = 10.20%
- Reinvestment Rate = g/ROE = 3/10.20% = 29.41%

Cashflows

<table>
<thead>
<tr>
<th>Year</th>
<th>Capital</th>
<th>ROE</th>
<th>Change in capital</th>
<th>Net Income</th>
<th>Reinvestment</th>
<th>FCFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>325,398</td>
<td>9.56%</td>
<td>1,146</td>
<td>3,161</td>
<td>1,146</td>
<td>2,014</td>
</tr>
<tr>
<td>2</td>
<td>338,414</td>
<td>9.72%</td>
<td>1,187</td>
<td>3,299</td>
<td>1,187</td>
<td>2,142</td>
</tr>
<tr>
<td>3</td>
<td>351,950</td>
<td>9.88%</td>
<td>1,229</td>
<td>3,505</td>
<td>1,229</td>
<td>2,278</td>
</tr>
<tr>
<td>4</td>
<td>366,028</td>
<td>10.4%</td>
<td>1,273</td>
<td>3,690</td>
<td>1,273</td>
<td>2,417</td>
</tr>
<tr>
<td>5</td>
<td>380,669</td>
<td>10.2%</td>
<td>1,318</td>
<td>3,883</td>
<td>1,318</td>
<td>2,565</td>
</tr>
</tbody>
</table>

Terminal Value = 2,823/(1.102^-3) = 39,209 m

PV of CF = 31,383 m
- # shares = 581.85
- Value/Share = 53.94€

Discount at Cost of equity = 3.60% + 1.162 * 6% + -0.60% = 11.172%

In March 2009
- Deutsche Bank price = 48 Euros/share (down from 89 Euros in early 2008)

Riskfree Rate:
- Euro Riskfree Rate = 3.6%

Beta for commercial & Investment banking

<table>
<thead>
<tr>
<th>Region</th>
<th>Lambda</th>
<th>CRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe</td>
<td>0.68</td>
<td>0.00%</td>
</tr>
<tr>
<td>United States</td>
<td>0.42</td>
<td>0.00%</td>
</tr>
<tr>
<td>Latin America</td>
<td>0.01</td>
<td>4.50%</td>
</tr>
<tr>
<td>Africa &amp; Middle East</td>
<td>0.01</td>
<td>7.00%</td>
</tr>
<tr>
<td>Asia</td>
<td>0.11</td>
<td>3.50%</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>0.04</td>
<td>3.00%</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>0.60</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
VI. Valuing Companies with “intangible” assets

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

What is the value added by growth assets?

What are the cashflows from existing assets?

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

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

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

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

Intangible assets such as brand name and customer loyalty can last for very long periods or dissipate overnight.
Lesson 1: Accounting rules are cluttered with inconsistencies...

- 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
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

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D Expense</th>
<th>Unamortized portion</th>
<th>Amortization this year</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>663.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>-9</td>
<td>823.00</td>
<td>0.10</td>
<td>82.30</td>
</tr>
<tr>
<td>-8</td>
<td>845.00</td>
<td>0.20</td>
<td>169.00</td>
</tr>
<tr>
<td>-7</td>
<td>864.00</td>
<td>0.30</td>
<td>259.20</td>
</tr>
<tr>
<td>-6</td>
<td>1117.00</td>
<td>0.40</td>
<td>446.80</td>
</tr>
<tr>
<td>-5</td>
<td>1655.00</td>
<td>0.50</td>
<td>827.50</td>
</tr>
<tr>
<td>-4</td>
<td>2028.00</td>
<td>0.60</td>
<td>1216.80</td>
</tr>
<tr>
<td>-3</td>
<td>2314.00</td>
<td>0.70</td>
<td>1619.80</td>
</tr>
<tr>
<td>-2</td>
<td>3366.00</td>
<td>0.80</td>
<td>2692.80</td>
</tr>
<tr>
<td>-1</td>
<td>3266.00</td>
<td>0.90</td>
<td>2939.40</td>
</tr>
<tr>
<td>Current</td>
<td>3030.00</td>
<td>1.00</td>
<td>3030.00</td>
</tr>
</tbody>
</table>

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

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

**Current Cashflow to Firm**
- EBIT(1-t) = $7336(1-0.28) = $6058
- Nt CpX = 6443
- Chg WC = -423
- FCFF = 6058 - 423
- Reinvestment Rate = 6480/6058 = 106.98%
- Return on capital = 16.71%

**Expected Growth in EBIT (1-t)**
- 0.60 * 0.16 = 0.096
- 9.6%

**Return on Capital**
- 16%

**Expected Growth**
- in EBIT (1-t)
- 0.60 * 0.16 = 0.096
- 9.6%

**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 Value**
- 10 = $7300/(0.0808 - 0.04) = $179,099

**Weight**
- E = 90%
- D = 10%

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

**Riskfree Rate**
- 4.78%

**Beta**
- 1.73

**Risk Premium**
- 4%

**Unlevered Beta for Sectors**
- 1.59

**D/E**
- 11.06%

---

**Op. Assets**
- 94214
  + **Cash**
  - **Debt**
  = **Equity**
  - **Options**
  **Value/Share** $74.33

---

**First 5 years**

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

**Growth decreases gradually to 4%**

**Term Yr**
- 18718
- 12167
- 4867
- 7300

**Debt ratio increases to 20%**

**Beta decreases to 1.10**

**On May 1, 2007, Amgen was trading at $55/share**
Lesson 2: And fixing those inconsistencies can alter your view of a company and affect its value

<table>
<thead>
<tr>
<th></th>
<th>No R&amp;D adjustment</th>
<th>R&amp;D adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>$5,071</td>
<td>$7,336</td>
</tr>
<tr>
<td>Invested Capital</td>
<td>$25,277</td>
<td>$33,173</td>
</tr>
<tr>
<td>ROIC</td>
<td>14.58%</td>
<td>18.26%</td>
</tr>
<tr>
<td>Reinvestment Rate</td>
<td>115.68%</td>
<td>106.98%</td>
</tr>
<tr>
<td>Value of firm</td>
<td>$58,617</td>
<td>$95,497</td>
</tr>
<tr>
<td>Value of equity</td>
<td>$50,346</td>
<td>$87,226</td>
</tr>
<tr>
<td>Value/share</td>
<td>$42.73</td>
<td>$74.33</td>
</tr>
</tbody>
</table>
VII. Valuing cyclical and commodity companies

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

What are the cashflows from existing assets?

What is the value added by growth assets?

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

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

Historical revenue and earnings data are volatile, as the economic cycle and commodity prices change.

Primary risk is from the economy for cyclical firms and from commodity price movements for commodity companies. These risks can stay dormant for long periods of apparent prosperity.

For commodity companies, the fact that there are only finite amounts of the commodity may put a limit on growth forever. For cyclical firms, there is the peril that the next recession may put an end to the firm.
Valuing a Cyclical Company - Toyota in Early 2009

As a cyclical company, Toyota's earnings have been volatile and 2009 earnings reflect the troubled global economy. We will assume that when economic growth returns, the operating margin for Toyota will revert back to the historical average.

\[
\text{Normalized Operating Income} = \text{Revenues in 2009} \times \text{Average Operating Margin (98--09)}
\]
\[
= 22661 \times 0.0733 = 1660.7 \text{ billion yen}
\]

**Normalized Cost of capital**

The cost of capital is computed using the average beta of automobile companies (1.10), and Toyota's cost of debt (3.25%) and debt ratio (52.9% debt ratio). We use the Japanese marginal tax rate of 40.7% for computing both the after-tax cost of debt and the after-tax operating income.

\[
\text{Cost of capital} = 8.65\% \times (1 - 0.471) + 3.25\% \times (1 - 0.407) \times 0.529 = 5.09\%
\]

**Stable Growth**

Once earnings are normalized, we assume that Toyota, as the largest market-share company, will be able to maintain only stable growth (1.5% in Yen terms).

**Value of operating assets**

\[
\text{Value of operating assets} = \frac{1660.7 (1.015) (1 - 0.407) (1 - 0.2946)}{(0.509 - 0.015)} = 19,640 \text{ billion yen}
\]

In early 2009, Toyota Motors had the highest market share in the sector. However, the global economic recession in 2008-09 had pulled earnings down.

**Normalized Return on capital and Reinvestment**

Once earnings bounce back to normal, we assume that Toyota will be able to earn a return on capital equal to its cost of capital (5.09%). This is a sector, where earning excess returns has proved to be difficult even for the best of firms.

To sustain a 1.5% growth rate, the reinvestment rate has to be:

\[
\text{Reinvestment rate} = \frac{1.5\%}{5.09\%} = 29.46\%
\]

**Operating Assets + Cash + Non-operating assets - Debt - Minority Interests**

\[
\text{Value of Equity} / \text{No of shares} = \frac{19,640 + 2,288 + 6,845 - 11,862 - 583}{3,448} = ¥4735
\]
Valuing a commodity company - Exxon in Early 2009

Regressing Exxon’s operating income against the oil price per barrel from 1985-2008:

\[
\text{Operating Income} = -6,395 + 911.32 \text{ (Average Oil Price)} \quad R^2 = 90.2\%
\]

\[
(2.95) \quad (14.59)
\]

Exxon Mobil’s operating income increases about $9.11 billion for every $10 increase in the price per barrel of oil and 90% of the variation in Exxon’s earnings over time comes from movements in oil prices.

Estimate normalized income based on current oil price

At the time of the valuation, the oil price was $45 a barrel. Exxon’s operating income based on this price is

\[
\text{Normalized Operating Income} = -6,395 + 911.32 \times 45 = 34,614
\]

Estimate return on capital and reinvestment rate based on normalized income

This operating income translates into a return on capital of approximately 21% and a reinvestment rate of 9.52%, based upon a 2% growth rate.

\[
\text{Reinvestment Rate} = \frac{g}{\text{ROC}} = \frac{2}{21} = 9.52\%
\]

Expected growth in operating income

Since Exxon Mobile is the largest oil company in the world, we will assume an expected growth of only 2% in perpetuity.

Exxon’s cost of capital

Exxon has been a predominantly equity funded company, and is expected to remain so, with a debt ratio of only 2.85%. Its cost of equity is 8.35% (based on a beta of 0.90) and its pre-tax cost of debt is 3.75% (given AAA rating). The marginal tax rate is 38%.

\[
\text{Cost of capital} = 8.35\% \times (1-.38) + 3.75\% \times (1-.38) \times 0.0285 = 8.18\%
\]
Lesson 1: With “macro” companies, it is easy to get lost in “macro” assumptions...

- 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...

- 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)
Exxon Mobil Valuation: Simulation

![Histogram of Exxon Mobil Value per Share: Oil price Simulation](image)