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

Let’s have some fun!
Equity Risk Premiums in Valuation

The equity risk premiums that I have used in the valuations that follow reflect my thinking (and how it has evolved) on the issue.

- **Pre-1998 valuations:** In the valuations prior to 1998, I use a risk premium of 5.5% for mature markets (close to both the historical and the implied premiums then).

- **Between 1998 and Sept 2008:** In the valuations between 1998 and September 2008, I used a risk premium of 4% for mature markets, reflecting my belief that risk premiums in mature markets do not change much and revert back to historical norms (at least for implied premiums).

- **Valuations done in 2009:** After the 2008 crisis and the jump in equity risk premiums to 6.43% in January 2008, I have used a higher equity risk premium (5-6%) for the next 5 years and will assume a reversion back to historical norms (4%) only after year 5.

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

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

Stocks that look like Bonds, Things Change and Market Valuations

Aswath Damodaran
Training Wheels valuation: Con Ed in August 2008

- Earnings per share = $3.17
- Dividends per share = $2.32

Value per share today = Expected Dividends per share next year / (Cost of equity - Growth rate)

Value per share today = 2.32 (1.021) / (0.077 - 0.021) = $42.30

Cost of Equity = 4.1% + 0.8 (4.5%) = 7.7%

- Riskfree rate
  - 4.10%
  - 10-year T.Bond rate
- Beta
  - 0.80
  - Beta for regulated power utilities
- Equity Risk Premium
  - 4.5%
  - Implied Equity Risk Premium - US market in 8/2008

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

Test 1: Is the firm paying dividends like a stable growth firm?
- Dividend payout ratio is 73%

Test 2: Is the stable growth rate consistent with fundamentals?
- Retention Ratio = 27%
- ROE = Cost of equity = 7.7%
- Expected growth = 2.1%

Growth rate forever = 2.1%

Test 3: Is the firm’s risk and cost of equity consistent with a stable growth firm?
- Beta of 0.80 is at lower end of the range of stable company betas: 0.8 - 1.2

Why a stable growth dividend discount model?
1. **Why stable growth:** Company is a regulated utility, restricted from investing in new growth markets. Growth is constrained by the fact that the population (and power needs) of its customers in New York are growing at very low rates.
   - Growth rate forever = 2%
2. **Why equity:** Company’s debt ratio has been stable at about 70% equity, 30% debt for decades.
3. **Why dividends:** Company has paid out about 97% of its FCFE as dividends over the last five years.
A break even growth rate to get to market price...

Con Ed: Value versus Growth Rate

Break even point: Value = Price

Value per share vs. Expected Growth rate

Aswath Damodaran
Assume that you believe that your valuation of Con Ed ($42.30) is a fair estimate of the value, 7.70% is a reasonable estimate of Con Ed’s cost of equity and that your expected dividends for next year (2.32*1.021) is a fair estimate, what is the expected stock price a year from now (assuming that the market corrects its mistake?)

If you bought the stock today at $40.76, what return can you expect to make over the next year (assuming again that the market corrects its mistake)?
3M: A Pre-crisis valuation

Current Cashflow to Firm

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

Return on Capital = 3474
30%

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

Reinvestment Rate

Stable Growth

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

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

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

Value/Share $ 83.55

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

Riskfree Rate:
Riskfree rate = 3.72%

Cost of Equity 8.32%

Unlevered Beta for Sectors: 1.09
D/E=8.8%

Risk Premium 4%

On September 12, 2008, 3M was trading at $70/share
3M: Post-crisis valuation

Current Cashflow to Firm

EBIT(1-t) = 4810 (1-.35) = 3180
→ Nt CpX = 350
- Chg WC = 691

FCFF = 2139

Return on capital = 23.06%

Reinvestment Rate = 1041/3180 = 33%

Return on Capital = 20%

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

5%

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

Cost of capital = 7.55%
Reinvestment Rate = 3/7.55 = 40%

Stable Growth

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

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

Value/Share $60.53

First 5 years

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT (1-t)</td>
<td>$3,339</td>
<td>$3,506</td>
<td>$3,667</td>
<td>$3,807</td>
<td>$3,921</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$835</td>
<td>$877</td>
<td>$1,025</td>
<td>$1,288</td>
<td>$1,558</td>
</tr>
<tr>
<td>= FCFF</td>
<td>$2,504</td>
<td>$2,630</td>
<td>$2,642</td>
<td>$2,519</td>
<td>$2,363</td>
</tr>
</tbody>
</table>

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

Increase risk premium to 6% for next 5 years

Riskfree rate = 3.96%

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

Weights
E = 92% D = 8%

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

Higher default spread for next 5 years

Cost of Equity
10.86%

Riskfree Rate:
Riskfree rate = 3.96%

Higher default spread for next 5 years

Unlevered Beta for Sectors: 1.09

D/E = 8.8%

Beta
1.15

Risk Premium
6%

Increased risk premium to 6% for next 5 years
Rationale for model
Why dividends? Because it is the only tangible cash flow, right?
Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

From a Company to the Market: Valuing the S&P 500: Dividend Discount Model in January 2015

Dividends
$ Dividends in trailing 12 months = 38.57

Expected Growth
Analyst estimate for growth over next 5 years = 5.58%

Terminal Value = DPS in year 6 / (r-g)
= (50.59 * 1.0217) / (.0728 - .0217) = 1010.91

Risk Premium 5.11%
Set at the average ERP over the last decade

Beta 1.00

Riskfree Rate: Treasury bond rate 2.17%

Cost of Equity
2.17% + 1.00 (5.11%) = 7.28%

Value of Equity per share = PV of Dividends & Terminal value at 7.94% = 895.14

On January 1, 2015, the S&P 500 index was trading at 2058.90.
Rationale for model
Why augmented dividends? Because companies are increasing returning cash in the form of stock buybacks
Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

<table>
<thead>
<tr>
<th>Dividends</th>
<th>Expected Growth</th>
<th>Cost of Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ Dividends + $ Buybacks in trailing 12 months = 100.50</td>
<td>Analyst estimate for growth over next 5 years = 5.58%</td>
<td>2.17% + 1.00 (5.11%) = 7.28%</td>
</tr>
</tbody>
</table>

On January 1, 2015, the S&P 500 index was trading at 2058.90

Discount at Cost of Equity

Value of Equity per share = PV of Dividends & Terminal value at 7.28% = 2332.34

Terminal Value= Augmented Dividends in year 6/ (r-g)
= (131.81*1.0217)/(.0728-.0217) = 2633.97

S&P 500 is a good reflection of overall market

Risk Free rate: Treasury bond rate 2.17%

Risk Premium 5.11%
Set at the average ERP over the last decade
Valuing the S&P 500: Augmented Dividends and Fundamental Growth January 2015

Rationale for model
Why augmented dividends? Because companies are increasing returning cash in the form of stock buybacks
Why 2-stage? Why not?

Dividends
$ Dividends + $ Buybacks in trailing 12 months = 100.50

ROE = 16.03%
Retention Ratio = 12.42%

Expected Growth
ROE * Retention Ratio = .1603*.1242 = 1.99%

g = Riskfree rate = 2.17%
Assume that earnings on the index will grow at same rate as economy.

Terminal Value= Augmented Dividends in year 6/ (r-g)
= (110.90*1.0217)/(.0728-.0217) = 2216.06

Discount at Cost of Equity

Value of Equity per share = PV of Dividends & Terminal value at 7.28% = 1992.11

On January 1, 2015, the S&P 500 index was trading at 2058.90

Cost of Equity
2.17% + 1.00 (5.11%) = 7.28%

Riskfree Rate:
Treasury bond rate
2.17%

Beta
1.00

Risk Premium
5.11%
Set at the average ERP over the last decade

S&P 500 is a good reflection of overall market
Anyone can value a company that is stable, makes money and has an established business model!

Aswath Damodaran
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?
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 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.
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

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

Cost of Equity: 12.90%

Cost of Debt: 6.5% + 1.5% = 8.0%

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

Beta: 1.60 -> 1.00

Risk Premium: 4%

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

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

Cost of Equity 12.90% 12.90% 12.90% 12.90% 12.90% 12.42% 12.30% 12.10% 11.70% 10.50%
Cost of Debt 8.00% 8.00% 8.00% 8.00% 7.80% 7.80% 7.75% 7.67% 7.50% 7.00%
AT cost of debt 8.00% 8.00% 8.00% 6.71% 5.20% 5.07% 5.04% 4.98% 4.88% 4.55%
Cost of Capital 12.84% 12.84% 12.84% 12.83% 12.81% 12.13% 11.96% 11.69% 11.15% 9.61%

Amazon was trading at $84 in January 2000.

Pushed debt ratio to retail industry average of 15%.

Used average interest coverage ratio over next 5 years to get BBB rating.
Lesson 1: Don’t sweat the small stuff

- Spotlight the business the company is in & use the beta of that business.
- Don’t try to incorporate failure risk into the discount rate.
- Let the cost of capital change over time, as the company changes.
- If you are desperate, use the cross section of costs of capital to get your estimation going (use the 90th or 95th percentile across all companies).
Lesson 2: Work backwards and keep it simple...

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

- Lower revenue growth rates, as revenues scale up.
- Keep track of dollar revenues, as you go through time, measuring against market size.
Lesson 4: Don’t forget to pay for growth...

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

- With young growth companies, it is almost a given that the number of shares outstanding will increase over time for two reasons:
  - To grow, the company will have to issue new shares either to raise cash to take projects or to offer to target company stockholders in acquisitions
  - Many young, growth companies also offer options to managers as compensation and these options will get exercised, if the company is successful.

- In DCF valuation, both effects are already incorporated into the value per share, even though we use the current number of shares in estimating value per share
  - The need for new equity issues is captured in negative cash flows in the earlier years. The present value of these negative cash flows will drag down the current value of equity and this is the effect of future dilution.
  - The options are valued and netted out against the current value. Using an option pricing model allows you to incorporate the expected likelihood that they will be exercised and the price at which they will be exercised.
Lesson 6: If you are worried about failure, incorporate into value
Lesson 7: 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 8: You will be wrong 100% of the time and it really is not your fault...

- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.

- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.

- A test: If your valuations are unbiased, you should find yourself increasing estimated values as often as you are decreasing values. In other words, there should be equal doses of good and bad news affecting valuations (at least over time).
And the market is often “more wrong”....
Assessing my 2000 forecasts, in 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>Operating Income</th>
<th>Operating Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$2,793</td>
<td>$2,762</td>
<td>-$</td>
</tr>
<tr>
<td>2001</td>
<td>$5,585</td>
<td>$3,122</td>
<td>-$</td>
</tr>
<tr>
<td>2002</td>
<td>$9,774</td>
<td>$3,932</td>
<td>$</td>
</tr>
<tr>
<td>2003</td>
<td>$14,661</td>
<td>$5,264</td>
<td>$</td>
</tr>
<tr>
<td>2004</td>
<td>$19,059</td>
<td>$6,921</td>
<td>$</td>
</tr>
<tr>
<td>2005</td>
<td>$23,862</td>
<td>$8,490</td>
<td>$</td>
</tr>
<tr>
<td>2006</td>
<td>$28,729</td>
<td>$10,711</td>
<td>$</td>
</tr>
<tr>
<td>2007</td>
<td>$33,211</td>
<td>$14,835</td>
<td>$</td>
</tr>
<tr>
<td>2008</td>
<td>$36,798</td>
<td>$19,166</td>
<td>$</td>
</tr>
<tr>
<td>2009</td>
<td>$39,006</td>
<td>$24,509</td>
<td>$</td>
</tr>
<tr>
<td>2010</td>
<td>$41,346</td>
<td>$34,204</td>
<td>$</td>
</tr>
<tr>
<td>2011</td>
<td>$43,827</td>
<td>$48,077</td>
<td>$</td>
</tr>
<tr>
<td>2012</td>
<td>$46,457</td>
<td>$61,093</td>
<td>$</td>
</tr>
<tr>
<td>2013</td>
<td>$49,244</td>
<td>$74,452</td>
<td>$</td>
</tr>
<tr>
<td>2014 (LTM)</td>
<td>$51,460</td>
<td>$85,247</td>
<td>$</td>
</tr>
</tbody>
</table>
Amazon: My “Field of Dreams” Valuation – October 2014

To deliver this high revenue growth, Amazon will continue to sell its products/services at or below cost. Operating margin stays low for the next few years.

Amazon will continue on its path of revenue growth first, pushing into media & cloud services to become the second largest retailer in the world. Revenues grow @ 15% a year for 5 years, tapering down to 2.2% growth after year 10.

As Amazon becomes more dominant, it will increase prices, but easy entry into the business will act as a restraint. Operating margin improves to 7.38% in year 10, weighted average of retail & media businesses.

Amazon will be able to invest more efficiently than the average retailer. Reinvest $1 for every $3.68 in additional revenues.

Amazon’s technology twist will keep financial leverage low. Debt ratio is 9.47%, equity, 8.3% debt, with a pre-tax cost of debt of 5.00%.

Amazon's risk profile will reflect a mix of retail, media and cloud businesses as well as geographic ambitions. Beta used in cost of capital is 1.12, weighted average of online retail, entertainment and business services (cloud). ERP is weighted average of US ERP (5%) and rest of the world (6.45%).

### Table: Amazon's Revenue Growth and Financial Projections

<table>
<thead>
<tr>
<th>Base year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Terminal year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>12.44%</td>
<td>9.88%</td>
<td>7.32%</td>
<td>4.76%</td>
<td>2.20%</td>
<td>2.20%</td>
</tr>
<tr>
<td>EBIT (Operating margin)</td>
<td>0.58%</td>
<td>1.20%</td>
<td>1.94%</td>
<td>2.62%</td>
<td>3.30%</td>
<td>3.98%</td>
<td>4.66%</td>
<td>5.43%</td>
<td>6.02%</td>
<td>6.87%</td>
<td>7.38%</td>
</tr>
<tr>
<td>EBIT (Operating income)</td>
<td>$494</td>
<td>$1,235</td>
<td>$2,187</td>
<td>$3,397</td>
<td>$4,920</td>
<td>$6,824</td>
<td>$9,464</td>
<td>$11,312</td>
<td>$13,686</td>
<td>$15,957</td>
<td>$17,963</td>
</tr>
<tr>
<td>Tax rate</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$377</td>
<td>$842</td>
<td>$1,492</td>
<td>$2,317</td>
<td>$3,566</td>
<td>$4,654</td>
<td>$6,127</td>
<td>$7,157</td>
<td>$9,334</td>
<td>$10,883</td>
<td>$12,251</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$3,474</td>
<td>$3,993</td>
<td>$4,594</td>
<td>$5,284</td>
<td>$6,076</td>
<td>$6,975</td>
<td>$7,917</td>
<td>$8,873</td>
<td>$9,925</td>
<td>$10,883</td>
<td>$11,827</td>
</tr>
<tr>
<td>FCF ($)</td>
<td>$2,652</td>
<td>$2,564</td>
<td>$2,278</td>
<td>$1,928</td>
<td>$1,422</td>
<td>$332</td>
<td>$2,540</td>
<td>$5,121</td>
<td>$7,943</td>
<td>$10,827</td>
<td>$9,766</td>
</tr>
</tbody>
</table>

### Table: Terminal Value Calculation

<table>
<thead>
<tr>
<th>Terminal Value</th>
<th>$76,029</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV (CF over next 10 years)</td>
<td>$4,064</td>
</tr>
<tr>
<td>Value of operating assets</td>
<td>$80,093</td>
</tr>
<tr>
<td>- Debt</td>
<td>$8,353</td>
</tr>
<tr>
<td>+ Cash</td>
<td>$10,252</td>
</tr>
<tr>
<td>Value of equity</td>
<td>$81,143</td>
</tr>
<tr>
<td>- Value of options</td>
<td>$ -</td>
</tr>
<tr>
<td>Value of equity in common stock</td>
<td>$81,125</td>
</tr>
<tr>
<td>Number of shares</td>
<td>463,01</td>
</tr>
<tr>
<td>Estimated value/share</td>
<td>$175.25</td>
</tr>
<tr>
<td>Price</td>
<td>$287.06</td>
</tr>
<tr>
<td>Price as % of value</td>
<td>103.54%</td>
</tr>
</tbody>
</table>

Amazon: A DCF valuation in late October 2014
Amazon: World Dominator in October 2014

To deliver this high revenue growth, Amazon will continue to sell its products/services at or below cost. Operating margin stays low for the next few years.

<table>
<thead>
<tr>
<th>Revenue growth rate</th>
<th>Base year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Terminal year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$85,246</td>
<td>$102,295</td>
<td>$122,754</td>
<td>$147,305</td>
<td>$176,766</td>
<td>$212,119</td>
<td>$246,992</td>
<td>$278,804</td>
<td>$304,789</td>
<td>$322,345</td>
<td>$329,436</td>
<td>$336,684</td>
</tr>
<tr>
<td>EBIT (Operating) margin</td>
<td>0.47%</td>
<td>1.71%</td>
<td>2.94%</td>
<td>4.18%</td>
<td>5.42%</td>
<td>6.65%</td>
<td>7.89%</td>
<td>9.13%</td>
<td>10.37%</td>
<td>11.60%</td>
<td>12.84%</td>
<td>12.84%</td>
</tr>
<tr>
<td>EBIT (Operating income)</td>
<td>$400</td>
<td>$1,746</td>
<td>$3,613</td>
<td>$6,158</td>
<td>$9,576</td>
<td>$14,116</td>
<td>$19,492</td>
<td>$25,451</td>
<td>$31,594</td>
<td>$37,401</td>
<td>$42,300</td>
<td>$43,230</td>
</tr>
<tr>
<td>Tax rate</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
</tr>
<tr>
<td>EBIT(1-t)</td>
<td>$273</td>
<td>$1,190</td>
<td>$2,464</td>
<td>$4,200</td>
<td>$6,531</td>
<td>$9,627</td>
<td>$13,293</td>
<td>$17,358</td>
<td>$21,547</td>
<td>$25,508</td>
<td>$28,848</td>
<td>$29,483</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$4,632</td>
<td>$5,559</td>
<td>$6,670</td>
<td>$8,104</td>
<td>$9,605</td>
<td>$9,475</td>
<td>$8,643</td>
<td>$7,060</td>
<td>$4,770</td>
<td>$1,927</td>
<td>$5,405</td>
<td></td>
</tr>
<tr>
<td>FCFF</td>
<td>$3,442</td>
<td>$3,094</td>
<td>$2,470</td>
<td>$1,473</td>
<td>$22</td>
<td>$3,819</td>
<td>$8,715</td>
<td>$14,487</td>
<td>$20,738</td>
<td>$26,922</td>
<td>$24,078</td>
<td></td>
</tr>
<tr>
<td>Cost of capital</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.32%</td>
<td>8.24%</td>
<td>8.16%</td>
<td>8.08%</td>
<td>8.00%</td>
<td>8.00%</td>
<td></td>
</tr>
<tr>
<td>Cumulated discount factor</td>
<td>0.9226</td>
<td>0.8851</td>
<td>0.8782</td>
<td>0.7244</td>
<td>0.6683</td>
<td>0.6170</td>
<td>0.5700</td>
<td>0.5271</td>
<td>0.4877</td>
<td>0.4515</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV (FCFF)</td>
<td>$3,175</td>
<td>$2,834</td>
<td>$1,940</td>
<td>$1,067</td>
<td>$15</td>
<td>$2,356</td>
<td>$4,968</td>
<td>$7,636</td>
<td>$10,113</td>
<td>$12,156</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As Amazon becomes more dominant, it will increase prices, with few restraints. Operating margin improves to 12.84% in year 10, the 75th percentile of retail & media businesses.

Amazon will continue on its path of revenue growth first, pushing strongly into media & cloud services to become the second largest retailer in the world. Revenues grow @20% a year for 5 years, tapering down to 2.2% growth after year 10.

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Amazon will be able to invest more efficiently than the average retailer. Reinvest $1 for every $3.68 in additional revenues.

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Amazon's risk profile will reflect a mix of retail, media and cloud businesses as well as geographic ambitions: Beta used in cost of capital is 1.12, weighted average of online retail, entertainment and businesses services (cloud). ERP is weighted average of US ERP (5%) and rest of the world (6.45%).

Terminal value | $415,134.21
PV(Terminal value) | $187,547.77
PV (CF over next 10 years) | $28,427.49
Value of operating assets = | $215,875.26
- Debt | $9,201.58
+ Cash | $10,252.00
+ Non-operating assets | $-
Value of equity | $216,925.67
- Value of options | $-
Value of equity in common stock | $216,925.67
Number of shares | 463,01
Estimated value /share | $468.51

296  Aswath Damodaran
# Amazon: Bezos, the Change-maker

To deliver this high revenue growth, Amazon will continue to sell its products/services at or below cost. Operating margin stays low for the next few years.

Amazon will continue on its path of revenue growth first, pushing into media & cloud services to become the second largest retailer in the world. Revenues grow @15% a year for 5 years, tapering down to 2.2% growth after year 10.

<table>
<thead>
<tr>
<th>Base year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Terminal year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>15.00%</td>
<td>12.44%</td>
<td>9.88%</td>
<td>7.32%</td>
<td>4.76%</td>
<td>2.20%</td>
</tr>
<tr>
<td>Revenue</td>
<td>$85,246</td>
<td>$98,033</td>
<td>$112,738</td>
<td>$129,649</td>
<td>$149,096</td>
<td>$171,460</td>
<td>$192,790</td>
<td>$211,837</td>
<td>$227,344</td>
<td>$238,166</td>
<td>$243,405</td>
</tr>
<tr>
<td>EBIT (Operating) margin</td>
<td>0.47%</td>
<td>0.71%</td>
<td>0.95%</td>
<td>1.18%</td>
<td>1.42%</td>
<td>1.66%</td>
<td>1.90%</td>
<td>2.14%</td>
<td>2.37%</td>
<td>2.61%</td>
<td>2.85%</td>
</tr>
<tr>
<td>EBIT (Operating income)</td>
<td>$400</td>
<td>$693</td>
<td>$1,066</td>
<td>$1,534</td>
<td>$2,120</td>
<td>$2,846</td>
<td>$3,659</td>
<td>$4,524</td>
<td>$5,397</td>
<td>$6,221</td>
<td>$6,937</td>
</tr>
<tr>
<td>Tax rate</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
<td>31.80%</td>
</tr>
<tr>
<td>EBIT(1-t)</td>
<td>$273</td>
<td>$473</td>
<td>$727</td>
<td>$1,046</td>
<td>$1,446</td>
<td>$1,941</td>
<td>$2,495</td>
<td>$3,086</td>
<td>$3,681</td>
<td>$4,243</td>
<td>$4,835</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$3,474</td>
<td>$3,995</td>
<td>$4,594</td>
<td>$5,284</td>
<td>$6,076</td>
<td>$5,795</td>
<td>$5,175</td>
<td>$4,213</td>
<td>$2,940</td>
<td>$1,424</td>
<td>$1,064</td>
</tr>
<tr>
<td>FCFF</td>
<td>$(3,001)</td>
<td>$(2,268)</td>
<td>$(3,548)</td>
<td>$(3,838)</td>
<td>$(4,136)</td>
<td>$(3,300)</td>
<td>$(2,089)</td>
<td>$(532)</td>
<td>$1,302</td>
<td>$3,307</td>
<td>$3,771</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.39%</td>
<td>8.32%</td>
<td>8.24%</td>
<td>8.16%</td>
<td>8.08%</td>
<td>8.00%</td>
<td>8.00%</td>
</tr>
<tr>
<td>Cumulated discount factor</td>
<td>0.9226</td>
<td>0.8511</td>
<td>0.7852</td>
<td>0.7244</td>
<td>0.6683</td>
<td>0.6170</td>
<td>0.5700</td>
<td>0.5271</td>
<td>0.4877</td>
<td>0.4515</td>
<td></td>
</tr>
<tr>
<td>PV(PCFF)</td>
<td>$-2,768.76</td>
<td>$-2,781.71</td>
<td>$-2,785.95</td>
<td>$-2,780.38</td>
<td>$-2,763.78</td>
<td>$-2,036.06</td>
<td>$-1,191.09</td>
<td>$-280.38</td>
<td>$635.12</td>
<td>$1,493.45</td>
<td></td>
</tr>
</tbody>
</table>

*PV(Terminal value) = $29,361*

*PV (CF over next 10 years) = $15,260*

*Value of operating assets = $14,101*

- Debt $9,202
- Cash $10,252
Value of equity $15,151
- Value of options $0
Value of equity in common stock $15,151
Number of shares 463,01
Estimated value/share $32.72

Amazon’s technology twist will keep financial leverage low: Debt ratio is 94.7% equity, 5.3% debt, with a pre-tax cost of debt of 5.00%.

Amazon’s risk profile will reflect a mix of retail, media and cloud businesses as well as geographic ambitions. Beta used in cost of capital is 1.12, weighted average of online retail, entertainment and business services (cloud). ERP is weighted average of US ERP (5%) and rest of the world (6.45%)
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...

Lots of historical data on earnings and cashflows. Key questions remain if these numbers are volatile over time or if the existing assets are not being efficiently utilized.

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?

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.

What is the value added by 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.

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

Maintaining excess returns or high growth for any length of time is difficult to do for a mature firm.

When will the firm become a mature firm, and what are the potential roadblocks?
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>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>1</td>
<td>$324</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>2</td>
<td>$333</td>
<td>2.75%</td>
<td>14.34%</td>
<td>19.14%</td>
<td>$64</td>
<td>$276</td>
<td>6.79%</td>
<td>$227</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>$284</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
(Subtract) Debt: $491
(Subtract) Management Options: $53
Value of equity in common stock: $4,293
Value per share: $31.91

New and better management

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

Operating Restructuring

Expected growth rate = ROC * Reinvestment Rate
Expected growth rate (status quo) = 14.34% * 19.14% = 2.75%
Expected growth rate (optimal) = 14.00% * 40% = 5.60%
ROC drops, reinvestment rises and growth goes up.

Financial restructuring

Cost of capital = Cost of equity (1-Debt ratio) + Cost of debt (Debt ratio)
Status quo = 7.33% (1-.104) + 3.60% (1-.40) (.104) = 6.79%
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 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.

55% of the companies (41,889) earned less than their cost of capital leading into the start of 2016.

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


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.  
As cost of capital drops, firm value rises (as operating cash flows remain unchanged).

<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>10.39%</td>
<td>0.83</td>
<td>7.33%</td>
<td>AAA</td>
<td>3.60%</td>
<td>40.00%</td>
<td>2.16%</td>
<td>6.79%</td>
<td>$4,680</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>
<td>CCC</td>
<td>12.35%</td>
<td>40.00%</td>
<td>7.41%</td>
<td>9.24%</td>
<td>$3,398</td>
</tr>
<tr>
<td>80%</td>
<td>2.70</td>
<td>18.53%</td>
<td>CC</td>
<td>14.35%</td>
<td>38.07%</td>
<td>8.89%</td>
<td>10.81%</td>
<td>$2,892</td>
</tr>
<tr>
<td>90%</td>
<td>5.39</td>
<td>34.70%</td>
<td>CC</td>
<td>14.35%</td>
<td>33.84%</td>
<td>9.49%</td>
<td>12.01%</td>
<td>$2,597</td>
</tr>
</tbody>
</table>

Current Cost of Capital: 
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 firm borrows more money, its ratings drop and cost of debt rises.  
As cost of capital drops, firm value rises (as operating cash flows remain unchanged).
III. Dealing with decline and distress...

Historical data often reflects flat or declining revenues and falling margins. Investments often earn less than the cost of capital. Growth can be negative, as firm sheds assets and shrinks. As less profitable assets are shed, the firm’s remaining assets may improve in quality.

What 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?

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.

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.

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

**Figure 14.5: A Valuation of JC Penney**

As stores shut down, cash released from real estate. The cost of capital is at 9%, higher because of high cost of debt.

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

<table>
<thead>
<tr>
<th>Base year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue growth rate</td>
<td>-3.00%</td>
<td>-3.00%</td>
<td>-3.00%</td>
<td>-3.00%</td>
<td>-2.00%</td>
<td>-1.00%</td>
<td>0.00%</td>
<td>1.00%</td>
<td>2.00%</td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td>$12,522</td>
<td>$12,146</td>
<td>$11,782</td>
<td>$11,428</td>
<td>$11,086</td>
<td>$10,753</td>
<td>$10,538</td>
<td>$10,433</td>
<td>$10,433</td>
<td>$10,537</td>
</tr>
<tr>
<td>EBIT (Operating margin)</td>
<td>1.32%</td>
<td>1.82%</td>
<td>2.31%</td>
<td>2.80%</td>
<td>3.29%</td>
<td>3.79%</td>
<td>4.28%</td>
<td>4.77%</td>
<td>5.26%</td>
<td>5.76%</td>
</tr>
<tr>
<td>EBIT (Operating income)</td>
<td>$166</td>
<td>$221</td>
<td>$272</td>
<td>$320</td>
<td>$365</td>
<td>$407</td>
<td>$451</td>
<td>$498</td>
<td>$549</td>
<td>$607</td>
</tr>
<tr>
<td>Tax rate</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>36.00%</td>
<td>37.00%</td>
<td>38.00%</td>
<td>39.00%</td>
</tr>
<tr>
<td>EBIT(1-t)</td>
<td>$108</td>
<td>$143</td>
<td>$177</td>
<td>$208</td>
<td>$237</td>
<td>$265</td>
<td>$289</td>
<td>$314</td>
<td>$341</td>
<td>$370</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$(188)</td>
<td>$(182)</td>
<td>$(177)</td>
<td>$(171)</td>
<td>$(166)</td>
<td>$(108)</td>
<td>$(53)</td>
<td>-</td>
<td>$52</td>
<td>$105</td>
</tr>
<tr>
<td>FCF</td>
<td>$331</td>
<td>$359</td>
<td>$385</td>
<td>$409</td>
<td>$431</td>
<td>$396</td>
<td>$366</td>
<td>$341</td>
<td>$318</td>
<td>$298</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>9.00%</td>
<td>9.00%</td>
<td>9.00%</td>
<td>9.00%</td>
<td>9.00%</td>
<td>8.80%</td>
<td>8.60%</td>
<td>8.40%</td>
<td>8.20%</td>
<td>8.00%</td>
</tr>
<tr>
<td>PV(FCFF)</td>
<td>$304</td>
<td>$302</td>
<td>$297</td>
<td>$290</td>
<td>$280</td>
<td>$237</td>
<td>$201</td>
<td>$173</td>
<td>$149</td>
<td>$129</td>
</tr>
<tr>
<td>Terminal value</td>
<td>$5,710</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV(Terminal value)</td>
<td>$2,479</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV (CF over next 10 years)</td>
<td>$2,362</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of PV</td>
<td>$4,841</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability of failure</td>
<td>20.00%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proceeds if firm fails</td>
<td>$2,421</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of operating assets</td>
<td>$4,357</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

High debt load and poor earnings put survival at risk. Based on bond rating, 20% chance of failure and liquidation will bring in 50% of book value.
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 \( (1 - \text{Probability of distress}) + \text{Distress sale value of equity} \times \text{Probability of distress} \)

- 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).
Terminal Value = 758(0.0743-.03) = $17,129

Cost of Equity
21.82%

Cost of Debt
3% + 6% = 9%
9% (1-.38) = 5.58%

Weights
Debt = 73.5% -> 50%

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

Value per share = $8.12

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

Expected Margin: -> 17%

Stable Growth
Stable Revenue Growth: 3%
Stable Operating Margin: 17%
Stable ROC = 10%
Reinvest 30% of EBIT(1-t)

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

Casino
1.15

Beta
3.14 -> 1.20

Risk Premium
6%

Las Vegas Sands
February 2009
Trading @ $4.25

Aswath Damodaran
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
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?

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

What is the value added by growth assets?

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.

Cross holdings can affect value of equity

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

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

What is the value of equity in the firm?
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.

Aswath Damodaran
A $ Valuation of Embraer

Current Cashflow to Firm

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

Reinvestment Rate

Expected Growth in EBIT (1-t)
0.40*0.181 = 0.072
7.2%
Return on Capital 18.1%

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

Terminal Value = 254(0.0738 - 0.038) = 8,371

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%

On May 22, 2008
Embraer Price = R$ 17.2

Riskfree Rate: US$ Riskfree Rate = 3.8%

Unlevered Beta for Sectors: 0.75
Firm's D/E Ratio: 26.84%

Beta 0.88
Mature market premium 4%
Lambda 0.27
Country Default Spread 2.2%

Country Equity Risk Premium 3.66%
Rel Equity Mkt Vol 1.64

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

Discount at $ Cost of Capital (WACC) = 8.31% (0.788) + 4.36% (0.212) = 7.47%

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

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

Term Yr 524 270 = 254

On May 22, 2008
Embraer Price = R$ 17.2
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.
6a. Tube Investments: Status Quo (in Rs)

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

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

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

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

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

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

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

EBIT(1-t)
- Reinvestment
FCFF

5.52%

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

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

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

Cost of Equity
22.80%

Riskfree Rate:
Rs riskfree rate = 12%

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

Weights
E = 55.8% D = 44.2%

β
1.17

Beta
Risk Premium
9.23%

Country Risk Premium
5.23%

Mature Risk Premium
4%

Unlevered Beta for Sectors: 0.75

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

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 = 112.82%

Expected Growth in EBIT (1-t)
0.60 * 0.122 = 0.0732
7.32%

Reinvestment Rate = 60%
Return on Capital = 12.20%

Expected Growth
in EBIT (1-t)
7.32%

Stable Growth
Expected Growth in EBIT = 7.32%

Terminal Value5 = 3904/(0.1478 - 0.05) = 39.921

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

Value/Share 84.34

Cost of Equity 22.80%

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

Riskfree Rate: Rs riskfree rate = 12%

Beta 1.17
+ X
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%

Company earns higher returns on new projects

Existing assets continue to generate negative excess returns.

Discount at Cost of Capital (WACC) = 22.8% (0.558) + 9.45% (0.442) = 16.90%

Firm's D/E Ratio: 79%

316 Aswath Damodaran
6c. Tube Investments: Higher Average Return

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

Reinvestment Rate
- 60%

Expected Growth
60*.122 + .0581 = .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 Value5 = 5081/(.1478-.05) = 51,956

Cost of Equity
- 22.80%

Cost of Debt
- 9.45%

Weights
E = 55.8% D = 44.2%

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

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

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%

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

Term Yr
- 8,610
3,529
5,081

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

Return on Capital
- 12.20%

Improvement on existing assets
{ (1+(.122-.092)/.092)^1/5-1}
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.
Tata Companies: Value Breakdown

- % of value from cash
- % of value from holdings
- % of value from operating assets

- Tata Chemicals: 5.32% cash, 47.06% holdings, 47.62% operating assets
- Tata Steel: 1.62% cash, 47.45% holdings, 50.94% operating assets
- Tata Motors: 2.97% cash, 36.62% holdings, 60.41% operating assets
- TCS: 0.22% cash, 4.64% holdings, 95.13% operating assets

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.
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?

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

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?

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

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

In addition to all the normal constraints, financial service firms also have to worry about maintaining capital ratios that are acceptable to regulators. If they do not, they can be taken over and shut down.
CIB Egypt in December 2015
Valuation in Egyptian Pounds

**Expected Growth**
75.25% * 42.48% = 31.96%

**ROE = 42.48%**

**Termial Value**
= EPS₆*Payout/(r-g)
= (37.97*.6)/(.2325-.10) = 189.20

**Cost of Equity**
10.53% + 0.81 (15.70%) = 23.25%

**Value of Equity per share**
= PV of Dividends & Terminal value = 41.93 EGP

**Discount at Cost of Equity**
In December 2015, CIB was trading at 36 EGP per share


**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%

**ROE** = 13.19%

**g =4%: ROE = 10% (>Cost of equity)**

**Beta** = 1.20

**Payout** = (1 - 4/10) = .60 or 60%

**Terminal Value**

\[
\text{Terminal Value} = \frac{\text{EPS}_{10} \times \text{Payout}}{(r-g)}
\]

\[
= \frac{42.03 \times 1.04 \times 0.6}{0.095 - 0.04} = 476.86
\]

**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%

**Risk Free 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

**Mature Market**
4.5%

**Country Risk**
0%

Left return on equity at 2008 levels. well below 16% in 2007 and 20% in 2004-2006.
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%

DPS | EPS | Expected Growth
---|---|---
$1.25 | $2.29 | $2.58
$1.33 | $2.43 | $2.74
$1.41 | $2.58 | $2.91
$1.50 | $2.74 | $3.00
$1.59 | $2.91 | $3.29

Expected Return on equity = 13.5%

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

Value of Equity per share = PV of Dividends & Terminal value at 9.6% = $30.29

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

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

Risk free 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%
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:
  - FCFE = Net Income – Reinvestment in regulatory capital (book equity)

Aswath Damodaran
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
2d. Deutsche Bank: March 2009

Last 2 years

2007 2008
Net Income 3,954 m -3,855m
Dividends 2,146 m 285 m
Risk adjusted assets = 312,882m
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%

Cashflows

<table>
<thead>
<tr>
<th>Year</th>
<th>Asset Base</th>
<th>Capital ratio</th>
<th>Regulatory 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>10.16%</td>
<td>33,060 €</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>10.12%</td>
<td>34,247 €</td>
<td>9.72%</td>
<td>1,187 €</td>
<td>3,329 €</td>
<td>1,187 €</td>
<td>2,142 €</td>
</tr>
<tr>
<td>3</td>
<td>351,950 €</td>
<td>10.08%</td>
<td>35,477 €</td>
<td>9.88%</td>
<td>1,229 €</td>
<td>3,505 €</td>
<td>1,229 €</td>
<td>2,276 €</td>
</tr>
<tr>
<td>4</td>
<td>366,028 €</td>
<td>10.04%</td>
<td>36,749 €</td>
<td>10.04%</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>10.00%</td>
<td>38,067 €</td>
<td>10.20%</td>
<td>1,318 €</td>
<td>3,883 €</td>
<td>1,318 €</td>
<td>2,565 €</td>
</tr>
</tbody>
</table>

Terminal Value = $2,823/(.102-.03) = $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
1.162

Mature market
premium
6%

Region | Lambda | CRP
-------|--------|------
Western Europe | 0.68 | 0.00%
United States | 0.42 | 0.00%
Latin America | 0.01 | 4.50%
Africa & Middle East | 0.01 | 7.00%
Asia | 0.11 | 3.50%
Eastern Europe | 0.04 | 3.00%
Deutsche Bank | 0.60 | 3.00%

Beta for commercial & Investment banking

329

Aswath Damodaran
VI. Valuing Companies with “intangible” assets

- 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?

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.

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.

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

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.
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 expenses

<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>Current</td>
<td>3030.00</td>
<td>1.00</td>
<td>3030.00</td>
</tr>
<tr>
<td>-1</td>
<td>3266.00</td>
<td>0.90</td>
<td>2939.40</td>
</tr>
<tr>
<td>-2</td>
<td>3366.00</td>
<td>0.80</td>
<td>2692.80</td>
</tr>
<tr>
<td>-3</td>
<td>2314.00</td>
<td>0.70</td>
<td>1619.80</td>
</tr>
<tr>
<td>-4</td>
<td>2028.00</td>
<td>0.60</td>
<td>1216.80</td>
</tr>
<tr>
<td>-5</td>
<td>1655.00</td>
<td>0.50</td>
<td>827.50</td>
</tr>
<tr>
<td>-6</td>
<td>1117.00</td>
<td>0.40</td>
<td>446.80</td>
</tr>
<tr>
<td>-7</td>
<td>864.00</td>
<td>0.30</td>
<td>259.20</td>
</tr>
<tr>
<td>-8</td>
<td>845.00</td>
<td>0.20</td>
<td>169.00</td>
</tr>
<tr>
<td>-9</td>
<td>823.00</td>
<td>0.10</td>
<td>82.30</td>
</tr>
<tr>
<td>-10</td>
<td>663.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$13283.60</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>23.48%</td>
<td>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>25.44%</td>
<td>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>
Current Cashflow to Firm
EBIT(1-t) = \(7336(1 - 0.28) = 6058\)
- Nt CpX = 6443
- Chg WC = 37
- Reinvestment = 423
FCFF = 6480/6058 = 106.98%
Return on capital = 16.71%

Expected Growth in EBIT (1-t)
\(.60 \times 0.16 = 0.096\)
9.6%

Reinvestment Rate = 60%

Stable Growth
\(g = 4\%; \quad \beta = 1.10; \quad \text{Debt ratio} = 20\%; \quad \text{Tax rate} = 35\% \)
\(\text{Cost of capital} = 8.08\% \)
\(\text{ROE} = 10.00\%; \quad \text{Reinvestment Rate} = 4/10 = 40\% \)

Terminal Value
\(\frac{7300}{0.0808 - 0.04} = 179,099\)

Cost of Equity
11.70%

Cost of Debt
\(4.78\% + 0.85\% (1 - 0.35) = 3.66\%

Weights
E = 90\% D = 10\%

Debt ratio increases to 20\%
Beta decreases to 1.10

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

Aswath Damodaran
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.
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)
### Shell: A "Oil Price" Neutral Valuation: March 2016

Revenue calculated from prevailing oil price of $40/barrel in March 2016
Revenue = $39,992.77 + 4039.40 * $40 = $201,569

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

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

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

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

Return on capital reverts and stays at Shell's historic average of 12.37% from 200-2015
Shell’s Revenues & Oil Prices

Revenues = 39,992.77 + 4,039.39 * Average Oil Price
R squared = 96.44%
Revenue calculated from the oil price drawn from distribution
Revenue = 39992.77 + 4039.40 * Oil Price/Barrel

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

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

<table>
<thead>
<tr>
<th>Percentiles</th>
<th>Forecast values</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$6.55</td>
</tr>
<tr>
<td>10%</td>
<td>$23.90</td>
</tr>
<tr>
<td>20%</td>
<td>$27.73</td>
</tr>
<tr>
<td>30%</td>
<td>$30.89</td>
</tr>
<tr>
<td>40%</td>
<td>$33.88</td>
</tr>
<tr>
<td>50%</td>
<td>$35.99</td>
</tr>
<tr>
<td>60%</td>
<td>$40.28</td>
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<tr>
<td>70%</td>
<td>$44.22</td>
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<tr>
<td>80%</td>
<td>$49.24</td>
</tr>
<tr>
<td>90%</td>
<td>$57.49</td>
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<tr>
<td>100%</td>
<td>$197.11</td>
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</table>