The Dark Side of Valuation: Bias, Uncertainty and Complexity

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The Bermuda Triangle of Valuation

Valuation First Principles & Good Sense

Bias & Preconceptions

Uncertainty & the Unknown

Complexity & Detail
I. Valuation Bias

- **Preconceptions and priors:** When you start on the valuation of a company, you almost never start with a blank slate. Instead, your valuation is shaped by your prior views of the company in question.
  - Corollary 1: The more you know about a company, the more likely it is that you will be biased, when valuing the company.
  - Corollary 2: The “closer” you get to the management/owners of a company, the more biased your valuation of the company will become.

- **Value first, valuation to follow:** In principle, you should do your valuation first before you decide how much to pay for an asset. In practice, people often decide what to pay and do the valuation afterwards.
Sources of bias

- **The power of the subconscious**: We are human, after all, and as a consequence are susceptible to
  - **Herd behavior**: For instance, there is the “market price” magnet in valuation, where estimates of intrinsic value move towards the market price with each iteration.
  - **Hindsight bias**: If you know the outcome of a sequence of events, it will affect your valuation. (That is why teaching valuation with cases is an exercise in futility)

- **The power of suggestion**: Hearing what others think a company is worth will color your thinking, and if you view those others as more informed/smarter than you are, you will be influenced even more.

- **The power of money**: If you have an economic stake in the outcome of a valuation, bias will almost always follow.
  - **Corollary 1**: Your bias in a valuation will be directly proportional to who pays you to do the valuation and how much you get paid.
  - **Corollary 2**: You will be more biased when valuing a company where you already have a position (long or short) in the company.
Biases in DCF valuation: A template of "tricks"

If you want higher (lower) value, you can:
1. Augment (haircut) earnings
2. Reduce (increase) effective tax rate
3. Ignore (Count in) unconventional cap ex
4. Narrow (Broaden) definition of working capital

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

Expected Growth in FCFF during high growth

If you want to increase (decrease) value, you can:
1. Use higher (lower) growth rates
2. Assume less (more) reinvestment with the same growth rate, thus raising (lowering) the quality and value of growth.

Value of Operating Assets today
+ Cash & non-operating assets
- Debt
Value of equity

If you want to increase (decrease) value, you can add (subtract) premiums (discounts) for things you like (dislike) about the company.
Premiums: Control, Synergy, liquidity
Discounts: Illiquidity, private company

Cost of Capital
Weighted average of cost of equity & cost of debt

Stable Growth
When operating income and FCFF grow at constant rate forever.

If you want to increase value, you can:
1. Use stable growth rates that are economically impossible (higher than the growth rate of the economy)
2. Allow this growth to be accompanied by high positive excess returns (low reinvestment)

If you want to decrease value, you can:
1. Use lower growth rates in perpetuity
2. Accompany this growth with high negative excess returns
Facebook IPO: May 17, 2012

**Revenue growth** of 40% a year for 5 years, tapering down to 2% in year 10

- Pre-tax operating margin declines to 35% in year 10
- Sales to capital ratio of 1.50 for incremental sales

**Terminal Value**

\[ $7,713/(.08-.02) = 128,546 \]

**Cost of capital**

\[ .988 + .012 = 11.07\% \]

**Operating assets**

- 62,053
- + Cash: 1,512
- - Debt: 1,219

**Value of equity**

- 62,350
- - Options: 3,088

**Value in stock**

- 59,262

**Value/share**

- $25.39

**Stable Growth**

- g = 2%; Beta = 1.00;
- Cost of capital = 8%
- ROC = 12%;
- Reinvestment Rate = 2%/12% = 16.67%

**Cost of capital decreases to 8% from years 6-10**

At 4:00 pm, May 17, the offering was priced at $38/share
**Bias Up: Facebook IPO: May 17, 2012**

### Terminal Value

\[ \text{Terminal Value}_{10} = \frac{10,870}{.08 - .02} = 181,173 \]

### Cost of capital decreases to 8% from years 6-10

At 4:00 PM, May 17, the offering was priced at $38/share.
**Bias Down: Facebook IPO: May 17, 2012**

### Terminal Value

\[
\text{Terminal Value}_{10} = \frac{6,148}{(0.08 - 0.02)} = 102,469
\]

### Stable Growth

- $g = 2\%$; Beta = 1.00;
- Cost of capital = 8\%
- ROC = 8\%
- Reinvestment Rate = 2\%/20\% = 10\%

### Cost of capital decreases to 8\% from years 6-10

At 4.00 pm, May 17, the offering was priced at $38/share.
Manifestations of Bias: Relative Valuation

**Market value of equity**

**Market value for the firm**
- Firm value = Market value of equity + Market value of debt

**Market value of operating assets of firm**
- Enterprise value (EV) = Market value of equity + Market value of debt - Cash

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**Revenues**
- a. Accounting revenues
  - b. Drivers
    - # Customers
    - # Subscribers
  - = # units

**Earnings**
- a. To Equity investors
  - - Net Income
  - - Earnings per share
- b. To Firm
  - - Operating income (EBIT)

**Cash flow**
- a. To Equity
  - - Net Income + Depreciation
  - - Free CF to Equity
- b. To Firm
  - - EBIT + DA (EBITDA)
  - - Free CF to Firm

**Book Value**
- a. Equity
  - = BV of equity
- b. Firm
  - = BV of debt + BV of equity
- c. Invested Capital
  - = BV of equity + BV of debt - Cash

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**Numerator = What you are paying for the asset**

**Denominator = What you are getting in return**

**Multiple =**

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**Step 1: Pick a multiple**

**Step 2: Choose comparables**
- Narrow versus Broad sector/business
- Similar market cap or all companies
- Country, Region or Global
- Other criteria, subjective & objective

**Step 3: Tell a story**
- Risk
  - - Lower risk for higher value
  - - Higher risk for lower value
- Growth
  - - Higher growth for higher value
  - - Lower growth for lower value
- Quality of growth
  - - Higher barriers to entry/moats for higher value
  - - Lower barriers to entry for lower value

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**Choose a multiple**

**Pick comparable firms**

**Spin/tell your story**
Dealing with bias: The “bad” ways

- **I use only numbers:** The easiest defense is to argue that you are only using numbers and that bias requires subjective judgments.
- **I am a “professional”:** Valuation professionals point to the requirements of their professional groups (CPA, CFA, CVA etc.) that they be unbiased.
- **It is a “FAIR” value (with my lawyer/accountant’s imprimatur):** The most common response to bias is to add legal or accounting cover.
  - Legal fair value: In most countries, investment bankers have to sign a legal document that their value is a “fair” value.
  - Accounting fair value: Accountants have jumped into the mix and have set up standards for fair value.
Healthy responses to bias

- **Build processes that minimize bias, not maximize it:** To the degree that a significant portion of bias comes from reward/punishment mechanisms, we need to build processes that disassociate the valuation outcome from compensation.

- **Be honest (at least with yourself):** Even if you may not want to reveal your biases to your clients, you should at least be honest with yourself.

- **Bayesian valuation:** It may be a good idea to require anyone valuing a company to state what they believe that they will find in the valuation, before they actually do the valuation. Anyone using the valuation should then have access to both the analyst’s priors and the valuation.

- **Transparency about motives:** All valuations should be accompanied with full details of who is paying for the valuation and how much, as well as any other stakes in the outcome of the valuation.
II. Valuation Uncertainty

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?
3M: A Pre-crisis valuation

Current Cashflow to Firm

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

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

Expected Growth in EBIT (1-t)

.30*.75 = 0.75
7.5%

Return on Capital

25%

Stable Growth

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

Terminal Value

5 = 2645/(.0676-.03) = 70,409

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

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>$3,734</td>
<td>$4,014</td>
<td>$4,279</td>
<td>$4,485</td>
<td>$4,619</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$1,120</td>
<td>$1,204</td>
<td>$1,312</td>
<td>$1,435</td>
<td>$1,540</td>
</tr>
<tr>
<td>= FCFF</td>
<td>$2,614</td>
<td>$2,810</td>
<td>$2,967</td>
<td>$3,049</td>
<td>$3,079</td>
</tr>
</tbody>
</table>

Value/Share $ 83.55

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

Cost of Equity

8.32%

Cost of Debt

(3.72%+.75%)(1-.35) = 2.91%

Weights

E = 92% D = 8%

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

Riskfree Rate:

Riskfree rate = 3.72%

Beta

1.15

Risk Premium

4%

Unlevered Beta for Sectors: 1.09

D/E=8.8%
Current Cashflow to Firm

EBIT(1-t) = Rs 20,116
- Nt CpX = Rs 31,590
- Chg WC = Rs 2,732
Reinv Rate = (31590+2732)/20116 = 170.61%; Tax rate = 21.00%
Return on capital = 17.16%

Expected Growth from new inv.
.70*.1716=0.1201

Return on Capital 17.16%

Terminal Value = 23493/(.1039-.05) = Rs 435,686

Cost of Equity 14.00%

Cost of Debt
(5%+ 4.25%+3)(1-.3399)
= 8.09%

Weights
E = 74.7% D = 25.3%

Riskfree Rate:
Rs Riskfree Rate = 5%

Beta 1.20
Mature market premium 4.5%
Country Equity Risk Premium 4.50%

Country Default Spread 3%

Unlevered Beta for Sectors: 1.04
Firm’s D/E Ratio: 33%

On April 1, 2010
Tata Motors price = Rs 781
Aswath Damodaran

9a. Amazon in January 2000

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

Cost of Equity: 12.90%
Cost of Debt: 8.00%
Tax rate = 10.00%

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

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

Riskfree Rate: T. Bond rate = 6.5%
Beta: 1.60 -> 1.00
Risk Premium: 4%

Pushed debt ratio to retail industry average of 15%.

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

- Estimation versus Economic uncertainty
  - *Estimation uncertainty* reflects the possibility that you could have the “wrong model” or estimated inputs incorrectly within this model.
  - *Economic uncertainty* comes the fact that markets and economies can change over time and that even the best medals will fail to capture these unexpected changes.

- Micro uncertainty versus Macro uncertainty
  - *Micro uncertainty* refers to uncertainty about the potential market for a firm’s products, the competition it will face and the quality of its management team.
  - *Macro uncertainty* reflects the reality that your firm’s fortunes can be affected by changes in the macro economic environment.

- Discrete versus continuous uncertainty
  - *Discrete risk*: Risks that lie dormant for periods but show up at points in time. (Examples: A drug working its way through the FDA pipeline may fail at some stage of the approval process or a company in Venezuela may be nationalized)
  - *Continuous risk*: Risks changes in interest rates or economic growth occur continuously and affect value as they happen.
Assessing uncertainty…

- Rank the four firms in terms of uncertainty (least to most) in your estimate:
  - 3M in 2007
  - Tata Motors in 2010
  - Amazon in 2000
  - Facebook in 2012

- With each company, specify the type of uncertainty that you face:

<table>
<thead>
<tr>
<th>Company</th>
<th>Estimation or Economic</th>
<th>Micro or Macro</th>
<th>Discrete or Continuous</th>
</tr>
</thead>
<tbody>
<tr>
<td>3M (2007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tata Motors (2010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amazon (2000)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facebook (2012)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unhealthy ways of dealing with uncertainty

- **Paralysis & Denial**: When faced with uncertainty, some of us get paralyzed. Accompanying the paralysis is the hope that if you close your eyes to it, the uncertainty will go away.

- **Mental short cuts (rules of thumb)**: Behavioral economists note that investors faced with uncertainty adopt mental short cuts that have no basis in reality. And here is the clincher. More intelligent people are more likely to be prone to this.

- **Herding**: When in doubt, it is safest to go with the crowd. The herding instinct is deeply engrained and very difficult to fight.

- **Outsourcing**: Assuming that there are experts out there who have the answers does take a weight off your shoulders, even if those experts have no idea of what they are talking about.
Healthy responses to uncertainty

1. Less is more (the rule on detail….) (Revenue & margin forecasts)
2. Build in internal checks on reasonableness… (reinvestment and ROC)
3. Use the offsetting principle (risk free rates & inflation at Tata Motors)
4. Draw on economic first principles (Terminal value at all the companies)
5. Use the “market” as a crutch (equity risk premiums, country risk premiums)
6. Use the law of large numbers (Beta for all companies)
7. Don’t let the discount rate become the receptacle for all uncertainties.
8. Confront uncertainty, if you can
9. Don’t look for precision
1. Less is more
Revenues & Margins for Amazon in 2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth rate</th>
<th>Revenues</th>
<th>Operating Margin</th>
<th>EBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tr12m</td>
<td>200%</td>
<td>$1,117</td>
<td>-36.71%</td>
<td>-$410</td>
</tr>
<tr>
<td>1</td>
<td>150%</td>
<td>$2,793</td>
<td>-13.35%</td>
<td>-$373</td>
</tr>
<tr>
<td>2</td>
<td>100%</td>
<td>$5,585</td>
<td>-1.68%</td>
<td>-$94</td>
</tr>
<tr>
<td>3</td>
<td>75%</td>
<td>$9,774</td>
<td>4.16%</td>
<td>$407</td>
</tr>
<tr>
<td>4</td>
<td>50%</td>
<td>$14,661</td>
<td>7.08%</td>
<td>$1,038</td>
</tr>
<tr>
<td>5</td>
<td>30%</td>
<td>$19,059</td>
<td>8.54%</td>
<td>$1,628</td>
</tr>
<tr>
<td>6</td>
<td>25.2%</td>
<td>$23,862</td>
<td>9.27%</td>
<td>$2,212</td>
</tr>
<tr>
<td>7</td>
<td>20.4%</td>
<td>$28,729</td>
<td>9.64%</td>
<td>$2,768</td>
</tr>
<tr>
<td>8</td>
<td>15.6%</td>
<td>$33,211</td>
<td>9.82%</td>
<td>$3,261</td>
</tr>
<tr>
<td>9</td>
<td>10.8%</td>
<td>$36,798</td>
<td>9.91%</td>
<td>$3,646</td>
</tr>
<tr>
<td>10</td>
<td>6.0%</td>
<td>$39,006</td>
<td>9.95%</td>
<td>$3,883</td>
</tr>
<tr>
<td>TY(11)</td>
<td>6.0%</td>
<td>$41,346</td>
<td>10.00%</td>
<td>$4,135</td>
</tr>
</tbody>
</table>

Be parsimonious: Estimate the big numbers (revenues and margin in year 11)
2. Build in “internal” checks for reasonableness…

Reinvestment and Return on Capital

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>After-tax Op Inc</th>
<th>Sales/Capital</th>
<th>Reinvestment</th>
<th>Invested Capital</th>
<th>Return on Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base year</td>
<td>$1,117</td>
<td>-$410</td>
<td></td>
<td>$487</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>$2,793</td>
<td>-$373</td>
<td>3.00</td>
<td>$559</td>
<td>$1,045</td>
<td>-76.62%</td>
</tr>
<tr>
<td>2</td>
<td>$5,585</td>
<td>-$94</td>
<td>3.00</td>
<td>$931</td>
<td>$1,976</td>
<td>-8.96%</td>
</tr>
<tr>
<td>3</td>
<td>$9,774</td>
<td>$407</td>
<td>3.00</td>
<td>$1,396</td>
<td>$3,372</td>
<td>20.59%</td>
</tr>
<tr>
<td>4</td>
<td>$14,661</td>
<td>$871</td>
<td>3.00</td>
<td>$1,629</td>
<td>$5,001</td>
<td>25.82%</td>
</tr>
<tr>
<td>5</td>
<td>$19,059</td>
<td>$1,058</td>
<td>3.00</td>
<td>$1,466</td>
<td>$6,467</td>
<td>21.16%</td>
</tr>
<tr>
<td>6</td>
<td>$23,862</td>
<td>$1,438</td>
<td>3.00</td>
<td>$1,601</td>
<td>$8,068</td>
<td>22.23%</td>
</tr>
<tr>
<td>7</td>
<td>$28,729</td>
<td>$1,799</td>
<td>3.00</td>
<td>$1,623</td>
<td>$9,691</td>
<td>22.30%</td>
</tr>
<tr>
<td>8</td>
<td>$33,211</td>
<td>$2,119</td>
<td>3.00</td>
<td>$1,494</td>
<td>$11,185</td>
<td>21.87%</td>
</tr>
<tr>
<td>9</td>
<td>$36,798</td>
<td>$2,370</td>
<td>3.00</td>
<td>$1,196</td>
<td>$12,380</td>
<td>21.19%</td>
</tr>
<tr>
<td>10</td>
<td>$39,006</td>
<td>$2,524</td>
<td>3.00</td>
<td>$736</td>
<td>$13,116</td>
<td>20.39%</td>
</tr>
<tr>
<td>Terminal year</td>
<td>$41,346</td>
<td>$2,688</td>
<td></td>
<td></td>
<td></td>
<td>20.00%</td>
</tr>
</tbody>
</table>

Comfortable with $41.3 billion in revenues
- Check against total market (and market share)
- Check against largest companies in the market

Comfortable with ROC = 20.39% in year 10?
- Check against cost of capital
- Check against industry average
### 3. Use consistency tests…

**Tata Motors: In Rupees and US dollars**

\[(1.125)^*(1.01/1.04)-1 = .0925\]

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

**Equity versus Firm:** If cash flows are post-debt and to equity, you should discount at the cost of equity. Pre-debt cash flows should be discounted at the cost of capital.

**Currency:** The currency in which the cash flows are estimated should also be the currency in which the discount rate is estimated.
4. Draw on economic first principles and mathematical limits…
   The terminal value limits

<table>
<thead>
<tr>
<th>Stable Growth rate</th>
<th>3M</th>
<th>Tata Motors</th>
<th>Amazon</th>
<th>Facebook</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$70,409</td>
<td>INR 435,686</td>
<td>$26,390</td>
<td>$113,423</td>
</tr>
<tr>
<td>1%</td>
<td>$70,409</td>
<td>INR 435,686</td>
<td>$28,263</td>
<td>$120,012</td>
</tr>
<tr>
<td>2%</td>
<td>$70,409</td>
<td>INR 435,686</td>
<td>$30,595</td>
<td>$128,546</td>
</tr>
<tr>
<td>3%</td>
<td>$70,409</td>
<td>INR 435,686</td>
<td>$33,594</td>
<td></td>
</tr>
<tr>
<td>4%</td>
<td></td>
<td>INR 435,686</td>
<td>$37,618</td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td></td>
<td>INR 435,686</td>
<td>$43,334</td>
<td></td>
</tr>
<tr>
<td>6%</td>
<td></td>
<td></td>
<td>$52,148</td>
<td></td>
</tr>
<tr>
<td>Riskfree rate</td>
<td>3.72%</td>
<td>5.00%</td>
<td>6.50%</td>
<td>2.00%</td>
</tr>
<tr>
<td>ROC (stable growth)</td>
<td>6.76%</td>
<td>10.39%</td>
<td>20.00%</td>
<td>8.00%</td>
</tr>
<tr>
<td>Cost of capital (stable growth)</td>
<td>6.76%</td>
<td>10.39%</td>
<td>9.61%</td>
<td>12.00%</td>
</tr>
</tbody>
</table>
5. Use the market as a crutch…

Equity Risk Premiums

<table>
<thead>
<tr>
<th></th>
<th>Arithmetic Average</th>
<th>Geometric Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stocks - T. Bills</td>
<td>Stocks - T. Bonds</td>
</tr>
<tr>
<td>1928-2011</td>
<td>7.55%</td>
<td>5.79%</td>
</tr>
<tr>
<td></td>
<td>2.22%</td>
<td>2.36%</td>
</tr>
<tr>
<td>1962-2011</td>
<td>5.38%</td>
<td>3.36%</td>
</tr>
<tr>
<td></td>
<td>2.39%</td>
<td>2.68%</td>
</tr>
<tr>
<td>2002-2011</td>
<td>3.12%</td>
<td>-1.92%</td>
</tr>
<tr>
<td></td>
<td>6.46%</td>
<td>8.94%</td>
</tr>
</tbody>
</table>

Analysts expect earnings to grow 9.6% in 2012, 11.9% in 2013, 8.2% in 2014, 4.5% in 2015 and 2% thereafter, resulting in a compounded annual growth rate of 7.18% over the next 5 years. We will assume that dividends & buybacks will grow 7.18% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.87%, the same rate as the entire economy (= riskfree rate).

January 1, 2012
S&P 500 is at 1257.60
Adjusted Dividends & Buybacks for 2011 = 59.29

In the trailing 12 months, the cash returned to stockholders was 74.17. Using the average cash yield of 4.71% for 2002-2011 the cash returned would have been 59.29.

Expected Return on Stocks (1/1/12) = 7.91%
T.Bond rate on 1/1/12 = 1.87%
Equity Risk Premium = 8.03% - 3.29% = 6.04%

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo!
Finance, Bloomberg
## Country Risk Premiums
### June 2012

<table>
<thead>
<tr>
<th>Region</th>
<th>Total ERP</th>
<th>Country Risk Premium</th>
<th>GDP Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFRICA</td>
<td>9.82%</td>
<td>3.82%</td>
<td></td>
</tr>
<tr>
<td>ASIA</td>
<td>7.63%</td>
<td>1.63%</td>
<td></td>
</tr>
<tr>
<td>LAT AM</td>
<td>9.42%</td>
<td>3.42%</td>
<td></td>
</tr>
<tr>
<td>NORTH AM</td>
<td>6.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>W. EUROPE</td>
<td>6.80%</td>
<td>0.80%</td>
<td></td>
</tr>
<tr>
<td>E. EUROPE</td>
<td>8.60%</td>
<td>2.60%</td>
<td></td>
</tr>
<tr>
<td>MIDDLE EAST</td>
<td>7.16%</td>
<td>1.16%</td>
<td></td>
</tr>
</tbody>
</table>

### Specific Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Total ERP</th>
<th>Country Risk Premium</th>
<th>GDP Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>12.00%</td>
<td>6.00%</td>
<td></td>
</tr>
<tr>
<td>Armenia</td>
<td>10.13%</td>
<td>4.13%</td>
<td></td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>9.00%</td>
<td>3.00%</td>
<td></td>
</tr>
<tr>
<td>Belarus</td>
<td>15.00%</td>
<td>9.00%</td>
<td></td>
</tr>
<tr>
<td>Bosnia</td>
<td>15.00%</td>
<td>9.00%</td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>8.63%</td>
<td>2.63%</td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>9.00%</td>
<td>3.00%</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>7.28%</td>
<td>1.28%</td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>7.28%</td>
<td>1.28%</td>
<td></td>
</tr>
<tr>
<td>Georgia</td>
<td>10.88%</td>
<td>4.88%</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>9.60%</td>
<td>3.60%</td>
<td></td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>8.63%</td>
<td>2.63%</td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td>9.00%</td>
<td>3.00%</td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>8.25%</td>
<td>2.25%</td>
<td></td>
</tr>
<tr>
<td>Moldova</td>
<td>5.00%</td>
<td>9.00%</td>
<td></td>
</tr>
<tr>
<td>Montenegro</td>
<td>10.88%</td>
<td>4.88%</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>7.50%</td>
<td>1.50%</td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>9.00%</td>
<td>3.00%</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>8.25%</td>
<td>2.25%</td>
<td></td>
</tr>
<tr>
<td>Slovakia</td>
<td>7.50%</td>
<td>1.50%</td>
<td></td>
</tr>
<tr>
<td>Slovenia [1]</td>
<td>7.50%</td>
<td>1.50%</td>
<td></td>
</tr>
<tr>
<td>Ukraine</td>
<td>13.50%</td>
<td>7.50%</td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>12.00%</td>
<td>6.00%</td>
<td></td>
</tr>
<tr>
<td>WO JAPAN</td>
<td>7.77%</td>
<td>1.77%</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>6.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>6.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>AUS &amp; NZ</td>
<td>6.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Bahrain</td>
<td>8.25%</td>
<td>2.25%</td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td>7.28%</td>
<td>1.28%</td>
<td></td>
</tr>
<tr>
<td>Jordan</td>
<td>10.13%</td>
<td>4.13%</td>
<td></td>
</tr>
<tr>
<td>Kuwait</td>
<td>6.75%</td>
<td>0.75%</td>
<td></td>
</tr>
<tr>
<td>Lebanon</td>
<td>12.00%</td>
<td>6.00%</td>
<td></td>
</tr>
<tr>
<td>Oman</td>
<td>7.28%</td>
<td>1.28%</td>
<td></td>
</tr>
<tr>
<td>Qatar</td>
<td>6.75%</td>
<td>0.75%</td>
<td></td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>7.05%</td>
<td>1.05%</td>
<td></td>
</tr>
<tr>
<td>UAE</td>
<td>6.75%</td>
<td>0.75%</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- **Black #: Total ERP**
- **Red #: Country risk premium**
- **AVG: GDP weighted average**
6. Draw on the law of large numbers…
A single regression beta is noisy…
But an average beta across companies is not…

- There are 111 publicly traded companies, globally in the automobile business.
  - Average beta across companies = 1.22
  - Average D/E ratio across companies = 35%
  - Average tax rate across companies = 30%
  - Unlevered beta for automobile company = $1.22 / (1+ (1-.30)(.35)) = 0.98$
  - Standard error on “average” beta = $0.26 / \sqrt{111} = 0.025$

- To estimate the beta for Tata Motors
  - Unlevered beta for automobile company = 0.98
  - D/E ratio for Tata Motors = 33.87%
  - Marginal tax rate in India = 33.99%
  - Levered beta = $0.98 (1+ (1-.3399)(.3387)) = 1.20$
7. Don’t let the discount rate become the receptacle for all uncertainty… For instance, most young firms don’t make it…
And you can deal with it in one of two ways…

- **The Venture Capital approach:** In the venture capital approach, you hike the “discount rate” well above what would be appropriate for a going concern and then use this “target” rate to discount your “exit value” (which is estimated using a multiple and forward earnings).
  \[
  \text{Value} = \frac{\text{Forward Earnings in year } n \times \text{Exit multiple}}{(1+ \text{target rate})^n}
  \]

- **The decision tree approach:**
  1. Value the business as a “going concern”, with a rate of return appropriate for a “going concern”.
  2. Estimate the probability of survival (and failure) and the value of the business in the event of failure.
  \[
  \text{Value} = \text{Going concern value (Probability of survival)} + \text{Liquidation value (Probability of failure)}
  \]
8. Confront uncertainty, if you can…
Revisiting the Facebook valuation…

<table>
<thead>
<tr>
<th><strong>Revenue Growth rate</strong></th>
<th>![Revenue Growth rate graph]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected growth rate = 40%</td>
<td></td>
</tr>
<tr>
<td>Distribution: Lognormal</td>
<td></td>
</tr>
<tr>
<td>Standard deviation = 6%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Pre-tax Operating Margin</strong></th>
<th>![Pre-tax Operating Margin graph]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected margin = 35%</td>
<td></td>
</tr>
<tr>
<td>Distribution: Uniform</td>
<td></td>
</tr>
<tr>
<td>Minimum = 25%</td>
<td></td>
</tr>
<tr>
<td>Maximum = 45%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sales to Capital Ratio</strong></th>
<th>![Sales to Capital Ratio graph]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution: Normal</td>
<td></td>
</tr>
<tr>
<td>Expected value = 1.50</td>
<td></td>
</tr>
<tr>
<td>Standard deviation = 0.15</td>
<td></td>
</tr>
</tbody>
</table>
With the consequences…

![Bar graph and table showing estimated value per share with various percentiles and forecast values.]
9. Don’t look for precision..
My valuations of Amazon over time…
III. Complexity in valuation

More complex companies
- Operate in many businesses
- Operate in many countries
- More financing options
- Different tax structures

Richer/ More Data
- Cross sectional data
- Historical data
- Macroeconomic data

Bigger/more sophisticated models
- Access to tools
- More powerful devices
- Analytical teams

Bigger, more complicated valuations

Analyst induced complexity
- Intimidation
- Fog of "numbers"
- Aura of knowledge

Legal induced complexity
- Worry about "lawsuits"
- Accountability
Sources of complexity

- **Globalization:** As companies globalize, valuations are getting more complex for a number of reasons:
  - Risk assessment has to factor in where a company operates and not where it is incorporated.
  - Currency choices proliferate, since a company can be valued in any of a half a dozen currencies (often to value different listings).

- **Shifting and volatile macro economic risks** have created changing risk premiums and strange interest rate/exchange rate environments.

- **More complex accounting standards** have created longer, more complicated, more difficult to read financial statements.

- **More complicated holding structures** (cross holdings, shares with different voting rights), motivated by tax and control reasons, make valuations more difficult.
Manifestations of complexity

- **Mysterious terms/acronyms**: A feature of complex valuation is line items or terms that sound “sophisticated” but you do not know or not sure what they mean or measure. (For an added layer of intimidation, make them Greek alphabets…)

- **Longer, more detailed valuations**: The level of detail that you see in valuations, with hundreds of line items and dozens of inputs, is staggering (and scary).

- **What if and scenario analysis**: While there is a place for asking what if questions and scenario analysis in valuation, the ease with which it can be done has opened the door to abuse, with the primary objective becoming cover, no matter what happens.
Unhealthy responses to complexity

- **Input fatigue:** Analysts who are called upon to estimate dozens and dozens of inputs, often with little information to do so, will give up at some point and input “numbers” just to get done. It is “garbage in, garbage out…”

- **Black box models:** The models becomes so complicated that what happens inside the model becomes a mystery to those outside. Consequently, analysts essentially claim no ownership or responsibility for the output from the model. “The model did it” becomes the refrain.

- **Suspension of common sense:** The dependence on models becomes so complete that analysts lose sight of common sense and mangle the valuation of the simplest assets.
Healthy responses to complexity

- **Parsimonious valuations**: Never estimate more inputs than you absolutely have to. Less is more. When faced with the question of adding more detail/complexity, ask yourself whether it will make your valuation more precise (or just make it look more precise).
- **Go back to first principles**: The fundamentals of valuation don’t change, just because you are faced with complexity. Always fall back on first principles.
- **Focus on key levers**: Even when there are dozens of inputs in a valuation, the valuation itself is a function of three or four key value drivers (which may be different for different companies). Keep your focus on those variables.