THE DARK SIDE OF VALUATION: BIAS, UNCERTAINTY AND COMPLEXITY

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The Bermuda Triangle of Valuation

Valuation First Principles & Good Sense

Uncertainty & the Unknown

Bias & Preconceptions

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.
Biasing a 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

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.

Expected Growth in FCFF during high growth

If you want to increase (decrease) value, you can
1. Assume a longer (shorter) growth period
2. Assume more (less) excess returns over the growth period

Length of high growth period: PV of FCFF during high

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

If you want to increase (decrease) value, you can
1. Assume a higher (lower) debt ratio, with the same costs of debt & equity. You may be able to accomplish this by using book (market) value debt ratios.
2. Use a lower (higher) equity risk premium for equity and a lower (higher) default spread for debt.
3. Find a "lower" ("higher") beta for your stock.
4. Don't add (add) other premiums to the cost of equity (small cap?)

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

Premiums: Control, Synergy, liquidity
Discounts: Illiquidity, private company
## Bias Tools 1a: The Cash Flow Ploy

<table>
<thead>
<tr>
<th>Item</th>
<th>The “unbiased” solution</th>
<th>Bias up</th>
<th>Bias down</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT/ Earnings</td>
<td>Remove all extraordinary items &amp; normalize the rest (with earnings going up or down) only if necessary.</td>
<td>Remove only extraordinary losses &amp; normalize to push earnings up</td>
<td>Remove only extraordinary income &amp; normalize to push earnings down</td>
</tr>
<tr>
<td>Tax rate</td>
<td>You can start with the effective tax rate but change over time towards marginal rate.</td>
<td>Use effective tax (if less than marginal) forever.</td>
<td>Use marginal tax rate (if higher than effective) forever.</td>
</tr>
<tr>
<td>Net Cap Ex</td>
<td>Count in all investments (R&amp;D, acquisitions) made for growth &amp; allow for the resulting growth.</td>
<td>Ignore unusual cap ex (acquisitions) while counting growth in.</td>
<td>Count unusual cap ex while ignoring growth generated.</td>
</tr>
<tr>
<td>Working Capital</td>
<td>Use historic or industry averages of working capital to estimate changes</td>
<td>Ignore working capital or use negative working capital as source of cash.</td>
<td>Use change in working capital, if it is a large drain on cash flow.</td>
</tr>
</tbody>
</table>
## Bias Tools 1b: Tax Mismatching

- **Unbiased**: If your cash flows are after (no, corporate, corporate + individual) taxes, your discount rate has to reflect (no, corporate, corporate + individual) taxes.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Entity taxes</th>
<th>Investor taxes</th>
<th>Valuation approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLPs, REITs, Partnerships, Sole</td>
<td>No taxes</td>
<td>1. Income taxed as ordinary income</td>
<td>1. Value pre-tax income at a pre-tax discount rate</td>
</tr>
<tr>
<td>proprietorships</td>
<td></td>
<td>2. Value appreciation taxed as capital gains</td>
<td>2. Value post-personal tax income at post personal tax discount rate.</td>
</tr>
<tr>
<td>Corporations</td>
<td>Income taxed at corporate tax rate</td>
<td>1. Dividends taxed when paid</td>
<td>1. Value cash flows, post-corporate but pre-personal taxes, at a discount rate that is post-corporate but pre-personal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Price appreciation taxed when stock sold</td>
<td>2. Value cash flows, post-corporate &amp; post personal taxes, at a discount rate that is post-corporate and post-personal.</td>
</tr>
</tbody>
</table>

- **Bias up**: Use pre-tax (personal, personal & corporate) cash flows while discounting at an after-tax (personal, personal & corporate) discount rate.

- **Bias down**: Use after-tax tax (personal, personal & corporate) cash flows while discounting at a pre-tax (personal, personal & corporate) discount rate.
## Bias Tools 2: The Growth Trick

<table>
<thead>
<tr>
<th></th>
<th>Unbiased</th>
<th>Bias up</th>
<th>Bias down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling up of growth</td>
<td>Reduce growth rates as company scales up, but allow for exceptions.</td>
<td>Continue with high revenue growth, as you scale up.</td>
<td>Scale down growth too quickly.</td>
</tr>
<tr>
<td>Target Operating Margin</td>
<td>Move towards margins of mature companies in industry</td>
<td>Move well above margins of mature companies in industry</td>
<td>Moves well below typical margins in industry</td>
</tr>
<tr>
<td>Reinvestment</td>
<td>Enough reinvestment to allow for growth</td>
<td>No or little reinvestment, as growth continues</td>
<td>Disproportionately large reinvestment, given growth.</td>
</tr>
<tr>
<td>Imputed ROC</td>
<td>Trends down towards industry average and cost of capital.</td>
<td>Trends up away from industry average &amp; cost of capital.</td>
<td>Trends down below the industry average &amp; cost of capital</td>
</tr>
</tbody>
</table>
## Bias Tools 3a: The Macro Game – Risk free rate

<table>
<thead>
<tr>
<th></th>
<th>Unbiased</th>
<th>Bias Up</th>
<th>Bias Down</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normalization</strong></td>
<td>Use the current risk free rate.</td>
<td>Use the risk free rate today, if it is low, but replace with an average rate over time, if the current rate is high.</td>
<td>Use the average rate over time, if the current rate is low or the current rate, if it is high.</td>
</tr>
<tr>
<td><strong>Government default risk</strong></td>
<td>Remove the default risk from the government bond rate to get to riskfree rate.</td>
<td>Use a risk free rate in a lower inflation currency, with a default free government (but leave cash flows in local currency)</td>
<td>Use the government bond rate as the risk free rate.</td>
</tr>
</tbody>
</table>
Bias Tools 3b: Equity Risk Premiums

### Historical Premium

<table>
<thead>
<tr>
<th>Year Range</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>1928-2012</td>
<td>7.65%</td>
<td>5.88%</td>
</tr>
<tr>
<td>1962-2012</td>
<td>5.93%</td>
<td>3.91%</td>
</tr>
<tr>
<td>2002-2012</td>
<td>7.06%</td>
<td>3.08%</td>
</tr>
<tr>
<td></td>
<td>5.82%</td>
<td>8.11%</td>
</tr>
</tbody>
</table>

In 2012, the actual cash returned to stockholders was 72.25. Using the average total yield for the last decade yields 69.46.

Analysts expect earnings to grow 7.67% in 2013, 7.28% in 2014, scaling down to 1.76% in 2017, resulting in a compounded annual growth rate of 5.27% over the next 5 years. We will assume that dividends & buybacks will grow 5.27% a year for the next 5 years. After year 5, we will assume that earnings on the index will grow at 1.76%, the same rate as the entire economy (= risk-free rate).

January 1, 2013
S&P 500 is at 1426.19
Adjusted Dividends & Buybacks for base year = 69.46

\[
1426.19 = \frac{73.12}{(1+r)} + \frac{76.97}{(1+r)^2} + \frac{81.03}{(1+r)^3} + \frac{85.30}{(1+r)^4} + \frac{89.80}{(1+r)^5} + \frac{89.80(1.0176)}{(1+r)^5}
\]

Expected Return on Stocks (1/1/13) = 7.54%
T.Bond rate on 1/1/13 = 1.76%
Equity Risk Premium = 7.54% - 1.76% = 5.78%

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate:
S&P, Media reports, Factset, Thomson-Reuters
Austria 0.00% 5.75%
Belgium 1.20% 6.95%
Cyprus 16.50% 22.25%
Denmark 0.00% 5.75%
Finland 0.00% 5.75%
France 6.45% 6.20%
Germany 0.00% 5.75%
Greece 10.13% 15.88%
Iceland 3.38% 9.13%
Ireland 4.13% 9.88%
Isle of Man 0.00% 5.75%
Italy 3.00% 8.75%
Liechtenstein 0.00% 5.75%
Luxembourg 0.00% 5.75%
Malta 1.95% 7.20%
Netherlands 0.00% 5.75%
Norway 0.00% 5.75%
Portugal 5.40% 9.15%
Spain 3.38% 9.13%
Sweden 0.00% 5.75%
Switzerland 0.00% 5.75%
Turkey 3.38% 9.13%
UK 0.45% 6.20%
W. Europe 1,222 6.97%
Angola 5.40% 11.15%
Benin 8.25% 14.00%
Botswana 1.65% 7.40%
Burkina Faso 8.25% 14.00%
Cameroon 8.25% 14.00%
Cape Verde 6.75% 12.50%
Egypt 12.00% 17.75%
Gabon 5.40% 11.15%
Ghana 6.75% 12.50%
Kenya 6.75% 12.50%
Morocco 4.13% 9.88%
Mozambique 6.75% 12.50%
Namibia 3.38% 9.13%
Nigeria 5.40% 11.15%
Rwanda 8.25% 14.00%
Senegal 6.75% 12.50%
South Africa 2.55% 8.30%
Tunisia 4.73% 10.48%
Uganda 6.75% 12.50%
Zambia 6.75% 12.50%
Africa 5.90% 11.65%

Albania 6.75% 12.50%
Armenia 4.73% 10.48%
Azerbaijan 3.38% 9.13%
Belarus 10.13% 15.88%
Bosnia 10.13% 15.88%
Bulgaria 3.00% 8.75%
Croatia 4.13% 9.88%
Czech Republic 1.43% 7.18%
Estonia 1.43% 7.18%
Georgia 6.40% 11.15%
Hungary 4.13% 9.88%
Kazakhstan 3.00% 8.75%
Latvia 3.00% 8.75%
Lithuania 2.55% 8.30%
Macedonia 5.40% 11.15%
Moldova 10.13% 15.88%
Montenegro 5.40% 11.15%
Poland 1.65% 7.40%
Romania 3.38% 9.13%
Russia 2.90% 8.30%
Serbia 5.40% 11.15%
Slovakia 1.65% 7.40%
Slovenia 4.13% 9.88%
Ukraine 10.13% 15.88%

Bangladesh 5.40% 11.15%
Cambodia 8.25% 14.00%
China 1.20% 6.95%
Fiji 6.75% 12.50%
Hong Kong 6.05% 6.20%
India 3.38% 9.13%
Indonesia 3.38% 9.13%
Japan 1.20% 6.95%
Korea 1.20% 6.95%
Macau 1.20% 6.95%
Malaysia 1.95% 7.70%
Mauritius 2.55% 8.30%
Mongolia 6.75% 12.50%
Pakistan 12.00% 17.75%
Papua NG 6.75% 12.50%
Philippines 4.13% 9.88%
Singapore 0.00% 5.75%
Sri Lanka 6.75% 12.50%
Taiwan 1.20% 6.95%
Thailand 2.55% 8.30%
Vietnam 8.25% 14.00%

Asia 1.77% 7.52%

E. Europe/Russia 3.13% 8.88%

Bahrain 2.55% 8.30%
Israel 1.43% 7.18%
Jordan 6.75% 12.50%
Kuwait 0.90% 6.65%
Lebanon 6.75% 12.50%
Oman 1.43% 7.18%
Qatar 0.90% 6.65%
Saudi Arabia 1.20% 6.95%
UAE 0.90% 6.65%

Middle East 1.38% 7.13%

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average
Bias Tools 3d: Adjust the discount rate

- **Unbiased:** If you feel that your risk adjustment metric (eg. Beta) is not capturing equity risk adequately, think about better ways of measuring that risk.

- **Bias up:** Reduce your discount rate to reflect imaginary savings or perceived safety.
  - Some value investors argue that the more they know about a firm, the lower the risk of the firm, and that a lower discount rate (even the risk free rate) can be used.
  - In acquisitions, you sometimes see analysts reducing discount rates to reflect the risk reduction from diversification.
  - A simple way to reduce your cost of capital is to increase the debt ratio you use, while keeping your cost of equity & debt fixed.

- **Bias down:** Add on premiums to your discount rate (for size, liquidity, private company risk, survival) to push up your discount rate and push down value.
Bias Tools 4: Terminal Value Magic

Unbiased: Move towards a marginal tax rate
Bias up: Leave at effective tax rate
Bias down: Use tax rate > marginal tax rate

Unbiased: Assume ROIC is equal to or just above cost of capital. RR = g/ROC
Bias up: Assume no or very low reinvestment & high ROIC
Bias down: Assume ROIC < Cost of capital in perpetuity.

Unbiased: Move towards mature company WACC
Bias up: Move below mature company WACC
Bias down: Leave at current WACC (especially if it is high risk company)

Unbiased: $g \leq$ risk free rate
Bias up: $g >$ risk free rate
Bias down: Depends on ROIC

Terminal Value\(_n\) = \frac{EBIT\(_{n+1}\) (1 - \text{tax rate}) (1 - \text{Reinvestment Rate})}{\text{Cost of capital - Expected growth rate}}
## Bias Tools 5: From firm to equity value

<table>
<thead>
<tr>
<th></th>
<th>Unbiased</th>
<th>Bias up</th>
<th>Bias Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>Treat as neutral, unless there is evidence that the market is discounting it.</td>
<td>Add a premium to the cash, arguing that it makes the company safer.</td>
<td>Discount the cash substantially, arguing that it earns a low rate of return.</td>
</tr>
<tr>
<td>Cross holdings</td>
<td>Try to estimate the intrinsic value of these holdings.</td>
<td>Use book value, especially if higher than intrinsic value, or let managers specify value.</td>
<td>Ignore cross holdings.</td>
</tr>
<tr>
<td>Other Assets</td>
<td>Add on the value of only those assets that are not counted in your cash flows.</td>
<td>Add on assets that you have already counted in your cash flows (real estate).</td>
<td>Ignore all other assets</td>
</tr>
<tr>
<td>Goodwill</td>
<td>Ignore value</td>
<td>Add on to value</td>
<td>Ignore goodwill but reduce earnings for impairment.</td>
</tr>
<tr>
<td>Debt</td>
<td>Include all debt counted in your cost of capital.</td>
<td>Use a lower debt number than you used in cost of capital.</td>
<td>Count in other liabilities as debt.</td>
</tr>
</tbody>
</table>
Bias Tools 6: Post-valuation garnishing

- **Unbiased**: Follow the “it” proposition: “It” can have value only if it affects the cash flows of an asset or its risk, and “it” can be valued explicitly.
- **Bias up**: Look for premiums to add to value
  - **Control premium**: Is it really always 20%?
  - **Synergy premium**: Don’t know what it is, but it is worth a lot.
  - **Liquidity premium**: If an asset is liquid, you add a premium.
- **Bias down**: Look for discounts
  - **Minority discount**: If you get less than 50%, you have to discount value.
  - **ILLiquidity discount**: If it is illiquid, you need to discount its value.
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 = 11.19% (.988) + 1.59% (.012) = 11.07%

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

Revenue growth of 40% a year for 5 years, tapering down to 2% in year 10
Pre-tax operating margin stays at 45.68%
Sales to capital ratio of 3.00 for incremental sales

Terminal Value
$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

Stable Growth
$ = 2%; Beta = 1.00;
Cost of capital = 8%
ROC = 20%;
Reinvestment Rate = 2%/20% = 10%

Starting numbers

<table>
<thead>
<tr>
<th>Term yr</th>
<th>EBIT (1-t)</th>
<th>Reinv</th>
<th>FCFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12078</td>
<td>1208</td>
<td>10870</td>
</tr>
</tbody>
</table>

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

Value in stock 91,772
Value/share $39.32

Operating assets 94,564
- Cash 1,512
- Debt 1,219

Value of equity 94,861
- Options 3,088

Value in stock 91,772
Value/share $39.32

Cost of capital = 11.19% (.988) + 1.59% (.012) = 11.07%

Cost of Equity 11.19%

Cost of Debt
(2%+0.65%)(1-.40)
= 1.59%

Weights
E = 98.8% D = 1.2%

Riskfree Rate: Riskfree rate = 2%

Beta 1.53

Risk Premium 6%

Unlevered Beta for Sectors: 1.52

D/E = 1.21%
Bias Down: Facebook IPO: May 17, 2012

Stable Growth

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

Terminal Value

\[ 10 = \frac{6,148}{0.08 - 0.02} = 102,469 \]

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

Revenues

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>Operating margin</th>
<th>EBIT</th>
<th>EBIT (1-t)</th>
<th>Reinvestment</th>
<th>FCFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$4,195</td>
<td>44.21%</td>
<td>$2,297</td>
<td>$1,378</td>
<td>$1,979</td>
<td>$(601)</td>
</tr>
<tr>
<td>2</td>
<td>$7,274</td>
<td>42.74%</td>
<td>$3,109</td>
<td>$2,771</td>
<td>$2,711</td>
<td>$(906)</td>
</tr>
<tr>
<td>3</td>
<td>$10,183</td>
<td>41.27%</td>
<td>$4,203</td>
<td>$3,879</td>
<td>$3,879</td>
<td>$(1,358)</td>
</tr>
<tr>
<td>4</td>
<td>$14,256</td>
<td>39.81%</td>
<td>$5,675</td>
<td>$5,431</td>
<td>$5,431</td>
<td>$(2,026)</td>
</tr>
<tr>
<td>5</td>
<td>$19,939</td>
<td>38.34%</td>
<td>$7,652</td>
<td>$6,622</td>
<td>$6,622</td>
<td>$(3,012)</td>
</tr>
<tr>
<td>6</td>
<td>$26,425</td>
<td>36.87%</td>
<td>$9,743</td>
<td>$8,738</td>
<td>$8,738</td>
<td>$(2,776)</td>
</tr>
<tr>
<td>7</td>
<td>$32,979</td>
<td>35.40%</td>
<td>$11,675</td>
<td>$9,763</td>
<td>$9,763</td>
<td>$(1,733)</td>
</tr>
<tr>
<td>8</td>
<td>$38,651</td>
<td>33.94%</td>
<td>$13,116</td>
<td>$10,394</td>
<td>$10,394</td>
<td>$(3,305)</td>
</tr>
<tr>
<td>9</td>
<td>$42,979</td>
<td>32.47%</td>
<td>$13,754</td>
<td>$11,675</td>
<td>$11,675</td>
<td>$(4,947)</td>
</tr>
<tr>
<td>10</td>
<td>$43,209</td>
<td>31.00%</td>
<td>$13,955</td>
<td>$12,302</td>
<td>$12,302</td>
<td>$(6,907)</td>
</tr>
</tbody>
</table>

Cost of capital = \[ 11.19\% \times (0.988) + 1.59\% \times (0.012) = 11.07\% \]

Weights

\[ E = 98.8\% \quad D = 1.2\% \]

Riskfree Rate:

Riskfree rate = 2%

\[ \text{Beta} = 1.53 \times \text{Risk Premium} = 6\% \]

Unlevered Beta for Sectors: 1.52

D/E = 1.21%

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

Step 1: Pick a multiple

- **Multiple** = \[
\frac{\text{Numerator} \quad \text{Denominator}}{\text{What you are paying for the asset}} \quad \text{What you are getting in return}
\]

**Numerator**
- **Market value of equity**
- **Market value for the firm**
- **Market value of operating assets of firm**

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

**Cash flow**
- **Earnings**
  - To Equity investors
    - Net Income
    - Earnings per share
  - To Firm
    - Operating income (EBIT)

**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

**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

**CHOOSE A MULTIPLE**

**SPIN/TELL YOUR STORY**
## Bias tool 1a: Pick the value measure – Market Cap, Enterprise Value or Firm Value

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Market Capitalization</th>
<th>Ranking</th>
<th>(Plus) Total Debt</th>
<th>(Plus) PV of leases</th>
<th>(Plus) Preferred Stock</th>
<th>Firm Value</th>
<th>Ranking</th>
<th>(Minus) Cash &amp; Investments</th>
<th>(Minus) Equity cross holdings</th>
<th>(Plus) Minority Interests</th>
<th>Enterprise Value</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exxon Mobil Corporation (NYSE: XOM)</td>
<td>$401,790</td>
<td>1</td>
<td>$13,412</td>
<td>$7,351</td>
<td>$0</td>
<td>$422,483</td>
<td>2</td>
<td>$41,853</td>
<td>$0</td>
<td>$6,076</td>
<td>$366,714</td>
<td>2</td>
</tr>
<tr>
<td>Apple Inc. (Nasdaq: AAPL)</td>
<td>$272,203</td>
<td>2</td>
<td>$0</td>
<td>$3,854</td>
<td>$0</td>
<td>$379,056</td>
<td>3</td>
<td>$144,667</td>
<td>$0</td>
<td>$0</td>
<td>$231,476</td>
<td>10</td>
</tr>
<tr>
<td>Google Inc. (Nasdaq: GOOGL)</td>
<td>$292,357</td>
<td>3</td>
<td>$7,376</td>
<td>$3,225</td>
<td>$0</td>
<td>$302,677</td>
<td>6</td>
<td>$51,568</td>
<td>$0</td>
<td>$0</td>
<td>$231,109</td>
<td>6</td>
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<tr>
<td>Microsoft Corporation (Nasdaq: MSFT)</td>
<td>$288,486</td>
<td>4</td>
<td>$14,765</td>
<td>$1,781</td>
<td>$0</td>
<td>$305,035</td>
<td>7</td>
<td>$84,981</td>
<td>$0</td>
<td>$0</td>
<td>$220,654</td>
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<tr>
<td>Wal-Mart Stores Inc. (NYSE: WMT)</td>
<td>$244,080</td>
<td>5</td>
<td>$57,201</td>
<td>$14,389</td>
<td>$0</td>
<td>$310,670</td>
<td>6</td>
<td>$9,305</td>
<td>$0</td>
<td>$6,141</td>
<td>$312,456</td>
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<tr>
<td>Johnson &amp; Johnson (NYSE: JNJ)</td>
<td>$241,171</td>
<td>6</td>
<td>$16,892</td>
<td>$4,035</td>
<td>$0</td>
<td>$257,086</td>
<td>11</td>
<td>$23,193</td>
<td>$0</td>
<td>$0</td>
<td>$234,705</td>
<td>8</td>
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<tr>
<td>General Electric Company (NYSE: GE)</td>
<td>$239,787</td>
<td>7</td>
<td>$397,412</td>
<td>$3,623</td>
<td>$0</td>
<td>$640,822</td>
<td>1</td>
<td>$159,210</td>
<td>$0</td>
<td>$5,336</td>
<td>$460,948</td>
<td>1</td>
</tr>
<tr>
<td>Chevron Corporation (NYSE: CVX)</td>
<td>$229,403</td>
<td>8</td>
<td>$14,143</td>
<td>$3,190</td>
<td>$0</td>
<td>$246,736</td>
<td>13</td>
<td>$43,552</td>
<td>$0</td>
<td>$1,352</td>
<td>$204,356</td>
<td>15</td>
</tr>
<tr>
<td>PetroChina Co. Ltd. (SEHK: 857)</td>
<td>$223,480</td>
<td>9</td>
<td>$91,709</td>
<td>$13,701</td>
<td>$0</td>
<td>$328,489</td>
<td>5</td>
<td>$33,089</td>
<td>$13,373</td>
<td>$19,413</td>
<td>$301,420</td>
<td>4</td>
</tr>
<tr>
<td>International Business Machines Corporation (NYSE: IBM)</td>
<td>$211,902</td>
<td>10</td>
<td>$33,397</td>
<td>$5,260</td>
<td>$0</td>
<td>$250,548</td>
<td>12</td>
<td>$17,043</td>
<td>$0</td>
<td>$122</td>
<td>$233,625</td>
<td>9</td>
</tr>
<tr>
<td>Procter &amp; Gamble Co. (NYSE: PG)</td>
<td>$211,012</td>
<td>11</td>
<td>$32,223</td>
<td>$1,598</td>
<td>$1,195</td>
<td>$246,028</td>
<td>14</td>
<td>$7,385</td>
<td>$0</td>
<td>$685</td>
<td>$239,328</td>
<td>7</td>
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<tr>
<td>Roche Holding AG (SWX: ROG)</td>
<td>$210,844</td>
<td>12</td>
<td>$26,859</td>
<td>$793</td>
<td>$0</td>
<td>$236,296</td>
<td>17</td>
<td>$15,609</td>
<td>$26</td>
<td>$2,440</td>
<td>$225,101</td>
<td>11</td>
</tr>
<tr>
<td>China Mobile Limited (SEHK: 941)</td>
<td>$209,922</td>
<td>13</td>
<td>$6,062</td>
<td>$5,387</td>
<td>$0</td>
<td>$219,911</td>
<td>18</td>
<td>$72,414</td>
<td>$7,757</td>
<td>$626</td>
<td>$160,029</td>
<td>20</td>
</tr>
<tr>
<td>Nestle S.A. (SWX: NESN)</td>
<td>$208,786</td>
<td>14</td>
<td>$30,402</td>
<td>$2,839</td>
<td>$0</td>
<td>$242,037</td>
<td>15</td>
<td>$27,005</td>
<td>$10,754</td>
<td>$1,810</td>
<td>$206,042</td>
<td>14</td>
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<tr>
<td>Royal Dutch Shell plc (LSE: RDS.A)</td>
<td>$203,401</td>
<td>15</td>
<td>$35,790</td>
<td>$27,023</td>
<td>$0</td>
<td>$269,283</td>
<td>10</td>
<td>$56,970</td>
<td>$34,476</td>
<td>$1,433</td>
<td>$176,248</td>
<td>17</td>
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<tr>
<td>Pfizer Inc. (NYSE: PFE)</td>
<td>$198,601</td>
<td>16</td>
<td>$40,403</td>
<td>$1,084</td>
<td>$39</td>
<td>$240,207</td>
<td>16</td>
<td>$51,529</td>
<td>$0</td>
<td>$577</td>
<td>$189,255</td>
<td>16</td>
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<tr>
<td>Toyota Motor Corporation (TSE: 7203)</td>
<td>$191,233</td>
<td>17</td>
<td>$157,749</td>
<td>$578</td>
<td>$0</td>
<td>$343,557</td>
<td>4</td>
<td>$105,270</td>
<td>$22,329</td>
<td>$6,533</td>
<td>$222,591</td>
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</tr>
<tr>
<td>AT&amp;T Inc. (NYSE: T)</td>
<td>$190,422</td>
<td>18</td>
<td>$74,915</td>
<td>$16,909</td>
<td>$0</td>
<td>$269,276</td>
<td>9</td>
<td>$9,025</td>
<td>$4,998</td>
<td>$345</td>
<td>$270,993</td>
<td>5</td>
</tr>
<tr>
<td>The Coca-Cola Company (NYSE: KO)</td>
<td>$178,640</td>
<td>19</td>
<td>$35,125</td>
<td>$906</td>
<td>$0</td>
<td>$214,731</td>
<td>19</td>
<td>$30,403</td>
<td>$9,850</td>
<td>$414</td>
<td>$174,892</td>
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<tr>
<td>Novartis AG (SWX: NOVN)</td>
<td>$174,213</td>
<td>20</td>
<td>$20,944</td>
<td>$2,664</td>
<td>$0</td>
<td>$197,822</td>
<td>20</td>
<td>$23,181</td>
<td>$0</td>
<td>$119</td>
<td>$174,786</td>
<td>19</td>
</tr>
</tbody>
</table>
Bias Tool 1b: Pick your scaling variable

Twitter: Revenues = $550 m, Users = 230 m, Employees = 1250, EBITDA and Net Income were negative.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook, Inc. (NasdaqGS:FB)</td>
<td>$100,017</td>
<td>$107,909</td>
<td>16.35</td>
<td>36.20</td>
<td>193.73</td>
<td>$97.22</td>
<td>$20.36</td>
</tr>
<tr>
<td>Google Inc. (NasdaqGS:GOOG)</td>
<td>$248,856</td>
<td>$296,078</td>
<td>4.46</td>
<td>14.64</td>
<td>25.45</td>
<td>$270.89</td>
<td>$6.61</td>
</tr>
<tr>
<td>LinkedIn Corporation (NYSE:LNKD)</td>
<td>$28,449</td>
<td>$29,322</td>
<td>22.87</td>
<td>179.26</td>
<td>729.40</td>
<td>$130.32</td>
<td>$6.91</td>
</tr>
<tr>
<td>Netflix</td>
<td>$13,959</td>
<td>$14,539</td>
<td>3.54</td>
<td>81.20</td>
<td>304.80</td>
<td>$403.86</td>
<td>$7.11</td>
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<tr>
<td>OpenTable, Inc. (NasdaqGS:OPEN)</td>
<td>$1,642</td>
<td>$1,734</td>
<td>9.45</td>
<td>30.35</td>
<td>59.99</td>
<td>$15.34</td>
<td>$3.02</td>
</tr>
<tr>
<td>Pandora Media, Inc. (NYSE:P)</td>
<td>$4,163</td>
<td>$4,232</td>
<td>7.89</td>
<td>NA</td>
<td>NA</td>
<td>$21.16</td>
<td>$5.72</td>
</tr>
<tr>
<td>RetailMeNot</td>
<td>$1,724</td>
<td>$1,715</td>
<td>10.20</td>
<td>34.20</td>
<td>64.96</td>
<td>$147.84</td>
<td>$4.60</td>
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<td>Trulia, Inc. (NYSE:TRLA)</td>
<td>$1,647</td>
<td>$1,853</td>
<td>17.75</td>
<td>NA</td>
<td>NA</td>
<td>$59.02</td>
<td>$3.57</td>
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<tr>
<td>Yelp, Inc. (NYSE:YELP)</td>
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<td>$4,103</td>
<td>22.42</td>
<td>NA</td>
<td>NA</td>
<td>$41.03</td>
<td>$2.67</td>
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<tr>
<td>Zillow, Inc. (NasdaqGS:Z)</td>
<td>$3,420</td>
<td>$3,590</td>
<td>22.48</td>
<td>NA</td>
<td>NA</td>
<td>$78.20</td>
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<tr>
<td>Yahoo! Inc. (NasdaqGS:YHOO)</td>
<td>$27,263</td>
<td>$29,855</td>
<td>5.65</td>
<td>21.24</td>
<td>7.19</td>
<td>$106.24</td>
<td>$2.55</td>
</tr>
<tr>
<td>Groupon</td>
<td>$5,857</td>
<td>$7,039</td>
<td>2.42</td>
<td>44.04</td>
<td>NA</td>
<td>$168.80</td>
<td>$0.62</td>
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<tr>
<td>Travelzoo Inc. (NasdaqGS:TZOO)</td>
<td>$347</td>
<td>$421</td>
<td>2.23</td>
<td>12.81</td>
<td>23.39</td>
<td>$16.20</td>
<td>$0.95</td>
</tr>
<tr>
<td>Aggregate</td>
<td>$441,350</td>
<td>$502,369</td>
<td>5.82</td>
<td>20.43</td>
<td>30.76</td>
<td>$151.57</td>
<td>$5.96</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>101.73</td>
<td>4.91</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td>10.97</td>
<td>47.44</td>
<td>159.96</td>
<td>121.98</td>
<td>5.42</td>
</tr>
</tbody>
</table>

If you wanted to show me that Twitter is cheap at $10 billion, which scaling variable would you use?
Bias Tools 1c: Choose the timing of your variable

- **Unbiased**: No particular preference but you stay consistent with that choice across companies and across time.
- **Bias up**: Use forward estimates for your company while sticking with trailing or current values for the comparable firms.
- **Bias down**: Use trailing or current values for your company while projecting forward values for your comparable firms.
Bias tool 2: Prune your comparable firms

- **Unbiased**: Have pre-set criteria for choosing comparable firms, but once selected, you generally do not prune that list. (Even if you have outliers, you remove firms symmetrically)

- **Bias up**: Remove the cheapest firms in your comparable firm list, based on whatever metric or multiple you are using in your valuation.

- **Bias down**: Remove the most expensive firms in your comparable firm list, based on whatever metric or multiple you are using in your valuation.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook, Inc. (NasdaqGS:FB)</td>
<td>$100,017.00</td>
<td>$107,909.00</td>
<td>16.35</td>
<td>36.20</td>
<td>193.73</td>
<td>$97.22</td>
<td>$20.36</td>
</tr>
<tr>
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<td>$28,448.50</td>
<td>$29,321.90</td>
<td>22.87</td>
<td>179.26</td>
<td>729.40</td>
<td>$130.32</td>
<td>$6.91</td>
</tr>
<tr>
<td>Facebook + LinkedIn</td>
<td>$128,465.50</td>
<td>$137,230.90</td>
<td>17.45</td>
<td>43.97</td>
<td>229.79</td>
<td>$102.79</td>
<td>$14.38</td>
</tr>
</tbody>
</table>
Bias Tools 3: Spin your story

- **Unbiased:** Once you have the multiples computed for your ample, you control for differences in all of the fundamental variables, measuring risk, cash flows and growth between your firm and the comparable firms.

- **Bias up:** You pick the fundamental variable that your firm looks better than the comparable firms on and ignore the rest.

- **Bias down:** You pick the fundamental variable that your firm looks worse than the comparable firms on and ignore the rest.

Value of Stock = \( \frac{DPS}{k_e - g} \)

PE = Payout ratio \( \frac{1+g}{r-g} \)

PEG = Payout ratio \( \frac{1+g}{r-g} \)

PBV = ROE (Payout ratio) \( \frac{1+g}{r-g} \)

PS = Net Margin (Payout ratio) \( \frac{1+g}{r-g} \)

Value of Firm = FCFF \( \frac{1}{WACC - g} \)

Value/FCFF = \( \frac{1+g}{WACC - g} \)

Value/EBIT(1-t) = \( \frac{1+g}{1-RIR/(WACC-g)} \)

Value/EBIT = \( \frac{1+g}{1-RIR/(1-t)(WACC-g)} \)

VS = Oper Margin (1-RIR) \( \frac{1+g}{WACC - g} \)
Dealing with bias: The “bad” ways

- **I am not a crook**: You don’t have to be crooked to be biased. It is easy to delude yourself into believing that you are just being objective.

- **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

1. **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.

2. **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.

3. **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.

4. **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?
**Current Cashflow to Firm**

EBIT\((1-t)\) = 5344 \(1-0.35\) = 3474

- Net CPX = 350
- Chg WC = 691
= FCFF = 2433

Reinvestment Rate = 1041/3474 = 29.97%

Return on capital = 25.19%

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

\[ 0.30 \times 0.25 = 0.075 \]

7.5%

**Return on Capital**

25%

**Riskfree Rate**

3.72%

**Beta**

1.15

**Unlevered Beta for Sectors**

1.09

**D/E**

8.8%

**Cost of Equity**

8.32%

**Cost of Debt**

\[ (3.72\% + 0.75\%)(1-0.35) \]

= 2.91%

**Weights**

E = 92% D = 8%

**Cost of capital**

7.88%

**Terminal Value**

\[ \frac{2645}{0.0676-0.03} = 70,409 \]

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

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%

**Value/Share**

$83.55

**On September 12, 2008, 3M was trading at $70/share**
Tata Motors: April 2010

Current Cashflow to Firm

\[
\text{EBIT}(1-t): \quad \text{Rs } 20,116
\]
- Nt CpX: \quad \text{Rs } 31,590
- Chg WC: \quad \text{Rs } 2,732
\]
\[
= \text{FCFF} \quad \text{- Rs } 14,205
\]
Reinv Rate = \frac{(31590+2732)}{20116} = 170.61%; Tax rate = 21.00%
Return on capital = 17.16%

Retirement Rate = 70%

Expected Growth from new inv.:
\[
.70 \times 1.1716 = 0.1201
\]

Expected Growth

From new inv.
\[
.70 \times .1716 = 0.1201
\]

Stable Growth
\[
g = 5\%; \quad \beta = 1.00
\]
Country Premium = 3%
Cost of capital = 10.39%
Tax rate = 33.99%
ROC = 10.39%;
Reinvestment Rate = g/ROC
\[
= 5 / 10.39 = 48.11%
\]

Terminal Value5 = \frac{23493}{(.1039 - .05)} = \text{Rs } 435,686

Cost of Equity
\[
14.00\%
\]
Cost of Debt
\[
(5\% + 4.25\% + 3)(1-.3399) = 8.09\%
\]

Weights
\[
E = 74.7\% \quad D = 25.3\%
\]

On April 1, 2010
Tata Motors price = \text{Rs } 718

Riskfree Rate:
\[
\text{Rs Riskfree Rate = 5%}
\]

Beta
\[
1.20
\]
Mature market premium
\[
4.5\%
\]
Lambda
\[
0.80
\]
Country Default Spread
\[
3\%
\]
Country Equity Risk Premium
\[
4.50\%
\]

Country Default Spread
\[
3\%
\]
Hei Equity Mkt Vol
\[
1.50
\]

Growth declines to 5%
and cost of capital
moves to stable period
level.

Discount at Cost of Capital (WACC)
\[
= 14.00\% \times .747 + 8.09\% \times 0.253 = 12.50\%
\]

Op. Assets Rs 210,813
+ Cash: 11418
+ Other NO 140576
- Debt 109198
= Equity 253,628

Value/Share \text{Rs } 614

EBIT (1-t)
\[
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10
\]
\[
22533 \quad 25240 \quad 28272 \quad 31668 \quad 35472 \quad 39236 \quad 42848 \quad 46192 \quad 49150 \quad 51607
\]
- Reinvestment
\[
15773 \quad 17668 \quad 19790 \quad 22168 \quad 24830 \quad 25242 \quad 25138 \quad 24482 \quad 23264 \quad 21503
\]
FCFF
\[
6760 \quad 7572 \quad 8482 \quad 9500 \quad 10642 \quad 13994 \quad 17711 \quad 21710 \quad 25886 \quad 30104
\]

Return on Capital
17.16%
9a. Amazon in January 2000

- Current Revenue: $1,117
- Current Margin: -36.71%
- Value of Op Assets: $14,910
  + Cash: $26
  = Value of Firm: $14,936
  - Value of Debt: $349
  = Value of Equity: $14,587
- Value per share: $34.32

Sales Turnover:
- Ratio: 3.00
- Revenue Growth: 42%
- Expected Margin: -> 10.00%

Cost of Equity:
- 12.90%

Cost of Debt:
- 8.00%

AT cost of debt:
- 6.71%
- 5.20%
- 5.07%
- 5.04%
- 4.98%
- 4.88%
- 4.55%

Cost of Capital:
- 12.90%
- 12.90%
- 12.90%
- 12.90%
- 12.90%
- 12.42%
- 12.30%
- 12.10%
- 11.70%
- 10.50%

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

Revenue
- $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

- Reinvestment
- $559
- $931
- $1,396
- $1,629
- $1,466
- $1,601
- $1,623
- $1,494
- $1,196
- $736

FCFF
- $931
- -1,024
- -989
- -758
- -408
- -163
- 177
- 625
- 1,174
- 1,788

Cost of Equity:
- 12.90%
- 12.90%
- 12.90%
- 12.90%
- 12.90%
- 12.42%
- 12.30%
- 12.10%
- 11.70%
- 10.50%

Cost of Debt:
- 8.00%
- 8.00%
- 8.00%
- 8.00%
- 8.00%
- 7.80%
- 7.75%
- 7.67%
- 7.50%
- 7.00%

AT cost of debt:
- 8.00%
- 8.00%
- 8.00%
- 6.71%
- 5.20%
- 5.07%
- 5.04%
- 4.98%
- 4.88%
- 4.55%

Cost of Capital:
- 12.84%
- 12.84%
- 12.84%
- 12.84%
- 12.84%
- 12.84%
- 12.84%
- 12.84%
- 12.84%
- 11.96%

Sales Turnover:
- Ratio: 3.00
- Revenue Growth: 42%
- Expected Margin: -> 10.00%

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

Cost of Debt:
- 6.5% + 1.5% = 8.0%
- Tax rate: 0% -> 35%

Weights:
- Debt: 1.2% -> 15%

Pushed debt ratio to retail industry average of 15%.

Amazon was trading at $84 in January 2000.

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%

Internet/ Retail
- Operating Leverage
- Current D/E: 1.21%
- Base Equity Premium
- Country Risk Premium

Amazon was trading at $84 in January 2000.

Pushed debt ratio to retail industry average of 15%.
### Starting numbers

<table>
<thead>
<tr>
<th></th>
<th>Last 10K</th>
<th>Trailing 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$316.93</td>
<td>$534.46</td>
</tr>
<tr>
<td>Operating income</td>
<td>-$77.06</td>
<td>-$134.91</td>
</tr>
<tr>
<td>Adjusted Operating Income</td>
<td>$7.67</td>
<td></td>
</tr>
<tr>
<td>Invested Capital</td>
<td>$955.00</td>
<td></td>
</tr>
<tr>
<td>Adjusted Operating Margin</td>
<td>1.44%</td>
<td></td>
</tr>
<tr>
<td>Sales/Invested Capital</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Interest expenses</td>
<td>$2.49</td>
<td>$5.30</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating assets</td>
<td>$9,705</td>
<td></td>
</tr>
<tr>
<td>+ Cash</td>
<td>321</td>
<td></td>
</tr>
<tr>
<td>+ IPO Proceeds</td>
<td>1,295</td>
<td></td>
</tr>
<tr>
<td>- Debt</td>
<td>214</td>
<td></td>
</tr>
<tr>
<td>Value of equity</td>
<td>11,106</td>
<td></td>
</tr>
<tr>
<td>- Options</td>
<td>713</td>
<td></td>
</tr>
<tr>
<td>Value in stock</td>
<td>10,394</td>
<td></td>
</tr>
<tr>
<td>/ # of shares</td>
<td>582.46</td>
<td></td>
</tr>
<tr>
<td>Value/share</td>
<td>$17.84</td>
<td></td>
</tr>
</tbody>
</table>

### Twitter Pre-IPO Valuation: October 27, 2013

**Revenue growth**: $1.5% growth for 5 years, tapering down to 2.5% in year 10

**Pre-tax operating margin moves to 25% over the next 10 years**

**Sales to capital ratio of 1.50 for incremental sales**

**Stable Growth**

- **g** = 2.5%; **Beta** = 1.00;
- **Cost of capital** = 8%
- **ROC** = 12%
- **Reinvestment Rate** = 2.5%/12% = 20.83%

**Objectivistic Weighting**

- E = 98.1% D = 1.9%

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

---

### Terminal Value

\[ \text{Terminal Value} = \frac{FCFF}{\text{Cost of capital}} = \frac{1,466}{0.08 - 0.025} = \$26,657 \]

---

### Cost of Debt

\[ \text{Cost of Debt} = (2.5\% + 5.5\%) \times (1 - 0.40) = 5.16\% \]

### Riskfree Rate

\[ \text{Riskfree rate} = 2.5\% \]

### Beta

\[ \text{Beta} = 1.40 \]

### Risk Premium

\[ 6.15\% \]

### D/E Ratio

\[ D/E = 1.71\% \]

---

### Table

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>Operating Income</th>
<th>Operating Income after tax</th>
<th>- Reinvestment</th>
<th>FCFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$810</td>
<td>$31</td>
<td>$31</td>
<td>$183</td>
<td>$(153)</td>
</tr>
<tr>
<td>2</td>
<td>$1,227</td>
<td>$75</td>
<td>$75</td>
<td>$278</td>
<td>$(203)</td>
</tr>
<tr>
<td>3</td>
<td>$1,858</td>
<td>$158</td>
<td>$158</td>
<td>$421</td>
<td>$(263)</td>
</tr>
<tr>
<td>4</td>
<td>$2,816</td>
<td>$306</td>
<td>$306</td>
<td>$638</td>
<td>$(344)</td>
</tr>
<tr>
<td>5</td>
<td>$4,266</td>
<td>$564</td>
<td>$564</td>
<td>$967</td>
<td>$(344)</td>
</tr>
<tr>
<td>6</td>
<td>$6,044</td>
<td>$941</td>
<td>$941</td>
<td>$1,186</td>
<td>$(572)</td>
</tr>
<tr>
<td>7</td>
<td>$7,973</td>
<td>$1,430</td>
<td>$1,430</td>
<td>$1,285</td>
<td>$(537)</td>
</tr>
<tr>
<td>8</td>
<td>$9,734</td>
<td>$1,975</td>
<td>$1,975</td>
<td>$1,175</td>
<td>$(537)</td>
</tr>
<tr>
<td>9</td>
<td>$10,932</td>
<td>$2,475</td>
<td>$2,475</td>
<td>$798</td>
<td>$(316)</td>
</tr>
<tr>
<td>10</td>
<td>$11,205</td>
<td>$2,801</td>
<td>$2,801</td>
<td>$182</td>
<td>$143</td>
</tr>
</tbody>
</table>

**Cost of capital** = 11.12\% + 5.16\% = 11.01\%

---

### Notes

- **Risk Premium**: 75% from US (5.75%) + 25% from rest of the world (7.23%)
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.
Unhealthy ways of dealing with uncertainty

1. **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.

2. **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.

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

4. **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.
2. Build in internal checks on reasonableness.
3. Don’t sweat the discount rate.
4. Use the offsetting principle (risk free rates & inflation at Tata Motors).
5. Draw on economic first principles (Terminal value at all the companies).
6. Confront uncertainty, if you can.
1. Less is more
Revenues & Margins for Twitter, pre-IPO

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue growth rate</th>
<th>Revenues</th>
<th>Operating Margin</th>
<th>EBIT</th>
<th>EBIT (1-t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td></td>
<td>$534.46</td>
<td>1.44%</td>
<td>$7.67</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>51.50%</td>
<td>$809.71</td>
<td>3.79%</td>
<td>$30.70</td>
<td>$30.70</td>
</tr>
<tr>
<td>2</td>
<td>51.50%</td>
<td>$1,226.71</td>
<td>6.15%</td>
<td>$75.42</td>
<td>$75.42</td>
</tr>
<tr>
<td>3</td>
<td>51.50%</td>
<td>$1,858.47</td>
<td>8.50%</td>
<td>$158.06</td>
<td>$158.06</td>
</tr>
<tr>
<td>4</td>
<td>51.50%</td>
<td>$2,815.58</td>
<td>10.86%</td>
<td>$305.81</td>
<td>$294.22</td>
</tr>
<tr>
<td>5</td>
<td>51.50%</td>
<td>$4,265.60</td>
<td>13.22%</td>
<td>$563.82</td>
<td>$394.67</td>
</tr>
<tr>
<td>6</td>
<td>41.70%</td>
<td>$6,044.35</td>
<td>15.57%</td>
<td>$941.36</td>
<td>$648.60</td>
</tr>
<tr>
<td>7</td>
<td>31.90%</td>
<td>$7,972.50</td>
<td>17.93%</td>
<td>$1,429.53</td>
<td>$969.22</td>
</tr>
<tr>
<td>8</td>
<td>22.10%</td>
<td>$9,734.43</td>
<td>20.29%</td>
<td>$1,974.84</td>
<td>$1,317.22</td>
</tr>
<tr>
<td>9</td>
<td>12.30%</td>
<td>$10,931.76</td>
<td>22.64%</td>
<td>$2,475.34</td>
<td>$1,623.82</td>
</tr>
<tr>
<td>10</td>
<td>2.50%</td>
<td>$11,205.05</td>
<td>25.00%</td>
<td>$2,801.26</td>
<td>$1,806.81</td>
</tr>
<tr>
<td>TY</td>
<td>2.50%</td>
<td>$11,485.18</td>
<td>25.00%</td>
<td>$2,871.29</td>
<td>$1,851.99</td>
</tr>
</tbody>
</table>

The NOLs are embedded in the taxes and cash flows.

Put intermediate numbers on autopilot

Be parsimonious: Estimate the big numbers (revenues and margin in year 10)
Revenue Judgment: The existing players

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th></th>
<th>2012</th>
<th></th>
<th>2013</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>$</td>
<td>%</td>
<td>$</td>
<td>%</td>
<td>$</td>
</tr>
<tr>
<td>Google</td>
<td>32.09%</td>
<td>$27.74</td>
<td>31.46%</td>
<td>$32.73</td>
<td>33.24%</td>
<td>$38.83</td>
</tr>
<tr>
<td>Facebook</td>
<td>3.65%</td>
<td>$3.15</td>
<td>4.11%</td>
<td>$4.28</td>
<td>5.04%</td>
<td>$5.89</td>
</tr>
<tr>
<td>Yahoo!</td>
<td>3.95%</td>
<td>$3.41</td>
<td>3.37%</td>
<td>$3.51</td>
<td>3.10%</td>
<td>$3.62</td>
</tr>
<tr>
<td>Microsoft</td>
<td>1.27%</td>
<td>$1.10</td>
<td>1.63%</td>
<td>$1.70</td>
<td>1.78%</td>
<td>$2.08</td>
</tr>
<tr>
<td>IAC</td>
<td>1.15%</td>
<td>$0.99</td>
<td>1.39%</td>
<td>$1.45</td>
<td>1.47%</td>
<td>$1.72</td>
</tr>
<tr>
<td>AOL</td>
<td>1.17%</td>
<td>$1.01</td>
<td>1.02%</td>
<td>$1.06</td>
<td>0.95%</td>
<td>$1.11</td>
</tr>
<tr>
<td>Amazon</td>
<td>0.48%</td>
<td>$0.41</td>
<td>0.59%</td>
<td>$0.61</td>
<td>0.71%</td>
<td>$0.83</td>
</tr>
<tr>
<td>Pandora</td>
<td>0.28%</td>
<td>$0.24</td>
<td>0.36%</td>
<td>$0.37</td>
<td>0.50%</td>
<td>$0.58</td>
</tr>
<tr>
<td>Twitter</td>
<td>0.16%</td>
<td>$0.14</td>
<td>0.28%</td>
<td>$0.29</td>
<td>0.50%</td>
<td>$0.58</td>
</tr>
<tr>
<td>Linkedin</td>
<td>0.18%</td>
<td>$0.16</td>
<td>0.25%</td>
<td>$0.26</td>
<td>0.32%</td>
<td>$0.37</td>
</tr>
<tr>
<td>Millennial Media</td>
<td>0.05%</td>
<td>$0.04</td>
<td>0.07%</td>
<td>$0.07</td>
<td>0.10%</td>
<td>$0.12</td>
</tr>
<tr>
<td>Other</td>
<td>55.59%</td>
<td>$48.05</td>
<td>55.47%</td>
<td>$57.71</td>
<td>52.29%</td>
<td>$61.09</td>
</tr>
<tr>
<td>Total Market</td>
<td>100%</td>
<td>$86.43</td>
<td>100%</td>
<td>$104.04</td>
<td>100%</td>
<td>$116.82</td>
</tr>
</tbody>
</table>
The Total Advertising Market in 2013

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspapers</td>
<td>$96.7</td>
<td>$93.2</td>
<td>$91.3</td>
<td>-2.83%</td>
</tr>
<tr>
<td>Magazines</td>
<td>$45.0</td>
<td>$43.2</td>
<td>$42.3</td>
<td>-3.05%</td>
</tr>
<tr>
<td>Television</td>
<td>$190.1</td>
<td>$197.6</td>
<td>$205.5</td>
<td>3.97%</td>
</tr>
<tr>
<td>Radio</td>
<td>$33.7</td>
<td>$34.3</td>
<td>$35.2</td>
<td>2.20%</td>
</tr>
<tr>
<td>Cinema</td>
<td>$2.5</td>
<td>$2.7</td>
<td>$2.8</td>
<td>5.83%</td>
</tr>
<tr>
<td>Outdoor</td>
<td>$31.7</td>
<td>$32.3</td>
<td>$33.2</td>
<td>2.34%</td>
</tr>
<tr>
<td>Online</td>
<td>$76.9</td>
<td>$88.6</td>
<td>$101.5</td>
<td>14.89%</td>
</tr>
<tr>
<td>Total</td>
<td>$476.6</td>
<td>$491.9</td>
<td>$511.8</td>
<td>3.63%</td>
</tr>
</tbody>
</table>
The Online Ad market in 2023

<table>
<thead>
<tr>
<th>Online advertising share of market</th>
<th>2.00%</th>
<th>2.50%</th>
<th>3.00%</th>
<th>3.50%</th>
<th>4.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
<td>$124.78</td>
<td>$131.03</td>
<td>$137.56</td>
<td>$144.39</td>
<td>$151.52</td>
</tr>
<tr>
<td>25%</td>
<td>$155.97</td>
<td>$163.79</td>
<td>$171.95</td>
<td>$180.49</td>
<td>$189.40</td>
</tr>
<tr>
<td>30%</td>
<td>$187.16</td>
<td>$196.54</td>
<td>$206.34</td>
<td>$216.58</td>
<td>$227.28</td>
</tr>
<tr>
<td>35%</td>
<td>$218.36</td>
<td>$229.30</td>
<td>$240.74</td>
<td>$252.68</td>
<td>$265.16</td>
</tr>
<tr>
<td>40%</td>
<td>$249.55</td>
<td>$262.06</td>
<td>$275.13</td>
<td>$288.78</td>
<td>$303.04</td>
</tr>
</tbody>
</table>
### And margin judgments

<table>
<thead>
<tr>
<th>Company</th>
<th>Revenue</th>
<th>EBIT (TTM)</th>
<th>Operating Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Inc. (NasdaqGS:GOOG)</td>
<td>$55,797.00</td>
<td>$12,734.00</td>
<td>22.82%</td>
</tr>
<tr>
<td>Facebook, Inc. (NasdaqGS:FB)</td>
<td>$6,118.00</td>
<td>$1,835.00</td>
<td>29.99%</td>
</tr>
<tr>
<td>Yahoo! Inc. (NasdaqGS:YHOO)</td>
<td>$4,823.20</td>
<td>$665.00</td>
<td>13.79%</td>
</tr>
<tr>
<td>Netflix</td>
<td>$3,944.00</td>
<td>$124.70</td>
<td>3.16%</td>
</tr>
<tr>
<td>Groupon</td>
<td>$2,417.00</td>
<td>$61.10</td>
<td>2.53%</td>
</tr>
<tr>
<td>LinkedIn Corporation (NYSE:LNKD)</td>
<td>$1,244.00</td>
<td>$64.44</td>
<td>5.18%</td>
</tr>
<tr>
<td>Pandora Media, Inc. (NYSE:P)</td>
<td>$528.00</td>
<td>-$48.20</td>
<td>-9.13%</td>
</tr>
<tr>
<td>Yelp, Inc. (NYSE:YELP)</td>
<td>$178.70</td>
<td>-$11.06</td>
<td>-6.19%</td>
</tr>
<tr>
<td>OpenTable, Inc. (NasdaqGS:OPEN)</td>
<td>$173.80</td>
<td>$43.27</td>
<td>24.90%</td>
</tr>
<tr>
<td>RetailMeNot</td>
<td>$168.90</td>
<td>$76.68</td>
<td>45.40%</td>
</tr>
<tr>
<td>Travelzoo Inc. (NasdaqGS:TZOO)</td>
<td>$156.00</td>
<td>$24.43</td>
<td>15.66%</td>
</tr>
<tr>
<td>Zillow, Inc. (NasdaqGS:Z)</td>
<td>$152.10</td>
<td>-$101.30</td>
<td>-66.60%</td>
</tr>
<tr>
<td>Trulia, Inc. (NYSE:TRLA)</td>
<td>$92.80</td>
<td>-$6.30</td>
<td>-6.79%</td>
</tr>
<tr>
<td>Aggregate</td>
<td>$75,793.50</td>
<td>$15,461.76</td>
<td>20.40%</td>
</tr>
</tbody>
</table>
2. Build in “internal” checks ...
Reinvestment and Return on Capital

<table>
<thead>
<tr>
<th>Year</th>
<th>Change in revenues</th>
<th>Sales/Capital</th>
<th>Reinvestment</th>
<th>Invested Capital</th>
<th>EBIT (1-t)</th>
<th>ROC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td></td>
<td></td>
<td></td>
<td>$955</td>
<td>$ 7.67</td>
<td>0.80%</td>
</tr>
<tr>
<td>1</td>
<td>$ 275.25</td>
<td>1.50</td>
<td>$ 183.50</td>
<td>$1,138.90</td>
<td>$ 30.70</td>
<td>2.70%</td>
</tr>
<tr>
<td>2</td>
<td>$ 417.00</td>
<td>1.50</td>
<td>$ 278.00</td>
<td>$1,416.90</td>
<td>$ 75.42</td>
<td>5.32%</td>
</tr>
<tr>
<td>3</td>
<td>$ 631.76</td>
<td>1.50</td>
<td>$ 421.17</td>
<td>$1,838.07</td>
<td>$ 158.06</td>
<td>8.60%</td>
</tr>
<tr>
<td>4</td>
<td>$ 957.11</td>
<td>1.50</td>
<td>$ 638.07</td>
<td>$2,476.15</td>
<td>$ 294.22</td>
<td>11.88%</td>
</tr>
<tr>
<td>5</td>
<td>$ 1,450.02</td>
<td>1.50</td>
<td>$ 966.68</td>
<td>$3,442.83</td>
<td>$ 394.67</td>
<td>11.46%</td>
</tr>
<tr>
<td>6</td>
<td>$ 1,778.75</td>
<td>1.50</td>
<td>$ 1,185.84</td>
<td>$4,628.66</td>
<td>$ 648.60</td>
<td>14.01%</td>
</tr>
<tr>
<td>7</td>
<td>$ 1,928.15</td>
<td>1.50</td>
<td>$ 1,285.43</td>
<td>$5,914.10</td>
<td>$ 969.22</td>
<td>16.39%</td>
</tr>
<tr>
<td>8</td>
<td>$ 1,761.92</td>
<td>1.50</td>
<td>$ 1,174.62</td>
<td>$7,088.71</td>
<td>$1,317.22</td>
<td>18.58%</td>
</tr>
<tr>
<td>9</td>
<td>$ 1,197.33</td>
<td>1.50</td>
<td>$ 798.22</td>
<td>$7,886.94</td>
<td>$1,623.82</td>
<td>20.59%</td>
</tr>
<tr>
<td>10</td>
<td>$ 273.29</td>
<td>1.50</td>
<td>$ 182.20</td>
<td>$8,069.13</td>
<td>$1,806.81</td>
<td>22.39%</td>
</tr>
</tbody>
</table>

Comfortable with ROC = 22.39% in year 10?
- Check against cost of capital
- Check against industry average
Sales to Invested Capital

<table>
<thead>
<tr>
<th>Incremental Sales/Reinvestment: Twitter</th>
<th>Total Sales/ Invested Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Change in revenues</td>
<td>$28.3</td>
</tr>
<tr>
<td>Reinvestment</td>
<td>$44.0</td>
</tr>
<tr>
<td>Sales/Invested Capital</td>
<td>0.64</td>
</tr>
</tbody>
</table>
3. Don’t sweat over the discount rate: Twitter’s cost of capital

Cost of capital = 11.12% (.981) + 5.16% (.019) = 11.01%

Cost of Equity

11.12%

Cost of Debt

(2.5%+5.5%)(1-.40)
= 5.16%

Weights

E = 98.11% D = 1.89%

Risk Premium

6.15%

75% from US(5.75%) + 25% from rest of world (7.23%)

Riskfree Rate

Riskfree rate = 2.5%

Beta

1.40

90% advertising (1.44) + 10% info svcs (1.05)

D/E=1.71%
4. Just be consistent on macro variables

<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.

\[(1.125) \times (1.01/1.04) - 1 = 0.0925\]
5. Draw on Econ 101 and Math 101;
The terminal value limits

<table>
<thead>
<tr>
<th>Stable growth rate</th>
<th>3M</th>
<th>Tata Motors</th>
<th>Amazon</th>
<th>Twitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$70,409</td>
<td>435,686₹</td>
<td>$26,390</td>
<td>$23,111</td>
</tr>
<tr>
<td>1%</td>
<td>$70,409</td>
<td>435,686₹</td>
<td>$28,263</td>
<td>$24,212</td>
</tr>
<tr>
<td>2%</td>
<td>$70,409</td>
<td>435,686₹</td>
<td>$30,595</td>
<td>$25,679</td>
</tr>
<tr>
<td>3%</td>
<td>$70,409</td>
<td>435,686₹</td>
<td>$33,594</td>
<td></td>
</tr>
<tr>
<td>4%</td>
<td></td>
<td>435,686₹</td>
<td>$37,618</td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td></td>
<td>435,686₹</td>
<td>$43,334</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$52,148</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Riskfree rate</th>
<th>3.72%</th>
<th>5%</th>
<th>6.60%</th>
<th>2.70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROIC</td>
<td>6.76%</td>
<td>10.39%</td>
<td>20%</td>
<td>12.00%</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>6.76%</td>
<td>10.39%</td>
<td>9.61%</td>
<td>8.00%</td>
</tr>
</tbody>
</table>
And the market share cannot > 100%

<table>
<thead>
<tr>
<th>Company</th>
<th>Market Capitalization</th>
<th>Enterprise Value</th>
<th>Current Revenues</th>
<th>Breakeven Revenues (2023)</th>
<th>% from Online Ads (2012)</th>
<th>Imputed Online Ad Revenue (2023)</th>
<th>Cost of capital</th>
<th>Target margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google</td>
<td>$291,586.00</td>
<td>$240,579.00</td>
<td>$56,594.00</td>
<td>$168,336.00</td>
<td>87.07%</td>
<td>$146,570.16</td>
<td>10%</td>
<td>22.45%</td>
</tr>
<tr>
<td>Facebook</td>
<td>$119,769.00</td>
<td>$111,684.00</td>
<td>$6,118.00</td>
<td>$90,959.00</td>
<td>84.08%</td>
<td>$76,478.33</td>
<td>10%</td>
<td>29.99%</td>
</tr>
<tr>
<td>Yahoo!</td>
<td>$34,688.00</td>
<td>$29,955.00</td>
<td>$4,823.00</td>
<td>$17,695.00</td>
<td>100%</td>
<td>$17,695.00</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>LinkedIn</td>
<td>$27,044.00</td>
<td>$26,171.00</td>
<td>$1,244.00</td>
<td>$32,110.00</td>
<td>80.41%</td>
<td>$25,819.65</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Twitter (Est)</td>
<td>$12,000.00</td>
<td>$11,000.00</td>
<td>$448.00</td>
<td>$7,846.00</td>
<td>90.00%</td>
<td>$7,061.40</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Pandora</td>
<td>$4,833.00</td>
<td>$4,774.00</td>
<td>$528.00</td>
<td>$3,085.00</td>
<td>87.84%</td>
<td>$2,709.86</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Yelp</td>
<td>$4,422.00</td>
<td>$4,325.00</td>
<td>$179.00</td>
<td>$2,825.00</td>
<td>94.31%</td>
<td>$2,664.26</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Zillow</td>
<td>$3,192.00</td>
<td>$3,060.00</td>
<td>$152.00</td>
<td>$1,984.00</td>
<td>25.83%</td>
<td>$512.47</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>AOL</td>
<td>$2,586.00</td>
<td>$2,208.00</td>
<td>$2,211.00</td>
<td>$10,055.00</td>
<td>64.72%</td>
<td>$6,507.60</td>
<td>10%</td>
<td>9.32%</td>
</tr>
<tr>
<td>Retailmenot</td>
<td>$1,718.00</td>
<td>$1,644.00</td>
<td>$169.00</td>
<td>$1,605.00</td>
<td>100%</td>
<td>$1,605.00</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>OpenTable</td>
<td>$1,597.00</td>
<td>$1,505.00</td>
<td>$173.77</td>
<td>$1,361.38</td>
<td>74.22%</td>
<td>$1,010.42</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td><strong>US based</strong></td>
<td><strong>$503,435.00</strong></td>
<td><strong>$436,905.00</strong></td>
<td><strong>$72,639.77</strong></td>
<td><strong>$337,861.38</strong></td>
<td><strong>8.88%</strong></td>
<td><strong>$288,634.13</strong></td>
<td><strong>10%</strong></td>
<td><strong>25.00%</strong></td>
</tr>
<tr>
<td>Baidu</td>
<td>$53,589.00</td>
<td>$49,961.00</td>
<td>$4,182.00</td>
<td>$15,526.00</td>
<td>99.73%</td>
<td>$15,484.08</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Sohu.com</td>
<td>$3,166.00</td>
<td>$2,540.00</td>
<td>$1,231.00</td>
<td>$1,338.00</td>
<td>36.33%</td>
<td>$486.10</td>
<td>10%</td>
<td>21.45%</td>
</tr>
<tr>
<td>Naver</td>
<td>$17,843.00</td>
<td>$17,595.00</td>
<td>$133.00</td>
<td>$11,227.00</td>
<td>62.94%</td>
<td>$7,066.27</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Yandex</td>
<td>$12,654.00</td>
<td>$11,872.00</td>
<td>$965.00</td>
<td>$7,684.00</td>
<td>98%</td>
<td>$7,505.73</td>
<td>10%</td>
<td>25.00%</td>
</tr>
<tr>
<td><strong>Global</strong></td>
<td><strong>$590,687.00</strong></td>
<td><strong>$518,873.00</strong></td>
<td><strong>$79,250.77</strong></td>
<td><strong>$373,636.38</strong></td>
<td><strong>11.85%</strong></td>
<td><strong>$319,176.31</strong></td>
<td><strong>10%</strong></td>
<td><strong>25.00%</strong></td>
</tr>
</tbody>
</table>
6. Confront uncertainty, if you can…
Revisiting the Twitter valuation

**Revenue Growth Rate**
- Distribution: Uniform
- Expected Value: 55%
- Minimum Value: 40%
- Maximum Value: 70%

**Target Operating Margin**
- Distribution: Normal
- Expected Value: 25%
- Standard Deviation: 5%

**Sales to Capital Ratio**
- Distribution: Lognormal
- Expected value: 1.50
- Standard deviation: 0.15

**Cost of Capital**
- Distribution: Triangular
- Expected value: 11.22%
- Minimum value: 10.02%
- Maximum value: 12.22%
With the consequences for equity value...
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

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

2. **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).

3. **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

1. **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…

2. **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.

3. **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

1. **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).

2. **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.

3. **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.
In closing

- The problem with valuation practice is not that we do not have access to enough data or that our models are not good enough or that we don’t understand valuation.

- The perils to good valuation lie in three very human failings:
  - We are biased and we don’t like to admit we are biased. Instead, we delude ourselves into believing that we are being fair and objective.
  - We fear uncertainty and try to evade it or hide from it.
  - We think that bigger and more sophisticated models will make the big choices for us and spare us the pain of having to do it ourselves.
ADDENDUM: BIAS EXAMPLES
There is an anchoring bias

- Tversky & Kahnemann ran an experiment with two groups. They drew a number from a spinning wheel, say 10, and then asked people to guess whether the percent of African countries was greater or less than 10%. They then asked them to guess the actual percent. The median answer was 25%. They drew a different number for the second group (say 40) and then asked the same questions. The median value of the second group was 65%.

- I ran the same experiment on a class, where I gave the same prospectus for an IPO to two sections of the same valuation class. For one section, I threw in the number “ten” randomly into the discussion (not tied to anything with the company) and for the second, I threw in the number “twenty five” into the discussion, again randomly. The median value per share for the first group was clustered around $12/share, whereas it was closer to $30/share for the second group.
And it gets worse with unfamiliarity

Figure 2. Anchoring Effect in Experiment 2 by Subject Type

In the high condition, subjects are told about the exceptionally good real returns during the recent 20-year period in Sweden, quoting 20% real returns. In the low condition, subjects are told about the exceptionally bad real returns during the recent 20-year period in Japan, quoting 2% real returns. The respondents then make a subjective estimate of whether the future return in Europe will exceed or underperform the 20% or 2% threshold.

Kaustia, Alho, and Puttonen: Ran experiment with 300 financial market professionals and 213 students.
The bias of past prices

Source: Baker & Wurgler (2012)
They show that acquisition pricing is often tied to 52-week high prices, rather than to valuation. This then explains why acquisitions tend to increase in up markets and down in down markets.
Biases in IPO pricing: IPO multiple versus Peer Group Multiple

Paleari, Signori and Vismara (2012): Looked at 348 IPOs in France & Italy and found that the peer groups used by underwriters to justify valuations were about 14-37% higher than peer groups using other approaches.
IPOs: Underwriting Bias

Michaely & Womack: Analysts from IPO underwriting banks are “too optimistic” in their buy recommendations.