PRICE AND VALUE: DISCERNING THE DIFFERENCE

May 2014
Aswath Damodaran
Test 1: Are you pricing or valuing?
Test 2: Are you pricing or valuing?
Test 3: Are you pricing or valuing?

Strong sector and stock-picking continue

Impressive performance
Over the past two years, BB Biotech shares have roughly tripled, which could tempt investors to take profits. However, this performance has been well backed by a deserved revival of the biotech industry, encouraging fundamental news, M&A, and increased money flow into health care stocks. In addition, BBB returned to index outperformance by modifying its stock-picking approach. Hence, despite excellent performance, the shares still trade at a 23% discount to the net asset value of the portfolio. Hence, the shares are an attractive value vehicle to capture growth opportunities in an attractive sector.

Biotech industry remains attractive
With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of “cheap” money and high liquidity. BB Biotech remains an attractive vehicle to capture the future potential of the biotech sector. In addition, investors benefit from a 23% discount to NAV and attractive cash distribution policy of 5% yield p.a. Hence, we reiterate our Buy on BB Biotech shares.
Test 4: Are you pricing or valuing?

A Venture Capital “Valuation”

Today

Young software company
Revenues = $2 m
Earnings (Loss) = -$1 m

Exit Year (Year 3)

Estimated revenues = $50 m
Estimated earnings = $10 million
Exit Earnings Multiple = 20
Estimated Exit Value = $10 \times 20 = $200 m

Value today
= \frac{200}{1.5^3}
= $59.26 m

Discount back at target rate of return on 50%
Test 5: Are you pricing or valuing?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBITDA</td>
<td>$100.00</td>
<td>$120.00</td>
<td>$144.00</td>
<td>$172.80</td>
<td>$207.36</td>
</tr>
<tr>
<td>- Depreciation</td>
<td>$20.00</td>
<td>$24.00</td>
<td>$28.80</td>
<td>$34.56</td>
<td>$41.47</td>
</tr>
<tr>
<td>EBIT</td>
<td>$80.00</td>
<td>$96.00</td>
<td>$115.20</td>
<td>$138.24</td>
<td>$165.89</td>
</tr>
<tr>
<td>- Taxes</td>
<td>$24.00</td>
<td>$28.80</td>
<td>$34.56</td>
<td>$41.47</td>
<td>$49.77</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$56.00</td>
<td>$67.20</td>
<td>$80.64</td>
<td>$96.77</td>
<td>$116.12</td>
</tr>
<tr>
<td>+ Depreciation</td>
<td>$20.00</td>
<td>$24.00</td>
<td>$28.80</td>
<td>$34.56</td>
<td>$41.47</td>
</tr>
<tr>
<td>- Cap Ex</td>
<td>$50.00</td>
<td>$60.00</td>
<td>$72.00</td>
<td>$86.40</td>
<td>$103.68</td>
</tr>
<tr>
<td>- Chg in WC</td>
<td>$10.00</td>
<td>$12.00</td>
<td>$14.40</td>
<td>$17.28</td>
<td>$20.74</td>
</tr>
<tr>
<td>FCFF</td>
<td>$16.00</td>
<td>$19.20</td>
<td>$23.04</td>
<td>$27.65</td>
<td>$33.18</td>
</tr>
<tr>
<td>Terminal Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,658.88</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>8.25%</td>
<td>8.25%</td>
<td>8.25%</td>
<td>8.25%</td>
<td>8.25%</td>
</tr>
<tr>
<td>Present Value</td>
<td>$14.78</td>
<td>$16.38</td>
<td>$18.16</td>
<td>$20.14</td>
<td>$1,138.35</td>
</tr>
<tr>
<td>Value of operating assets today</td>
<td>$1,207.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Cash</td>
<td>$125.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Debt</td>
<td>$200.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Value of equity</strong></td>
<td><strong>$1,132.81</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Aswath Damodaran
Test 6: Are you pricing or valuing?

- You are an accountant, given the onerous and massive responsibility of restating the assets on a balance sheet to “fair value”.
- In FAS 157, here is what it says: “The exchange price is the price in an orderly transaction between market participants to sell the asset or transfer ... The transaction to sell the asset or transfer the liability is a hypothetical transaction at the measurement date, considered from the perspective of a market participant that holds the asset or owes the liability.
- Therefore, the definition focuses on the price that would be received to sell the asset or paid to transfer the liability (an exit price), not the price that would be paid to acquire the asset or received to assume the liability (an entry price).”
Price versus Value: The Set up

Drivers of intrinsic value
- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of price
- Market moods & momentum
- Surface stories about fundamentals

THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?
The traditional accounting balance sheet...

The Balance Sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Lived Real Assets</td>
<td>Current Liabilities</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>Short-term liabilities of the firm</td>
</tr>
<tr>
<td>Short-lived Assets</td>
<td>Debt</td>
</tr>
<tr>
<td>Current Assets</td>
<td>Debt obligations of firm</td>
</tr>
<tr>
<td>Financial Investments</td>
<td>Other Liabilities</td>
</tr>
<tr>
<td>Intangible Assets</td>
<td>Other long-term obligations</td>
</tr>
<tr>
<td>Investments in securities &amp; assets of other firms</td>
<td>Equity</td>
</tr>
<tr>
<td>Assets which are not physical, like patents &amp; trademarks</td>
<td>Equity investment in firm</td>
</tr>
</tbody>
</table>

- **Assets are recorded at original cost, adjusted for depreciation.**
- **Valued based upon motive for investment – some marked to market, some recorded at cost and some at quasi-cost.**
- **True intangible assets like brand name, patents and customer did not show up. The only intangible asset of any magnitude (goodwill) is a plug variable that is of consequence only if you do an acquisition.**
- **Equity reflects original capital invested and historical retained earnings.**
## The intrinsic value balance sheet

*Recorded at intrinsic value (based upon cash flows and risk), not at original cost*

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

**Assets in Place**

**Growth Assets**

**Equity**

*Value will depend upon magnitude of growth investments and excess returns on these investments*

*Intrinsic value of equity, reflecting intrinsic value of assets, net of true value of debt outstanding.*
The “Market Price” balance sheet

A Market Value Balance Sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Investments</td>
<td>Debt</td>
</tr>
<tr>
<td>Generate cashflows today</td>
<td>Borrowed money</td>
</tr>
<tr>
<td>Investments already made</td>
<td>Equity</td>
</tr>
<tr>
<td>Expected Value that will be created</td>
<td>Owner’s funds</td>
</tr>
<tr>
<td>by future investments</td>
<td></td>
</tr>
<tr>
<td>Investments yet to be made</td>
<td></td>
</tr>
</tbody>
</table>

Assets recorded at market value, i.e., what investors will be willing to pay for the assets today (rather than original cost or intrinsic value)

Should equate to market value of equity, if publicly traded.
# Twitter: The Contrast in November 2013

<table>
<thead>
<tr>
<th>Accounting Balance Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
</tr>
<tr>
<td>PP&amp;E</td>
</tr>
<tr>
<td>Intangible assets</td>
</tr>
<tr>
<td>Goodwill</td>
</tr>
<tr>
<td>Debt (leases)</td>
</tr>
<tr>
<td>Preferred stock</td>
</tr>
<tr>
<td>Equity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intrinsic Value Balance Sheet (post-IPO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
</tr>
<tr>
<td>Assets in place</td>
</tr>
<tr>
<td>Growth assets</td>
</tr>
<tr>
<td>Debt</td>
</tr>
<tr>
<td>Equity</td>
</tr>
</tbody>
</table>

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<tr>
<th>Market Price Balance Sheet (post-IPO)</th>
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<tr>
<td>Cash</td>
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</tr>
<tr>
<td>Growth assets</td>
</tr>
<tr>
<td>Debt</td>
</tr>
<tr>
<td>Equity</td>
</tr>
</tbody>
</table>

Aswath Damodaran
INTRINSIC VALUATION
CASH FLOWS, GROWTH & RISK
Intrinsic value is simple: We choose to make it complex

For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows.

1. **The IT Proposition**: If “it” does not affect the cash flows or alter risk (thus changing discount rates), “it” cannot affect value.

2. **The DUH Proposition**: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.

3. **The DON’T FREAK OUT Proposition**: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.

4. **The VALUE IS NOT PRICE Proposition**: The value of an asset may be very different from its price.
The determinants of value

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

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

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

When will the firm become a mature firm, and what are the potential roadblocks?
DCF as a tool for intrinsic valuation

**Cash flows from existing assets**
The base earnings will reflect the earnings power of the existing assets of the firm, net of taxes and any reinvestment needed to sustain the base earnings.

**Value of growth**
The future cash flows will reflect expectations of how quickly earnings will grow in the future (as a positive) and how much the company will have to reinvest to generate that growth (as a negative). The net effect will determine the value of growth.

Expected Cash Flow in year \( t \) = \( E(CF) = \text{Expected Earnings in year } t - \text{Reinvestment needed for growth} \)

\[
\text{Value of asset} = \frac{E(CF_1)}{1+r} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} + \ldots + \frac{E(CF_n)}{(1+r)^n}
\]

**Risk in the Cash flows**
The risk in the investment is captured in the discount rate as a beta in the cost of equity and the default spread in the cost of debt.

**Steady state**
The value of growth comes from the capacity to generate excess returns. The length of your growth period comes from the strength & sustainability of your competitive advantages.
## 1. Cash Flows

<table>
<thead>
<tr>
<th>To get to cash flow</th>
<th>Here is why</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Earnings</td>
<td>This is the earnings before interest &amp; taxes you generate from your existing assets. Operating Earnings = Revenues * Operating Margin Measures the operating efficiency of your assets &amp; can be grown either by growing revenues and/or improving margins.</td>
</tr>
<tr>
<td>(minus) Taxes</td>
<td>These are the taxes you would pay on your operating income and are a function of the tax code under which you operate &amp; your fidelity to that code.</td>
</tr>
<tr>
<td>(minus) Reinvestment</td>
<td>Reinvestment is designed to generate future growth and can be in long term and short term assets. Higher growth usually requires more reinvestment, and the efficiency of growth is a function of how much growth you can get for your reinvestment.</td>
</tr>
<tr>
<td>Free Cash Flow to the Firm</td>
<td>This is a pre-debt cash flow that will be shared by lenders (as interest &amp; principal payments) and by equity investors (as dividends &amp; buybacks).</td>
</tr>
</tbody>
</table>
2. Discount rates

\[
\text{Expected Return on a Risky Investment} = \text{Cost of Equity}
\]

\[
\begin{align*}
\text{Risk free Rate} & \quad \text{Beta} \quad \text{Equity Risk Premium} \\
\text{Rate of return on a long term, default free bond.} & \quad \text{Relative measure of risk added to a diversified portfolio.} & \quad \text{Premium investors demand over and above the risk free rate for investing in equities as a class.} \\
\text{Will vary across currencies and across time.} & \quad \text{Determined by the business or businesses that you operate in, with more exposure to macro economic risk translating into a higher beta.} & \quad \text{Function of the countries that you do business in and how much value you derive from each country.}
\end{align*}
\]
3. Expected Growth

- Quality growth is rare and requires that a firm be able to reinvest a lot and reinvest well (earnings more than your cost of capital) at the same time.
- The larger you get, the more difficult it becomes to maintain quality growth.
- You can grow while destroying value at the same time.
And its value...

ROIC versus Cost of Capital: A Global Assessment for 2013

Of the 33,968 firms that had data available for ROC and cost of capital, 58.8% earned less than their cost of capital in 2013.

- ROC more than 5% below cost of capital
- ROC between 2% and 5% below cost of capital
- ROC between 2% and 0% below cost of capital
- ROC between 0 and 2% more than cost of capital
- ROC between 2% and 5% above cost of capital
- ROC more than 5% above cost of capital

A. Global

Australia, NZ & Canada
Europe
Emerging Markets
Japan
US
Global

% of firms in the group

0.00%
10.00%
20.00%
30.00%
40.00%
50.00%
60.00%
70.00%
80.00%

14,351 firms
10,518 firms

Aswath Damodaran
4. The Terminal Value

Terminal Value_{n} = \frac{EBIT_{n+1}(1 - \text{tax rate})(1 - \text{Reinvestment Rate})}{\text{Cost of capital - Expected growth rate}}

This is a mature company. Its cost of capital should reflect that.

This growth rate should be less than the nominal growth rate of the economy.

Are you reinvesting enough to sustain your stable growth rate?
Reinv Rate = g/ROC
Is the ROC that of a stable company?

Move towards a marginal tax rate
If your job is assessing value, here are your challenges...

If your job is assessing value, here are your challenges...

Company's history
Look at past growth in revenues & earnings and how much the company has had to invest to generate this growth.

Cash flows from existing assets
Based on the current financial statements of the company, make assessments of earnings and cash flows from existing assets.

Value of asset
\[
\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} + \cdots + \frac{E(CF_n)}{(1+r)^n}
\]

Competitors
Look at the growth, profitability & reinvestment at competitors & determine your competitive advantages

Market potential
Make a judgment on the size, growth potential & profitability of the overall market served by the company.

Steady state
Look at the largest and most mature companies in your peer group to make a judgment on when stability will come to your company & what it will look like.

Past earnings
Look at the variability of past earnings and the sources of the variability.

Past market prices
If your company has been traded historically, get a measure of the variability in stock prices.

Peer group
Look at the costs of funding faced by peer group companies, similar to yours.

Aswath Damodaran
Disney - November 2013

Reinvestment Rate 53.93%
Return on Capital 12.61%

Expected Growth
0.5393 * 1.261 = 0.68 or 6.8%

First 5 years

<table>
<thead>
<tr>
<th>Year</th>
<th>EBIT * (1 - tax rate)</th>
<th>Reinvestment</th>
<th>FCFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$7,391</td>
<td>$3,985</td>
<td>$3,405</td>
</tr>
<tr>
<td>2</td>
<td>$7,893</td>
<td>$4,256</td>
<td>$3,637</td>
</tr>
<tr>
<td>3</td>
<td>$8,430</td>
<td>$4,546</td>
<td>$3,884</td>
</tr>
<tr>
<td>4</td>
<td>$9,003</td>
<td>$4,855</td>
<td>$4,148</td>
</tr>
<tr>
<td>5</td>
<td>$9,615</td>
<td>$5,185</td>
<td>$4,430</td>
</tr>
<tr>
<td>6</td>
<td>$10,187</td>
<td>$4,904</td>
<td>$5,283</td>
</tr>
<tr>
<td>7</td>
<td>$10,704</td>
<td>$4,534</td>
<td>$6,170</td>
</tr>
<tr>
<td>8</td>
<td>$11,156</td>
<td>$4,080</td>
<td>$7,076</td>
</tr>
<tr>
<td>9</td>
<td>$11,531</td>
<td>$3,550</td>
<td>$7,981</td>
</tr>
<tr>
<td>10</td>
<td>$11,819</td>
<td>$2,955</td>
<td>$8,864</td>
</tr>
</tbody>
</table>

Growth declines gradually to 2.75%

Cost of Capital (WACC) = 8.52% (0.885) + 2.40% (0.115) = 7.81%

In November 2013, Disney was trading at $67.71/share

Stable Growth

\[ g = 2.75\%; \quad \beta = 1.00; \quad \text{Debt} = 20\%; \quad k(\text{debt}) = 3.75 \]
\[ \text{Cost of capital} = 7.29\% \]
\[ \text{Tax rate} = 36.1\%; \quad \text{ROC} = 10\%; \]
\[ \text{Reinvestment Rate} = 2.5/10 = 25\% \]

Terminal Value\(_{10}\) = 7,980/(0.0729 - 0.025) = 165,323

Term Yr
10
10,639
2,660
7,980

Cost of capital declines gradually to 7.29%

Riskfree Rate: Riskfree rate = 2.75%

Beta 1.0013
ERP for operations 5.76%

Unlevered Beta for Sectors: 0.9239
D/E = 13.10%

Op. Assets 125,484
+ Cash: 3,931
+ Non op inv 2,849
= Equity 113,582
- Debt 15,961
- Minority Int 2,721
=Equity 113,582
-Options 869

Value/Share $62.26
So, how about a young start-up company?

Figure 3: Estimation Issues - Young and Start-up Companies

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

Cash flows from existing assets non-existent or negative.

What are the cashflows from existing assets?

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

What is the value added by growth assets?

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

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

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

Will the firm make it through the gauntlet of market demand and competition? Even if it does, assessing when it will become mature is difficult because there is so little to go on.
Twitter: Setting the table in October 2013

<table>
<thead>
<tr>
<th></th>
<th>Last 10K</th>
<th>Trailing 12 month</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>$7.66</td>
<td></td>
</tr>
<tr>
<td>Invested Capital</td>
<td></td>
<td>$955.00</td>
</tr>
<tr>
<td>Adjusted Operating Margin</td>
<td></td>
<td>1.44%</td>
</tr>
<tr>
<td>Sales/ Invested Capital</td>
<td></td>
<td>$0.56</td>
</tr>
</tbody>
</table>
Twitter: Priming the Pump for Valuation

1. Make small revenues into big revenues

My estimate for 2023: Overall online advertising market will be close to $200 billion and Twitter will have about 5.7% ($11.5 billion)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Google</td>
<td>32.09%</td>
<td>31.46%</td>
<td>33.24%</td>
</tr>
<tr>
<td></td>
<td>$27.74</td>
<td>$32.73</td>
<td>$38.83</td>
</tr>
<tr>
<td>Facebook</td>
<td>3.65%</td>
<td>4.11%</td>
<td>5.04%</td>
</tr>
<tr>
<td></td>
<td>$3.15</td>
<td>$4.28</td>
<td>$5.89</td>
</tr>
<tr>
<td>Yahoo!</td>
<td>3.95%</td>
<td>3.37%</td>
<td>3.10%</td>
</tr>
<tr>
<td></td>
<td>$3.41</td>
<td>$3.51</td>
<td>$3.62</td>
</tr>
<tr>
<td>Microsoft</td>
<td>1.27%</td>
<td>1.63%</td>
<td>1.78%</td>
</tr>
<tr>
<td></td>
<td>$1.10</td>
<td>$1.70</td>
<td>$2.08</td>
</tr>
<tr>
<td>IAC</td>
<td>1.15%</td>
<td>1.39%</td>
<td>1.47%</td>
</tr>
<tr>
<td></td>
<td>$0.99</td>
<td>$1.45</td>
<td>$1.72</td>
</tr>
<tr>
<td>AOL</td>
<td>1.17%</td>
<td>1.02%</td>
<td>0.95%</td>
</tr>
<tr>
<td></td>
<td>$1.01</td>
<td>$1.06</td>
<td>$1.11</td>
</tr>
<tr>
<td>Amazon</td>
<td>0.48%</td>
<td>0.59%</td>
<td>0.71%</td>
</tr>
<tr>
<td></td>
<td>$0.41</td>
<td>$0.61</td>
<td>$0.83</td>
</tr>
<tr>
<td>Pandora</td>
<td>0.28%</td>
<td>0.36%</td>
<td>0.50%</td>
</tr>
<tr>
<td></td>
<td>$0.24</td>
<td>$0.37</td>
<td>$0.58</td>
</tr>
<tr>
<td>Twitter</td>
<td>0.16%</td>
<td>0.28%</td>
<td>0.50%</td>
</tr>
<tr>
<td></td>
<td>$0.14</td>
<td>$0.29</td>
<td>$0.58</td>
</tr>
<tr>
<td>Linkedin</td>
<td>0.18%</td>
<td>0.25%</td>
<td>0.32%</td>
</tr>
<tr>
<td></td>
<td>$0.16</td>
<td>$0.26</td>
<td>$0.37</td>
</tr>
<tr>
<td>Millennial Media</td>
<td>0.05%</td>
<td>0.07%</td>
<td>0.10%</td>
</tr>
<tr>
<td></td>
<td>$0.04</td>
<td>$0.07</td>
<td>$0.12</td>
</tr>
<tr>
<td>Other</td>
<td>55.59%</td>
<td>55.47%</td>
<td>52.29%</td>
</tr>
<tr>
<td></td>
<td>$48.05</td>
<td>$57.71</td>
<td>$61.09</td>
</tr>
<tr>
<td>Total Market</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>$86.43</td>
<td>$104.04</td>
<td>$116.82</td>
</tr>
</tbody>
</table>

2. Make losses into profits

My estimate for Twitter: Operating margin of 25% in year 10

<table>
<thead>
<tr>
<th>Company</th>
<th>Operating Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Inc. (NasdaqGS:GOOG)</td>
<td>22.82%</td>
</tr>
<tr>
<td>Facebook, Inc. (NasdaqGS:FB)</td>
<td>29.99%</td>
</tr>
<tr>
<td>Yahoo! Inc. (NasdaqGS:YHOO)</td>
<td>13.79%</td>
</tr>
<tr>
<td>Netflix</td>
<td>3.16%</td>
</tr>
<tr>
<td>Groupon</td>
<td>2.53%</td>
</tr>
<tr>
<td>LinkedIn Corporation (NYSE:LNKD)</td>
<td>5.18%</td>
</tr>
<tr>
<td>Pandora Media, Inc. (NYSE:P)</td>
<td>-9.13%</td>
</tr>
<tr>
<td>Yelp, Inc. (NYSE:YELP)</td>
<td>-6.19%</td>
</tr>
<tr>
<td>OpenTable, Inc. (NasdaqGS:OPEN)</td>
<td>24.90%</td>
</tr>
<tr>
<td>RetailMeNot</td>
<td>45.40%</td>
</tr>
<tr>
<td>Travelzoo Inc. (NasdaqGS:TZOO)</td>
<td>15.66%</td>
</tr>
<tr>
<td>Zillow, Inc. (NasdaqGS:Z)</td>
<td>-66.60%</td>
</tr>
<tr>
<td>Trulia, Inc. (NYSE:TRLA)</td>
<td>-6.79%</td>
</tr>
<tr>
<td>Aggregate</td>
<td>20.40%</td>
</tr>
</tbody>
</table>

3. Reinvest for growth

My estimate for 2023: Overall online advertising market will be close to $200 billion and Twitter will have about 5.7% ($11.5 billion)

Aswath Damodaran
Sweating the small stuff: Risk and Required Return

Risk in the discount rate

My estimate for Twitter

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

Risk Premium

6.15%

Cost of Debt

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

Weights

E = 98.11% D = 1.89%

Cost of Equity

11.12%

Riskfree Rate:

Riskfree rate = 2.5%

Cost of Capital: US - Nov ‘13

Survival Risk

Probability that the firm will not make it as a going concern

Certain to make it as going concern

My assumption for Twitter

Certain to fail
Twitter Pre-IPO Valuation: October 27, 2013

Terminal Value:
10

= 1466/(.08-.025) = $26,657

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

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

Risk Premium
6.15%

D/E=1.71%

Stable Growth

g = 2.5%; Beta = 1.00;
Cost of capital = 8%

ROC= 12%;
Reinvestment Rate=2.5%/12% = 20.83%

Terminal year (11)

EBIT (1-t) $ 1,852
- Reinvestment $  386
FCFF $ 1,466

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

Revenue growth of 51.5% a year for 5 years, tapering down to 2.5% in year 10

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

Sales to capital ratio of 1.50 for incremental sales
### Twitter Valuation after first earnings report: February 8, 2014

<table>
<thead>
<tr>
<th>Revenue growth of 50% a year for 5 years, tapering down to 2.75% in year 10</th>
<th>Pre-tax operating margin increases to 25% over the next 10 years</th>
<th>Sales to capital ratio of 1.50 for incremental sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal Value ( T_{10} ) = ( \frac{\text{FCFF}}{0.08 - 0.025} ) = $31,741</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cost of capital**

\[
\text{Cost of capital} = 0.987(8.72\%) + 0.013(3.87\%) = 8.66\%
\]

**Risk Free Rate**

\[
\text{Riskfree rate} = 2.75\%
\]

**Beta**

\[
\beta = 1.12
\]

**Risk Premium**

\[
\text{Risk Premium} = 5.35\%
\]

**D/E Ratio**

\[
\text{D/E} = 1.29\%
\]

**Operating assets**

\[
\text{Operating assets} = 11,767
\]

**Value of equity**

\[
\text{Value of equity} = 13,604
\]

**Value in stock**

\[
\text{Value in stock} = 11,421
\]

**Value/share**

\[
\text{Value/share} = 19.61
\]

**Operatings assets**

\[
\text{Operating assets} = 11,767
\]

**Cash**

\[
\text{Cash} = 2,234
\]

**Debt**

\[
\text{Debt} = 397
\]

**Options**

\[
\text{Options} = 2,183
\]

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

\[
\text{Sales to capital ratio of } 1.50 \text{ for incremental sales}
\]

**Terminal year (11)**

<table>
<thead>
<tr>
<th>EBIT (1-t)</th>
<th>$2,162</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Reinvestment</td>
<td>$495</td>
</tr>
<tr>
<td>FCFF</td>
<td>$1,666</td>
</tr>
</tbody>
</table>

**Cost of capital decreases to 8% from years 6-10**
If your job is enhancing value, it’s got to come from changing the fundamentals.
Aswath Damodaran

**Increase Cash Flows**

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

Revenues
- Operating Margin = EBIT
- Tax Rate \( \cdot \) EBIT
- EBIT \( (1-t) \)
- Depreciation
- Capital Expenditures
- Chg in Working Capital = FCFF

**Divest assets that have negative EBIT**

**More efficient operations and cost cutting:** Higher Margins

**Reduce tax rate:** moving income to lower tax locales, transfer pricing, risk management

**Better inventory management and tighter credit policies**

**Reduce the cost of capital**

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

Cost of Equity \( \cdot \) (Equity/Capital) + Pre-tax Cost of Debt \( (1-\text{tax rate}) \) \( \cdot \) Debt/Capital

Match your financing to your assets: Reduce your default risk and cost of debt

Shift interest expenses to higher tax locales

Change financing mix to reduce cost of capital

**Firm Value**

**Increase Expected Growth**

- Reinvest more in projects
- Increase operating margins

Reinvestment Rate
- Return on Capital = Expected Growth Rate

**Reinvest more in projects**

Do acquisitions

Increase capital turnover ratio

**Build on existing competitive advantages**

**Create new competitive advantages**

**Increase length of growth period**

**Increase the cost of capital**

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

Cost of Equity \( \cdot \) (Equity/Capital) + Pre-tax Cost of Debt \( (1-\text{tax rate}) \) \( \cdot \) Debt/Capital

Match your financing to your assets: Reduce your default risk and cost of debt

Shift interest expenses to higher tax locales

Change financing mix to reduce cost of capital
## Disney (Restructured)- November 2013

### Current Cashflow to Firm
- EBIT(1-t) = 10,032(1-.31) = 6,920
- (Cap Ex - Deprecn) = 3,629
- Chg Working capital = 103
- FCFF = 3,188
- Reinvestment Rate = 3,732/6920 = 53.93%
- Return on capital = 12.61%

### Terminal Value
\[ \text{Terminal Value} = \frac{9,206}{0.0676-0.025} = 216,262 \]

### Cap Ex & Deprecn

<table>
<thead>
<tr>
<th>Year</th>
<th>EBIT * (1 - tax rate)</th>
<th>- Reinvestment</th>
<th>Free Cashflow to Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$7,404</td>
<td>$3,702</td>
<td>$3,702</td>
</tr>
<tr>
<td>2</td>
<td>$7,923</td>
<td>$3,961</td>
<td>$3,961</td>
</tr>
<tr>
<td>3</td>
<td>$8,477</td>
<td>$4,239</td>
<td>$4,239</td>
</tr>
<tr>
<td>4</td>
<td>$9,071</td>
<td>$4,535</td>
<td>$4,535</td>
</tr>
<tr>
<td>5</td>
<td>$9,706</td>
<td>$4,853</td>
<td>$4,853</td>
</tr>
<tr>
<td>6</td>
<td>$10,298</td>
<td>$4,634</td>
<td>$4,634</td>
</tr>
<tr>
<td>7</td>
<td>$10,833</td>
<td>$4,333</td>
<td>$4,333</td>
</tr>
<tr>
<td>8</td>
<td>$11,299</td>
<td>$3,955</td>
<td>$3,955</td>
</tr>
<tr>
<td>9</td>
<td>$11,683</td>
<td>$3,505</td>
<td>$3,505</td>
</tr>
<tr>
<td>10</td>
<td>$11,975</td>
<td>$2,994</td>
<td>$2,994</td>
</tr>
</tbody>
</table>

### Expected Growth
\[ 0.50 \times 0.14 = 0.07 \text{ or } 7\% \]

### Stable Growth
- g = 2.75\%; Beta = 1.20
- Debt % = 40\%; k(debt) = 3.75\%
- Cost of capital = 6.76\%
- Tax rate = 36.1\%; ROC = 10\%
- Reinvestment Rate = 2.5/10 = 25\%

### Stable Growth
\[ \text{Terminal Value}_{10} = \frac{9,206}{0.0676-0.025} = 216,262 \]

### Current Cashflow to Firm
\[ \text{Value/Share} = \$74.96 \]

### Reinvestment Rate
- More selective acquisitions & payoff from gaming
- Return on Capital = 14.00%

### Expected Growth
- Expected Growth = 0.50 \times 0.14 = 0.07 or 7\%

### Cost of Capital (WACC)
\[ \text{Cost of Capital} = 8.52\% \times (0.60) + 2.40\% \times (0.40) = 7.16\% \]

### Riskfree Rate
- Riskfree rate = 2.75\%

### Beta
\[ \text{Beta} = 1.3175 \]

### ERP for operations
\[ \text{ERP for operations} = 5.76\% \]

### Unlevered Beta for Sectors
\[ \text{Unlevered Beta for Sectors} = 0.9239 \]

### In November 2013, Disney was trading at $67.71/share

### Move to optimal debt ratio, with higher beta.

### In November 2013, Disney was trading at $67.71/share.
And intrinsic value can change a lot, especially for young companies & in market crisis

| Company-specific | 1. **Company**: The most obvious source of information is the company itself, with earnings reports being the most frequently used vehicle for delivery of that information.  
   2. **Outsiders**: Some company-specific information is unearthed by investors and analysts in the course of doing research on the company, without accessing either company insiders or proprietary corporate data. |
|------------------|-----------------------------------------------------------------------------------------------------|
| Sector-wide      | 1. **Other companies in the sector**: Earnings and investment announcements by other companies in the sector can be used to reassess investor expectations of market potential and profitability.  
   2. **Sector research**: There are sector experts and consultants whose job it is to collect information about the overall sector and analyze it, with the intent of assessing sector trends and prospects. |
| Macroeconomic     | 1. **Government**: The biggest source of macroeconomic data (interest rates, inflation, economic growth) is the government through its many institutions.  
   2. **Private entities**: There are private entities that also generate macroeconomic data that markets react to. In the US, for instance ADP (a publicly traded company) produces a monthly national employment report and the Conference Board reports a composite index of leading economic indicators. |
**My first try: Tesla Valuation: September/October 2013**

### Starting numbers

<table>
<thead>
<tr>
<th>Last 12 months</th>
<th>Prior year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>1329</td>
</tr>
<tr>
<td>Operating Income</td>
<td>-217</td>
</tr>
<tr>
<td>Adj. Operating Income</td>
<td>(22.00)</td>
</tr>
<tr>
<td>Invested Capital</td>
<td>1006</td>
</tr>
<tr>
<td>Adj. Operating Margin</td>
<td>-1.66%</td>
</tr>
<tr>
<td>Sales/Capital Ratio</td>
<td>1.32</td>
</tr>
</tbody>
</table>

### Revenue growth of 70% a year for 5 years, tapering down to 2.75% in year 10

### Pre-tax operating margin increases to 12.5% over the next 10 years

### Stable Growth
- g = 2.75%; Beta = 1.00;
- Cost of capital = 8%;
- ROC = 8%;
- Reinvestment Rate = 2.75%/8% = 34.38%

### Terminal Value
- $V_{\text{Terminal}} = \frac{\text{FCFF}}{\text{Cost of capital}}$
- $V_{\text{Terminal}} = \frac{3,584}{.08-.0275} = 68,271$

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

### Cost of capital = 10.18% (.974) + 4.55% (.026) = 10.03%

### Stock was trading at $170/ share at the time of the valuation.
An update: Tesla Valuation: March 2014

Starting numbers

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
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</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$2,013.50</td>
<td>$413.30</td>
</tr>
<tr>
<td>Operating income or EBIT</td>
<td>$ (61.28)</td>
<td>$ (395.46)</td>
</tr>
<tr>
<td>Adjusted Operating income</td>
<td>-16.83</td>
<td></td>
</tr>
<tr>
<td>Invested Capital</td>
<td>$1,015</td>
<td></td>
</tr>
<tr>
<td>Adjusted Operating margin</td>
<td>-0.84</td>
<td></td>
</tr>
</tbody>
</table>

End revenues $14 billion higher & margins slightly lower due to entering battery market

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
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<tbody>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td>$3,322</td>
<td>$5,482</td>
<td>$9,045</td>
<td>$14,924</td>
<td>$24,625</td>
<td>$37,565</td>
<td>$52,629</td>
<td>$67,180</td>
<td>$77,392</td>
<td>$79,520</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$7</td>
<td>$84</td>
<td>$254</td>
<td>$403</td>
<td>$874</td>
<td>$1,652</td>
<td>$2,762</td>
<td>$4,097</td>
<td>$5,378</td>
<td>$6,203</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$844</td>
<td>$1,393</td>
<td>$2,299</td>
<td>$3,793</td>
<td>$6,258</td>
<td>$8,349</td>
<td>$9,718</td>
<td>$9,388</td>
<td>$6,588</td>
<td>$1,373</td>
</tr>
<tr>
<td>FCFF</td>
<td>$837</td>
<td>$(1,309)</td>
<td>$(2,044)</td>
<td>$(3,390)</td>
<td>$(5,385)</td>
<td>$(6,696)</td>
<td>$(6,956)</td>
<td>$(5,291)</td>
<td>$(1,210)</td>
<td>$4,829</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$(1,309)</td>
<td>$(2,044)</td>
<td>$(3,390)</td>
<td>$(5,385)</td>
<td>$(6,696)</td>
<td>$(6,956)</td>
<td>$(5,291)</td>
<td>$(1,210)</td>
<td>$(4,829)</td>
<td></td>
</tr>
<tr>
<td>Invested Capital</td>
<td>$1,889</td>
<td>$3,282</td>
<td>$5,581</td>
<td>$9,374</td>
<td>$15,632</td>
<td>$23,981</td>
<td>$33,699</td>
<td>$43,088</td>
<td>$49,676</td>
<td>$51,049</td>
</tr>
<tr>
<td>ROIC</td>
<td>0.40%</td>
<td>2.56%</td>
<td>4.56%</td>
<td>4.29%</td>
<td>5.59%</td>
<td>6.89%</td>
<td>8.20%</td>
<td>9.51%</td>
<td>10.83%</td>
<td>12.15%</td>
</tr>
</tbody>
</table>

Terminal Value

\[ \frac{4,182}{0.08 - 0.0275} = \$79,664 \]

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

Stock was trading at $170/ share at the time of the valuation.

Cost of capital = 8.87% (.9734) + 3.90% (.0266) = 8.74%

Cost of Equity

Riskfree Rate: Riskfree rate = 2.75%

\[ \text{Beta} \times 1.22 \]

Changed business mix

70% autos (1.14) + 30% technology (1.29)

D/E=2.73%

Lower ERP for market

Used US equity risk premium

Risk Premium

5.00%

Weights

E = 97.34% D = 2.66%

Stable Growth

\[ g = 2.75\%; \beta = 1.00; \]

Cost of capital = 8%

ROC= 8%;

Reinvestment Rate=2.75%/8% = 34.38%

Weights

E = 97.34% D = 2.66%

Riskfree Rate:

Riskfree rate = 2.75%

\[ \text{Beta} \times 1.22 \]

Changed business mix

70% autos (1.14) + 30% technology (1.29)

D/E=2.73%

Lower ERP for market

Used US equity risk premium

Risk Premium

5.00%

Weights

E = 97.34% D = 2.66%

Stable Growth

\[ g = 2.75\%; \beta = 1.00; \]

Cost of capital = 8%

ROC= 8%;

Reinvestment Rate=2.75%/8% = 34.38%
Three simple suggestions to make you better at estimating intrinsic value!

1. Be honest about your biases/preconceptions: The biggest bogeyman in most valuations is that your preconceptions and biases will lead your choices. While you can never be unbiased, being aware of your biases can help.

2. Keep it simple: Less is more in valuation. While it is easy to build bigger models and you have more access to data, parsimonious valuations often do a better job than complex ones.

3. Face up to uncertainty: Uncertainty is a feature, not a bug. Make the best estimates you can, with the information you have, recognize that everyone else faces the same uncertainty and understand that you don’t have to be right, just less wrong than everyone else.
PRICING
IT’S DEMAND AND SUPPLY
The determinants of price

**Mood and Momentum**
Price is determined in large part by mood and momentum, which, in turn, are driven by behavioral factors (panic, fear, greed).

**Liquidity & Trading Ease**
While the value of an asset may not change much from period to period, liquidity and ease of trading can, and as it does, so will the price.

**The Market Price**

**Incremental information**
Since you make money on price changes, not price levels, the focus is on incremental information (news stories, rumors, gossip) and how it measures up, relative to expectations.

**Group Think**
To the extent that pricing is about gauging what other investors will do, the price can be determined by the "herd".
1a. The Momentum Game
With inflection points

Figure 7: Differential Returns - Winner versus Loser Portfolios
The momentum game works, until it does not...

Figure 7.5: Returns to a momentum strategy for US stock: 1927 - 2010

Aswath Damodaran
1b. Mood matters

Used a computer algorithm & 9.7 million tweets to see if you can predict movements in the Dow 30. Find 87% correlation.
Mood inducing words

<table>
<thead>
<tr>
<th>HIGH ACTIVATION</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>Panic</td>
<td>Hectic</td>
<td>Enthusiasm</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fears</td>
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<td>Surprised</td>
<td>Eager</td>
<td>Joyful</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Pains</td>
<td>Stunned</td>
<td>Confused</td>
<td>Optimistic</td>
<td>Happy</td>
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<td></td>
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</tr>
<tr>
<td>5</td>
<td>No comfort</td>
<td>Doubtful</td>
<td>No panic</td>
<td>Confidence</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Despair</td>
<td>No-confidence</td>
<td>Not happy</td>
<td>No concern</td>
<td>No gloom</td>
<td>Pleased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Despair</td>
<td>Disappointed</td>
<td>No joy</td>
<td>No surprise</td>
<td>No shock</td>
<td>Comfortable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No hope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Depressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: The grey areas represent the borders of the quadrants

Aswath Damodaran
And pricing consequences...

<table>
<thead>
<tr>
<th></th>
<th>Prior Day Closing Price Control</th>
<th>Pleasant Mood Univariate</th>
<th>Unpleasant Mood Univariate</th>
<th>Full Multivariate Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>T-value</td>
<td>B</td>
<td>T-value</td>
</tr>
<tr>
<td>Market</td>
<td>^</td>
<td>^</td>
<td>^</td>
<td>^</td>
</tr>
<tr>
<td>Prior day closing price</td>
<td>-0.001</td>
<td>-0.61</td>
<td>-0.002</td>
<td>-2.14*</td>
</tr>
<tr>
<td>Mood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasant mood</td>
<td></td>
<td></td>
<td>196.46</td>
<td>3.72**</td>
</tr>
<tr>
<td>Unpleasant mood</td>
<td></td>
<td></td>
<td>-194.77</td>
<td>-6.25**</td>
</tr>
<tr>
<td>Variance of dependent variable</td>
<td>13378</td>
<td></td>
<td>13378</td>
<td></td>
</tr>
<tr>
<td>Residual variance</td>
<td>12730</td>
<td></td>
<td>12634</td>
<td></td>
</tr>
<tr>
<td>% of Variance Modeled</td>
<td>4.84%</td>
<td></td>
<td>5.56%</td>
<td></td>
</tr>
</tbody>
</table>

Notes. N = 251 days of NASDAQ price data.
*p<.05.
**p<.01.
All analyses include ARIMA(3,0,3) terms.
doi:10.1371/journal.pone.0072031.t003
Another mood experiment: The market and sporting outcomes
2. Liquidity & Volume

Figure 7.14: Volume and Price Interaction - NYSE and AMEX stocks - 1965-95

- Average Monthly return in following 6 months
- Winners
- Average
- Losers
- Low Volume
- Average Volume
- High Volume
3. Incremental Information: Earnings Reports

Figure 10.10: Market Reaction to Unexpected Quarterly Earnings Surprises: US Companies from 1988-2002

Aswath Damodaran
And the post-announcement drift

Figure 10.11: Post-Announcement Drift after Unexpected Quarterly Earnings Surprises: US Companies from 1988-2002
4. The Herd Mentality
Tools for Pricing: Technical Analysis & Charting
And time is of the essence

Aswath Damodaran
A more general tool: Multiples and Comparable Transactions

Market value of equity

Market value of 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

Step 1: Pick a multiple
Multiple = Numerator = What you are paying for the asset
Denominator = What you are getting in return

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

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

CHOOSE A MULTIPLE
PICK COMPARABLE FIRMS
SPIN/TELL YOUR STORY
Pricing Twitter: Start with the “comparables”

<table>
<thead>
<tr>
<th>Company</th>
<th>Market Cap (millions)</th>
<th>Enterprise value (millions)</th>
<th>Revenues (millions)</th>
<th>EBITDA (millions)</th>
<th>Net Income (millions)</th>
<th>Number of users (millions)</th>
<th>EV/User</th>
<th>EV/Revenue</th>
<th>EV/EBITDA</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>$173,540.00</td>
<td>$160,090.00</td>
<td>$7,870.00</td>
<td>$3,930.00</td>
<td>$1,490.00</td>
<td>1230.00</td>
<td>$130.15</td>
<td>20.34</td>
<td>40.74</td>
<td>116.47</td>
</tr>
<tr>
<td>Linkedin</td>
<td>$23,530.00</td>
<td>$19,980.00</td>
<td>$1,530.00</td>
<td>$182.00</td>
<td>$27.00</td>
<td>277.00</td>
<td>$72.13</td>
<td>13.06</td>
<td>109.78</td>
<td>871.48</td>
</tr>
<tr>
<td>Pandora</td>
<td>$7,320.00</td>
<td>$7,150.00</td>
<td>$655.00</td>
<td>-$18.00</td>
<td>-$29.00</td>
<td>73.40</td>
<td>$97.41</td>
<td>10.92</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Groupon</td>
<td>$6,690.00</td>
<td>$5,880.00</td>
<td>$2,440.00</td>
<td>$125.00</td>
<td>-$95.00</td>
<td>43.00</td>
<td>$136.74</td>
<td>2.41</td>
<td>47.04</td>
<td>NA</td>
</tr>
<tr>
<td>Netflix</td>
<td>$25,900.00</td>
<td>$25,380.00</td>
<td>$4,370.00</td>
<td>$277.00</td>
<td>$112.00</td>
<td>44.00</td>
<td>$576.82</td>
<td>5.81</td>
<td>91.62</td>
<td>231.25</td>
</tr>
<tr>
<td>Yelp</td>
<td>$6,200.00</td>
<td>$5,790.00</td>
<td>$233.00</td>
<td>$2.40</td>
<td>-$10.00</td>
<td>120.00</td>
<td>$48.25</td>
<td>24.85</td>
<td>2412.50</td>
<td>NA</td>
</tr>
<tr>
<td>Open Table</td>
<td>$1,720.00</td>
<td>$1,500.00</td>
<td>$190.00</td>
<td>$63.00</td>
<td>$33.00</td>
<td>14.00</td>
<td>$107.14</td>
<td>7.89</td>
<td>23.81</td>
<td>52.12</td>
</tr>
<tr>
<td>Zynga</td>
<td>$4,200.00</td>
<td>$2,930.00</td>
<td>$873.00</td>
<td>$74.00</td>
<td>-$37.00</td>
<td>27.00</td>
<td>$108.52</td>
<td>3.36</td>
<td>39.59</td>
<td>NA</td>
</tr>
<tr>
<td>Zillow</td>
<td>$3,070.00</td>
<td>$2,860.00</td>
<td>$197.00</td>
<td>-$13.00</td>
<td>-$12.45</td>
<td>34.50</td>
<td>$82.90</td>
<td>14.52</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Trulia</td>
<td>$1,140.00</td>
<td>$1,120.00</td>
<td>$144.00</td>
<td>-$6.00</td>
<td>-$18.00</td>
<td>54.40</td>
<td>$20.59</td>
<td>7.78</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Tripadvisor</td>
<td>$13,510.00</td>
<td>$12,860.00</td>
<td>$945.00</td>
<td>$311.00</td>
<td>$205.00</td>
<td>260.00</td>
<td>$49.46</td>
<td>13.61</td>
<td>41.35</td>
<td>65.90</td>
</tr>
</tbody>
</table>

Average: $130.01, 11.32, 350.80, 267.44
Median: $97.41, 10.92, 44.20, 116.47
## Read the tea leaves: See what the market cares about

<table>
<thead>
<tr>
<th></th>
<th>Market Cap</th>
<th>Enterprise value</th>
<th>Revenues</th>
<th>EBITDA</th>
<th>Net Income</th>
<th>Number of users (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Cap</strong></td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Enterprise value</strong></td>
<td>0.9998</td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Revenues</strong></td>
<td>0.8933</td>
<td>0.8966</td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EBITDA</strong></td>
<td>0.9709</td>
<td>0.9701</td>
<td>0.8869</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td>0.8978</td>
<td>0.8971</td>
<td>0.8466</td>
<td>0.9716</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td><strong>Number of users (millions)</strong></td>
<td>0.9812</td>
<td>0.9789</td>
<td>0.8053</td>
<td>0.9354</td>
<td>0.8453</td>
<td>1.</td>
</tr>
</tbody>
</table>
Use the “market metric” and “market price”

- The most important variable, in late 2013, in determining market value and price in this sector (social media, ill defined as that is) is the number of users that a company has.

- Looking at comparable firms, it looks like the market is paying about $100/user in valuing social media companies, with a premium for “predictable” revenues (subscriptions) and user intensity.

- Twitter has about 240 million users and can be valued based on the $100/user:

  - Enterprise value = 240 * 100 = $24 billion
To be a better pricer, here are four suggestions

- **Check your multiple or consistency/uniformity**
  - In use, the same multiple can be defined in different ways by different users. When comparing and using multiples, estimated by someone else, it is critical that we understand how the multiples have been estimated.

- **Look at all the data, not just the key statistics**
  - Too many people who use a multiple have no idea what its cross sectional distribution is. If you do not know what the cross sectional distribution of a multiple is, it is difficult to look at a number and pass judgment on whether it is too high or low.

- **Don’t forget the fundamentals ultimately matter**
  - It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.

- **Don’t define comparables based only on sector**
  - Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.
1. Check the Multiple

☐ Is the multiple consistently defined?
  - **The consistency principle:** Both the value (the numerator) and the standardizing variable (the denominator) should be to the same claimholders in the firm. In other words, the value of equity should be divided by equity earnings or equity book value, and firm value should be divided by firm earnings or book value.
  
  - **The cost of mismatching:** Assets that are not cheap (expensive) will look cheap (expensive), because your mismatch will skew the numbers.

☐ Is the multiple uniformly estimated?
  - **The uniformity rule:** The variables used in defining the multiple should be estimated uniformly across assets in the “comparable firm” list.
  
  - **The cost of ignoring this rule:** You will be comparing non-comparable numbers and drawing all the wrong conclusions.
Let’s try these definitional rules: PE ratio

PE = Market Price per Share / Earnings per Share

- There are a number of variants on the basic PE ratio in use. They are based upon how the price and the earnings are defined.

  - **Price:** is usually the current price
    - is sometimes the average price for the year
  - **EPS:**
    - EPS in most recent financial year
    - EPS in trailing 12 months (Trailing PE)
    - Forecasted EPS in next year (Forward PE)
    - Forecasted EPS in future year

- Even though PE ratios are consistent at their most general level, there are sub-level consistency tests that you have to meet including:
  - Should you use primary, diluted or partially diluted earnings per share?
  - What do you do about cash balances at companies and the effects they have on market capitalization and earnings?
2. Play Moneyball: Let the numbers talk (not the analysts)

- What is the average and standard deviation for this multiple, across the universe (market)?
- What is the median for this multiple?
  - The median for this multiple is often a more reliable comparison point.
- How large are the outliers to the distribution, and how do we deal with the outliers?
  - Throwing out the outliers may seem like an obvious solution, but if the outliers all lie on one side of the distribution (they usually are large positive numbers), this can lead to a biased estimate.
- Are there cases where the multiple cannot be estimated? Will ignoring these cases lead to a biased estimate of the multiple?
- How has this multiple changed over time?
Multiples have skewed distributions...

PE Ratios for US companies: January 2013
Making statistics “dicey”

<table>
<thead>
<tr>
<th></th>
<th>Current PE</th>
<th>Trailing PE</th>
<th>Forward PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of firms</td>
<td>7871</td>
<td>7871</td>
<td>7871</td>
</tr>
<tr>
<td>Number of firms with PE</td>
<td>3337</td>
<td>3278</td>
<td>2674</td>
</tr>
<tr>
<td>Average</td>
<td>83.86</td>
<td>43.88</td>
<td>24.45</td>
</tr>
<tr>
<td>Median</td>
<td>16.38</td>
<td>15.79</td>
<td>14.87</td>
</tr>
<tr>
<td>Maximum</td>
<td>50,463.64</td>
<td>8,840.31</td>
<td>3,192.76</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1,299.9</td>
<td>250.87</td>
<td>83.5</td>
</tr>
<tr>
<td>Standard Error</td>
<td>22.5</td>
<td>4.38</td>
<td>1.61</td>
</tr>
<tr>
<td>Skewness</td>
<td>34.26</td>
<td>22.02</td>
<td>28.92</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1,250.28</td>
<td>620.81</td>
<td>995.61</td>
</tr>
<tr>
<td>25th Percentile</td>
<td>10.56</td>
<td>10.17</td>
<td>11.52</td>
</tr>
<tr>
<td>75th Percentile</td>
<td>26.15</td>
<td>24.15</td>
<td>20.2</td>
</tr>
</tbody>
</table>

Aswath Damodaran
3. Understand your “implicit” assumptions

- What are the fundamentals that determine and drive these multiples?
  - Proposition 1: Embedded in every multiple are all of the variables that drive every discounted cash flow valuation - growth, risk and cash flow patterns.
  - In fact, using a simple discounted cash flow model and basic algebra should yield the fundamentals that drive a multiple.

- How do changes in these fundamentals change the multiple?
  - The relationship between a fundamental (like growth) and a multiple (such as PE) is seldom linear. For example, if firm A has twice the growth rate of firm B, it will generally not trade at twice its PE ratio.
  - Proposition 2: It is impossible to properly compare firms on a multiple, if we do not know the nature of the relationship between fundamentals and the multiple.

Aswath Damodaran
PE Ratio: Understanding the Fundamentals

Equity Multiple or Firm Multiple

**Equity Multiple**

1. Start with an equity DCF model (a dividend or FCFE model)
\[ P_0 = \frac{DPS_i}{r - g_n} \]
2. Isolate the denominator of the multiple in the model
3. Do the algebra to arrive at the equation for the multiple

**Firm Multiple**

1. Start with a firm DCF model (a FCFF model)
\[ EV_0 = \frac{FCFF_i}{\text{Cost of capital} - g_n} \]
2. Isolate the denominator of the multiple in the model
3. Do the algebra to arrive at the equation for the multiple

Aswath Damodaran
The Determinants of Multiples...

\[
\text{Value of Stock} = \frac{\text{DPS}}{k_e - g}
\]

- \(\text{PE} = \text{Payout Ratio} = \frac{(1+g)}{(r-g)}\)
- \(\text{PEG} = \text{Payout ratio} = \frac{(1+g)}{(g(r-g))}\)
- \(\text{PBV} = \text{ROE (Payout ratio)} = \frac{(1+g)}{(r-g)}\)
- \(\text{PS} = \text{Net Margin (Payout ratio)} = \frac{(1+g)}{(r-g)}\)

**Equity Multiples**

- \(\text{Value of Firm} = \frac{\text{FCFF}}{WACC - g}\)
- \(\frac{\text{Value}}{\text{FCFF}} = \frac{(1+g)}{(WACC-g)}\)
- \(\frac{\text{Value}}{\text{EBIT(1-t)}} = \frac{(1+g)}{(1-\text{RIR})(WACC-g)}\)
- \(\frac{\text{Value}}{\text{EBIT}} = \frac{(1+g)(1-\text{RIR})}{(1-t)(WACC-g)}\)
- \(\text{VS} = \text{Oper Margin (1-RIR)} = \frac{(1+g)}{(WACC-g)}\)

**Firm Multiples**

Aswath Damodaran
4. Define “comparable” broadly & control for differences

- Given the firm that we are valuing, what is a “comparable” firm?
  - While traditional analysis is built on the premise that firms in the same sector are comparable firms, valuation theory would suggest that a comparable firm is one which is similar to the one being analyzed in terms of fundamentals.
  - Proposition 4: There is no reason why a firm cannot be compared with another firm in a very different business, if the two firms have the same risk, growth and cash flow characteristics.

- Given the comparable firms, how do we adjust for differences across firms on the fundamentals?
  - Proposition 5: It is impossible to find an exactly identical firm to the one you are valuing.
If your job is price enhancement....

The market gives...

And takes away....

NAME THAT STOCK

New Markets, New Names
In the bull market, adding .com to a company name made a stock soar. Lately, those zippy new monikers are disappearing.

Sources: Thomson Datastream; P. Raghuveerendra Rao, Michael J. Cooper, Igor Olechkov, Purdue Univ.; Arv Naron, Virginia Univ.; Arv Patil, Wake Forest Univ.
PRICE OR VALUE
WHAT SHOULD YOU DO?
What’s your game?

- The transactors
  - Traders: Oscar Wilde’s definition of a cynic: “knows the price of everything, the value of nothing”.
  - Salespeople: Caveat emptor!
  - Deal intermediaries: Get the deal done (even if it is not a good deal)!

- The muddled middle
  - Academic value: The cognitive dissonance of the “efficient market”
  - Accounting value: Rule maker, rule maker, make up your mind!
  - Legal value: The bane of the expert witness!

- The investors
  - Owners of businesses: Except if you want to run it for the long term.
  - Investors in companies: With faith and patience, you can take advantage of Mr. Market.
  - Long term consultants: You have to live with the consequences of the advice that you mete out to your clients.

Aswath Damodaran
Sometimes, you don’t have a choice..

At $142.4 Million, Triptych Is the Most Expensive Artwork Ever Sold at an Auction

2013 Estate of Francis Bacon/Artists Rights Society (ARS), New York/DACS, London
A fair price for gold? How about value?
And for Bitcoins?

![Bitcoin Price Index Chart]

Saturday, Mar 19, 2011
BPI (USD): 0.76

CoinDesk BPI in effect
www.bitstamp.net
In the muddled middle, what you get is neither price nor value, but mush..

- The “fair value accounting” oxymoron: Fair value accounting requires accountants to value assets based upon what “market participants” will pay for those assets in arms length transactions today.

- **Legal Valuation**: In courts, experts witnesses are generally asked to opine on the values of assets, often in the abstract. It is unclear whether they are being asked to price assets or value assets, and that allows them to stake extreme positions (depending on which side is paying them).

- **Academic valuation**: Much of what passes for asset pricing in finance is exactly that: pricing.
In the investing world, there are three views of “the gap”

<table>
<thead>
<tr>
<th>View of the gap</th>
<th>Investment Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Efficient Marketer</td>
<td>The gaps between price and value, if they do occur, are random.</td>
</tr>
<tr>
<td>The “value” extremist</td>
<td>You view pricers as dilettantes who will move on to fad and fad. Eventually, the price will converge on value.</td>
</tr>
<tr>
<td>The pricing extremist</td>
<td>Value is only in the heads of the “eggheads”. Even if it exists (and it is questionable), price may never converge on value.</td>
</tr>
</tbody>
</table>
If you believe in efficient markets, there is no contradiction

- If you believe that markets are efficient, you are not arguing that there will never be gaps between price and value, but that if there are gaps, they are random and cannot be exploited by investors.
- If you buy into this notion, it is indeed appropriate to use price and value as interchangeable, since the market price is your best estimate of the value.
If you are a pure pricer (trader)

- **Philosophy:** The price is the only real number that you can act on. No one knows what the value of an asset is and estimating it is of little use.

- **To play the game:** You try to guess which direction the price will move in the next period(s) and trade ahead of the movement. To win the game, you have to be right more often than wrong about direction and to exit before the winds shift.

- **Key skill:** Be able to gauge market mood/momentum shifts earlier than the rest of the market.

- **Time Horizon:** Can be very short term (minutes) to mildly short term (weeks, months).

- **Key personality traits:** (a) Market amnesia, (b) Quick acting (c) Gambling instincts.

- **Added Bonus:** Capacity to move prices (with lots of money and lots of followers)
And here are your dilemmas..

- **No anchor**: If you do not believe in intrinsic value and make no attempt to estimate it, you have no moorings when you invest. You will therefore be pushed back and forth as the price moves from high to low. In other words, everything becomes relative and you can lose perspective.

- **Reactive**: Without a core measure of value, your investment strategy will often be reactive rather than proactive.

- **Crowds are fickle and tough to get a read on**: The key to being successful as a pricer is to be able to read the crowd mood and to detect shifts in that mood early in the process. By their nature, crowds are tough to read and almost impossible to model systematically.
To be a pure valuer

- **Philosophy:** Every asset has a fair or true value. You can estimate that value, albeit with error, and price has to converge on value (eventually).

- **To play the game:** You try to estimate the value of an asset, and if it is under(over) value, you buy (sell) the asset. To win the game, you have to be right about value (for the most part) and the market price has to move to that value.

- **Key skill(s):** Be able to “value” assets, given uncertainty.

- **Time Horizon:** As long as it takes for market to correct their mistakes.

- **Key personality traits:** (a) Faith in “value” (b) Patience (c) immunity from peer pressure.

- **Added Bonus:** Can provide the catalyst that can move price to value.
And your dilemma...

- **Uncertainty about the magnitude of the gap:**
  - Margin of safety: Many value investors swear by the notion of the “margin of safety” as protection against risk/uncertainty.
  - Collect more information: Collecting more information about the company is viewed as one way to make your investment less risky.
  - Ask what if questions: Doing scenario analysis or what if analysis gives you a sense of whether you should invest.
  - Confront uncertainty: Face up to the uncertainty, bring it into the analysis and deal with the consequences.

- **Uncertainty about gap closing:** This is tougher and you can reduce your exposure to it by
  - Lengthening your time horizon
  - Providing or looking for a catalyst that will cause the gap to close.
A case study: Apple in early 2013

- Starting in September 2012, when the stock peaked at $700, the pricing mood turned sour at the company with the stock dropping to $450 by the end of January 2013.

- In January 2013, I valued the company at about $600/share, and suggested that it was significantly under valued.

- I also argued that investors were pricing the stock to deliver no growth and have rapidly declining margins and were then punishing the stock for delivering some growth and slowly declining margins.

<table>
<thead>
<tr>
<th></th>
<th>Last year</th>
<th>Q2 2013</th>
<th>My estimate</th>
<th>Breakeven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Growth Rate</td>
<td>44.58%</td>
<td>11.28%</td>
<td>5.00%</td>
<td>-5.00%</td>
</tr>
<tr>
<td>Operating Margin</td>
<td>35.30%</td>
<td>28.80%</td>
<td>25.00%</td>
<td>12.00%</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>12.49%</td>
<td>11.29%</td>
<td>11.29%</td>
<td>21.00%</td>
</tr>
</tbody>
</table>
Apple: Visualizing uncertainty
A simulation of value in January 2013

Apple was trading at $450/share in January 2013

Probability that Apple is under valued > 90%
Gap and Time Horizon: My estimates for Apple in January 2013

Apple: Pricing Gap versus Time Horizon in January 2013

Gap widens  |  Gap stays same  |  Gap narrows
Watch the Gap! Apple updated through April 2014

Aswath Damodaran
And the uncertainty is greater in some assets (stocks) than others

- In which of these two cities would you find it easier to forecast the weather?

### Weather changeability for Honolulu, Hawaii

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Last Month</th>
<th>Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average change in high temperature</td>
<td>1.7°</td>
<td>1.2°</td>
</tr>
<tr>
<td>day-to-day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average change in low temperature</td>
<td>1.5°</td>
<td>2.0°</td>
</tr>
<tr>
<td>day-to-day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Precipitation</th>
<th>Last Month</th>
<th>Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chance of dry day after a precip day</td>
<td>67%</td>
<td>81%</td>
</tr>
<tr>
<td>Chance of precip day after a dry day</td>
<td>7%</td>
<td>13%</td>
</tr>
</tbody>
</table>

### Weather changeability for Epping, North Dakota

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Last Month</th>
<th>Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average change in high temperature</td>
<td>8.5°</td>
<td>7.7°</td>
</tr>
<tr>
<td>day-to-day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average change in low temperature</td>
<td>7.1°</td>
<td>8.6°</td>
</tr>
<tr>
<td>day-to-day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Precipitation</th>
<th>Last Month</th>
<th>Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chance of dry day after a precip day</td>
<td>50%</td>
<td>65%</td>
</tr>
<tr>
<td>Chance of precip day after a dry day</td>
<td>38%</td>
<td>20%</td>
</tr>
</tbody>
</table>
But the payoff is greatest where there is the most uncertainty...

Aswath Damodaran
Three rules for the road

1. **Do your job:** There is no right or wrong way to put a number on an asset. If your job is to price it, that is exactly what you should do. If it is to value it, go for an intrinsic value approach.

2. **Don’t be delusional:** If you are pricing an asset, don’t get distracted too much by fundamentals and intrinsic value concerns. If you are valuing an asset, don’t let the pricing process (mood & momentum) feed back into your valuation.

3. **Play to your strengths:** To be a successful investor, you have to know what makes you tick and pick the approach that best fits you.