VI. Valuing Companies with “intangible” assets

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

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

**What is the value added by growth assets?**

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

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

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

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

The capital expenditures associated with acquiring intangible assets (technology, human capital) are mis-categorized as operating expenses, leading to incorrect accounting earnings and measures of capital invested.
Lesson 1: Accounting rules are cluttered with inconsistencies...

- If we start with accounting first principles, capital expenditures are expenditures designed to create benefits over many periods. They should not be used to reduce operating income in the period that they are made, but should be depreciated/amortized over their life. They should show up as assets on the balance sheet.

- Accounting is consistent in its treatment of cap ex with manufacturing firms, but is inconsistent with firms that do not fit the mold.
  - With pharmaceutical and technology firms, R&D is the ultimate cap ex but is treated as an operating expense.
  - With consulting firms and other firms dependent on human capital, recruiting and training expenses are your long term investments that are treated as operating expenses.
  - With brand name consumer product companies, a portion of the advertising expense is to build up brand name and is the real capital expenditure. It is treated as an operating expense.
**Exhibit 11.1: Converting R&D expenses to R&D assets - Amgen**

**Step 1: Determining an amortizable life for R&D expenses.**
How long will it take, on an expected basis, for research to pay off at Amgen? Given the length of the approval process for new drugs by the Food and Drugs Administration, we will assume that this amortizable life is 10 years.

**Step 2: Capitalize historical R&D expense**

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D Expense</th>
<th>Unamortized portion</th>
<th>Amortization this year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>3030.00</td>
<td>1.00</td>
<td>3030.00</td>
</tr>
<tr>
<td>-1</td>
<td>3266.00</td>
<td>0.90</td>
<td>2939.40</td>
</tr>
<tr>
<td>-2</td>
<td>3366.00</td>
<td>0.80</td>
<td>2692.80</td>
</tr>
<tr>
<td>-3</td>
<td>2314.00</td>
<td>0.70</td>
<td>1619.80</td>
</tr>
<tr>
<td>-4</td>
<td>2028.00</td>
<td>0.60</td>
<td>1216.80</td>
</tr>
<tr>
<td>-5</td>
<td>1655.00</td>
<td>0.50</td>
<td>827.50</td>
</tr>
<tr>
<td>-6</td>
<td>1117.00</td>
<td>0.40</td>
<td>446.80</td>
</tr>
<tr>
<td>-7</td>
<td>864.00</td>
<td>0.30</td>
<td>259.20</td>
</tr>
<tr>
<td>-8</td>
<td>845.00</td>
<td>0.20</td>
<td>169.00</td>
</tr>
<tr>
<td>-9</td>
<td>832.00</td>
<td>0.10</td>
<td>82.30</td>
</tr>
<tr>
<td>-10</td>
<td>663.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

$13,283.60 - $1,694.10

**Step 3: Restate earnings, book value and return numbers**

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

Current Cashflow to Firm

EBIT(1-t) = \( 0.7336(1 - 0.28) = 0.6058 \)

Nt CpX = 6443

Chg WC = 37

Reinvestment Rate = 6480/6058 = 106.98%

Return on capital = 16.71%

Expected Growth in EBIT (1-t)

0.60 * 0.16 = 0.096
9.6%

Return on Capital

Stable Growth

g = 4%; Beta = 1.10;
Debt Ratio = 20%; Tax rate = 35%
Cost of capital = 8.08%
ROC = 10.00%;
Reinvestment Rate = 4/10 = 40%

Terminal Value

\[ 7300 / (0.0808 - 0.04) = 179,099 \]

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

Cost of Equity

11.70%

Cost of Debt

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

Weights

E = 90% D = 10%

Riskfree Rate:

Riskfree rate = 4.78%

Beta

1.73

Risk Premium

4%

Unlevered Beta for Sectors: 1.59

D/E = 11.06%

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

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

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

What are the cashflows from existing assets?

What is the value added by growth assets?

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

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

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

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

For commodity companies, the fact that there are only finite amounts of the commodity may put a limit on growth forever. For cyclical firms, there is the peril that the next recession may put an end to the firm.
Lesson 1: With “macro” companies, it is easy to get lost in “macro” assumptions...

- With cyclical and commodity companies, it is undeniable that the value you arrive at will be affected by your views on the economy or the price of the commodity.

- Consequently, you will feel the urge to take a stand on these macro variables and build them into your valuation. Doing so, though, will create valuations that are jointly impacted by your views on macro variables and your views on the company, and it is difficult to separate the two.

- The best (though not easiest) thing to do is to separate your macro views from your micro views. Use current market based numbers for your valuation, but then provide a separate assessment of what you think about those market numbers.
Lesson 2: Use probabilistic tools to assess value as a function of macro variables...

- If there is a key macro variable affecting the value of your company that you are uncertain about (and who is not), why not quantify the uncertainty in a distribution (rather than a single price) and use that distribution in your valuation.

- That is exactly what you do in a Monte Carlo simulation, where you allow one or more variables to be distributions and compute a distribution of values for the company.

- With a simulation, you get not only everything you would get in a standard valuation (an estimated value for your company) but you will get additional output (on the variation in that value and the likelihood that your firm is under or over valued)
Shell: A "Oil Price" Neutral Valuation: March 2016

Revenue calculated from prevailing oil price of $40/barrel in March 2016
Revenue = 39992.77 + 4039.40 * $40 = $201,569

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

<table>
<thead>
<tr>
<th></th>
<th>Base Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Terminal Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$ 201,569</td>
<td>$ 209,450</td>
<td>$ 217,639</td>
<td>$ 226,149</td>
<td>$ 234,991</td>
<td>$ 244,180</td>
<td>$ 249,063</td>
</tr>
<tr>
<td>Operating Margin</td>
<td>3.01%</td>
<td>6.18%</td>
<td>7.76%</td>
<td>8.56%</td>
<td>8.95%</td>
<td>9.35%</td>
<td>9.35%</td>
</tr>
<tr>
<td>Operating Income</td>
<td>$ 6,065.00</td>
<td>$ 12,942.85</td>
<td>$ 16,899.10</td>
<td>$ 19,352.39</td>
<td>$ 21,040.39</td>
<td>$ 22,830.80</td>
<td>$ 23,287.41</td>
</tr>
<tr>
<td>Effective tax rate</td>
<td>30.00%</td>
<td>30.00%</td>
<td>30.00%</td>
<td>30.00%</td>
<td>30.00%</td>
<td>30.00%</td>
<td>30.00%</td>
</tr>
<tr>
<td>AT Operating Income</td>
<td>$ 4,245.50</td>
<td>$ 9,060.00</td>
<td>$ 11,829.37</td>
<td>$ 13,546.68</td>
<td>$ 14,728.27</td>
<td>$ 15,981.56</td>
<td>$ 16,301.19</td>
</tr>
<tr>
<td>+ Depreciation</td>
<td>$ 26,714.00</td>
<td>$ 27,759</td>
<td>$ 28,844</td>
<td>$ 29,972</td>
<td>$ 31,144</td>
<td>$ 32,361</td>
<td></td>
</tr>
<tr>
<td>- Cap Ex</td>
<td>$ 31,854.00</td>
<td>$ 33,099</td>
<td>$ 34,394</td>
<td>$ 35,738</td>
<td>$ 37,136</td>
<td>$ 38,588</td>
<td></td>
</tr>
<tr>
<td>- Chg in WC</td>
<td>$ 472.88</td>
<td>$ 491.37</td>
<td>$ 510.58</td>
<td>$ 530.55</td>
<td>$ 551.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCFF</td>
<td>$ 3,246.14</td>
<td>$ 5,788.19</td>
<td>$ 7,269.29</td>
<td>$ 8,205.44</td>
<td>$ 9,203.68</td>
<td>$ 13,011.34</td>
<td></td>
</tr>
<tr>
<td>Terminal Value</td>
<td>$ 216,855.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Capital</td>
<td>12.37%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of Capital</td>
<td>9.91%</td>
<td>9.91%</td>
<td>9.91%</td>
<td>9.91%</td>
<td>9.91%</td>
<td>8.00%</td>
<td></td>
</tr>
<tr>
<td>Cumulated Discount Factor</td>
<td>1.0991</td>
<td>1.2080</td>
<td>1.3277</td>
<td>1.4593</td>
<td>1.6039</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Value</td>
<td>$ 2,953.45</td>
<td>$ 4,791.47</td>
<td>$ 5,474.95</td>
<td>$ 5,622.81</td>
<td>$ 140,940.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of Operating Assets</td>
<td>$ 159,783.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Cash</td>
<td>$ 31,752.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Cross Holdings</td>
<td>$ 33,566.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Debt</td>
<td>$ 58,379.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Minority Interests</td>
<td>$ 1,245.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of Equity</td>
<td>$ 165,477.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of shares</td>
<td>4209.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value per share</td>
<td>$ 39.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Revenues = 39,992.77 + 4,039.39 * Average Oil Price

R squared = 96.44%
Revenue calculated from the oil price drawn from distribution
Revenue = 39992.77 + 4039.40 * Oil Price/Barrel

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

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

Percentiles:  
0%   $6.55  
10%  $23.90  
20%  $27.73  
30%  $30.89  
40%  $33.88  
50%  $36.99  
60%  $40.28  
70%  $44.22  
80%  $49.24  
90%  $57.49  
100% $197.11
VALUE, PRICE AND INFORMATION: CLOSING THE DEAL

Value versus Price
Are you valuing or pricing?

Tools for intrinsic analysis
- Discounted Cashflow Valuation (DCF)
- Intrinsic multiples
- Book value based approaches
- Excess Return Models

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

Drivers of "the gap"
- Information
- Liquidity
- Corporate governance

Tools for pricing
- Multiples and comparables
- Charting and technical indicators
- Pseudo DCF

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

Tools for "the gap"
- Behavioral finance
- Price catalysts

Value of cashflows, adjusted for time and risk

INTRINSIC VALUE

THE GAP
Is there one? Will it close?

PRICE

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

---

**Rating**
- Buy

**Company**
- BB BIOTECH

**Europe**
- Switzerland

**Biotechnology**
- Biotechnology

**Date**
- 13 August 2013

**Forecast Change**

<table>
<thead>
<tr>
<th>Price at 12 Aug 2013 (CHF)</th>
<th>124.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price Target (CHF)</td>
<td>164.50</td>
</tr>
<tr>
<td>52-week range (CHF)</td>
<td>128.40 - 84.90</td>
</tr>
</tbody>
</table>

**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.

**BB Biotech shares remain attractive**

In the first 6M of 2013, BB Biotech increased its NAV by 36%, which marks good outperformance against the Nasdaq Biotech Index (NBI)’s 27%. This is a remarkable performance after 2012, when BBB’s NAV increase of 45% also
The drivers of value

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

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

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

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

Aswath Damodaran
## Three views of “the gap”

<table>
<thead>
<tr>
<th>View of the gap</th>
<th>Investment Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Efficient Marketer</strong></td>
<td>Index funds</td>
</tr>
<tr>
<td>The gaps between price and value, if they do occur, are random.</td>
<td></td>
</tr>
<tr>
<td><strong>The “value” extremist</strong></td>
<td>Buy and hold stocks where value &lt; price</td>
</tr>
<tr>
<td>You view pricers as dilettantes who will move on to fad and fad. Eventually, the price will converge on value.</td>
<td></td>
</tr>
<tr>
<td><strong>The pricing extremist</strong></td>
<td>(1) Look for mispriced securities.</td>
</tr>
<tr>
<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>
<td>(2) Get ahead of shifts in demand/momentum.</td>
</tr>
</tbody>
</table>
The “pricers” dilemma..

- **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.
The valuer’s dilemma and ways of dealing with it...

- **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.
Strategies for managing the risk in the “closing” of the gap

- **The “karmic” approach**: In this one, you buy (sell short) under (over) valued companies and sit back and wait for the gap to close. You are implicitly assuming that given time, the market will see the error of its ways and fix that error.

- **The catalyst approach**: For the gap to close, the price has to converge on value. For that convergence to occur, there usually has to be a catalyst.
  - If you are an activist investor, you may be the catalyst yourself. In fact, your act of buying the stock may be a sufficient signal for the market to reassess the price.
  - If you are not, you have to look for other catalysts. Here are some to watch for: a new CEO or management team, a “blockbuster” new product or an acquisition bid where the firm is targeted.
An example: Apple – Price versus Value (my estimates) from 2011 to 2018

Aswath Damodaran
A closing thought...