III. Dealing with decline and distress...

Historical data often reflects flat or declining revenues and falling margins. Investments often earn less than the cost of capital. What are the cashflows from existing assets? How risky are the cash flows from both existing assets and growth assets? Underfunded pension obligations and litigation claims can lower value of equity. Liquidation preferences can affect value of equity. What is the value added by growth assets? Growth can be negative, as firm sheds assets and shrinks. As less profitable assets are shed, the firm’s remaining assets may improve in quality.

When will the firm become a mature firm, and what are the potential roadblocks? Depending upon the risk of the assets being divested and the use of the proceeds from the divestiture (to pay dividends or retire debt), the risk in both the firm and its equity can change. There is a real chance, especially with high financial leverage, that the firm will not make it. If it is expected to survive as a going concern, it will be as a much smaller entity.

Aswath Damodaran
a. Dealing with Decline

- In decline, firms often see declining revenues and lower margins, translating in negative expected growth over time.

- If these firms are run by good managers, they will not fight decline. Instead, they will adapt to it and shut down or sell investments that do not generate the cost of capital. This can translate into negative net capital expenditures (depreciation exceeds cap ex), declining working capital and an overall negative reinvestment rate. The best case scenario is that the firm can shed its bad assets, make itself a much smaller and healthier firm and then settle into long-term stable growth.

- As an investor, your worst case scenario is that these firms are run by managers in denial who continue to expand the firm by making bad investments (that generate lower returns than the cost of capital). These firms may be able to grow revenues and operating income but will destroy value along the way.
Figure 14.5: A Valuation of JC Penney

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

<table>
<thead>
<tr>
<th>Base year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue growth rate</td>
<td>-3.00%</td>
<td>-3.00%</td>
<td>-3.00%</td>
<td>-3.00%</td>
<td>-2.00%</td>
<td>-1.00%</td>
<td>0.00%</td>
<td>1.00%</td>
<td>2.00%</td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td>$12,522</td>
<td>$12,146</td>
<td>$11,782</td>
<td>$11,428</td>
<td>$11,086</td>
<td>$10,753</td>
<td>$10,433</td>
<td>$10,433</td>
<td>$10,537</td>
<td>$10,748</td>
</tr>
<tr>
<td>EBIT (Operating) margin</td>
<td>1.32%</td>
<td>1.82%</td>
<td>2.31%</td>
<td>2.80%</td>
<td>3.29%</td>
<td>3.79%</td>
<td>4.28%</td>
<td>4.77%</td>
<td>5.26%</td>
<td>5.76%</td>
</tr>
<tr>
<td>EBIT (Operating income)</td>
<td>$166</td>
<td>$221</td>
<td>$272</td>
<td>$320</td>
<td>$365</td>
<td>$407</td>
<td>$451</td>
<td>$498</td>
<td>$549</td>
<td>$607</td>
</tr>
<tr>
<td>Tax rate</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>35.00%</td>
<td>36.00%</td>
<td>37.00%</td>
<td>38.00%</td>
</tr>
<tr>
<td>EBIT(1-t)</td>
<td>$108</td>
<td>$143</td>
<td>$177</td>
<td>$208</td>
<td>$237</td>
<td>$265</td>
<td>$289</td>
<td>$314</td>
<td>$341</td>
<td>$370</td>
</tr>
<tr>
<td>- Reinvestment</td>
<td>$(188)</td>
<td>$(182)</td>
<td>$(177)</td>
<td>$(171)</td>
<td>$(166)</td>
<td>$(108)</td>
<td>$(53)</td>
<td>$-</td>
<td>$52</td>
<td>$105</td>
</tr>
<tr>
<td>FCFF</td>
<td>$331</td>
<td>$359</td>
<td>$385</td>
<td>$409</td>
<td>$431</td>
<td>$396</td>
<td>$366</td>
<td>$341</td>
<td>$318</td>
<td>$298</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>9.00%</td>
<td>9.00%</td>
<td>9.00%</td>
<td>9.00%</td>
<td>8.00%</td>
<td>8.00%</td>
<td>8.00%</td>
<td>8.00%</td>
<td>8.00%</td>
<td></td>
</tr>
<tr>
<td>PV(FCCF)</td>
<td>$304</td>
<td>$302</td>
<td>$297</td>
<td>$290</td>
<td>$280</td>
<td>$237</td>
<td>$201</td>
<td>$173</td>
<td>$149</td>
<td>$129</td>
</tr>
<tr>
<td>Terminal value</td>
<td>$5,710</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PV(Terminal value)</td>
<td>$2,479</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV (CF over next 10 years)</td>
<td>$2,362</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of PV</td>
<td>$4,841</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability of failure =</td>
<td>20.00%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proceeds if firm fails =</td>
<td>$2,421</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of operating assets =</td>
<td>$4,357</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

High debt load and poor earnings put survival at risk. Based on bond rating, 20% chance of failure and liquidation will bring in 50% of book value.
b. Dealing with the “downside” of Distress

- A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cashflows (a distress sale value), DCF valuations will overstate the value of the firm.

- Value of Equity = DCF value of equity \( (1 - \text{Probability of distress}) + \text{Distress sale value of equity} \times \text{Probability of distress} \)

- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds.

- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).

Aswath Damodaran
Adjusting the value of LVS for distress..

- In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at $529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

\[
529 = \sum_{t=1}^{7} \frac{63.75(1-\Pi_{\text{Distress}})^t}{(1.03)^t} + \frac{1000(1-\Pi_{\text{Distress}})^7}{(1.03)^7}
\]

- Solving for the probability of bankruptcy, we get:

  - \(\pi_{\text{distress}}\) = Annual probability of default = 13.54%
  - Cumulative probability of surviving 10 years = (1 - .1354)^10 = 23.34%
  - Cumulative probability of distress over 10 years = 1 - .2334 = .7666 or 76.66%

- If LVS is becomes distressed:

  - Expected distress sale proceeds = $2,769 million < Face value of debt
  - Expected equity value/stock = $0.00

- Expected value per share = $8.12 (1 - .7666) + $0.00 (.7666) = $1.92
IV. Emerging Market Companies

Estimation Issues - Emerging Market Companies

Big shifts in economic environment (inflation, interest rates) can affect operating earnings history. Poor corporate governance and weak accounting standards can lead to lack of transparency on earnings.

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

What is the value added by growth assets?

What are the cashflows from existing assets?

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

Cross holdings can affect value of equity

Even if the company’s risk is stable, there can be significant changes in country risk over time.

What is the value of equity in the firm?

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

Even if the company’s risk is stable, there can be significant changes in country risk over time.

Economic crises can put many companies at risk. Government actions (nationalization) can affect long term value.
Lesson 1: Country risk has to be incorporated... but with a scalpel, not a bludgeon

- Emerging market companies are undoubtedly exposed to additional country risk because they are incorporated in countries that are more exposed to political and economic risk.

- Not all emerging market companies are equally exposed to country risk and many developed markets have emerging market risk exposure because of their operations.

- You can use either the “weighted country risk premium”, with the weights reflecting the countries you get your revenues from or the lambda approach (which may incorporate more than revenues) to capture country risk exposure.
A $ Valuation of Embraer

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

Reinvestment Rate
40%

Expected Growth in EBIT (1-t)
.40*.181 = .072
7.2%

Return on Capital
18.1%

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

Terminal Value
5
= 254 (.0738 -.038) = 8,371

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

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

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

On May 22, 2008
Embraer Price = R$ 17.2

Cost of Equity
8.31%

Cost of Debt
(3.8% + 1.7% + 1.1%)(1-.34)
= 4.36%

Weights
E = 78.8% D = 21.2%

Riskfree Rate:
US$ Riskfree Rate = 3.8%

Beta 0.88
Mature market premium 4%
Lambda 0.27
Country Equity Risk Premium 3.66%
Country Default Spread 2.2%
Rel Equity Mkt Vol 1.64

Unlevered Beta for Sectors: 0.75
Firm’s D/E Ratio: 26.84%
Lesson 2: Currency should not matter

- You can value any company in any currency. Thus, you can value a Brazilian company in nominal reais, US dollars or Swiss Francs.

- For your valuation to stay invariant and consistent, your cash flows and discount rates have to be in the same currency. Thus, if you are using a high inflation currency, both your growth rates and discount rates will be much higher.

- For your cash flows to be consistent, you have to use expected exchange rates that reflect purchasing power parity (the higher inflation currency has to depreciate by the inflation differential each year).
Lesson 3: The “corporate governance” drag

- Stockholders in Asian, Latin American and many European companies have little or no power over the managers of the firm. In many cases, insiders own voting shares and control the firm and the potential for conflict of interests is huge.

- This weak corporate governance is often a reason for giving for using higher discount rates or discounting the estimated value for these companies.

- Would you discount the value that you estimate for an emerging market company to allow for this absence of stockholder power?
  
  a. Yes
  
  b. No.
6a. Tube Investments: Status Quo (in Rs)

**Current Cashflow to Firm**

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

**Reinvestment Rate** = 60%

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

\[ \text{Expected Growth} = 0.60 \times 0.092 = 0.0552 \]

\[ \text{Expected Growth} = 5.52\% \]

**Return on Capital** = 9.20%

**Stable Growth**

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

**Terminal Value**

\[ \text{Terminal Value} = \frac{2775}{0.1478 - 0.05} = 28,378 \]

**Cost of Equity** = 22.80%

**Cost of Debt**

\[ 0.12 + 1.50\% \times (1 - 0.30) = 9.45\% \]

**E = 55.8% D = 44.2%**

**Firm Value**

\[ \text{Firm Value} = 19,578 \]

\[ + \text{ Cash: } 13,653 \]

\[ - \text{ Debt: } 18,073 \]

\[ = \text{ Equity: } 15,158 \]

\[ - \text{ Options: } 0 \]

\[ \text{Value/Share} = \text{Rs61.57} \]

**In 2000, the stock was trading at 102 Rupees/share.**
6b. Tube Investments: Higher Marginal Return (in Rs)

Current Cashflow to Firm

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT(1-t)</td>
<td>4,425</td>
</tr>
<tr>
<td>- Nt CpX</td>
<td>843</td>
</tr>
<tr>
<td>- Chg WC</td>
<td>4,150</td>
</tr>
<tr>
<td>= FCFF</td>
<td>- 568</td>
</tr>
<tr>
<td>Reinvestment Rate</td>
<td>=112.82%</td>
</tr>
</tbody>
</table>

Expected Growth in EBIT (1-t)

\[ .60 \times 1.22 = 0.732 \]

7.32%

Return on Capital 12.20%

Stable Growth
\[ g = 5\%; \; \text{Beta} = 1.00; \]
\[ \text{Debt ratio} = 44.2\%; \]
\[ \text{ROC}=12.2\%; \]
\[ \text{Reinvestment Rate}= 40.98\% \]

Terminal Value
\[ 5 = 3904/(.1478-.05) = 39.921 \]

Cost of Equity 22.80%

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

Weights
\[ E = 55.8\%; D = 44.2\% \]

Beta 1.17

Risk Premium 9.23%

Unlevered Beta for Sectors: 0.75

Mature risk premium 4%

Country Risk Premium 5.23%

Firm's D/E Ratio: 79%

Riskfree Rate: Rs riskfree rate = 12%

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

Firm Value: 25,185

+ Cash: 13,653

- Debt: 18,073

= Equity 20,765

Value/Share 84.34

Company earns higher returns on new projects

Existing assets continue to generate negative excess returns.

Reinvestment Rate 60%

Return on Capital

EBIT(1-t)

60%

Expected Growth in EBIT (1-t)

\[ .60 \times 1.22 = 0.732 \]

7.32%

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

Riskfree Rate: Rs riskfree rate = 12%

Beta 1.17

Risk Premium 9.23%

Unlevered Beta for Sectors: 0.75

Mature risk premium 4%

Country Risk Premium 5.23%

Firm's D/E Ratio: 79%
Current Cashflow to Firm

\[
\text{EBIT(1-t)} : \quad 4,425 \\
- \text{Nt CpX} \quad 843 \\
- \text{Chg WC} \quad 4,150 \\
= \text{FCFF} \quad -568 \\
\text{Reinvestment Rate} = 112.82\%
\]

Reinvestment Rate

60%

Expected Growth

\[
60 \times 0.122 + 0.0581 = 0.1313
\]

13.13%

Reinvestment Rate = 112.82%

Expected Growth

5.81%

Stable Growth

\[
g = 5\%; \quad \text{Beta} = 1.00; \\
\text{Debt ratio} = 44.2\%; \\
\text{Country Premium} = 3\% \\
\text{ROC} = 12.2\% \\
\text{Reinvestment Rate} = 40.98\%
\]

Terminal Value

\[
5,081 / (0.1478 - 0.05) = 51,956
\]

Firm Value: 31,829

+ Cash: 13,653

- Debt: 18,073

= Equity 27,409

- Options 0

Value/Share 111.3

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

Cost of Equity

22.80%

Cost of Debt

\[
(12\% + 1.50\%)(1 - 0.30) = 9.45\%
\]

Weights

E = 55.8%  D = 44.2%

Beta

1.17

Risk Premium

9.23%

Unlevered Beta for Sectors: 0.75

Firm's D/E Ratio: 79%

Mature risk premium 4%

Country Risk Premium 5.23%
Lesson 4: Watch out for cross holdings...

- Emerging market companies are more prone to having cross holdings that companies in developed markets. This is partially the result of history (since many of the larger public companies used to be family owned businesses until a few decades ago) and partly because those who run these companies value control (and use cross holdings to preserve this control).

- In many emerging market companies, the real process of valuation begins when you have finished your DCF valuation, since the cross holdings (which can be numerous) have to be valued, often with minimal information.
### Tata Chemicals: April 2010

- **Return on Capital:** 10.36%
- **Expected Growth in EBIT (1-4):** 5.66%, 1035.0585, 5.89%
- **Current Cashflow to Firm:**
  - Current: Rs 5,833
  - NP C/EP: Rs 5,832
  - Chg WC: Rs 4,229
  - PCFF: Rs 4,229
  - Reinvest Rate: 5832/2429 = 0.5832
  - Change in Cash: -31.5%

<table>
<thead>
<tr>
<th>Value/Share</th>
<th>Rs 372</th>
</tr>
</thead>
</table>

### Tata Motors: April 2010

- **Return on Capital:** 17.16%
- **Expected Growth from new inv:** 70.17165-0.1201
- **Current Cashflow to Firm:**
  - Current: Rs 20,936
  - NP C/EP: Rs 31,590
  - Chg WC: Rs 2,732
  - PCFF: Rs 14,206
  - Reinvest Rate: 15900/27203 = 0.1188
  - Change in Cash: 70.81%

<table>
<thead>
<tr>
<th>Value/Share</th>
<th>Rs 666</th>
</tr>
</thead>
</table>

### Tata Steel: April 2010

- **Return on Capital:** 13.42%
- **Expected Growth in EBIT (1-4):** 13.42%
- **Current Cashflow to Firm:**
  - Current: Rs 80,213
  - NP C/EP: Rs 81,820
  - Chg WC: Rs 3,618
  - PCFF: Rs 2,251
  - Reinvest Rate: 61620/34633602515 = 0.99%

<table>
<thead>
<tr>
<th>Value/Share</th>
<th>Rs 644</th>
</tr>
</thead>
</table>

### TCS: April 2010

- **Return on Capital:** 40.64%
- **Expected Growth from new inv:** 5700-4056=0.2305
- **Current Cashflow to Firm:**
  - Current: Rs 3,355,361
  - NP C/EP: Rs 6,511
  - Chg WC: Rs 6,358
  - PCFF: Rs 31,679
  - Reinvest Rate: 56111/631014320 = 0.8705

<table>
<thead>
<tr>
<th>Value/Share</th>
<th>Rs 841</th>
</tr>
</thead>
</table>

---

### Notes:

- **Riskfree Rate:** 6%
- **Beta:** 1.00
- **Country Premium:** 3%
- **Tax rate:** 33.99%
- **ROC:** 9.78%
- **Reinvestment Rate-g/ROC:** 5/12 = 41.67%
- **Country Premium:** 3%
- **Stable Growth:** 5%
- **Beta:** 1.00
- **Country Premium:** 3%
- **Tax rate:** 33.99%
- **ROC:** 9.78%
- **Reinvestment Rate-g/ROC:** 5/12 = 41.67%

---

**Aswath Damodaran**
Tata Companies: Value Breakdown

- Tata Chemicals: 5.32% (from cash), 47.06% (from holdings), 47.62% (from operating assets)
- Tata Steel: 1.62% (from cash), 47.45% (from holdings), 50.94% (from operating assets)
- Tata Motors: 2.97% (from cash), 36.62% (from holdings), 60.41% (from operating assets)
- TCS: 4.64% (from cash), 0.22% (from holdings), 95.13% (from operating assets)
Lesson 5: Truncation risk can come in many forms...

- **Natural disasters**: Small companies in some economies are much exposed to natural disasters (hurricanes, earthquakes), without the means to hedge against that risk (with insurance or derivative products).

- **Terrorism risk**: Companies in some countries that are unstable or in the grips of civil war are exposed to damage or destruction.

- **Nationalization risk**: While less common than it used to be, there are countries where businesses may be nationalized, with owners receiving less than fair value as compensation.
V. Valuing Financial Service Companies

Existing assets are usually financial assets or loans, often marked to market. Earnings do not provide much information on underlying risk.

What are the cashflows from existing assets?

Preferred stock is a significant source of capital.

What is the value of equity in the firm?

Defining capital expenditures and working capital is a challenge. Growth can be strongly influenced by regulatory limits and constraints. Both the amount of new investments and the returns on these investments can change with regulatory changes.

What is the value added by growth assets?

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

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

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

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

Aswath Damodaran
CIB Egypt in December 2015
Valuation in Egyptian Pounds

Dividends
EPS = 4.04 EGP
* Payout Ratio 24.75%
DPS = 1.00 EGP

Expected Growth
75.25% *
42.48% = 31.96%

Expected Growth Rate
31.96% 31.96% 31.96% 31.96% 27.57% 23.18% 18.79% 14.39% 10.00%
Earnings per share
5.33 7.04 9.28 12.25 16.17 20.63 25.41 30.18 34.52 37.97
Payout ratio
24.75% 24.75% 24.75% 24.75% 24.75% 24.75% 31.80% 38.85% 45.90% 52.95% 60.00%
Dividends per share
1.32 1.74 2.30 3.03 4.00 6.56 9.87 13.85 18.28 22.78
Cost of Equity
23.25% 23.25% 23.25% 23.25% 23.25% 23.25% 23.25% 23.25% 23.25% 23.25%
Cumulative Cost of Equity
123.25% 151.90% 187.21% 230.73% 284.37% 350.48% 431.95% 532.37% 656.13% 808.66%
Present Value
1.07 1.15 1.23 1.31 1.41 1.87 2.29 2.60 2.79 2.82

Retention Ratio = 75.25%

ROE = 42.48%
g = 10%: ROE = 25% (=Cost of equity)
Beta = 0.81
Payout = (1 - 10/25) = .60

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

Equity Risk Premium
15.7%

Average Beta for Banks
0.81

In December 2015, CIB was trading at 36 EGP per share

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

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

Riskfree Rate:
In EGP
10.53%

US $ risk free rate (2.27%)
adjusted for diff inflation
(1.0227) * (1.097/1.015) - 1

100% in Egypt
**2b. Goldman Sachs: August 2008**

**Rationale for model**
Why dividends? Because FCFE cannot be estimated
Why 3-stage? Because the firm is behaving (reinvesting, growing) like a firm with potential.

**Dividends**
- EPS = $16.77
- Payout Ratio 8.35%
- DPS = $1.40
(Updated numbers for 2008 financial year ending 11/08)

**Expected Growth in first 5 years =**
91.65% * 13.19% = 12.09%

**Terminal Value = EPS^{10} \times \text{Payout}/(r-g)**
= (42.03 * 1.04 * .6) / (.095 - .04) = 476.86

**Discount at Cost of Equity**
**Between years 6-10, as growth drops to 4%, payout ratio increases and cost of equity decreases.**

**Cost of Equity**
4.10% + 1.40 (4.5%) = 10.4%

**Risk Free Rate:**
Treasury bond rate 4.10%

**Beta**
1.40

**Risk Premium**
4.5%
Implied Equity Risk premium in 8/08

**Average beta for investment banks = 1.40**

**Country Risk**
4.5%

**Mature Market**
0%

**Value of Equity per share = PV of Dividends & Terminal value = $222.49**

Left return on equity at 2008 levels. well below 16% in 2007 and 20% in 2004-2006.
Lesson 1: Financial service companies are opaque...

- With financial service firms, we enter into a Faustian bargain. They tell us very little about the quality of their assets (loans, for a bank, for instance are not broken down by default risk status) but we accept that in return for assets being marked to market (by accountants who presumably have access to the information that we don’t have).

- In addition, estimating cash flows for a financial service firm is difficult to do. So, we trust financial service firms to pay out their cash flows as dividends. Hence, the use of the dividend discount model.

- During times of crises or when you don’t trust banks to pay out what they can afford to in dividends, using the dividend discount model may not give you a “reliable” value.
2c. Wells Fargo: Valuation on October 7, 2008

Rationale for model

Why dividends? Because FCFE cannot be estimated
Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

Return on equity: 17.56%

Dividends (Trailing 12 months)

<table>
<thead>
<tr>
<th>EPS</th>
<th>DPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2.16</td>
<td>$1.18</td>
</tr>
</tbody>
</table>

Payout Ratio 54.63%

DPS = $1.18

Expected Growth

45.37% * 13.5% = 6.13%

EPS $ 2.29 $2.43 $2.58 $2.74 $2.91

DPS $1.25 $1.33 $1.41 $1.50 $1.59

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

Cost of Equity

3.60% + 1.20 (5%) = 9.60%

Risk Free Rate:

Long term treasury bond rate 3.60%

Beta

1.20

Risk Premium

5%

Updated in October 2008

Average beta for US Banks over last year: 1.20

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

Assuming that Wells will have to increase its capital base by about 30% to reflect tighter regulatory concerns. (.1756/1.3 = .135

Aswath Damodaran
Lesson 2: For financial service companies, book value matters...

- The book value of assets and equity is mostly irrelevant when valuing non-financial service companies. After all, the book value of equity is a historical figure and can be nonsensical. (The book value of equity can be negative and is so for more than a 1000 publicly traded US companies)

- With financial service firms, book value of equity is relevant for two reasons:
  - Since financial service firms mark to market, the book value is more likely to reflect what the firms own right now (rather than a historical value)
  - The regulatory capital ratios are based on book equity. Thus, a bank with negative or even low book equity will be shut down by the regulators.

- From a valuation perspective, it therefore makes sense to pay heed to book value. In fact, you can argue that reinvestment for a bank is the amount that it needs to add to book equity to sustain its growth ambitions and safety requirements:
  - FCFE = Net Income – Reinvestment in regulatory capital (book equity)
To estimate the FCFE for a bank, we redefine reinvestment as investment in regulatory capital. Since any dividends paid deplete equity capital and retained earnings increase that capital, the FCFE is:

$$\text{FCFE}_{\text{Bank}} = \text{Net Income} - \text{Increase in Regulatory Capital (Book Equity)}$$

**Deutsche Bank: FCFE**

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Steady state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Base</td>
<td>€312,882</td>
<td>€325,398</td>
<td>€338,414</td>
<td>€351,950</td>
<td>€366,028</td>
<td>€380,669</td>
<td>€392,089</td>
</tr>
<tr>
<td>Capital ratio</td>
<td>10.20%</td>
<td>10.16%</td>
<td>10.12%</td>
<td>10.08%</td>
<td>10.04%</td>
<td>10.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>Regulatory Capital</td>
<td>€31,914</td>
<td>€33,060</td>
<td>€34,247</td>
<td>€35,477</td>
<td>€36,749</td>
<td>€38,067</td>
<td>€39,244</td>
</tr>
<tr>
<td>Change in regulatory capital</td>
<td>€1,146</td>
<td>€1,187</td>
<td>€1,229</td>
<td>€1,273</td>
<td>€1,318</td>
<td>€1,177</td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>9.40%</td>
<td>9.56%</td>
<td>9.72%</td>
<td>9.88%</td>
<td>10.04%</td>
<td>10.20%</td>
<td>10.20%</td>
</tr>
<tr>
<td>Net Income</td>
<td>€3,000</td>
<td>€3,161</td>
<td>€3,329</td>
<td>€3,505</td>
<td>€3,690</td>
<td>€3,883</td>
<td>€4,003</td>
</tr>
<tr>
<td>- Investment in Regulatory Capital</td>
<td>€1,146</td>
<td>€1,187</td>
<td>€1,229</td>
<td>€1,273</td>
<td>€1,318</td>
<td>€1,177</td>
<td></td>
</tr>
<tr>
<td>FCFE</td>
<td>€2,014</td>
<td>€2,142</td>
<td>€2,276</td>
<td>€2,417</td>
<td>€2,565</td>
<td>€2,826</td>
<td></td>
</tr>
</tbody>
</table>
2d. Deutsche Bank: March 2009

Last 2 years
- 2007: Net Income 3,954 m, Dividends 2,146 m, Risk adjusted assets 312,882 m, Book Equity 31,914 m
- 2008: Net Income -3,855 m, Dividends 285 m

Normalized Net Income for base year 3,000 m, Normalized ROE = 9.4%

Expected growth in asset base 4%
Target capital ratio 10%
Target ROE 10.2%

Cashflows

Terminal Value = \( \frac{2,823}{(1.102 - 0.03)} = 39,209 \) m

PV of CF = 31,383 m

Value/Share = 53.94 €

Discount at Cost of equity = 3.60% + 1.162 * 6% + (-0.60%) = 11.172%

In March 2009
- Deutsche Bank price = 48 Euros/share (down from 89 Euros in early 2008)

Riskfree Rate: Euro Riskfree Rate = 3.6%

Beta = 1.162
Mature market premium = 6%

Beta for commercial & investment banking

Stable Growth
- g = 3%; Beta = 1.00
- Cost of equity = 10.20%
- Return on equity = 10.20%
- Reinvestment Rate = g/ROE = 3/10.20% = 29.41%

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

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?

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.

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.

Aswath Damodaran
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>823.00</td>
<td>0.10</td>
<td>82.30</td>
</tr>
<tr>
<td>-10</td>
<td>663.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$13283.60</td>
</tr>
</tbody>
</table>

Current year’s R&D expense = Cap ex = $3,030 million
R&D amortization = Depreciation = $1,694 million
Unamortized R&D = Capital invested (R&D) = $13,284 million

Step 3: Restate earnings, book value and return numbers

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjusted for R&amp;D</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income</td>
<td>$4,196</td>
<td>4,196 + 3030 – 1694 = $ 5,532</td>
<td>Add current year’s R&amp;D and subtract R&amp;D amortization</td>
</tr>
<tr>
<td>Book value of equity</td>
<td>$17,869</td>
<td>17,869 + 13,284 = $ 31,153</td>
<td>Add unamortized R&amp;D from prior years</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>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

\[ \text{EBIT}(1-t) = 7336(1-0.28) = 6058 \]
\[ \text{Nt CpX} = 6443 \]
\[ \text{Chg WC} = 37 \]
\[ = \text{FCFF} = 423 \]
\[ \text{Reinvestment Rate} = 6480/6058 = 106.98\% \]
\[ \text{Return on capital} = 16.71\% \]

Expected Growth in EBIT (1-t)

\[ .60 \times 16 = .096 \]
\[ 9.6\% \]

Return on Capital 16%

Stable Growth
\[ g = 4\%; \text{ Beta} = 1.10; \]
\[ \text{Debt Ratio} = 20\%; \text{ Tax rate} = 35\% \]
\[ \text{Cost of capital} = 8.08\% \]
\[ \text{ROC} = 10.00\%; \]
\[ \text{Reinvestment Rate} = 4/10 = 40\% \]

Terminal Value
\[ V_{10} = \frac{7300}{0.0808 - 0.04} = 179,099 \]

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%

Op. Assets 94214
+ Cash: 1283
- Debt 8272
=Equity 87226
-Options 479
Value/Share $ 74.33

Aswath Damodaran
Lesson 2: And fixing those inconsistencies can alter your view of a company and affect its value

<table>
<thead>
<tr>
<th></th>
<th>No R&amp;D adjustment</th>
<th>R&amp;D adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EBIT</strong></td>
<td>$5,071</td>
<td>$7,336</td>
</tr>
<tr>
<td><strong>Invested Capital</strong></td>
<td>$25,277</td>
<td>$33,173</td>
</tr>
<tr>
<td><strong>ROIC</strong></td>
<td>14.58%</td>
<td>18.26%</td>
</tr>
<tr>
<td><strong>Reinvestment Rate</strong></td>
<td>115.68%</td>
<td>106.98%</td>
</tr>
<tr>
<td><strong>Value of firm</strong></td>
<td>$58,617</td>
<td>$95,497</td>
</tr>
<tr>
<td><strong>Value of equity</strong></td>
<td>$50,346</td>
<td>$87,226</td>
</tr>
<tr>
<td><strong>Value/share</strong></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 cashflows 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)
Revenue calculated from prevailing oil price of $40/barrel in March 2016
Revenue = 39992.77+4039.40*$40
= $201,569

**Shell: A "Oil Price" Neutral Valuation: March 2016**

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

<table>
<thead>
<tr>
<th>Revenues</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>$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>
<td></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>
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<tr>
<td>Value per share</td>
<td>$39.31</td>
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</tbody>
</table>

Added long term investments in joint ventures and subtracted out minority interest in consolidated holdings.
Shell’s Revenues & Oil Prices

Shell: Revenues vs Oil Price

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: | Forecast values
--- | ---
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