VALUATION: DREAMS AND DELUSIONS
Intrinsic Value: Three Basic Propositions

The value of an asset is the present value of the expected cash flows on that asset, over its expected life:

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

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.

Aswath Damodaran
Price versus Value

**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

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

**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

Value of cashflows, adjusted for time and risk

INTRINSIC VALUE

THE GAP
Is there one? Will it close?

PRICE

Aswath Damodaran
The traditional accounting 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>Short-lived Assets</td>
<td>Short-term liabilities of the firm</td>
</tr>
<tr>
<td>Investments in securities &amp; assets of other firms</td>
<td>Debt obligations of firm</td>
</tr>
<tr>
<td>Assets which are not physical, like patents &amp; trademarks</td>
<td>Other Liabilities</td>
</tr>
<tr>
<td></td>
<td>Equity</td>
</tr>
<tr>
<td></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

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

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

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 Generate cashflows today</td>
<td>Debt</td>
</tr>
<tr>
<td>Investments already made</td>
<td>Borrowed money</td>
</tr>
<tr>
<td>Expected Value that will be created by future investments</td>
<td>Investments yet to be made</td>
</tr>
<tr>
<td>Investments yet to be made</td>
<td>Equity</td>
</tr>
<tr>
<td></td>
<td>Owner’s funds</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.
## Accounting Balance Sheet

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>$550</td>
</tr>
<tr>
<td>PP&amp;E</td>
<td>$ 62</td>
</tr>
<tr>
<td>Intangible assets</td>
<td>$ 6</td>
</tr>
<tr>
<td>Goodwill</td>
<td>$ 47</td>
</tr>
<tr>
<td>Debt (leases)</td>
<td>$ 21</td>
</tr>
<tr>
<td>Preferred stock</td>
<td>$835</td>
</tr>
<tr>
<td>Equity</td>
<td>$202</td>
</tr>
</tbody>
</table>

## Intrinsic Value Balance Sheet (post-IPO)

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>$1,616</td>
</tr>
<tr>
<td>Assets in place</td>
<td>$ 73</td>
</tr>
<tr>
<td>Growth assets</td>
<td>$ 9,631</td>
</tr>
<tr>
<td>Debt</td>
<td>$ 214</td>
</tr>
<tr>
<td>Equity</td>
<td>$11,106</td>
</tr>
</tbody>
</table>

## Market Price Balance Sheet (post-IPO)

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>$1,816</td>
</tr>
<tr>
<td>Assets in place</td>
<td>$ 73</td>
</tr>
<tr>
<td>Growth assets</td>
<td>$ 26,444</td>
</tr>
<tr>
<td>Debt</td>
<td>$ 214</td>
</tr>
<tr>
<td>Equity</td>
<td>$28,119</td>
</tr>
</tbody>
</table>
What’s your game?

- **Transaction base**
  - 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)!

- **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!

- **Investment base**
  - 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
Intrinsic Value: Fundamental Determinants

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

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

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

When will the firm become a mature firm, and what are the potential roadblocks?
Current Cashflow to Firm

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

Reinvestment Rate 30%
Expected Growth in EBIT (1-t) .30*.25=.075 7.5%

Return on Capital 25%
Stable Growth
g = 3%; Beta = 1.10;
Debt Ratio= 20%; Tax rate=35%
Cost of capital = 6.76%
ROC= 6.76%;
Reinvestment Rate=3/6.76=44%
Terminal Value_5= 2645/(.0676-.03) = 70,409

Cost of Equity 8.32%
Cost of Debt (3.72%+.75%)(1-.35) = 2.91%

Weights
E = 92% D = 8%

Riskfree Rate: Riskfree rate = 3.72%

Beta 1.15

Risk Premium 4%

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

Current Cashflow to Firm

| EBIT(1-t) | Rs 20,116 |
| Nt CpX | Rs 31,590 |
| Chg WC | Rs 2,732 |
| FCFF | - Rs 14,205 |

Reinv Rate = (31590+2732)/20116 = 170.61%; Tax rate = 21.00%
Return on capital = 17.16%

Expected Growth from new inv.

\[ .70 \times 1.1716 = 0.1201 \]

Return on Capital

\[ \text{Reinvestment Rate} = \frac{31590 + 2732}{20116} = 170.61\%; \text{Tax rate} = 21.00\% \]

\[ \text{Return on capital} = 17.16\% \]

Expected Growth from new inv.

\[ .70 \times .1716 = 0.1201 \]

Stable Growth

\[ g = 5\%; \text{Beta} = 1.00 \]

Country Premium = 3%
Cost of capital = 10.39%
Tax rate = 33.99%
ROC = 10.39%
Reinvestment Rate = \( g / \text{ROC} = 5 / 10.39 = 48.11\% \)

Terminal Value

\[ 5 = \frac{23493}{(.1039 - .05)} = \text{Rs 435,686} \]

Op. Assets Rs 210,813
+ Cash: 11418
+ Other NO 140576
- Debt 109198
= Equity 253,628
Value/Share Rs 614

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

Cost of Equity

\[ 14.00\% \]

Cost of Debt

\[ 5\% + 4.25\% + 3\% (1 - .3399) = 8.09\% \]

Weights

\[ E = 74.7\% \text{ D} = 25.3\% \]

Riskfree Rate

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

Beta

\[ 1.20 \]

Mature market premium

\[ 4.5\% \]

Lambda

\[ 0.80 \]

Country Equity Risk Premium

\[ 4.50\% \]

Country Default Spread

3%

Hei Equity Mkt Vol

1.50

On April 1, 2010
Tata Motors price = Rs 781

Average reinvestment rate from 2005-09: 179.59%; without acquisitions: 70%

Return on Capital 17.16%

Growth declines to 5% and cost of capital moves to stable period level.
9a. Amazon in January 2000

Cost of Equity: 12.90%

Cost of Debt: 6.5% + 1.5% = 8.0%

Tax rate: 0% -> 35%

Revenues:
- Current Revenue: $1,117
- Value of Op Assets: $15,170 + Cash: $26 = Value of Firm: $14,936
- Value of Debt: $349
- Equity Options: $2,892
- Value of Equity: $14,847

Revenue Turnover Ratio: 3.00

Revenues Growth: 42%

Operating Margin: -13.35%

Expected Margin: -> 10.00%

EBIT -410m

EBIT(1-t) -373

FCFF -931

Cost of Equity:
- 12.90%
- 12.90%
- 12.90%
- 12.90%
- 12.90%
- 12.42%
- 11.94%
- 11.46%
- 10.98%
- 10.50%

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

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

Cost of Capital:
- 12.84%
- 12.84%
- 12.84%
- 12.83%
- 12.81%
- 12.13%
- 11.62%
- 11.08%
- 10.49%
- 9.61%

To get BBB rating:
- Used average interest coverage ratio over next 5 years.

Revenue Growth:
- 150.00%
- 100.00%
- 75.00%
- 50.00%
- 30.00%
- 25.00%
- 20.40%
- 15.60%
- 10.80%
- 6.00%

EBIT:
- $373
- $94
- $407
- $1,038
- $1,628
- $2,212
- $3,485
- $4,307
- $6,586
- $8,212

EBIT(1-t):
- $373
- $94
- $407
- $1,038
- $1,628
- $2,212
- $3,485
- $4,307
- $6,586
- $8,212

Reinvestment:
- $600
- $967
- $1,420
- $1,663
- $1,543
- $1,688
- $1,721
- $1,639
- $1,363
- $961

Value of Options:
- $2,892

Value per share:
- $35.08

Amazon was trading at $84 in January 2000.

Pushed debt ratio to retail industry average of 15%.
### Twitter Pre-IPO Valuation: October 27, 2013

**Terminal Value**

\[
\text{Terminal Value}_{10} = \frac{1466}{.08-.025} = $26,657
\]

**Cost of capital**

\[
\text{Cost of capital} = 11.12\% (.981) + 5.16\% (.019) = 11.01\%
\]

**Stable Growth**

\[
g = 2.5\%; \quad \beta = 1.00; \quad \text{Cost of capital} = 8\%
\]

\[
\text{ROE} = 12\%;
\]

\[
\text{Reinvestment Rate} = 2.5\%/12\% = 20.83\%
\]

**Weights**

\[
\text{E} = 98.1\% \quad \text{D} = 1.9\%
\]

**Risk Premium**

\[
\text{Risk Premium} = 6.15\%
\]

**Riskfree Rate**

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

**Beta**

\[
\beta = 1.40
\]

**D/E**

\[
\frac{\text{D}}{\text{E}} = 1.71
\]

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

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

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

**Cost of Debt**

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

**Terminal year (11)**

**EBIT (1-t) $1,852**

- Reinvestment $386

**FCFF $1,466**

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

**Starting numbers**

<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>$343.46</td>
</tr>
<tr>
<td>Operating income</td>
<td>-$77.06</td>
<td>-$134.91</td>
</tr>
<tr>
<td>Adjusted Operating Income</td>
<td>$7.67</td>
<td>$7.67</td>
</tr>
<tr>
<td>Invested Capital</td>
<td>$955.00</td>
<td>$955.00</td>
</tr>
<tr>
<td>Adjusted Operating Margin</td>
<td>1.44%</td>
<td>1.44%</td>
</tr>
<tr>
<td>Sales/ Invested Capital</td>
<td>0.56</td>
<td>0.56</td>
</tr>
<tr>
<td>Interest expenses</td>
<td>$2.49</td>
<td>$5.30</td>
</tr>
</tbody>
</table>

| Operating assets | $9,705 |
| + Cash           | 321    |
| + IPO Proceeds   | 1,295  |
| - Debt           | 214    |
| Value of equity  | 11,106 |
| - Options        | 713    |
| Value in stock   | 10,394 |
| l # of shares    | 582.46 |
| Value/share      | $17.84 |

**Revenues**

<table>
<thead>
<tr>
<th></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>$</td>
<td>$810</td>
<td>$1,227</td>
<td>$1,858</td>
<td>$2,816</td>
<td>$4,266</td>
<td>$6,044</td>
<td>$7,973</td>
<td>$9,734</td>
<td>$10,932</td>
<td>$11,205</td>
</tr>
</tbody>
</table>

**Operating Income**

<table>
<thead>
<tr>
<th></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>$</td>
<td>31</td>
<td>75</td>
<td>158</td>
<td>306</td>
<td>564</td>
<td>941</td>
<td>1,430</td>
<td>1,975</td>
<td>$2,475</td>
<td>$2,801</td>
</tr>
</tbody>
</table>

**Operating Income after tax**

<table>
<thead>
<tr>
<th></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>$</td>
<td>183</td>
<td>278</td>
<td>421</td>
<td>638</td>
<td>967</td>
<td>1,186</td>
<td>1,285</td>
<td>1,175</td>
<td>$798</td>
<td>$182</td>
</tr>
</tbody>
</table>

**FCFF**

|       | -(153) | -(203) | -(263) | -(344) | -(572) | -(537) | -(316) | $143   | $826  | $1,625 |

**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**

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

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Operating Income</th>
<th>Operating Income after tax</th>
<th>FCFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>$810</td>
<td>$31</td>
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<td>$2,801</td>
<td>$182</td>
<td>$1,625</td>
</tr>
</tbody>
</table>

**Reinvestment Rate**

\[
\frac{\text{D}}{\text{E}} = \frac{1.71}{1.71} = 1.71
\]

**90% advertising (1.44) + 10% info svcs (1.05)**
Golden Rule 1: Motive matters and Bias rules

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

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

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

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

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

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

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

**Free Cashflow to Firm**

\[
\text{EBIT} \times (1 - \text{tax rate}) - (\text{Cap Ex} - \text{Depreciation}) - \text{Change in non-cash WC} = \text{Free Cashflow to firm}
\]

**Expected Growth in FCFF during high growth**

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

**Value of Operating Assets today**

\[
\text{Value of Operating Assets today} = \text{Value of equity} + \text{Cash & non-operating assets} - \text{Debt}
\]

**Length of high growth period: PV of FCFF during high**

**Cost of Capital**

Weighted average of cost of equity & cost of debt

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

**Stable Growth**

When operating income and FCFF grow at constant rate forever.

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

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

**If you want to increase (decrease) value, you can**

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

**Premiums: Control, Synergy, liquidity**

**Discounts: Illiquidity, private company**
Relative Valuation Bias

Step 1: Pick a multiple

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

- **Numerator**
  - Market value of equity
  - Market value for the firm: \( \text{Firm value} = \text{Market value of equity} + \text{Market value of debt} \)
  - Market value of operating assets of firm: \( \text{Enterprise value (EV)} = \text{Market value of equity} + \text{Market value of debt} - \text{Cash} \)

- **Denominator**
  - Book Value
    - a. Equity: \( \text{BV of equity} \)
    - b. Firm: \( \text{BV of debt} + \text{BV of equity} \)
    - c. Invested Capital: \( \text{BV of equity} + \text{BV of debt} - \text{Cash} \)

- **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: \( \text{BV of equity} \)
  - b. Firm: \( \text{BV of debt} + \text{BV of equity} \)
  - c. Invested Capital: \( \text{BV of equity} + \text{BV of debt} - \text{Cash} \)

Step 2: Choose comparables

- Narrow versus Broad sector/business
- Similar market cap or all companies
- Country, Region or Global
- Other criteria, subjective & objective

Step 3: Tell a story

- **Risk**
  - Lower risk for higher value
  - Higher risk for lower value
- **Growth**
  - Higher growth for higher value
  - Lower growth for lower value
- **Quality of growth**
  - Higher barriers to entry/moats for higher value
  - Lower barriers to entry for lower value

**CHOOSE A MULTIPLE**

**PICK COMPARABLE FIRMS**

**SPIN/TELL YOUR STORY**
Golden Rule 2: Uncertainty is a feature, not a bug, and comes in different forms

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

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

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

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

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

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

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

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

Use “auto pilot” approaches to estimate future years

Principle of parsimony: Estimate fewer inputs when faced with uncertainty.
A tougher task at Twitter

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

Aswath Damodaran
2. Build in “internal” checks for reasonableness...

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>Δ Revenue</th>
<th>Sales/Cap</th>
<th>Δ Investment</th>
<th>Invested Capital</th>
<th>EBIT (1-t)</th>
<th>Imputed ROC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tr 12 mths</td>
<td>$1,117</td>
<td></td>
<td></td>
<td></td>
<td>$487</td>
<td>-$410</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>$2,793</td>
<td>$1,676</td>
<td>3.00</td>
<td>$559</td>
<td>$1,045</td>
<td>-$373</td>
<td>-76.62%</td>
</tr>
<tr>
<td>2</td>
<td>$5,585</td>
<td>$2,793</td>
<td>3.00</td>
<td>$931</td>
<td>$1,976</td>
<td>-$94</td>
<td>-8.96%</td>
</tr>
<tr>
<td>3</td>
<td>$9,774</td>
<td>$4,189</td>
<td>3.00</td>
<td>$1,396</td>
<td>$3,372</td>
<td>$407</td>
<td>20.59%</td>
</tr>
<tr>
<td>4</td>
<td>$14,661</td>
<td>$4,887</td>
<td>3.00</td>
<td>$1,629</td>
<td>$5,001</td>
<td>$871</td>
<td>25.82%</td>
</tr>
<tr>
<td>5</td>
<td>$19,059</td>
<td>$4,398</td>
<td>3.00</td>
<td>$1,466</td>
<td>$6,467</td>
<td>$1,058</td>
<td>21.16%</td>
</tr>
<tr>
<td>6</td>
<td>$23,862</td>
<td>$4,803</td>
<td>3.00</td>
<td>$1,601</td>
<td>$8,068</td>
<td>$1,438</td>
<td>22.23%</td>
</tr>
<tr>
<td>7</td>
<td>$28,729</td>
<td>$4,868</td>
<td>3.00</td>
<td>$1,623</td>
<td>$9,691</td>
<td>$1,799</td>
<td>22.30%</td>
</tr>
<tr>
<td>8</td>
<td>$33,211</td>
<td>$4,482</td>
<td>3.00</td>
<td>$1,494</td>
<td>$11,185</td>
<td>$2,119</td>
<td>21.87%</td>
</tr>
<tr>
<td>9</td>
<td>$36,798</td>
<td>$3,587</td>
<td>3.00</td>
<td>$1,196</td>
<td>$12,380</td>
<td>$2,370</td>
<td>21.19%</td>
</tr>
<tr>
<td>10</td>
<td>$39,006</td>
<td>$2,208</td>
<td>3.00</td>
<td>$736</td>
<td>$13,116</td>
<td>$2,524</td>
<td>20.39%</td>
</tr>
<tr>
<td>TY</td>
<td>$41,346</td>
<td>$2,340</td>
<td>NA</td>
<td>Assumed to be</td>
<td></td>
<td></td>
<td>20.00%</td>
</tr>
</tbody>
</table>

Check total revenues, relative to the market that it serves…
Your market share obviously cannot exceed 100% but there may be tighter constraints.

Are the margins and imputed returns on capital ‘reasonable’ in the outer years?
3. Use consistency tests...

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

<table>
<thead>
<tr>
<th>Stable growth rate</th>
<th>3M</th>
<th>Tata Motors</th>
<th>Amazon</th>
<th>Twitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$70,409</td>
<td>₹435,686</td>
<td>$26,390</td>
<td>$23,111</td>
</tr>
<tr>
<td>1%</td>
<td>$70,409</td>
<td>₹435,686</td>
<td>$28,263</td>
<td>$24,212</td>
</tr>
<tr>
<td>2%</td>
<td>$70,409</td>
<td>₹435,686</td>
<td>$30,595</td>
<td>$25,679</td>
</tr>
<tr>
<td>3%</td>
<td>$70,409</td>
<td>₹435,686</td>
<td>$33,594</td>
<td></td>
</tr>
<tr>
<td>4%</td>
<td></td>
<td>₹435,686</td>
<td>$37,618</td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td></td>
<td>₹435,686</td>
<td>$43,334</td>
<td>$52,148</td>
</tr>
<tr>
<td>Riskfree rate</td>
<td>3.72%</td>
<td>5%</td>
<td>6.60%</td>
<td>2.70%</td>
</tr>
<tr>
<td>ROIC</td>
<td>6.76%</td>
<td>10.39%</td>
<td>20%</td>
<td>12.00%</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>6.76%</td>
<td>10.39%</td>
<td>9.61%</td>
<td>8.00%</td>
</tr>
</tbody>
</table>
5. Use the market as a crutch... ERP as an illustration

<table>
<thead>
<tr>
<th></th>
<th>Arithmetic Average</th>
<th>Geometric Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stocks - T. Bills</td>
<td>Stocks - T. Bonds</td>
</tr>
<tr>
<td>1928-2012</td>
<td>7.65%</td>
<td>5.88%</td>
</tr>
<tr>
<td></td>
<td>2.20%</td>
<td>2.33%</td>
</tr>
<tr>
<td>1962-2012</td>
<td>5.93%</td>
<td>3.91%</td>
</tr>
<tr>
<td></td>
<td>2.38%</td>
<td>2.66%</td>
</tr>
<tr>
<td>2002-2012</td>
<td>7.06%</td>
<td>3.08%</td>
</tr>
<tr>
<td></td>
<td>5.82%</td>
<td>8.11%</td>
</tr>
</tbody>
</table>

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

Analysts expect earnings to grow 7.67% in 2013, 7.28% in 2014, scaling down to 1.76% in 2017, resulting in a compounded annual growth rate of 5.27% over the next 5 years. We will assume that dividends & buybacks will grow 5.27% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.76%, the same rate as the entire economy (= riskfree rate).

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

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: S&P, Media reports, Factset, Thomson-Reuters

Aswath Damodaran
<table>
<thead>
<tr>
<th>Country</th>
<th>Risk Premium 1</th>
<th>Risk Premium 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra</td>
<td>1.95%</td>
<td>7.70%</td>
</tr>
<tr>
<td>Austria</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Belgium</td>
<td>1.20%</td>
<td>6.95%</td>
</tr>
<tr>
<td>Cyprus</td>
<td>16.50%</td>
<td>22.25%</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Finland</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>France</td>
<td>0.45%</td>
<td>6.20%</td>
</tr>
<tr>
<td>Germany</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Greece</td>
<td>10.13%</td>
<td>15.88%</td>
</tr>
<tr>
<td>Iceland</td>
<td>3.38%</td>
<td>9.13%</td>
</tr>
<tr>
<td>Ireland</td>
<td>4.13%</td>
<td>9.88%</td>
</tr>
<tr>
<td>Isle of Man</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Italy</td>
<td>3.00%</td>
<td>8.75%</td>
</tr>
<tr>
<td>Liechtenstein</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Malta</td>
<td>1.95%</td>
<td>7.70%</td>
</tr>
<tr>
<td>Norway</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Portugal</td>
<td>5.40%</td>
<td>11.15%</td>
</tr>
<tr>
<td>Spain</td>
<td>3.38%</td>
<td>9.13%</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.00%</td>
<td>5.75%</td>
</tr>
<tr>
<td>Turkey</td>
<td>3.38%</td>
<td>9.13%</td>
</tr>
<tr>
<td>UK</td>
<td>0.45%</td>
<td>6.20%</td>
</tr>
<tr>
<td>W. Europe</td>
<td>1.22%</td>
<td>6.97%</td>
</tr>
<tr>
<td>Angola</td>
<td>5.40%</td>
<td>11.15%</td>
</tr>
<tr>
<td>Benin</td>
<td>8.25%</td>
<td>14.00%</td>
</tr>
<tr>
<td>Botswana</td>
<td>1.65%</td>
<td>7.40%</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>8.25%</td>
<td>14.00%</td>
</tr>
<tr>
<td>Cameroon</td>
<td>8.25%</td>
<td>14.00%</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>6.75%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Egypt</td>
<td>12.00%</td>
<td>17.75%</td>
</tr>
<tr>
<td>Gabon</td>
<td>5.40%</td>
<td>11.15%</td>
</tr>
<tr>
<td>Ghana</td>
<td>6.75%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Kenya</td>
<td>6.75%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Morocco</td>
<td>4.13%</td>
<td>9.88%</td>
</tr>
<tr>
<td>Mozambique</td>
<td>6.75%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Namibia</td>
<td>3.38%</td>
<td>9.13%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>5.40%</td>
<td>11.15%</td>
</tr>
<tr>
<td>Rwanda</td>
<td>8.25%</td>
<td>14.00%</td>
</tr>
<tr>
<td>Senegal</td>
<td>6.75%</td>
<td>12.50%</td>
</tr>
<tr>
<td>South Africa</td>
<td>2.55%</td>
<td>8.30%</td>
</tr>
<tr>
<td>Tunisia</td>
<td>4.73%</td>
<td>10.48%</td>
</tr>
<tr>
<td>Zambia</td>
<td>6.75%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Africa</td>
<td>5.90%</td>
<td>11.65%</td>
</tr>
</tbody>
</table>

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average
6. Draw on the law of large numbers...

- To estimate the beta for Tata Motors
  - Unlevered beta for automobile company = 0.98
  - D/E ratio for Tata Motors = 33.87%
  - Marginal tax rate in India = 33.99%
  - Levered beta = 0.98 \times (1 + (1 - 0.3399)(0.3387)) = 1.20

Aswath Damodaran
7. Don’t let the discount rate become the receptacle for all your uncertainty…
Contrasting ways of dealing with survival risk...

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

- **The decision tree approach:**
  - Value the business as a “going concern”, with a rate of return appropriate for a “going concern”.
  - Estimate the probability of survival (and failure) and the value of the business in the event of failure.
  - Value = Going concern value (Probability of survival) + Liquidation value (Probability of failure)
8. Confront uncertainty, if you can... for 
Twitter

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

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

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

**Cost of Capital**
- Distribution: Triangular
- Expected value: 11.22%
- Minimum value: 10.02%
- Maximum value: 12.22%

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Forecast values</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>($1,279.18)</td>
</tr>
<tr>
<td>10%</td>
<td>$5,121.73</td>
</tr>
<tr>
<td>20%</td>
<td>$6,264.92</td>
</tr>
<tr>
<td>30%</td>
<td>$7,267.34</td>
</tr>
<tr>
<td>40%</td>
<td>$8,336.73</td>
</tr>
<tr>
<td>50%</td>
<td>$9,554.16</td>
</tr>
<tr>
<td>60%</td>
<td>$10,971.39</td>
</tr>
<tr>
<td>70%</td>
<td>$12,643.68</td>
</tr>
<tr>
<td>80%</td>
<td>$14,771.24</td>
</tr>
<tr>
<td>90%</td>
<td>$17,757.35</td>
</tr>
<tr>
<td>100%</td>
<td>$38,846.54</td>
</tr>
</tbody>
</table>
9. Don’t look for precision..

- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.

- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.

Aswath Damodaran
Amazon: Value versus Price over time

Aswath Damodaran
10. Keep your perspective

- “It’s only a valuation.” Nothing in valuation is worth losing sleep or developing ulcers over.
- “It’s better to be lucky than good”. Luck is the dominant paradigm in financial markets, separating the winners from the losers. Skill and hard work are distant seconds.