Information, Value and Price

Aswath Damodaran
http://www.damodaran.com
Who let the air out?

Amazon: Price Chart
The world… it is a’ changing….

- In the year since the valuation, Amazon has seen its market price plummet from $76-84 ($28.6 billion) to $10-12 ($4 billion).
- No valuation is timeless. New information arrives constantly about the state of the economy and periodically about the sector and the firm. Each piece of information has an impact on value.
The economy has slowed dramatically leading to
  • Lower interest rates (T.Bond rate has dropped from 6.5% to 5.1%)
  • Lower expected real growth in the economy which has a ripple effect on expected growth rates (at least for the immediate future) for the more cyclical sectors and the firms in those sectors

Investors have become more negative about equities and there seems to be a reawakening to the risks on investing in equity

There has been a string of news from Amazon itself about its financial prospects that have
  • Made investors aware of the potential for default risk in the firm
  • The difficulties of making money in the e-tailing environment
Lower Interest Rates generally increase value

- Holding all else constant, increasing the riskless rate will lower value while lowering the riskless rate will increase value.
- Lower interest rates translate into lower discount rates. If we hold cash flows constant, the lower discount rate will translate into higher value.
As borne out by the Empirical Evidence: Interest Rates and Earnings/Price Ratios
But lower interest rates exaggerate the impact of earnings surprises...

![Graph showing PE Ratios and Expected Growth: Interest Rate Scenarios](image)
The equity risk premium is the best single indicator of investor mood and perceptions about the risk of equity. When investors are optimistic and downplay the risk associated with investing in equity, they will demand smaller equity risk premiums. As they become more pessimistic and aware of equity risk, equity risk premiums will increase.

Holding all else constant, higher equity risk premiums will reduce the value of all equities, but the effect will be much greater for higher growth firms.
If we use a basic discounted cash flow model, we can estimate the implied risk premium from the current level of stock prices.

For instance, if stock prices are determined by a variation of the simple Gordon Growth Model:

- Value = Expected Dividends next year/ (Required Returns on Stocks - Expected Growth Rate)
- Dividends can be extended to include expected stock buybacks and a high growth period.
- Plugging in the current level of the index, the dividends on the index and expected growth rate will yield a “implied” expected return on stocks. Subtracting out the riskfree rate will yield the implied premium.

This model can be extended to allow for two stages of growth - an initial period where the entire market will have earnings growth greater than that of the economy, and then a stable growth period.

- Level of the index = 1469
- Treasury bond rate = 6.50%
- Expected Growth rate in earnings (next 5 years) = 10% (Consensus estimate for S&P 500)
- Expected growth rate after year 5 = set equal to T.Bond rate
- Expected dividends + stock buybacks = 1.68% of index

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Dividends + Buybacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$27.23 + Stock Buybacks</td>
</tr>
<tr>
<td>Year 2</td>
<td>$29.95 + Stock Buybacks</td>
</tr>
<tr>
<td>Year 3</td>
<td>$32.94 + Stock Buybacks</td>
</tr>
<tr>
<td>Year 4</td>
<td>$36.24 + Stock Buybacks</td>
</tr>
<tr>
<td>Year 5</td>
<td>$39.86 + Stock Buybacks</td>
</tr>
</tbody>
</table>

1469 = 27.23/(1+r) + 29.95/(1+r)^2 + 32.94/(1+r)^3 + 36.24/(1+r)^4 + (39.86 + 42.45/(r-.065))/(1+r)^5

Solving for r, r = 8.60%. (Only way to do this is trial and error)

Implied risk premium = 8.60% - 6.50% = 2.10%
Estimating Implied Premium for U.S. Market:
Jan 1, 2001

- Level of the index = 1320
- Treasury bond rate = 5.10%
- Expected Growth rate in earnings (next 5 years) = 7.50% (Consensus estimate for S&P 500)
- Expected growth rate after year 5 = 5.50%
- Expected dividends + stock buybacks = 2.14% of index

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Dividends (Year 1)</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$30.38</td>
<td>$32.66</td>
<td>$35.11</td>
<td>$37.75</td>
<td>$40.58</td>
</tr>
</tbody>
</table>
+ Stock Buybacks

Expected dividends + buybacks in year 6 = 40.58 (1.055) = $ 43.22

1320 = 30.38/(1+r) + 32.66/(1+r)^2 + 35.11/(1+r)^3 + 37.75/(1+r)^4 + (40.55+(43.22/(r-.055)))/(1+r)^5

Solving for r, r = 7.97%. (Only way to do this is trial and error)

Implied risk premium = 7.97% - 5.10% = 2.87%
Implied Premium for US Equity Market

Year

Implied Premium
As Amazon’s stock price has dropped, its equity has become more risky....

- In January 2000, Amazon had a market value of equity of $28.6 billion and a market value of debt of $349 million, yielding a debt to equity ratio of 1.2%. In conjunction with an unlevered beta for e-tailers of 1.60, this yields a levered beta that is close to 1.60.

- In January 2001, Amazon’s market value of equity was $5.013 billion and the market value of debt was $1.768 billion. With the same unlevered beta of 1.60 and a tax rate of 0%, we arrive at a levered beta of 2.18.

  Levered beta = 1.60 (1 + (1-0)(1768/5013)) = 2.18
Amazon’s earnings reports

- Over the year, Amazon released a series of reports. In summary, it reported that
  - Revenues for the year would be about $2.465 billion, which was a little below the expected revenue (from last year’s valuation) of $2.7 billion
  - The operating loss for the year -$864 million, which was significantly higher than the expected loss for the year which was -$373 million

- This information would suggest to us that we should
  - Temper expected revenue growth for the future
  - Reduce the target margin from 10% to 9.32% to reflect expected competition
  - Slow down how quickly Amazon moves towards its target margin
The larger than expected operating loss in conjunction with an increase in debt outstanding has significantly increased the default risk at Amazon.

- In the January 2000 valuation, the rating that we assigned to the firm based upon expected operating income is BBB.
- In the January 2001 valuation, the rating that we assign to the firm is B- and the default spread increases to 4.75%.
Collateral Effects

- The value of the cross holdings of the firm (which are mostly in other dot.com firms such as Pets.co) has dropped dramatically. This lowers the value of Amazon.com.
- In the presence of significant cross holdings, stock price declines may themselves cause more stock price declines.
But there is a positive side…

- The management options that Amazon has outstanding have dropped dramatically in value as the stock price has dropped. This reduces the drag on equity value per share.
  - In January 2000, the value of equity options was $2.89 billion - the average exercise price was $13.375 and the stock price was $84.
  - In January 2001, the value of equity options was $845 million - the average exercise price was $27.755 and the stock price was $14.

- The e-commerce market does not look as attractive as it did a year ago. Many of Amazon.com’s potential competitors (like Walmart.com or Gap.com) have either pulled back or decided not to invest significantly in online operations. Many of its actual competitors (other e-tailers like Etoys) are in far worse shape than Amazon or have gone out of business altogether.
### Terminal Value Calculation

\[
\text{Terminal Value} = \frac{1064}{.0876 - .05} = 28,310
\]

### Cost of Equity and Cost of Debt

- **Cost of Equity**
  - Internet/Retail: 13.81%
  - Operating Leverage: 13.81%
  - Current D/E: 37.5%
  - Base Equity Premium: 4%
  - Country Risk Premium: 5%
  - Risk premium: 4%
  - Beta: 2.18
  - Risk free rate: 5.1%
  - Terminal year: $24,912
- **Cost of Debt**
  - Interest rate: 5.1%
  - Expected Margin: 9.32%
  - Reinvestment: 27.38%

### Reinvestment

- **Reinvestment:**
  - Cap ex includes acquisitions
  - Working capital is 3% of revenues

### Value Calculation

- **Value of Op Assets**: $7,967
- **Value of Cash & Non-op**: $1,263
- **Value of Firm**: $9,230
- **Value of Debt**: $1,890
- **Value of Equity**: $7,340
- **Equity Options**: $748
- **Value per share**: $18.74

### Revenues and EBIT

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues</th>
<th>EBIT</th>
<th>EBIT(1-t)</th>
<th>Reinvestment</th>
<th>FCFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$4,314</td>
<td>-$703</td>
<td>-$703</td>
<td>$612</td>
<td>-$1,315</td>
</tr>
<tr>
<td>2</td>
<td>$6,471</td>
<td>-$364</td>
<td>$54</td>
<td>$714</td>
<td>-$1,078</td>
</tr>
<tr>
<td>3</td>
<td>$9,059</td>
<td>$54</td>
<td>$499</td>
<td>$857</td>
<td>-$803</td>
</tr>
<tr>
<td>4</td>
<td>$11,777</td>
<td>$499</td>
<td>$499</td>
<td>$900</td>
<td>-$401</td>
</tr>
<tr>
<td>5</td>
<td>$14,132</td>
<td>$898</td>
<td>$898</td>
<td>$780</td>
<td>$118</td>
</tr>
<tr>
<td>6</td>
<td>$16,534</td>
<td>$1,133</td>
<td>$1,133</td>
<td>$796</td>
<td>$337</td>
</tr>
<tr>
<td>7</td>
<td>$18,849</td>
<td>$1,133</td>
<td>$1,133</td>
<td>$766</td>
<td>$252</td>
</tr>
<tr>
<td>8</td>
<td>$20,922</td>
<td>$1,133</td>
<td>$1,133</td>
<td>$887</td>
<td>$501</td>
</tr>
<tr>
<td>9</td>
<td>$22,596</td>
<td>$1,133</td>
<td>$1,133</td>
<td>$554</td>
<td>$764</td>
</tr>
<tr>
<td>10</td>
<td>$23,726</td>
<td>$1,133</td>
<td>$1,133</td>
<td>$374</td>
<td>$1,064</td>
</tr>
</tbody>
</table>

### Reinvestment

- **Reinvestment**: $612 $714 $857 $900 $337 $252 $501 $764 $1,064

### Debt Ratio and Cost of Capital

- **Debt Ratio**: 27.27%, 27.27%, 27.27%
- **Cost of Capital**: 12.77%, 12.77%, 12.77%

### Growth Rates

- **Stable Revenue Growth**: 5%
- **Stable Operating Margin**: 9.32%
- **Stable ROC**: 16.94%
- **Reinvestment**: 29.5%

### Stock Price

- **Amazon.com**: January 2001
- **Stock price**: $14
- **Revenue**: $4,314 $6,471 $9,059 $11,777 $14,132 $16,534 $18,849 $20,922 $22,596 $23,726
- **EBIT**: -$703 -$364 $54 $499 $898 $1,133 $1,133 $1,133 $1,133 $1,133
- **EBIT (1-t)**: -$703 -$364 $54 $499 $898 $1,133 $1,133 $1,133 $1,133 $1,133
- **NOL**: $1,289
- **Value of Op Assets**: $7,967
- **Value of Cash & Non-op**: $1,263
- **Value of Firm**: $9,230
- **Value of Debt**: $1,890
- **Value of Equity**: $7,340
- **Equity Options**: $748
- **Value per share**: $18.74
- **Cost of Equity**: 13.81%
- **Cost of Debt**: 5.1%
- **Risk free rate**: 5.1%
- **Beta**: 2.18
- **Risk premium**: 4%

### Summary

- **Amazon.com**: January 2001
- **Stock price**: $14
- **Revenue**: $4,314 $6,471 $9,059 $11,777 $14,132 $16,534 $18,849 $20,922 $22,596 $23,726
- **EBIT**: -$703 -$364 $54 $499 $898 $1,133 $1,133 $1,133 $1,133 $1,133
- **EBIT (1-t)**: -$703 -$364 $54 $499 $898 $1,133 $1,133 $1,133 $1,133 $1,133
- **NOL**: $1,289
- **Value of Op Assets**: $7,967
- **Value of Cash & Non-op**: $1,263
- **Value of Firm**: $9,230
- **Value of Debt**: $1,890
- **Value of Equity**: $7,340
- **Equity Options**: $748
- **Value per share**: $18.74
- **Cost of Equity**: 13.81%
- **Cost of Debt**: 5.1%
- **Risk free rate**: 5.1%
- **Beta**: 2.18
- **Risk premium**: 4%
Amazon looked significantly over valued last year and it looks significantly under valued today. While the same caveats about expectations and assumptions apply today as they did last year, there is one difference. You can buy and hold for the long term but you cannot sell short in the long term. Thus, time can be made your ally here.

The expectations game is now in your favor. Investors whose expectations were set too high last year seem to have to gone to the other extreme this year. All Amazon has to do is survive to beat expectations now….