Chapter 18

Equity Valuation Models
Models of Equity Valuation

- Balance Sheet Models
  - Book Value
- Dividend Discount Models
- Price/Earning Ratios
Intrinsic Value and Market Price

- Intrinsic Value
  - Self assigned Value
  - Variety of models are used for estimation

- Market Price (MP)
  - Consensus value of all potential traders

- Trading Signal
  - IV > MP Buy
  - IV < MP Sell or Short Sell
  - IV = MP Hold or Fairly Priced
Dividend Discount Models: General Model

\[ V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k)^t} \]

\[ V_0 = \text{Value of Stock} \]
\[ D_t = \text{Dividend} \]
\[ k = \text{required return} \]
No Growth Model

\[ V_0 = \frac{D_1}{k} \]

The no growth model would work for common stocks that have earnings and dividends that are expected to remain constant (this assumption is probably not too realistic).

A good example of a claim that has constant dividends is Preferred Stock.
No Growth Model: Example

\[ V_0 = \frac{D_1}{k} \]

\[ D_1 = $5.00 \]
\[ k = 0.15 \]
\[ V_0 = \frac{$5.00}{0.15} = $33.33 \]
The constant growth model

\[ V_0 = \sum_{t=1}^{\infty} \frac{D_0(1 + g)^t}{(1 + k)^t} \]

Where \( D_1 = D_0(1+g) \)

\[ D_2 = D_1(1+g) = D_0(1+g)^2 \]

and so on ..... 

As long as \( k > g \), the sum will converge to:

\[ V_0 = \frac{D_0(1 + g)}{k - g} = \frac{D_1}{k - g} \]
Constant Growth Model: Example

\[ V_0 = \frac{D_0(1 + g)}{k - g} = \frac{D_1}{k - g} \]

\( k = 15\% \quad D_1 = $3.00 \quad g = 8\% \)
(therefore: \( D_0 = 3/1.08 \))

\( V_0 = 3.00 / (0.15 - 0.08) = $42.86 \)
Constant growth continued

On the previous slide we computed the intrinsic value as

\[ V_0 = \frac{3}{(0.15-0.08)} = $42.86. \]

Based on the constant growth model, what is the intrinsic value at \( t=1, V_1 \)?

\[ V_1 = \frac{D_2}{k - g} \]

Because \( D_2 = D_1(1+g) \), we can substitute this value for \( D_2 \) into the expression for \( V_1 \) as follows:

\[ V_1 = \frac{D_1(1+g)}{k - g} = \frac{D_1}{k - g} (1 + g) = V_0(1 + g) \]

In words, the intrinsic value grows at the same rate, \( g \), as dividends.
Constant growth continued

\[ V_0 = \frac{3}{(0.15 - 0.08)} = $42.86 \] and \[ V_1 = 42.86(1.08) = 46.29 \]

What is the Holding Period Return from \( t = 0 \) to \( t = 1 \) if prices follow the DDM?

\[
HPR = \frac{V_1 - V_0 + D_1}{V_0}
\]

\[
HPR = \frac{V_1 - V_0}{V_0} + \frac{D_1}{V_0}
\]

\[ HPR = 8\% + 7\% = 15\% = k \]
Specified Holding Period Model

\[ V_0 = \frac{D_1}{1 + k} + \frac{D_2}{(1 + k)^2} + \cdots + \frac{D_N + P_N}{(1 + k)^N} \]

\[ P_N = \sum_{t=N+1}^{\infty} \frac{D_t}{(1 + k)^t} \]

\[ P_N = \frac{D_{N+1}}{k - g_2} \]

Where the growth rate during the stage from \( N+1 \) to \( \infty \), \( g_2 \), may differ from the growth rate used from periods 1 to \( N \).
Example of 2-stage model

Assume that the current dividend is $D_0 = 1.00$ and dividends are expected to grow at 10% for the next 3 years (i.e., from $t=0$ to $t=1$, $t=1$ to $t=2$, and $t=2$ to $t=3$). Starting in year 3, dividends will grow at 4% indefinitely (i.e., from $t=3$ to infinity). Calculate the current intrinsic value based on these assumptions, given $k = 8\%$.

**Step 1: Trace out all the dividends**

Growth in the first stage, $g_1 = 10\%$

$D_1 = 1.00 \times 1.10 = $1.10

$D_2 = 1.00 \times 1.10^2 = $1.21

$D_3 = 1.00 \times 1.10^3 = $1.33

$D_4 = D_3 \times 1.04 = $1.33 \times 1.04 = $1.38$ growing at 4% forever.
2-stage model continued

**Step 2: Compute the horizon value at t = 3**
The second stage is infinite and dividends grow at \( g_2 = 4\% \)

Because dividends grow at 4\% forever (and 4\% < k=8\%), we can use the constant growth dividend discount model to value the dividends from t=4 onward.

With \( D_4 = $1.38 \), we can calculate \( P_3 \) as follows:

\[
P_3 = \frac{D_4}{k-g}
\]

\[
P_3 = \frac{1.38}{0.08 - 0.04} = $34.5
\]

**Step 3: Compute overall intrinsic value at t=0**

We can now use the holding period version of the dividend discount model to calculate the intrinsic value, \( V_0 \).

\[
V_0 = \frac{D_1}{1 + k} + \frac{D_2}{(1 + k)^2} + \frac{D_3 + P_3}{(1 + k)^3}
\]

\[
V_0 = \frac{1.10}{1.08} + \frac{1.21}{1.08^2} + \frac{1.33 + 34.50}{1.08^3} = $30.50
\]
2-stage model continued

If the current market price is $P_0 = 30.50$, and we buy the stock, then we should expect to earn a holding period return of 8% from $t=0$ to $t = 1$ (as long as actual prices follow the DDM). Let’s see why.

Under this model, the expected selling price at $t = 1$, $P_1$, is the present value of the dividends, $D_2$ and $D_3$, and the expected price at $t=3$, $P_3$. Let’s calculate $P_1$ as follows:

$$P_1 = \frac{1.21}{1.08} + \frac{1.33 + 34.50}{1.08^2} = \$31.84$$

Note the price does not grow by the initial 10% growth rate, since the initial calculation for the price does not depend on a single growth rate. The growth in price = $31.84/30.50 = 1.044$ or growth rate in price = 4.4%

We can now compute the holding period return from $t=0$ to $t=1$

$$HPR = \frac{P_1 - P_0 + D_1}{P_0} = \frac{31.84 - 30.50 + 1.10}{30.50} = 8\%$$
Estimating Dividend Growth Rates

\[ g = ROE \times b \]

\( g \) = growth rate in dividends
\( ROE \) = Return on Equity for the firm
\( b \) = plowback or retention percentage rate

(1- dividend payout percentage rate)
Partitioning Value: Example

ROE = 20%, b = 40% and (1-b) = 60%

\[ E_1 = $5.00 \quad D_1 = $3.00 \quad k = 15\% \]

\[ g = 0.20 \times 0.40 = 0.08 \text{ or } 8\% \]
Partitioning Value: Example

\[ V_0 = \frac{3.00}{0.15 - 0.08} = \$42.86 \]

\[ NGV_0 = \frac{5.00}{0.15} = \$33.33 \]

\[ PVGO = 42.86 - 33.33 = \$9.52 \]

\( V_0 \) = value with growth
\( NGV_0 \) = no growth component value
\( PVGO \) = Present Value of Growth Opportunities
Price Earnings Ratios

- P/E Ratios are a function of two factors
  - Required Rates of Return (k)
  - Expected growth in Dividends

- Uses
  - Relative valuation
  - Extensive Use in industry
P/E Ratio: No Expected Growth

\[ P_0 = \frac{E_1}{k} \]

\[ \frac{P_0}{E_1} = \frac{1}{k} \]

- **E₁**: expected earnings for next year
  - E₁ is equal to D₁ under no growth
- **k**: required rate of return
P/E Ratio with Constant Growth

\[ P_0 = \frac{D_1}{k - g} = \frac{E_1(1 - b)}{k - (b \times ROE)} \]

\[ \frac{P_0}{E_1} = \frac{(1 - b)}{k - (b \times ROE)} \]

\( b = \text{retention ratio} \)

\( \text{ROE} = \text{Return on Equity} \)
Numerical Example: No Growth

\[ E_0 = \$2.50 \quad g = 0 \quad k = 12.5\% \]

\[ P_0 = \frac{D}{k} = \frac{\$2.50}{0.125} = \$20.00 \]

\[ PE = \frac{1}{k} = \frac{1}{0.125} = 8 \]
Numerical Example with Growth

\( b = 60\% \) \( \text{ROE} = 15\% \) \( (1-b) = 40\% \)

\( E_1 = \$2.50 \times (1 + (0.6)(0.15)) = \$2.73 \)

\( D_1 = \$2.73 \times (1-0.6) = \$1.09 \)

\( k = 12.5\% \) \( g = 9\% \)

\( P_0 = 1.09/(0.125-0.09) = \$31.14 \)

\( PE = 31.14/2.73 = 11.4 \)

\( PE = (1 - 0.60) / (0.125 - 0.09) = 11.4 \times \)
Table 18.3 Effect of ROE and Plowback on Growth and the P/E Ratio

<table>
<thead>
<tr>
<th>ROE</th>
<th>0</th>
<th>.25</th>
<th>.50</th>
<th>.75</th>
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<tr>
<td></td>
<td>A. Growth rate, g</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10%</td>
<td>0</td>
<td>2.5%</td>
<td>5.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>3.0</td>
<td>6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>3.5</td>
<td>7.0</td>
<td>10.5</td>
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<tr>
<td></td>
<td>B. P/E ratio</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10%</td>
<td>8.33</td>
<td>7.89</td>
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<td>14</td>
<td>8.33</td>
<td>8.82</td>
<td>10.00</td>
<td>16.67</td>
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</table>

Assumption: $k = 12\%$ per year.
Free Cash Flow Approach

• Discount the free cash flow for the firm
• Discount rate is the firm’s cost of capital
• Components of free cash flow
  – After tax EBIT
  – Depreciation
  – Capital expenditures
  – Increase in net working capital
Value Line Investment Example for Honda (May 25, 2012)
(see pages 605 – 607 in the text). Value Line report is the last slide in this. You can get Value Line reports from the UNL Library (http://libraries.unl.edu/).
Log onto your My.UNL Account; Choose E-resources, Browse under the letter V.

Relevant information for late 2009 (row is indicated by letters A – E)

Beta (row A) = 0.95
Recent Price (row B) = $32.88
Dividends (row C) = $1.00 (forecast for 2016)
ROE (row D) = 10%
Dividend payout ratio (row E) = 25%

Growth = g = ROE x b = 10.0% x (1-0.25) = 7.50%

We will use an investment horizon of 2016 and the intrinsic value will be computed as the PV of the dividends for 2013, 2014, 2015, 2016 and the horizon price for 2016 (i.e., P_{2016})
Honda example, continued

\[ P_{2016} = \frac{D_{2017}}{(k - g)} = $1.00 \frac{(1.075)}{(k-0.075)} \]

Now we need an estimate of \( k \) and we will use the CAPM

Inputs given are as follows:
\( r(f) = 2.0\% \) and suppose the market risk premium is 8.0%

\[ k = 2.0\% + 0.95(10.0 - 2.0) = 9.6\% \]

\( P_{2016} = 51.19 \); D(2013) = 0.78, D(2014) = 0.85, D(2015) = 0.92, and D(2016) = 1.00,

The intrinsic value for 2012, \( V(2012) \) is now the present value of the stream of dividends and the horizon value (all discounted at 9.6\%).

\[ V(2012) = $38.29 \]
Honda Motor Company struggled in fiscal 2011 (year ended March 31, 2012), but ended the year on an improved note. Sales improved 5% in the final quarter, despite unfavorable currency movements. The company has accelerated following the earlier natural disaster, tax-driven disruptions. Notably, automotive unit sales increased 1.5%, with strong performance in North America and Europe more than compensated for decreased sales in Asia, which was attributed to the lingering impact from flooding in Thailand. Meanwhile, motorcycle unit sales remained strong, growing 18%. The top-line improvement resulted in earnings per share of $0.68, a penny below our estimate, and a significant increase from the prior year.

We have raised our fiscal 2012 earnings-per-ADR estimate by $0.10, to $3.10, while lifting our 2013 projection by $0.25, to $3.35. Honda is poised for a substantial earnings recovery in fiscal 2012, as the company moves beyond the impact from the natural disasters of Japan and Thailand. Production should continue to accelerate, and the near-term sales outlook appears increasingly optimistic. Indeed, management provided guidance for global automotive sales volume of 4.3 million units, representing a robust 38% year-over-year gain. Yet, even based on more-conservative sales assumptions, we believe that earnings can easily double this fiscal year.

This neutrally ranked stock has pulled back a bit in recent months. Yet, we believe that there could potentially be some upside to near-term earnings, which would serve as a catalyst for these shares. Moreover, based on the current price, 3- to 5-year price appreciation potential is a hit above average.

Joel Schiller
May 25, 2012