Stock Valuation with Non-Constant Dividend Growth

- **Example 1**: Mack Industries just paid a dividend of $1.00 per share (i.e. $D_0 = $1.00). Analysts expect the company’s dividend to grow 20% this year (i.e. $D_1 = $1.21) and 15% next year. After 2 years, the dividend is expected to grow at a constant rate of 5%. The required rate of return on the company’s stock is $r_s = 12\%$. What is the current price of the company’s stock?

- **Answer**: First, let us find the expected dividend flow:

  \[
  D_1 = D_0 \times (1 + g_1) = $1.21
  \]
  \[
  D_2 = D_1 \times (1 + g_2) = $1.21 \times (1.15) = $1.3915
  \]

  After the first two dividends, the dividend is expected to grow at a constant rate $g = 5\%$. Therefore, we have

  \[
  P_2 = \frac{D_3}{r_s - g} = \frac{(1.3915) \times (1.05)}{12\% - 5\%} = $20.87
  \]

  Accordingly, the current stock price is given by

  \[
  P_0 = \frac{D_1}{1 + r_s} + \frac{D_2 + P_2}{(1 + r_s)^2}
  \]

  \[
  = \frac{1.21}{1 + 0.12} + \frac{1.3915 + 20.87}{(1 + 0.12)^2} = 18.827
  \]
• **Example 2:** Stewart Industries expects to pay a $3.00 per share dividend on its common stock at the end of the year ($D_1 = 3.00$). This dividend is expected to grow 25% a year for the first two years, i.e.,

\[
\begin{align*}
D_2 &= 3.75 \\
D_3 &= 4.6875
\end{align*}
\]

after which the dividend is expected to grow at a constant rate of 5% a year:

\[
D_4 = D_3(1.05) = 4.6875(1.05) = 4.9218
\]

The stock’s beta is 1.2, the risk-free rate of interest is 6% and the rate of return on the market portfolio is 11%. What is the company’s current stock price?

• **Answer:** First find the required rate of return on the stock

\[
r_s = 6\% + 1.2(11\% - 6\%) = 12\%
\]

Now one can find $P_3$ as

\[
P_3 = \frac{D_4}{r_s - g} = \frac{4.9218}{12\% - 5\%} = 70.31
\]

Accordingly, the current stock price is given by

\[
P_0 = \frac{D_1}{1 + 0.12} + \frac{D_2}{(1 + 0.12)^2} + \frac{D_3 + P_3}{(1 + 0.12)^3} = \frac{3}{1 + 0.12} + \frac{3.75}{(1 + 0.12)^2} + \frac{4.6875 + 70.31}{(1 + 0.12)^3} = 59.04
\]