Multi-Stage Growth Model

To value a growing business's equity, practitioners often use a 'two-stage growth model'. For example,

Question: A dividend of $10 was just paid. Dividends are forecast to increase at a high rate of 7% pa for the first 3 years (t=0 to 3) and then revert to a lower rate of 2% (inflation) forever after that (t=3 to infinity). The required return on equity is 10% pa. What should be the share price?

Answer: The basic idea is to discount the high growth years individually, then discount the 'terminal value' at the end. In the finance industry, the terminal value might be calculated using the DDM as we did here, or it might be calculated using a multiples approach such as using PE ratios (see the addendum slides), or even an average of the two. Note that the $10 dividend just paid is excluded since it's in the past.

$$P_0 = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{\left(\frac{C_3}{r - g_{low}}\right)}{(1+r)^2}$$

$$= \frac{C_0\left(1+g_{high}\right)^1}{(1+r)^1} + \frac{C_0\left(1+g_{high}\right)^2}{(1+r)^2} + \frac{\left(\frac{C_0\left(1+g_{high}\right)^3}{r - g_{low}}\right)}{(1+r)^2}$$

$$= \frac{10(1+0.07)^1}{(1+0.1)^1} + \frac{10(1+0.07)^2}{(1+0.1)^2} + \frac{\left(\frac{10(1+0.07)^3}{0.1-0.02}\right)}{(1+0.1)^2}$$

$$= 145.7432851$$

Note that the second line above:

$$P_0 = \frac{C_0\left(1+g_{high}\right)^1}{(1+r)^1} + \frac{C_0\left(1+g_{high}\right)^2}{(1+r)^2} + \frac{\left(\frac{C_0\left(1+g_{high}\right)^3}{r-g_{low}}\right)}{(1+r)^2}$$

is equivalent to this:

$$P_0 = \frac{C_0\left(1+g_{high}\right)^1}{(1+r)^1} + \frac{C_0\left(1+g_{high}\right)^2}{(1+r)^2} + \frac{C_0\left(1+g_{high}\right)^3}{(1+r)^3} + \frac{\left(\frac{C_0\left(1+g_{high}\right)^3(1+g_{low})^1}{r-g_{low}}\right)}{(1+r)^3}$$

and both will give the same answer.

Questions: Multi-stage growth model

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