

Problem Set 3: Common Stock
Solution

1. (a) Yes. Dividend can only be constant or grow at constant rate.
 (b) Yes in the sense that you can only use the general formula if grow is indefinite. But you can extend the model easily to accommodate multi-stage growth.
 (c) Yes, otherwise the model will not give you a finite, positive number, which is definitely wrong.
2. (a) If the dividends grow at a faster rate than the required rate of return. That should not concern you in reality because you should always demand at rate of return that is higher than the expected growth rate.
 The other possibility is that $\lim_{T \rightarrow \infty} \frac{E_0[P_T]}{(1+r)^t}$ goes to infinity. This is the "no bubble" condition. That should also not happen, because when you discount an infinite number of dividend payments, you have to hold on to the stock forever, and there is no reason why you can get an infinite payoff selling something you will never sell! (or even any payoff at all)
 (b) Companies with good growth opportunities will have high P/E ratio, because current earnings do not reflect its potential. Companies with high tangible asset will have high B/M ratio, since the market value of its asset is similar to the book value. Usually, companies in the same industry has very similar P/E and B/M ratios, but quite different across industries. The nature of the company usually explains the differences in the ratios. However, if you see a very unusual P/E ratio in a company (from its industry counterparts), it still does not necessary mean it is mis-priced. Maybe people think the company has specific advantage/disadvantage. One good example is eBay. It has a much higher multiple than its industry peers.
3. (a) $P_0 = \frac{DIV_1}{r-g}$, so $r = 10.8\%$
 (b) Plowback = 0.5
 so $g = 0.5 * 12\% = 6\%$
 and $73 = \frac{1.68}{r-6\%}$
 $r = 8.3\%$
4. (a) $P_0 = \frac{8}{10\% - 5\%} = \160
 (b) $Plowback = 1 - \frac{8}{12} = \frac{1}{3}$
 $g = b * ROE$ so $ROE = 15\%$
 (c) Price with no growth = $\frac{12}{10\%} = \$120$
 So the market is paying \$40 per share for growth opportunities.

5. (a) Value of company 5 years from now $= \frac{D_6}{r-g} = \frac{11.446}{15\%-9\%} = \190.77
 So value of company today is $\frac{199.07}{1.15^5} = \94.847
- (b) The price should rise by 15% per year until year 6. Since there is no capital gain, the entire return must be in capital gains.
- (c) There will be no effect as $ROE = r$.
6. (a) $\frac{5}{r} = 100$, so $r = 5\%$
- (b) Value of RK $= \frac{1}{(1+15\%)^2} * \frac{5}{15\%} = 25.20$, So total value $= \$125.20$
- (c) NPV of the project $= \frac{1}{(1+15\%)^4} * \frac{5*80\%}{15\%-10\%} - 20 = \25.74
 So the value of the combined entity will be $\$125.20 + \$25.74 = \$150.94$
- (d) Discounting all the cashflows at the same rate:
 $\frac{5}{r} + \frac{1}{(1+r)^2} * \frac{5}{r} + \frac{1}{(1+r)^4} * \frac{5}{r-10\%} - 20 = 150.94$
 So $r = 12.997\%$