

LSE Summer School
FM250 – Finance

Classwork 3: Stocks
Answer key

Question 1

To understand this question, note that stock return, by definition, is

$$R = \frac{D_1 + P_1}{P_0} - 1$$

so that return comes from dividend yield (D_1/P_0) and capital gain ((P_1/P_0)). But the dividend discount model says that capital gain also comes from expectations of dividends further into the future:

$$\frac{P_1}{P_0} - 1 = \frac{\frac{D_2}{1+r} + \frac{D_3}{(1+r)^2} + \dots}{P_0} - 1$$

So investors looking for capital gain are merely looking for stocks whose dividends far into the future are likely to be high.

Question 2

$$P_A = \frac{DIV_1}{r} = \frac{\$10}{0.10} = \$100.00$$

$$P_B = \frac{DIV_1}{r - g} = \frac{\$5}{0.10 - 0.04} = \$83.33$$

$$P_C = \frac{DIV_1}{1.10^1} + \frac{DIV_2}{1.10^2} + \frac{DIV_3}{1.10^3} + \frac{DIV_4}{1.10^4} + \frac{DIV_5}{1.10^5} + \frac{DIV_6}{1.10^6} + \left(\frac{DIV_7}{0.10} \times \frac{1}{1.10^6} \right)$$

$$P_C = \frac{5.00}{1.10^1} + \frac{6.00}{1.10^2} + \frac{7.20}{1.10^3} + \frac{8.64}{1.10^4} + \frac{10.37}{1.10^5} + \frac{12.44}{1.10^6} + \left(\frac{12.44}{0.10} \times \frac{1}{1.10^6} \right) = \$104.50$$

At a required rate of return of 10 percent, Stock C is the most valuable.

Question 3

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
EPS		\$50 * .14 = \$7	\$7.49	\$8.014	\$8.575	\$7.537
Dividend		\$7 * .5 = \$3.5	\$3.75	\$4.007	\$4.288	\$6.030
BVPS	\$50	\$50 + \$3.5 = \$53.5	\$57.245	\$61.252	\$65.54	\$67.05

- The growth rate of EPS and dividends are given by ROE times the plowback ratio ($1 - \text{payout ratio}$) = $14\% * 0.5 = 7\%$ in the first 4 years. After that, the growth rate is $11.5\% * .2 = 2.3\%$.
- Recall $P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{P_4}{(1+r)^4}$. Note

$D_t = 3.5 * 1.07^{t-1}$ for $t = 1, 2, 3, 4$ so that $\frac{D_t}{(1+r)^t} = \frac{3.5 * 1.07^{t-1}}{1.115^t}$ for the first 4 years.

By Gordon growth model, $P_4 = \frac{6.03}{0.115 - 0.023} = 65.54$

So,

$$P_0 = 3.14 + 3.01 + 2.89 + 2.77 + \frac{65.54}{(1.115)^4} = 54.21$$

Higher ROE after year 4 increases the price today.

However, price DOES NOT depend on the payout ratio after year 4. To verify this, you can check that using any other payout ratio from year 4 gives you the same P_4 and therefore P_0 . The neutral impact of payout ratio on stock price happens only if the ROE equals the cost of capital, which is what Modigliani & Miller assume should happen in a long-run equilibrium in their famous argument that dividend policy should not affect stock prices.