*Lecture 6: Supplementary exercises*

1) Dividends and News. If dividend changes and announcements contain news, they will move the stock price. This exercise allows you to work out some of the numbers from Lecture 7. You will need the spreadsheet lect_7.xls. First a description of the spreadsheet. You need to enter the expected earnings (C2). This is what we expect earnings to be on average at the end of both the first and second years. You also need to enter magnitude of the earnings shock (C3). Thus the first year's earnings will be expected earnings plus or minus the earnings shock. Second year's earnings will also be expected earnings plus or minus the earning shock. However, if earnings shocks are correlated (C4 is not zero), then the expected earnings in year two will depend upon the earnings shock in year 1.

$$E[\ \tilde{\varepsilon}_2 \mid \varepsilon_1] = \gamma\ \varepsilon_1 \qquad \textbf{(1)}$$

In Lecture 7, we assumed that the expected earnings in year 2 rises by 0.50 for every 1.00 increase in the earnings surprise (see equation (6) in Lecture 7). This means $\gamma$ is 0.5. To determine cashflow, we need to know how much cash is to be reinvested in year 1.[1] Assume the correct discount rate is 7% and that the asset $\beta$ is zero.

A) Expected earnings. Assume that expected earnings are 10 and that 4 will be reinvested in year 1. Assume that the earnings surprise is plus or minus 3 and that $\gamma$ is equal to 1. If the earnings surprise is positive, what is earnings in year 1. What are expected earnings in year 2, conditional on a positive surprise?

B) What is the value of the stock prior to the dividend and earnings announcement. The dividend will be announced today and paid tomorrow. Thus the stock price is the value of the current dividend plus the present value of next year's dividend.

C) Post-announcement stock price – case 1. Assume the firm announced a dividend of 9, what is the cum-dividend stock price now? This year's dividend will be paid tomorrow.

D) Post-announcement stock price – case 2. Assume the firm announced a dividend of 3, what is the cum-dividend stock price now? This year's dividend will be paid tomorrow.

E) When the firm announces its dividend how much does the stock price change per dollar of dividend revision? In other words, if the firm announces a dividend one dollar above expected, how much does the stock price rise by?

Once you have answered these questions, you can use the Excel spreadsheet to check your answers. After entering the inputs, you can hit the button in Excel. The spreadsheet will build the earnings tree (see Tree tab). It will also calculate the pre-announcement stock price and the two post-announcement stock prices.

[1] Since the firm stops after year 2, the reinvestment in year 2 is zero.

*Lecture 6: Supplementary exercise answers*

1) Dividends and News.

A) Expected earnings. Expected earnings are 10. If the earnings surprise is positive 3, then earnings in year 1 turned out to be 13. Since the earnings surprise today raises our estimate of future earnings by one times today's earnings surprise, then expected earnings in year 2 is also 13.

$$\begin{aligned} E[\ \text{Earnings}_2\ ] &= 10 + \gamma\ \varepsilon_1 \\ &= 10 + 1\,(3) = 13 \end{aligned} \qquad \textbf{(2)}$$

Actual year two earnings could be 16 (3 higher than expected) or 10 (3 lower than expected).

B) Pre-announcement stock price. The expected dividend in year 1, is year 1 earnings minus year one investment – i.e. free cashflow. Thus the first year's dividend is 6 (10-4). Next year's dividend is year two's expected earnings (there is no investment in year 2). Expected earnings in year 2 is also 10.

$$\begin{aligned} E[\ \text{Earnings}_2\ ] &= 10 + \gamma\ E[\ \varepsilon_1\ ] \\ &= 10 + 1\,(0) = 10 \end{aligned} \qquad \textbf{(3)}$$

Prior to the dividend/earnings announcement we don't know $\varepsilon_1$, and thus the expected earnings is based on the expected value of $\varepsilon_1$ – which is zero. The stock price prior to the announcement is 15.35

$$P_{1,\text{pre-announcement}} = (10-4) + \frac{10}{1 + .07} = 15.35 \qquad \textbf{(4)}$$

C) Post-announcement stock price – case 1. The dividend of 9 means that earnings were 13 – 3 above the expected earnings. Since the earnings and dividend surprise was positive, the market will revise its estimate of next year's earnings and dividend up to 13. Thus the value of the stock is now 21.15.

$$P_{1,\text{post-announcement}} = (13-4) + \frac{13}{1 + .07} = 21.15 \qquad \textbf{(5)}$$

D) Post-announcement stock price – case 2. The dividend of 3 means that earnings were 7 – 3 below the expected earnings. Since the earnings and dividend surprise was negative, the market will revise its estimate of next year's earnings and dividend down to 7. Thus the value of the stock is now 9.54.

$$P_{1,\text{post-announcement}} = (7-4) + \frac{7}{1 + .07} = 9.54 \qquad \textbf{(6)}$$

E) If the firm announces a dividend of 9 – 3 above expected – the stock price rises by 5.80 (21.15-15.35). If the firm announces a dividend of 3 – 3 below expected – the stock price falls by 5.80 (9.54-15.35). Thus the stock prices rises or falls 1.93 for every dollar the dividend is above or below the expected dividend.