

Economics 180.367: Investments and Portfolio Management
Solutions to Problem Set 4

1. (a) The utility of a loss of \$1 is $\frac{e^{-1}}{1+e^{-1}} = 0.2689$. The utility of a loss of \$2 is 0.1192. The utility of no loss is 0.5. So the expected utility of the gamble is 0.3095, and the individual will prefer the gamble to losing \$1 for sure.

(b) The utility of a gain of \$1 is 0.7311. The utility of a gain of \$2 is 0.8808. The utility of no gain is 0.5. So the expected utility of the gamble is 0.6904, and the individual will prefer \$1 for sure to taking the gamble.

(c) This is an example of loss aversion (or prospect theory).

2. From the formula in class, $P = \frac{D}{k} = \frac{2.1}{0.11} = 19.09$

3. From the formula in class, $P = \frac{D_0(1+g)}{k-g} = \frac{1.01}{0.06-0.01} = \frac{1.01}{0.05} = 20.2$

4. For both firms, the required return is $0.02 + (1.4 * 0.05) = 0.09$.

Let P_B and g_B denote the price and growth of expected dividends for Blob. Then

$$P_B = \frac{1}{k - g_B} = \frac{1}{0.09 - g_B}$$

But $P_B = \frac{10}{9}$ and so $\frac{10}{9} = \frac{1}{0.09 - g_B} \Rightarrow 0.9 - 10g_B = 9 \Rightarrow g_B = -0.81$

Let P_G and g_G denote the price and growth of expected dividends for Gob. Then

$$P_G = \frac{1}{k - g_G} = \frac{1}{0.09 - g_G}$$

But $P_G = \frac{40}{9}$ and so $\frac{40}{9} = \frac{1}{0.09 - g_G} \Rightarrow 3.6 - 40g_G = 9 \Rightarrow g_G = -0.135$

So, the dividend growth rate is negative for each firm, which implies that dividends per share are declining, although declining much faster for Blob in New York City than for Gob in Northern Virginia. As for their growth prospects, both firms are likely to shrink over time.

5. (a) The two year yield is $(1.05 * 1.07)^{1/2} - 1 = 6\%$

The three year yield is $(1.05 * 1.07 * 1.08)^{1/3} - 1 = 6.66\%$

(b) The price of the coupon bond is

$$\frac{6}{1.05} + \frac{6}{1.06^2} + \frac{106}{1.0666^3} = 98.41$$

(c) The yield to maturity solves the equation

$$\frac{6}{1+y} + \frac{6}{(1+y)^2} + \frac{106}{(1+y)^3} = 98.41$$

Using the solver function gives $y = 6.6015\%$

6. The price was \$136.45 on 2/15 and \$137.29 on 8/15 (you could also take the prices on the next business days). So the holding period return is

$$\frac{137.29 + 5.625 + 136.45}{136.45} = 4.74\%$$

7. The clean price is \$112.0625. The coupon dates are 8/15/2011 and 2/15/2012. The accrued interest is $\frac{30}{184} * 2 = 0.326$ (treating 9/14/2011 as the settlement date; it would be fine to instead treat 9/15/2011 as the settlement date, in which case accrued interest is 0.337).

The dirty price is $\$112.0625 + 0.326 = \112.03885 .