

1. The following information is given for a \$1,000-face value, 10-year bond that was issued on June 14, 2010. All yields/prices are calculated right after the coupon payment is made:

Price on June 14, 2012: \$1,323
 Current yield on June 14, 2012: 7.56%
 Capital gains yield on June 14, 2012: -2.56%

If the market rate stayed at the same level since 2012, what is the current yield of this bond today?

Solution: Yield to Maturity on June 14, 2012 is 7.56%-2.56%=5%.

*Price on June 14, 2012 = $1000/1.05^8 + C/0.05 * (1-1/1.05^8)$*

C=100 (3 points)

Current Yield today = $100 / \text{Price today} = 100 / (1000/1.05^2 + (100/0.05)(1-1/1.05^2)) = 9.15\%$*

2. READER Inc. has total assets of \$3,000,000 and profit of \$900,000. READER is growing at a constant rate equal to its internal growth rate of 37%. Companies as risky as READER offer a return of 47% to their investors.

- a) If the current stock price of READER is \$2.65, and it has 1,000,000 shares trading in the market, what is READER's total debt ?

$$ROA = 900,000/3,000,000 = 0.3$$

$$IGR = 17.65\% = ROA * b / (1 - ROA * b) = 0.3 * b / (1 - 0.3 * b)$$

$$b = 0.5 \text{ (3 points)}$$

$$EPS = 900,000/1,000,000 = 0.9$$

$$P = \text{Div}/R - g = EPS(1-b)/(R - ROE*b)$$

$$2.65 = 0.9 * 0.5 / (0.47 - ROE * 0.5)$$

$$ROE = 0.6 \text{ (2 points)}$$

$$900,000/E = 0.6$$

$$E = 1,500,000$$

$$\text{Total Debt} = \text{Total Assets} - \text{Total Equity} = 3,000,000 - 1,500,000 = 1,500,000 \text{ (1 point)}$$

- b) Would the investors prefer READER to retain more of its profit within the company?

Since the sign of dP/db depends on whether ROE is greater than R or not (3 points), we should compare READER's ROE and R, the return that is expected in the market from companies of the same risk level as READER: $0.6 > 0.47$

Then, READER should increase its retention ratio. This will increase the stock price. (3 points)

3. Consider three stocks, A, B, and C with the following characteristics:

Stock	Expected Return(%)	Standard Deviation(%)
A	9	22
B	15	45
C	18	52

The covariance between the returns of A and B is 0.001, A and C is 0.07, and B and C is -0.04.

- a) You invested 50% of your funds on A, 25% on B, and the rest on C. What is the risk (as it is measured by the standard deviation) and the expected return of your portfolio?

Let the risky portfolio be denoted by P.

$$E(r_P) = 0.5*9\% + 0.25*15\% + 0.25*18\% = 12.75\%$$

$$\sigma_P^2 = x_A^2 \sigma_A^2 + x_B^2 \sigma_B^2 + x_C^2 \sigma_C^2 + 2x_A x_B \text{Cov}(A,B) + 2x_A x_C \text{Cov}(A,C) + 2x_C x_B \text{Cov}(C,B)$$

$$\sigma_P^2 = 0.5^2(0.22)^2 + 0.25^2(0.45)^2 + 0.25^2(0.52)^2 + 2*0.5*0.25*0.001 + 2*0.5*0.25*0.07 - 2*0.25*0.25*0.04$$

$$\sigma_P^2 = 0.0544$$

$$\sigma_P = 0.2333$$

- b) Given that the risk free rate is 3%, what is the maximum expected return you can obtain if you would like to invest on risk free asset and the portfolio you formed in part (a), and your risk tolerance is 15% ?

Let the new portfolio be denoted by Q

$$\sigma_Q^2 = x_P^2 \sigma_P^2$$

$$0.15^2 = x_P^2 0.0544$$

$x_P = 0.64$, Then the weight of the risk free asset is 0.36.

$$E(r_Q) = 0.64*12.75\% + 0.36*3\% = 9.24\%$$

- c) If we could form any portfolio composed of A, B, C, and the risk free asset, and our overall risk tolerance were to be 15%, would the maximum return we can obtain be given by the rate we found in part(b)? Why or why not? Explain with one or two sentences. No calculation is necessary.

*No, it would not be. For the maximum return with any given risk level, the **separation principle** should be used. That is, first the efficient frontier should be found and the line that is tangent to the efficient frontier passing through the risk free rate should be found. The portfolio at the tangent point should be used as the risky portfolio.*