

**Chapter 10: Introduction to Risk, Return, and the Opportunity Cost of Capital**

1. a. 
$$\text{Rate of return} = \frac{\text{capital gain} + \text{dividend}}{\text{initial share price}} = \frac{(\$57 - \$50) + \$2.10}{\$50} = 0.182 = 18.2\%$$

Dividend yield = dividend/initial share price =  $\$2.10/\$50 = 0.042 = 4.2\%$

Capital gains yield = capital gain/initial share price =  $\$7/\$50 = 0.14 = 14\%$

b. 
$$\text{Rate of return} = \frac{\text{capital gain} + \text{dividend}}{\text{initial share price}} = \frac{(\$43 - \$50) + \$2.10}{\$50} = -0.098 = -9.8\%$$

Dividend yield = dividend/initial share price =  $\$2.10/\$50 = 0.042 = 4.2\%$

Capital gains yield = capital gain/initial share price =  $-\$7/\$50 = -0.14 = -14\%$

c. The dividend yield is a rate of return measure based on the initial investment in the stock. The change in the value of the stock affects the capital gain, and therefore the capital gains yield, but does not affect the dividend yield.

2. 
$$\begin{aligned} \text{Rate of return} &= \text{Capital gains yield} + \text{Dividend yield} \\ &= 0.10 + (\$0.19/\$6.32) = 0.1301 = 13.01\% \end{aligned}$$

8. a.

Year	Stock market return	T-bill return	Risk premium	Deviation from mean	Squared deviation
2000	-10.89	5.89	-16.78	-14.37	206.4969
2001	-10.97	3.83	-14.80	-12.39	153.5121
2002	-20.86	1.65	-22.51	-20.10	404.0100
2003	31.64	1.02	30.62	33.03	1,090.9809
2004	12.62	1.20	11.42	13.83	191.2689
		Average	-2.41		409.2538

- b. The average risk premium was: -2.41%
- c. The variance (the average squared deviation from the mean) was 409.2538 (without correcting for the lost degree of freedom).  
Therefore: standard deviation =  $\sqrt{409.2538} = 20.23\%$

14. Boom:  $\frac{\$5 + (\$195 - \$80)}{\$80} = 150.00\%$

Normal:  $\frac{\$2 + (\$100 - \$80)}{\$80} = 27.50\%$

Recession:  $\frac{\$0 + (\$0 - \$80)}{\$80} = -100.00\%$

$$r = \frac{150 + 27.50 + (-100)}{3} = 25.83\%$$

$$\text{Variance} = \frac{1}{3} \times (150 - 25.83)^2 + \frac{1}{3} \times (27.50 - 25.83)^2 + \frac{1}{3} \times (-100 - 25.83)^2 = 10,418.06$$

$$\text{Standard deviation} = \sqrt{\text{variance}} = 102.07\%$$

15. The bankruptcy lawyer does well when the rest of the economy is floundering, but does poorly when the rest of the economy is flourishing and the number of bankruptcies is down. Therefore, the Leaning Tower of Pita is a risk-reducing investment. When the economy does well and the lawyer's bankruptcy business suffers, the stock return is excellent, thereby stabilizing total income.

16. [Note: The last two sentences of the problem state: “Show that the portfolio standard deviation is lower than either stock’s. Explain why this happens.” Although it can happen that the portfolio standard deviation is lower than either stock’s, this is not the case in this problem.]

$$\text{Boom: } \frac{\$0 + (\$18 - \$25)}{\$25} = -28.00\%$$

$$\text{Normal: } \frac{\$1 + (\$26 - \$25)}{\$25} = 8.00\%$$

$$\text{Recession: } \frac{\$3 + (\$34 - \$25)}{\$25} = 48.00\%$$

$$r = \frac{(-28) + 8 + 48}{3} = 9.33\%$$

$$\text{Variance} = \frac{1}{3} \times (-28 - 9.33)^2 + \frac{1}{3} \times (8 - 9.33)^2 + \frac{1}{3} \times (48 - 9.33)^2 = 963.56$$

$$\text{Standard deviation} = \sqrt{\text{variance}} = 31.04\%$$

Portfolio Rate of Return

$$\text{Boom: } (-28 + 150)/2 = 61.00\%$$

$$\text{Normal: } (8 + 27.5)/2 = 17.75\%$$

$$\text{Recession: } (48 - 100)/2 = -26.0\%$$

$$\text{Expected return} = 17.58\%$$

$$\text{Standard deviation} = 35.52\%$$

As noted above, the portfolio standard deviation can be lower than the standard deviation of either stock; however, this is not the case in this problem. In general, the portfolio standard deviation can be less than the standard deviation of either stock as a consequence of diversification in a portfolio comprised of two stocks that are less than perfectly correlated. The lower the correlation, the greater the potential for reducing the standard deviation of the portfolio below the standard deviation of either stock in the portfolio.

17. a. Interest rates tend to fall at the outset of a recession and rise during boom periods. Because bond prices move inversely with interest rates, bonds provide higher returns during recessions when interest rates fall.

b.  $r_{\text{stock}} = [0.2 \times (-5\%)] + (0.6 \times 15\%) + (0.2 \times 25\%) = 13.0\%$

$r_{\text{bonds}} = (0.2 \times 14\%) + (0.6 \times 8\%) + (0.2 \times 4\%) = 8.4\%$

Variance(stocks) =  $[0.2 \times (-5-13)^2] + [0.6 \times (15-13)^2] + [0.2 \times (25 - 13)^2] = 96$

Standard deviation =  $\sqrt{96} = 9.80\%$

Variance(bonds) =  $[0.2 \times (14-8.4)^2] + [0.6 \times (8-8.4)^2] + [0.2 \times (4-8.4)^2] = 10.24$

Standard deviation =  $\sqrt{10.24} = 3.20\%$

c. Stocks have both higher expected return and higher volatility. More risk averse investors will choose bonds, while those who are less risk averse might choose stocks.

18. a. Recession  $(-5\% \times 0.6) + (14\% \times 0.4) = 2.6\%$

Normal economy  $(15\% \times 0.6) + (8\% \times 0.4) = 12.2\%$

Boom  $(25\% \times 0.6) + (4\% \times 0.4) = 16.6\%$

b. Expected return =  $(0.2 \times 2.6\%) + (0.6 \times 12.2\%) + (0.2 \times 16.6\%) = 11.16\%$

Variance =  $[0.2 \times (2.6 - 11.16)^2] + [0.6 \times (12.2 - 11.16)^2] + [0.2 \times (16.6 - 11.16)^2] = 21.22$

Standard deviation =  $\sqrt{21.22} = 4.61\%$

c. The investment opportunities have these characteristics:

	Mean Return	Standard Deviation
Stocks	13.00%	9.80%
Bonds	8.40%	3.20%
Portfolio	11.16%	4.61%

The best choice depends on the degree of your aversion to risk. Nevertheless, we suspect most people would choose the portfolio over stocks since the portfolio has almost the same return with much lower volatility. This is the advantage of diversification.

20. Risk reduction is most pronounced when the stock returns vary against each other. When one firm does poorly, the other will tend to do well, thereby stabilizing the return of the overall portfolio.
  
21.
  - a. General Steel ought to have greater sensitivity to broad market movements. Steel production is more sensitive to changes in the economy than is food consumption.
  
  - b. Club Med sells a luxury good (expensive vacations) while General Cinema sells movies, which are less sensitive to changes in the economy. Club Med will have greater market risk.