FIN 302 Homework Solution Ch11

Chapter 11: Risk, Return, and Capital Budgeting

1. a. False. Investors require higher expected rates of return on investments with high *market* risk, not high *total* risk. Variability of returns is a measure of total risk.

   b. False. If beta = 0, then the asset's expected return should equal the risk-free rate, not zero.

   c. False. The portfolio is invested one-third in Treasury bills and two-thirds in the market. Its beta will be:

   $$(1/3 \times 0) + (2/3 \times 1.0) = 2/3$$

   d. True.

   e. True.

2. a. For an undiversified investor, the relevant measure of risk is an investment's standard deviation. Therefore, for this investor, BA was the riskier investment because of its higher standard deviation.

   b. For a diversified investor, the relevant measure of risk is an investment's beta because beta measures the contribution of a stock to the riskiness of a diversified portfolio. Therefore, for this investor, BA was the riskier investment because of its higher beta.

   c. The relationship between the beta for a portfolio and the betas of the individual securities in the portfolio is given by:

   Beta of portfolio = (fraction of portfolio in first security × beta of first security)
   + (fraction of portfolio in second security × beta of second security)

   We will call BA stock the first security and U.K. Treasury bills the second security; Treasury bills have beta equal to zero.

   Let X = the fraction of the portfolio in BA stock, and;

   (1 – X) = the fraction of the portfolio in Treasury bills.

   Substituting in the equation above, we have:

   $$1.0 = (X \times 2.12) + [(1 - X) \times 0] \Rightarrow X = 0.472 \text{ and } (1 - X) = 0.528$$

   Therefore, the investor should invest 47.2% (£4,720) of her cash in BA stock and 52.8% (£5,280) of her cash in U.K. Treasury bills.

4. Required return = $r_f + \beta(r_m - r_f) = 6\% + [1.25 \times (13\% - 6\%)] = 14.75\%$

Expected return = 16%

The security is underpriced. Its expected return is greater than the required return given its risk.

5. a. Required return = $r_f + \beta(r_m - r_f) = 4\% + [0.6 \times (14\% - 4\%)] = 10\%$

With an IRR of 14%, the project should be accepted.

b. If beta = 1.6, then required return increases to:

$4\% + [1.6 \times (14\% - 4\%)] = 20\%$

This is greater than the project IRR. You should now reject the project.

c. Given its IRR, the project is attractive when its risk and therefore its required return are low. At a higher risk level, the IRR is no longer higher than the expected return on comparable-risk assets available elsewhere in the capital market.

11. a. Beta is the responsiveness of each stock's return to changes in the market return. Then:

$$\beta_A = \frac{\Delta r_A}{\Delta r_m} = \frac{38 - (-10)}{32 - (-8)} = \frac{48}{40} = 1.2$$

$$\beta_D = \frac{\Delta r_D}{\Delta r_m} = \frac{24 - (-6)}{32 - (-8)} = \frac{30}{40} = 0.75$$

Stock D is considered a more defensive stock than Stock A because the return of Stock D is less sensitive to the return of the overall market. In a recession, Stock D will usually outperform both Stock A and the market portfolio.

b. We take an average of returns in each scenario to obtain the expected return:

$r_m = (32\% - 8\%)/2 = 12\%$

$r_A = (38\% - 10\%)/2 = 14\%$

$r_D = (24\% - 6\%)/2 = 9\%$

c. According to the CAPM, the expected returns investors will demand of each stock, given the stock betas and the expected return on the market, are determined as follows:

$r = r_f + \beta(r_m - r_f)$

$r_A = 4\% + [1.2 \times (12\% - 4\%)] = 13.6\%$

$r_D = 4\% + [0.75 \times (12\% - 4\%)] = 10.0\%$

d. The return you *actually* expect for Stock A (14%) is above the fair return (13.6%). The return you expect for Stock D (9%) is below the fair return (10%). Therefore stock A is the better buy.

13. The appropriate discount rate for the project is:

$$r = r_f + \beta(r_m - r_f) = 4\% + 1.4 \times (12\% - 4\%) = 15.2\%$$

Therefore:

NPV = –\$100 + [\$15 × annuity factor(15.2%, 10 years)]

$$= -\$100 + \$15 \times \left[\frac{1}{0.152} - \frac{1}{0.152 \times (1.152)^{10}} \right] = -\$25.29$$

You should reject the project.

14. Find the discount rate (r) for which:

\$15 × annuity factor(r, 10 years) = 100

$$\$15 \times \left[\frac{1}{r} - \frac{1}{r \times (1+r)^{10}} \right] = \$100$$

Solving this equation using trial-and-error or a financial calculator, we find that the project IRR is 8.14%. The IRR is less than the opportunity cost of capital (15.2%). Therefore you should reject the project, just as you found from the NPV rule.

21. We can use the CAPM to derive the cost of capital for these firms:

$$r = r_f + \beta(r_m - r_f) = 5\% + (\beta \times 7\%)$$

	Beta	Cost of capital
Cisco	2.13	19.91%
CitiGroup	1.31	14.17%
Merck	0.29	7.03%
Walt Disney	1.15	13.05%

23. Cisco should use the beta of Merck (which is 0.29) to find that the required rate of return is 7.03%. The project is a pharmaceutical venture and the beta of Merck reflects the risk of pharmaceutical firms. The beta of Cisco does not reflect that risk.

25. a. False. The stock's risk premium, not its expected rate of return, is twice as high as the risk premium of the market portfolio.

b. True. The stock's unique risk does not affect its contribution to portfolio risk.

c. False. A stock plotting below the SML offers too low an expected return relative to the expected return indicated by the CAPM. The stock is *over*priced.

d. True. If the portfolio is diversified to such an extent that it has negligible unique risk, then the only source of volatility is its market exposure. A beta of 2 then implies twice the volatility of the market portfolio.

e. False. An *undiversified* portfolio has *more* than twice the volatility of the market. In addition to the fact that it has double the sensitivity to market risk, it also has volatility due to unique risk.

26. The CAPM implies that the required rate of return that investors will demand of the portfolio is:

$$r = r_f + \beta(r_m - r_f) = 4\% + 0.8 \times (14\% - 4\%) = 12\%$$

If the portfolio is expected to provide only an 11% rate of return, it's an unattractive investment. The portfolio does not provide an expected return that is sufficiently high relative to its risk.