Topic 6: Risk and Return

Describe the difference between a total holding period return and an expected return.

The holding period return is the total return over some investment or "holding" period. It consists of a capital appreciation component and an income component. The holding period return reflects past performance. The expected return is a return that is based on the probability-weighted average of the possible returns from an investment. It describes a possible return (or even a return that may not be possible) for a yet to occur investment period.

John is watching an old game show rerun on television called *Lets' make a deal in* which the contestant chooses a prize behind one of two curtains. One of the curtains will yield a joke prize worth $150, and the other will give a car worth $7200. The game show has placed a subliminal message on the curtain containing the joke prize, which makes the probability of choosing the joke prize equal to 75 per cent. What is the expected value of the selection, and what is the standard deviation of that selection?

$$E(\text{prize}) = 0.75(\$150) + (0.25)(\$7{,}200) = \$1{,}912.50$$

$$\sigma^2_{\text{prize}} = 0.75(\$150 - \$1{,}912.50)^2 + (0.25)(\$7{,}200 - \$1{,}912.50)^2$$

$$= \$9{,}319{,}218.75 \Rightarrow$$

$$\sigma_{\text{prize}} = (\$9{,}319{,}218.75)^{1/2} = \$3{,}052.74$$

Describe the general relation between risk and return that we observe in the historical bond and share market data.

The general axiom that the greater the risk, the greater the return describes the historical returns of the bond and share market. If we look at Exhibit 7.4 in the text, we see that small shares have averaged the greatest returns but that they also have the greatest standard deviation for the returns. When compared to large shares, the average return and standard deviation of the small shares are greater. Large share average returns and standard deviation numbers are larger than those of long-term government bonds, which are larger than those of intermediate-term government bonds, which in turn are larger than those of Australian notes or bonds. The comparison shows that the riskier the investment category, the greater the average return as well as standard deviation of returns.

Describe how investing in more than one asset can reduce risk through diversification.

An investor can reduce the risk of his or her investments by investing in two or more assets whose values do not always move in the same direction at the same time. This is because the movements in the values of the different investments will partially cancel each other out.

The distribution of results in an introductory finance class is normally distributed, with an expected result of 75. If the standard deviation of results is 7, in what range would you expect 95 per cent of the results to fall.

95% is 1.96 standard deviations from the mean

Lower bound: $75 - 1.96(7) = 61.28$

Upper bound: $75 + 1.96(7) = 88.72$

Range: 61.28 to 88.72

Topic 7: Cost of Capital

Fafincare Ltd has earnings before interest and tax equal to $500. If the company incurred interest expense of $200 and pays tax at the corporate tax rate of 30 per cent, what amount of cash is available for Fafincare Ltd's investors?

EBIT	$500
Interest Exp	200
EBT	$300
Tax (30%)	90
Profit	$210
Interest expense	200
Cash for investors	$410

(Cash available to shareholders $210, available to debtholders as interest payment, $200)

Whitewall Tire Ltd just paid a $1.60 dividend on its ordinary shares. If Whitewall is expected to increase its annual dividend by 2 per cent per year into the foreseeable future and the current price of Whitewall Tire Ltd's ordinary shares is $11.66, what is the cost of ordinary equity for Whitewall Tire Ltd?

The cost of ordinary equity for Whitewall can be found using the constant-growth assumption equation:

$$P_{cs} = \frac{D_1}{k_{cs} - g} = \frac{D_0(1+g)}{k_{cs} - g} = \frac{\$1.60(1+0.02)}{k_{cs} - 0.02} = \$11.66$$

Solving for k_{cs}, we find it is equal to 0.16 or 16 per cent.

Capital Ltd has a capital structure that is financed, based on current market values, with 50 per cent debt, 10 per cent preference shares and 40 per cent ordinary shares. If the return offered to the investors for each of those sources is 8 per cent, 10 per cent and 15 per cent for debt, preference shares and ordinary shares, respectively, what is Capital Ltd's after-tax WACC? Assume that the company's corporate tax rate is 30 per cent

$$WACC = x_{debt}k_{debt}(1-t) + x_{ps}k_{ps} + x_{cs}k_{cs}$$

WACC = 0.5x0.08x(1-0.3)+0.1x0.10+0.4x0.15=0.098 or 9.8%

Perpetual Ltd has issued bonds that never require the principal amount to be repaid to investors. Correspondingly, Perpetual Ltd must make interest payments into the infinite future. If the bondholders receive annual payments of $75 and the current price of the bonds is $882.35, what is the after-tax cost of this borrowing for Perpetual Ltd if the corporate tax rate is 30 per cent?

Since the bonds represent perpetuity, we know that the pre-tax cost of debt can be solved using the following:

$$k_{\text{debt}} = \frac{\text{Coupon Payment}}{\text{Bond Price}} = \frac{\$75}{\$882.35} = 0.085$$

and the after-tax cost is 0.085 × (1 - .3) = 0.0595, or 5.95%

Topic 6: Risk and Return (Part 2)

Describe the Capital Asset Pricing Model (CAPM) and what it tells us.

The CAPM is a model that describes the relation between systematic risk and the expected return. The model tells us that the expected return on an asset with no systematic risk equals the risk-free rate. As systematic risk increases, the expected return increases linearly with beta. The CAPM is written as $E(R_i) = R_{rf} + b_i(E(R_m) - R_{rf})$.

If the expected return on the market is 10 per cent and the risk free rate is 4 per cent, what is the expected return for a share with a beta equal to 1.5? What is the market risk premium for the set of circumstances described?

Following the CAPM prediction:

$(R_{cs}) = R_{rf} + \beta\,(E(R_M) - R_{rf}) \quad = 0.04 + 1.5(0.1 - 0.04) = 0.13$

The market risk premium is $(E(R_M) - R_{rf}) \; = 0.06$

Given the returns and probabilities for the three possible states listed here, calculate the covariance between the returns of Share A and Share B. For convenience, assume that the expected returns of Share A and Share B are 11.75 per cent and 18 per cent, respectively.

	Probability	Return (A)	Return (B)
Good	0.35	0.30	0.50
OK	0.50	0.10	0.10
Poor	0.15	-0.25	-0.30

$$Cov(R_A, R_B) = \sigma_{AB} = 0.35(0.3 - 0.1175)(0.5 - 0.18) + 0.5(0.1 - 0.1175)(0.1 - 0.18) + 0.15(-0.25 - 0.1175)(-0.3 - 0.18) = 0.0476$$

Damien knows that the beta of his portfolio is equal to 1, but he does not know the risk-free rate of return or the market risk premium. He also knows that the expected return on the market is 8 per cent. What is the expected return on Damien's portfolio?

Following the CAPM prediction:

$(R_{cs}) = R_{rf} + \beta\,(E(R_M) - R_{rf}) \quad = R_{rf} + E(R_M) - R_{rf} = E(R_M) = 0.08$

In order to fund her retirement, Megan requires a portfolio with an expected retrun of 12 per cent per year over the next 30 years. She has decided to invest in Shares 1, 2 and 3, with 25 per cent in Share 1, 50 per cent in Share 2 and 25 per cent in Share 3. If Shares 1 and 2 have expected returns of 9 per cent and 10 per cent per year, respectively, then what is the minimum expected annual return for Share 3 that will enable Megan to achieve her investment requirement?

The formula for the expected return of a three-share portfolio is:

$$E(R_{3\,asset\,port}) = x_1 E(R_1) + x_2 E(R_2) + x_3 E(R_3)$$

Therefore, we can solve as in the following:

$0.12 = 0.25(0.09) + 0.5(0.1) + 0.25E(R_3)$

$0.19 = E(R_3)$