FINA 614

Sample Exam

Problem 1

HMS Corporation is considering an expansion project that requires investment in capital assets of $545,000, costs of $15,000 to modify the assets before they can be put into operation, and additional raw materials inventory of $50,000 to support the project. In addition, HMS had spent $25,000 to study the viability of this project. The opportunity costs associated with this project are $36,000. The project is expected to generate operating revenue of $600,000 per year, and the associated operating expenses are estimated at $275,000 per year. The capital assets belong to asset class 9, which has a CCA rate of 30 percent. The assets are expected to sell for $42,000 when the project terminates in eight years. Assume the asset class remains open after the project terminates. The firm's cost of capital is 14 percent and marginal tax rate is 40 percent.

A. What is the initial after-tax cash flow?
B. What is the present value of the CCA tax savings?
C. What is the present value of the after-tax operating cash flows?
D. What is the ending after-tax cash flow?
E. What is the NPV of the project?

Solution:

A. $CF_0 = \$545{,}000 + \$36{,}000 + \$50{,}000 + \$15{,}000 = \$646{,}000$

B. $C_0 = \$545{,}000 + \$15{,}000 = \$560{,}000$

$$PV(CCATS) = \frac{\$560{,}000 * .4 * .3}{(.14 + .3)} \times \frac{1.07}{1.14} - \frac{\$42{,}000 * .4 * .3}{(.14 + .3)} \times \frac{1}{1.14^8} = \$139{,}333.79$$

C. $PV(CFAT) = \$(600{,}000 - 275{,}000) * (1 - 40\%) * PVAF(14\%,8) = \$904{,}578.46$

D. $PV(ECF) = \frac{\$42{,}000 + \$50{,}000}{1.14^8} = \$32{,}251.43$

E. $NPV = -\$646{,}000 + \$139{,}333.79 + \$904{,}578.46 + \$32{,}251.43 = \$430{,}163.68$

Problem 2

Stock ABC is currently selling for $16.72. It has just paid an annual dividend of $0.80 per share, which is expected to grow at 4.5 percent indefinitely. The risk-free rate is 6 percent. The expected return on the market portfolio is 14 percent with a standard deviation of 17 percent.

A. What is the expected return on Stock ABC?
B. Is Stock ABC overpriced, underpriced, or correctly priced if it has a beta of 0.6?
C. Is Stock ABC above, below, or on the SML?
D. What is the equilibrium price of Stock ABC? Assume the dividend grow rate remains at 4.5 percent.

Solution

A. Expected return on Stock ABC $= \frac{\$0.8*1.045}{\$16.72} + 4.5\% = 9.5\%$

B. Required return on Stock ABC = 6% + 0.6(14% - 6%) = 10.8%*
Since Stock ABC's required return > expected return, ABC is overpriced.

C. Since Stock ABC is overpriced, it lies below the SML

D. In equilibrium, the price of Stock ABC $= \frac{\$0.8*1.045}{10.8\% - 4.5\%} = \$13.27$

Problem 3

Suppose you have $20,000 to invest in two securities: Spot and Dot. After you have done an extensive analysis of the economy and the two securities, you have the following forecasts:

State of the Economy	Probability of Occurrence	Spot Expected Return	Dot Expected Return
Boom	15%	-6%	35%
Normal	60%	12%	20%
Bust	25%	18%	-10%

A. What are the expected returns on Spot and Dot?
B. What are the standard deviations of the returns on Spot and Dot?
C. What is the covariance of the returns on Spot and Dot?
D. What is the correlation between Spot and Dot?
E. What is the composition of the portfolio if you wish to have an expected return of 12 percent on the portfolio?
F. What is the standard deviation of the portfolio?

Solution:

*A. Expected return on Spot = -6%*15% + 12%*60% + 18%*25% = 10.8%*
*Expected return on Dot = 35%*15% + 20%*60% + (-10%)*25% = 14.75%*

B. Spot's standard deviation, $\sigma_S = \sqrt{\sum_{i=1}^{3} Pr_i (r_i - 10.8\%)^2} = \sqrt{0.004234 + 0.000086 + 0.001296} = 7.49\%$

Dot's standard deviation,

$$\sigma_D = \sqrt{\sum_{i=1}^{3} \Pr_i \left(r_i - 14.75\%\right)^2} = \sqrt{0.006151 + 0.001654 + 0.015314} = 15.20\%$$

C. The covariance of the returns on Spot and Dot,

$$COV_{SD} = \sum_{i=1}^{3} \Pr_i \left(r_{s,i} - 10.8\%\right)\left(r_{D,i} - 14.75\%\right) = -.0051 + .000378 - .00446 = -0.00918$$

D. The correlation between Spot and Dot, $\rho_{SD} = \dfrac{COV_{SD}}{\sigma_S \sigma_D} = \dfrac{-0.00918}{0.07494 * 0.152049} = -0.80565$

E. Portfolio weight in Spot, $w_S = \dfrac{ER_P - ER_D}{ER_S - ER_D} = \dfrac{12\% - 14.75\%}{10.8\% - 14.75\%} = 69.62\%$

Portfolio weight in Dot, $w_D = 1 - 69.62\% = 30.38\%$

F. The portfolio standard deviation,

$$\sigma_P = \sqrt{w_S^2 \sigma_S^2 + w_D^2 \sigma_D^2 + 2 w_S w_D COV_{SD}} = \sqrt{0.002722 + 0.002134 - 0.003883} = 3.1186\%$$