FINC3017 - Tutorials

Week 1: Introduction

REAL VS FINANCIAL ASSETS

BKM chapter 1

7. Lanni Products is a start-up computer software development firm. It currently owns computer equipment worth $30,000 and has cash on hand of $20,000 contributed by Lanni's owners. For each of the following transactions, identify the real and/or financial assets that trade hands. Are any financial assets created or destroyed in the transaction?
   a. Lanni takes out a bank loan. It receives $50,000 in cash and signs a note promising to pay back the loan over 3 years.
   b. Lanni uses the cash from the bank plus $20,000 of its own funds to finance the development of new financial planning software.
   c. Lanni sells the software product to Microsoft, which will market it to the public under the Microsoft name. Lanni accepts payment in the form of 1,250 shares of Microsoft stock.
   d. Lanni sells the shares of stock for $100 per share and uses part of the proceeds to pay off the bank loan.

a) Financial asset created = Bank loan contract (or bank note – owned by bank)
Financial asset is transferred = Cash – transferred to Lanni

b) Financial asset (cash) is transferred to provider of software
Real intangible asset – software (received by Lanni)

c) Real intangible asset – software is transferred to Microsoft
Financial asset created (Microsoft issues new shares to transfer to Lanni)

d) Financial asset (shares) transferred – for cash
Financial asset – cash transferred from Lanni to bank
Financial asset destroyed – bank loan dissolves

8. Reconsider Lanni Products from the previous problem.
   a. Prepare its balance sheet just after it gets the bank loan. What is the ratio of real assets to total assets?
   b. Prepare the balance sheet after Lanni spends the $70,000 to develop its software product. What is the ratio of real assets to total assets?
   c. Prepare the balance sheet after Lanni accepts the payment of shares from Microsoft. What is the ratio of real assets to total assets?

a) Ratio of real assets to total assets = 3/10 = 0.3

Asset		Liabilities & Shareholders' Equity	
Real Assets:		- Bank loan:	$50,000
- Computer equipment:	$30,000		
Financial Assets:		- Shareholders' equity	$50,000
- Cash on hand:	$70,000		

Stock B = 80%*32% = 25.6%
Stock C = 80%*43% = 34.4%

c) SD = 0.8*0.28 = 0.224 = 22.4%

18. Suppose that your client prefers to invest in your fund a proportion y that maximizes the expected return on the complete portfolio subject to the constraint that the complete portfolio's standard deviation will not exceed 18%.
a. What is the investment proportion, y?
b. What is the expected rate of return on the complete portfolio?

a)

$$\sigma_c = \gamma \sigma_P$$
$$\sigma_c = 0.28\gamma < 0.18$$
$$\gamma = 0.642857 = 64.29\%$$

b)

$$E(r_c) = \gamma E(r_P) + (1-\gamma) r_f$$
$$E(r_c) = \frac{0.18}{0.28} * 0.18 + \left(1 - \frac{0.18}{0.28}\right) * 0.08 = 0.1442857 = 14.43\%$$

19. Your client's degree of risk aversion is $A = 3.5$.
a. What proportion, y, of the total investment should be invested in your fund?
b. What are the expected value and standard deviation of the rate of return on your client's optimized portfolio?

a) Optimal Y:

$$Y *= \frac{E(r_P) - r_f}{A\sigma_P^2}$$
$$Y *= \frac{0.18 - 0.08}{3.5 * 0.28^2} = 0.364431 = 36.44\%$$

b) Expected return:
E(r) = 0.3644*0.18 + (1-0.3644)*0.08 = 0.1164 = 11.64%

Standard Deviation:
Sigma = 0.3644*0.28 = 0.10204 = 10.2%

a) Variance = Beta^2 * Market Variance (=20%) * Error Variance

Answer:

$$\sigma^2 = \beta^2 \sigma_M^2 + \sigma^2(e)$$

$$\sigma_A^2 = (0.8^2 \times 0.20^2) + 0.25^2 = 0.0881$$

$$\sigma_B^2 = (1.0^2 \times 0.20^2) + 0.10^2 = 0.05$$

$$\sigma_C^2 = (1.2^2 \times 0.20^2) + 0.20^2 = 0.0976$$

b) Only have systematic risk → since well-diversified portfolio.

Answer: If there are an infinite number of assets with identical characteristics, then a well-diversified portfolio of each type will have only systematic risk since the non-systematic risk will approach zero with large n. Each variance is simply $\beta^2 \times$ market variance:

Well-diversified $\sigma_A^2 = 0.8^2 \times 0.20^2 = 0.0256$

Well-diversified $\sigma_B^2 = 1.0^2 \times 0.20^2 = 0.04$

Well-diversified $\sigma_C^2 = 1.2^2 \times 0.20^2 = 0.0576$

The mean will equal that of the individual (identical) stocks.

c) SML suggests a straight line relationship between beta and expected returns

Answer: There is no arbitrage opportunity because the well-diversified portfolios all plot on the security market line (SML). Because they are fairly priced, there is no arbitrage.

10. Consider the following multifactor (APT) model of security returns for a particular stock.

Factor	Factor Beta	Factor Risk Premium
Inflation	1.2	6%
Industrial production	0.5	8
Oil prices	0.3	3

a. If T-bills currently offer a 6% yield, find the expected rate of return on this stock if the market views the stock as fairly priced.

Answer:

$$E(r) = 6\% + (1.2 \times 6\%) + (0.5 \times 8\%) + (0.3 \times 3\%) = 18.1\%$$

16. Return again to Problem 14. Now suppose that the manager misestimates the beta of Waterworks stock, believing it to be .50 instead of .75. The standard deviation of the monthly market rate of return is 5%.

   a. What is the standard deviation of the (now improperly) hedged portfolio?

   b. What is the probability of incurring a loss over the next month if the monthly market return has an expected value of 1% and a standard deviation of 5%? Compare your answer to the probability you found in Problem 14.

   c. What would be the probability of a loss using the data in Problem 15 if the manager similarly misestimated beta as .50 instead of .75? Compare your answer to the probability you found in Problem 14.

   d. Why does the misestimation of beta matter so much more for the 100-stock portfolio than it does for the 1-stock portfolio?

a) The effective beta is only 0.25 → since manager only sells contracts to account for the 0.5 of beta → they missed out on the 0.25

a. What is the standard deviation of the (now improperly) hedged portfolio?

Answer: The manager does not sell enough contracts to fully hedge market exposure. Beta is reduced from 0.75 to 0.25 (rather than all the way to zero). For the improperly hedged portfolio:

$$\text{Variance} = \beta^2 \times \sigma_M^2 + \sigma^2(e_i) = (0.25^2 \times 0.05^2) + 0.06^2 = 0.00375625$$

Standard deviation = 0.06129 = 6.129%

b)

Answer: Since the manager has underestimated the beta of Waterworks, the manager will sell only 10 S&P 500 contracts (rather than the 15 contracts in Problem 14):

$$\frac{\$2,000,000 \times 0.50}{\$50 \times 2,000} = 10 \text{ contracts}$$

The portfolio is not completely hedged so the expected rate of return is no longer 2.5%. We can determine the expected rate of return by adding the total dollar value of the stock position to the value of the futures position.

The dollar value of the stock portfolio will be:

$$\$2,000,000 \times (1 + r_p) = \$2,000,000 \times [1 + 0.005 + 0.75 \times (r_M - 0.005) + 0.02 + e]$$
$$= \$2,042,500 + \$1,500,000 \times r_M + \$2,000,000 \times e$$

The dollar proceeds from the 10 futures contracts sold will be:

$$10 \times \$50 \times (F_0 - F_1) = \$500 \times [(S_0 \times 1.005) - S_1]$$
$$= \$500 \times S_0 \times [1.005 - (1 + r_M)]$$
$$= \$500 \times 2,000 \times [0.005 - r_M]$$
$$= \$5,000 - \$1,000,000 \times r_M$$

Start by calculating the return on the portfolio from first principle → using CAPM, adding the alpha term and residual risk → multiplied by the value of the portfolio

5. There are two independent economic factors, *M1* and *M2*. The risk-free rate is 5%, and all stocks have independent firm-specific components with a standard deviation of 25%. Portfolios A and B are well diversified. Given the data below, which equation provides the correct pricing model?

Portfolio	Beta on *M1*	Beta on *M2*	$E[r_p]$
A	1.5	1.75	35%
B	1.0	0.65	20%

A. $E(r_P) = 5 + 1.12\beta_{P1} + 11.86\beta_{P2}$
B. $E(r_P) = 5 + 4.96\beta_{P1} + 13.26\beta_{P2}$
C. $E(r_P) = 5 + 3.23\beta_{P1} + 8.46\beta_{P2}$
D. $E(r_P) = 5 + 8.71\beta_{P1} + 9.68\beta_{P2}$

- This is a question on APT, multifactor models
- We have risk-free rate, beta on factor portfolio 1 and 2 (M1 and M2), and total returns on Portfolio A and B
- We are missing risk premiums on M1 and M2
- Use the APT to set up equations to find risk premium 1 and rp2:

5. $0.35 = 0.05 + 1.5\ RP_1 + 1.75\ RP_2$

$0.20 = 0.05 + RP_1 + 0.65\ RP_2$

- RP1 = 8.71%
- RP2 = 9.68%

6. If the daily returns on the stock market are normally distributed with a mean of 0.05% and a standard deviation of 1%, the probability that the stock market would have a return of -23% or worse on one particular day (as it did on Black Monday) is approximately ________.

A. 0.0%
B. 0.1%
C. 1%
D. 10%

- Calculate z-score = [Point estimate – mean]/SD
  = [-0.23 – 0.0005]/0.01
  = -23.05
- Week 3 Lecture, Page 19
- 99.74% = +/- 3 SD from the mean
- 68.26% = +/- 1 SD
- 95.44% = +/- 2 SD
- In Question 6 → - 23.05 SD is soooo far left that it is 0% probability
- Thus, Black Monday makes a comment about the normality of distributions