Commerce 374
Winter 2007
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Homework 3
Answer Key

Part I: Multiple Choice

1. The variance of a portfolio of risky securities is ...
   A) the sum of the securities' covariances
   B) the sum of the securities' variances
   C) the weighted sum of the securities' covariances
   D) the weighted sum of the securities' variances

2. The _____ decision should take precedence over the _____ decision.
   A) asset allocation, stock selection
   B) choice of fad, mutual fund selection
   C) stock selection, asset allocation
   D) stock selection, mutual fund selection

3. Asset A has an expected return of 15% and a reward-to-variability ratio of .4. Asset B has an expected return of 20% and a reward-to-variability ratio of .3. A risk-averse investor would prefer a portfolio using the risk-free asset and _____.
   A) asset A
   B) asset B
   C) no risky asset
   D) can't tell from the data given

4. Consider two perfectly negatively correlated risky securities, A and B. Security A has an expected rate of return of 16% and a standard deviation of return of 20%. B has an expected rate of return 10% and a standard deviation of return of 30%. The weight of security B in the global minimum variance is _____.
   A) 10%
   B) 20%
   C) 40%
   D) 60%

5. According to the capital asset pricing model, _____.
   A) all securities must lie on the capital market line
   B) all securities must lie on the security market line
   C) underpriced securities lie below the security market line
   D) overpriced securities lie above the security market line

6. Consider the CAPM. The risk-free rate is 5% and the expected return on the market is 15%. What is the beta on a stock with an expected return of 12%?
   A) .5
   B) .7
   C) 1.2
   D) 1.4

7. Security A has an expected rate of return of 12% and a beta of 1.10. The market expected rate of return is 8% and the risk-free rate is 5%. The alpha of the stock is _____.
   A) -1.7%
   B) 3.7%
   C) 5.5%
   D) 8.7%

8. The risk-free rate is 4%. The expected market rate of return is 11%. If you expect stock X with a beta of .8 to offer a rate of return of 12 percent, then you should _____.
   A) buy stock X because it is overpriced
   B) buy stock X because it is underpriced
   C) sell short stock X because it is overpriced
   D) sell short stock X because it is underpriced

9. A security's beta coefficient will be negative if _____.
   A) its returns are negatively correlated with market index returns
   B) its returns are positively correlated with market index returns
   C) its stock price has historically been very stable
   D) market demand for the firm's shares is very low

10. An index fund that holds the market portfolio will need to rebalance its portfolio _____.

    A) Prices change
    B) Expected returns change
    C) A stock split occurs
    D) None of the above

11. The beta of a security is...
    A) The covariance between the security and the market returns divided by the variance of the market's returns.
    B) The covariance between the security and the market returns divided by the variance of the securities' returns.
    C) The correlation coefficient between the security and the market returns.
    D) The covariance between the security and the market returns.

12. Stocks A, B, C, and D have betas of 1.5, 0.4, 0.9, and 1.7 respectively. What is the beta of an equally weighted portfolio of A, B, and C …
    A) 0.25
    B) 0.93
    C) 1.00
    D) 1.13

13. According to Tobin's separation property, portfolio choice can be separated into two independent tasks consisting of _____ and _____.
    A) identifying all investor imposed constraints; identifying the set of securities that conform to the investor's constraints and offer the best risk-return tradeoffs
    B) identifying the investor's degree of risk aversion; choosing securities from industry groups that are consistent with the investor's risk profile
    C) identifying the optimal risky portfolio; constructing a complete portfolio from T-bills and the optimal risky portfolio based on the investor's degree of risk aversion
    D) None of the above answers is correct

14. _____ is not a true statement regarding the market portfolio.
    A) All securities in the market portfolio are held in proportion to their market values
    B) It includes all assets of the universe
    C) It is the tangency point between the capital market line and the indifference curve
    D) It lies on the efficient frontier

15. According to the capital asset pricing model, _____.
    A) all securities must lie on the capital market line
    B) all securities must lie on the security market line
    C) underpriced securities lie below the security market line
    D) overpriced securities lie above the security market line

16. Consider the following two stocks, A and B. Stock A has an expected return of 10% and a beta of 1.20. Stock B has an expected return of 14% and a beta of 1.80. The expected market rate of return is 9% and the risk-free rate is 5%. Security … would be considered a good buy because _____
    A) A, it offers an alpha of 0.8%
    B) A, it offers an alpha of 2.2%
    C) B, it offers an alpha of 1.8%
    D) B, it offers an alpha of 2.4%

Use the following to answer questions 17-20:

Summary Output	
Regression Statistics	
Multiple R	0.35
R Square	0.12
Adjusted R Square	0.02
Standard Error	38.45
Observations	12

	Coefficients	Standard Error	t Stat	P-value
Intercept	4.05	15.44	0.26	.80
Market	1.32	0.97	1.36	.10

17. The beta of this stock is _____.
    A) 0.12
    B) 0.35
    C) 1.32
    D) 4.05

18. This stock has greater systematic risk than a stock with a beta of ____.
    A) 0.50
    B) 2.00
    C) 4.00
    D) all of the above

19. The characteristic line for this stock is R_{stock} = ___ + ___ $R_{market.}$
    A) 0.35, 0.12
    B) 4.05, 1.32
    C) 15.44, 0.97
    D) none of the above

20. ____ percent of the variance is explained by this regression
    A) 12
    B) 35
    C) 4.05
    D) 80

Part II: Calculations

1. *Are the following statements true or false? Explain.*
   a. *Stocks with a beta of zero offer an expected rate of return of zero.*

      False! Stocks with a beta of zero offer an expected rate of return equal to the risk-free rate.

   b. *The CAPM implies that investors require a higher return to hold highly volatile securities.*

      False! The CAPM implies that investors require a higher return to hold securities with the highest systematic risk. Firm-specific risk does not affect the expected returns of securities.

   c. *You can construct a portfolio with a beta of 0.75 by investing 0.75 of the budget in T-Bills and the remainder in the market portfolio.*

      False! You need to invest 75% in the market portfolio and 25% in T-Bills to get a beta of 0.75.

2. *If the CAPM is valid, which of the following situations is possible? Explain. Consider each situation separately.*

   a.

Portfolio	***Expected Return***	***Beta***
A	*20%*	*1.4*
B	*25%*	*1.2*

   Not possible. Portfolio A has a higher beta but a lower expected return.

   b.

Portfolio	***Expected Return***	***Standard Deviation***
A	*30%*	*35%*
B	*40%*	*25%*

   Possible. The expected rate of return compensates only for systematic risk as measured by beta rather than the standard deviation which includes firm-specific risk.

   c.

Portfolio	***Expected Return***	***Standard Deviation***
T-Bills	*10%*	*0%*
Market	*18%*	*24%*
A	*16%*	*12%*

   Not possible. The reward-to-variability ratio for portfolio A is better than that of the market. Portfolio A has a reward-to-variability ratio of 0.5 (=(0.16-0.1)/0.12) and the market has a ratio of 0.33 (=(0.18-0.10)/0.24). This is impossible, because the market is the most efficient portfolio.

d.	***Portfolio***	***Expected Return***	***Standard Deviation***
	T-Bills	*10%*	*0%*
	Market	*18%*	*24%*
	A	*20%*	*22%*

Not possible. Portfolio A clearly dominates the market portfolio, it has a lower standard deviation and a higher expected return.

3. *Sauder & Associates manages a $30 million equity portfolio for the multimanager Wilstead Pension Fund. Jason Jones, financial vice president of Wilstead, noted that Sauder had rather consistently achieved the best record among the Wilstead's six equity managers. Performance of the Sauder portfolio had been clearly superior to that of the S&P 500 in four of the past five years. In the one less favorable year, the shortfall was trivial*

   Sauder is a 'bottom-up' manager. The firm largly avoids any attempt to 'time the market.' It also focuses on selection of individual stocks rather than the weighting of favored industries.

   There is no apparent conformity of style among the six different equity managers. The five managers, other than Sauder, manage portfolios aggregating $250 million, made up of more than 150 individual issues.

   Jones is convinced that Sauder is able to apply superior skill to stock selection, but the favorable results are limited by the high degree of diversification in the portfolio. Over the years, the portfolio generally held 40-50 stocks, with about 2% to 3% of total funds committed to each issue. The reason Sauder seemed to do well most years was because the firm was able to identify each year 10 to 12 issues that registered particularly large gains.

   Based on this overview, Jones outlined the following plan to the Wilstead pension committee: "Let's tell Sauder to limit the portfolio to no more than 20 stocks. Sauder will double the commitments to the stocks that it really favors and eliminate the remainder. Except for this one new restriction, Sauder should be free to managed the portfolio exactly as before."

   All the members of the pension committee generally supported Jones' proposal, because all agreed that Sauder had seemed to demonstrate superior skill in selecting stocks. Yet, the proposal was a considerable departure from previous practice and several committee members raised questions.

   a. *Why will the decrease in the number of stocks increase the returns of the portfolio?*

      Sauder can concentrate its portfolio on holdings that have the highest alphas.

b. *How will the limitation of 20 stocks affect the total risk of the portfolio?*

The total risk of the portfolio will likely increase, because the portfolio becomes poorly diversified.

c. *Which criteria should they take into account when deciding whether to decrease the number of stocks in the Sauder fund?*

It is beneficial to decrease the number of stocks if the return increases sufficiently relative to the total risk in the complete portfolio of the pension fund, which includes six different funds. Since Sauder's portfolio is only one of six well-diversified portfolios, and is smaller than the average, the concentration in fewer issues might have a minimal effect on the diversification of the total fund. Hence, unleashing Sauder to do stock picking may be advantageous.

4. *A small investment-consulting firm in the country of Transylvania is convinced that there are two key common factors affecting stock returns. One is associated with a stock's dividend yield, the other with its historic earnings growth rate. To this end, each of the 100 stocks in the Transylvanian market has been analyzed, and assigned two numbers. The first, y(i) is the relative yield of the stock. This is an integer number that ranges from a value of 100 (for the stock with the highest yield) to 1 (for the stock with the lowest yield). The stock with the second-highest yield has a y(i) of 99, and so on. The second number g(i) indicates the stock's relative growth rate. Here, too the numbers are integers from 100 (for the stock with the highest historic growth rate) to 1 for the stock with the lowest historic growth rate.*
The consulting firm has also classified each stock based on its economic activity. Every stock has been assigned to one (and only one) economic sector, basic industries (B), consumer goods (C), finance (F), or technology (T).
The firm has hired you to implement this view in a factor model of security returns.
a) Write the equation that will characterize your model of the return-generating process. Please define each term in sufficient detail to avoid any confusion.

Six factors are needed. The first two can reflect the yield factor and growth factor, with the last four reflecting the industry factors. Let im1(i) equal 1 if security i is a member of industry 1 and zero otherwise, im2(i) equal 1 if security i is a member of industry 2 and zero otherwise, etc. we have:

r(i) = y(i)*fy + g(i)*fg + im1(i)*if1 + im2(i)*if2 + im3(i)*if3 + im4(i)*if4 + e(i)

Here the factors are the yield factor (fy) the growth factor (fg), and industry factors 1 (if1) through 4 (if4) Alternatively, an intercept could be included (for example, a(i)) with the understanding that the expected value of e(i) is zero.

b) Assume that the yield factor was positive last month. Does it mean that every stock with a yield greater than the median yield outperformed every stock with a yield below the median yield? Suppose that there are two stocks in the same industry with the same historic earnings growth. Does this mean that the one with the higher yield outperformed

the one with the lower yield? What, if anything, can you say about the relative performance of high yield and low yield stocks, based on the fact that the yield factor was positive?

The information that the yield factor was positive only indicates that on average, other things equal, high yield stocks outperformed low yield stocks. In fact there were undoubtedly many cases in which a high yield stock underperformed a low yield stock. This could be due to different exposures to other factors. However, even in the case in which two stocks had the same exposures to other factors (as the second part of the question asked), the residual returns could cause the high yield stock to underperform the low yield stock.