École de gestion TELFER School of Management

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Midterm Exam
ADM 3352 A
Portfolio Management
Fall 2009
(1 Hour and 20 minutes)
Prof. C. Guo

Closed-book exam. No material of any kind is allowed. A calculator is required. The formula pages can be detached and need not submit.

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I have read the text on academic integrity and I pledge not to have committed or attempted to commit academic fraud in this examination.

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Question	Credit	Mark
1	35	33
2	45	43
Multiple Choice	20	19
Total	100	95

Wow!

Question 1 (35 points)

Consider one share of a risky asset with two possible outcomes at the end of the year: it will be worth \$80 if the state of economy is good; it will be worth \$40 if the state of economy is bad. The asset is to pay \$2 dividend per year regardless the state of the economy. The probabilities of the good and bad states are 0.7 and 0.3, respectively. The risk-free interest rate is 4% per year.

(1) (5 points) What is the expected value of the asset?
(2) (5 points) What is the standard deviation of the value of the asset?
(3) (5 points) If you are risk-neutral, how much are you willing to pay for the asset today?
(4) (5 points) If you require 12% risk premium per year, how much are you willing to pay for the asset today?
(5) (15 points) Following your answer to part (4), what is the standard deviation of your holding period return?

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1) Expected Value of the Asset = (% good econ)(Value in good) + (% bad econ)(value in bad)
$= (0.7)(\$80) + (0.3)(\$40)$
$= \$68$
∴ The expected value of the asset is \$68

$E(r) = 0.7 \times 8 + 0.3 \times 0$

-2

2) $\sigma^2 = (0.70)(80 - 68)^2 + (0.3)(40 - 68)^2$
$= 100.8 + 235.2$
$\sigma = \sqrt{336}$
$\sigma = \$18.33$
∴ The standard deviation in dollars is \$18.33.

3) Price willing to Pay (risk neutral) = $\frac{\text{Final Price} + \text{Dividends}}{1 + \text{risk free rate}}$
$= \frac{\$68 + \$2}{1.04}$
$= \frac{70}{1.04}$
$\simeq \$67.31$
∴ The risk-neutral investor is willing to pay \$67.31.

4) Price willing to Pay (risk adverse) = $\frac{P_1 + D}{1 + r_f + r_p}$
$= \frac{\$68 + \$2}{1 + 0.04 + 0.12}$
$\simeq \$60.34$
∴ The risk adverse investor is willing to pay \$60.34

(Extra space for Question 1)

5) Expected Return = $(0,7)\left(\frac{80-60,34}{60,34}\right) + (0,3)\left(\frac{40-60,34}{60,34}\right)$

$= 0,22807 + -0,10112$ ✓

$= 12,69\%$

mistake carried forward, process ok.

∴ The expected return is 12,69% → 16.1.

Returns in good times $= \left(\frac{80-60,34}{60,34}\right) \times 100\%$

$= 32,58\%$ ✓ → 0.3589

Returns in bad times $= \left(\frac{40-60,34}{60,34}\right) \times 100\%$

→ -0.304

$= -33,71\%$

$\sigma^2 = (0,70)(0,3258 - 0,1269)^2 + (0,3)(-0,3371 - 0,1269)^2$

$\sigma^2 = 0,027612847 + 0,064588$

$\sigma^2 = 0,092281647$

$\sigma \approx \sqrt{0,09228}$

$\sigma \approx 0,30378$

$\sigma = 30,38\%$

∴ The expected standard deviation of the holding period return is 30,38%

Question 2 (45 points)

You have \$100,000 to invest. The following are information on two risky assets and one risk-free asset:

$E(r_1) = 10\%$ (0.10), $E(r_2) = 20\%$ (0.20), $\sigma_1 = 15\%$ (0.15), $\sigma_2 = 25\%$ (0.25), $\text{cov}(r_1, r_2) = 140(\%)^2$ (0.014), $r_f = 5\%$ (0.05)

18 (1) (20 points) Assume that the riskfree asset is not available. How should you allocate the \$100,000 in the two risky assets if you want the minimum variance? What is the expected return and standard deviation of this portfolio? Show all the intermediate steps and calculations.

25 (2) (25 points) The riskfree asset is now available. How should you allocate the \$100,000 to maximize your expected return without exceeding the risk level in part (1)? Show all the intermediate steps and calculations

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(1) $w_1^{min} = \dfrac{\sigma_2^2 - \text{cov}(r_1, r_2)}{\sigma_1^2 + \sigma_2^2 - 2\text{cov}(r_1, r_2)}$

$= \dfrac{(0,25)^2 - (0,0140)}{(0,15)^2 + (0,25)^2 - 2(0,0140)}$

$= \dfrac{0,0485}{0,057}$

$\approx 0,85$ ✓

$w_2^{min} = 1 - 0,85$

$= 0,15$

(-2)

$E(r_p) = w_1 E(r_1) + w_2 E(r_2)$

$E(r_p) = (0,85)(10\%) + (0,15)(20\%)$

$E(r_p) = 11,5\%$ ✓

$\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 - 2w_1w_2\,\text{Cov}(r_1, r_2)$

$= (0,85)^2(0,15)^2 + (0,15)^2(0,25)^2 - 2(0,85)(0,15)(0,014)$

$= 0,0176625 - 2(0,85)(0,15)(0,014)$

$= 0,0140925$ ✗ → 0.021232

$\sigma_p = \sqrt{0,0140925}$

$\sigma_p = 0,1187$ or $11,87\%$ → 0.1457.

∴ If a risk free asset is not available you should allocate 85% to asset #1 and 15% to asset #2. This will create a portfolio with an expected return of 11,5% and a standard deviation of 11,87% 14.57%.

(Extra space for Question 2)

(2) $E(r_c) = (1-y) \times r_f + y E(r)$ $\quad \sigma_c = y\,\sigma(r)$

$0.1187 = y(\quad)$

(a) $$w_1^* = \frac{[E(r_1)-r_f]\sigma_2^2 - [E(r_2)-r_f]\,cov(r_1,r_2)}{[E(r_1)-r_f]\sigma_2^2 + [E(r_2)-r_f]\sigma_1^2 - [E(r_1)-r_f + E(r_2)-r_f]\,cov(r_1,r_2)}$$

$$= \frac{[0.10-0.05](0.25)^2 - [0.2-0.05](0.014)}{[0.10-0.05](0.25)^2 + [0.2-0.05](0.15)^2 - [0.10-0.05+0.2-0.05](0.014)}$$

$$= \frac{0.001025}{0.0037}$$

$w_1^* = 0.2770$ or 27.70% ✓

$w_2^* = 1 - w_1^*$

$= 72.30\%$

(b) $\sigma^{2*} = (0.277)^2(0.15)^2 + (0.7230)^2(0.25)^2 + 2(0.277)(0.7230)(0.014)$

$= 0.04$

$\sigma^* = \sqrt{0.0400}$

$= 20.00\%$ ✓

(c) Find risky portfolio weightings

$\sigma_c = y\,\sigma(r)$

$y = \frac{0.1187}{0.2}$ → 14.57% (process ok, mistake carried forward) (E)

$y \cong 0.59$ or 59% → 0.7285

$(1-y) \cong 41\%$ → 0.2715.

(d) Return on optimal frontier

$E(r_c) = (1-y) \times r_f + y E(r)$

$= (0.41)(0.05) + (0.59)(0.1723)$

$= 12.22\%$ → 13.91%

∴ The performance is increased from 11.5% to 12.22% on the optimal frontier with same amount of risk.

(e) Allocation per asset

T-bill $\cong 41\% = \$41,000.00$ → 27150

Asset #1 $\cong (0.59)(0.277) = 16.34\% = \$16,340.00$ → 20182

Asset #2 $\cong (0.59)(0.723) = 42.66\% = \$42,660.00$ → 52672

(f) $E(r_c) = (1-y) \times r_f + y E(r)$

$= (0.277)(0.10) + (0.723)(0.2$

$E(r) = 17.23\%$ ✓

Multiple Choice (20 points)

1. Financial intermediaries differ from other businesses in that both their assets and their liabilities are mostly
   A) illiquid.
   B) owned by government.
   C) real.
   D) financial.
   E) regulated.

2. Firms that specialize in helping companies raise capital by selling securities are called _____.
   A) chartered banks
   B) investment banks
   C) trust companies
   D) credit unions
   E) all of the above.

3. Which of the following indices is (are) market-value weighted?
   I) The S&P/TSX Composite Index.
   II) The Standard and Poor's Composite 500- Stock Index.Response
   III) The Dow Jones Industrial Average.

   A) I only
   B) I and II only
   C) I and III only
   D) I, II, and III
   E) II and III only

4. The Dow Jones Industrial Average (DJIA) is computed by:
   A) adding the prices of 30 large "blue-chip" stocks and dividing by 30.
   B) calculating the total market value of the 30 firms in the index and dividing by 30.
   C) adding the prices of the 30 stocks in the index and dividing by a divisor.
   D) adding the prices of the 500 stocks in the index and dividing by a divisor.
   E) adding the prices of the 30 stocks in the index and dividing by the value of these stocks as of some base date period.

5. A purchase of a new issue of stock takes place
   A) in the secondary market.
   B) in the primary market.
   C) usually with the assistance of an investment banker or dealer.
   D) **a** and **b**.
   E) **b** and **c**.

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6. Investment bankers
   A) act as intermediaries between issuers of stocks and investors.
   B) act as advisors to companies in helping them analyze their financial needs and find buyers for newly issued securities.
   C) accept deposits from savers and lend them out to companies.
   D) **a** and **b**.
   E) **a**, **b**, and **c**.

7. In a "best-efforts" basis
   A) the investment banker buys the stock from the company and resells the issue to the public.
   B) the investment banker agrees to help the firm sell the stock at a favorable price.
   C) the investment banker finds the best marketing arrangement for the investment banking firm.
   D) **b** and **c**.
   E) **a** and **b**.

8. You purchased XYZ stock at $50 per share. The stock is currently selling at $65. Your gains may be protected by placing a _____
   A) stop-loss order
   B) limit-buy order
   C) market order
   D) limit-sell order
   E) none of the above.

9. You sold ABC stock short at $80 per share. Your losses could be minimized by placing a _____:
   A) limit-sell order
   B) limit-buy order
   C) stop-buy order
   D) day-order
   E) none of the above.

10. The cost of buying and selling a stock consists of _____.
   A) broker's commissions
   B) dealer's bid-asked spread
   C) a price concession an investor may be forced to make.
   D) **a** and **b**.
   E) **a**, **b**, and **c**.

11. Assume you purchased 200 shares of XYZ common stock on margin at $70 per share from your broker. If the initial margin is 55%, how much did you borrow from the broker?
A) $6,000
B) $4,000
C) $7,700
D) $7,000
E) $6,300

12. You sold short 200 shares of common stock at $60 per share. The initial margin is 60%. Your initial investment was
A) $4,800.
B) $12,000.
C) $5,600.
D) $7,200.
E) none of the above.

13. Shares for short transactions
A) are usually borrowed from other brokers.
B) are typically shares held by the short seller's broker in street name.
C) are borrowed from commercial banks.
D) **b** and **c**.
E) none of the above.

14. Which of the following orders is most useful to short sellers who want to limit their potential losses?
A) Limit order
B) Discretionary order
C) Limit-loss order
D) Stop-buy order
E) None of the above

15. A prompt offering prospectus
A) is a way of placing issues in the primary market.
B) allows firms to register securities for sale in advance of the actual time of sale.
C) increases transaction costs to the issuing firm.
D) **a** and **b**.
E) **a** and **c**.

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16. The finalized registration statement for new securities approved by the OSC is called
A) a red herring
B) the preliminary statement
C) the prospectus
D) a best-efforts agreement
E) a firm commitment

17. Multiple Mutual Fund had year-end assets of $457,000,000 and liabilities of $17,000,000. There were 24,300,000 shares in the fund at year end. What was Multiple Mutual's Net Asset Value?
A) $18.11
B) $18.81
C) $69.96
D) $7.00
E) $181.07

18. Diversified Portfolios had year-end assets of $279,000,000 and liabilities of $43,000,000. If Diversified's NAV was $42.13, how many shares must have been held in the fund?
A) 43,000,000
B) 6,488,372
C) 5,601,709
D) 1,182,203
E) None of the above.

19. Most actively managed mutual funds, when compared to a market index such as the Wilshire 5000,
A) beat the market return in all years.
B) beat the market return in most years.
C) exceed the return on index funds.
D) do not outperform the market
E) None of the above is a correct statement.

20. Management fees and other expenses of mutual funds may include
A) front-end loads.
B) back-end loads.
C) other charges.
D) **a** and **b** only.
E) **a**, **b** and **c**.