

15.433 Investments

Assignment 1: Securities, Markets & Capital Market Theory

Each question is worth 0.2 points, the max points is 3 points

1. The interest rate charged by banks with excess reserves at a Federal Reserve Bank to banks needing overnight loans to meet reserve requirements is called the_____.
A) prime rate
B) discount rate
C) federal funds rate
D) call money rate
E) money market rate

Ans: C

2. Which of the following statements is (are) true regarding municipal bonds?
I) A municipal bond is a debt obligation issued by state or local governments.
II) A municipal bond is a debt obligation issued by the federal government.
III) The interest income from a municipal bond is exempt from federal income taxation.
IV) The interest income from a municipal bond is exempt from state and local taxation in the issuing state.
A) I and II only
B) I and III only
C) I, II, and III only
D) I, III, and IV only
E) I and IV only

Ans: D

3. A form of short-term borrowing by dealers in government securities is
A) reserve requirements.
B) repurchase agreements
C) banker's acceptances.
D) commercial paper.
E) brokers' calls.

Ans: B

4. Restrictions on trading involving insider information apply to the following except
A) corporate officers and directors.
B) relatives of corporate directors and officers.

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- C) major stockholders.
- D) All of the above are subject to insider trading restrictions.
- E) None of the above is subject to insider trading restrictions.

Ans: D

5. Discuss margin buying of common stocks. Include in your discussion the advantages and disadvantages, the types of margin requirements, how these requirements are met, and who determines these requirements.

Ans: Buying stock on margin means buying stock with partially borrowed funds. These funds are borrowed from your broker, who has borrowed the funds from a commercial bank. The initial margin requirement is the percent of the funds that must be your own. The current initial margin requirement is 50% and is set by the Federal Reserve System. Margin is simply equity as a percent of the value of your account. Subsequent to opening the account, stock prices change and thus the margin of your account changes. The maintenance margin is the relevant margin after you open your account. A 25% maintenance margin is required for NYSE listed stocks; however, most brokers will require a maintenance margin above that amount. If the margin of your account falls below the maintenance margin requirement, you will receive a margin call. You can either send your broker more cash to reduce the amount of the original loan to get your account back to the required maintenance margin, or your broker can sell some of the shares for you, using the proceeds to reduce the amount of your original loan, thus getting your account back to the margin requirement.

If the price of the stock increases, your account will become overmargined and you can either pyramid (buy more shares without using any of your own cash) or you can withdraw cash from the account (increasing the amount of the loan). If you execute either of these actions, you must not let your account fall below the initial margin requirement (increasing the number of shares or the amount of the loan requires the account to be treated as a new account).

The advantage of margin is that of leverage. If the price of stock increases you own more shares than had you used only your own funds and your returns will be greater. The disadvantage of margin is that if the price of the stock declines you will own more shares and your losses will be greater than had you used only your own funds.

6. Security A has a beta of 1.0 and an expected return of 12%. Security B has a beta of 0.75 and an expected return of 11%. The risk-free rate is 6%. Explain the arbitrage opportunity that exists; explain how an investor can take advantage of it. Give specific details about how to form the portfolio, what to buy and what to sell (we assume that the company-specific risk can be neglected).

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Ans: An arbitrage opportunity exists because it is possible to form a portfolio of security A and the risk-free asset that has a beta of 0.75 and a different expected return than security B. The investor can accomplish this by choosing .75 as the weight in A and .25 in the risk-free asset. This portfolio would have $E(r_p) = 0.75(12\%) + 0.25(6\%) = 10.5\%$, which is less than B's 11% expected return. The investor should buy B and finance the purchase by short selling A and borrowing at the risk-free asset.

7. In the APT model, what is the nonsystematic standard deviation of an equally-weighted portfolio that has an average value of $\sigma(e_i)$ equal to 25% and 50 securities?
- A) 12.5%
 - B) 625%
 - C) 0.5%
 - D) 3.54%
 - E) 14.59%

Ans: D

8. Consider a well-diversified portfolio, A, in a two-factor economy. The risk-free rate is 6%, the risk premium on the first factor portfolio is 4% and the risk premium on the second factor portfolio is 3%. If portfolio A has a beta of 1.2 on the first factor and .8 on the second factor, what is its expected return?
- A) 7.0%
 - B) 8.0%
 - C) 9.2%
 - D) 13.0%
 - E) 13.2%

Ans: E

9. The index model for stock B has been estimated with the following result:

$$R_B = 0.01 + 1.1R_M + e_B$$

If $\sigma_M = 0.20$ and $R_B^2 = 0.50$, the standard deviation of the return on stock B is _____.

- A) 0.1111
- B) 0.2111
- C) 0.3111
- D) 0.4111
- E) none of the above

Ans: C

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10. Discuss the advantages of the single-index model over the Markowitz model in terms of numbers of variable estimates required and in terms of understanding risk relationships.

Ans: For a 50 security portfolio, the Markowitz model requires the following parameter estimates:
n = 50 estimates of expected returns;
n = 50 estimates of variances;
 $(n^2 - n)/2 = 1,225$ estimates of covariances; $(n^2 - n)/2 + 2n = 1,325$ estimates.

For a 50 security portfolio, the single-index model requires the following parameter estimates:
n = 50 estimates of expected excess returns, $E(R)$;
n = 50 estimates of sensitivity coefficients, β_i ;
n = 50 estimates of the firm-specific variances, $\sigma^2(e_i)$;
1 estimate for the variance of the common macroeconomic factor, σ^2_M ;
or $(3n + 1) = 151$ estimates.

In addition, the single-index model provides further insight by recognizing that different firms have different sensitivities to macroeconomic events. The model also summarizes the distinction between macroeconomic and firm-specific risk factors.

11. Draw graphs that represent each of the following situations:

- Investors face an efficient frontier of risky assets. There is no borrowing or lending allowed at a risk-free rate. Using indifference curves, show an example of the optimal portfolio choice for Investor A, who has a strong aversion to risk, and one for Investor B, who is much less risk-averse. Label points A and B clearly.
- Investors face an efficient frontier of risky assets. Borrowing and lending at a risk-free rate are allowed. Using indifference curves, show an example of Investor C, who chooses to put 100% of his investment in the optimal risky portfolio. Show an example of Investor D, who chooses to put 75% of her investment in the optimal risky portfolio. Label points C and D clearly.
- Investors face an efficient frontier of risky assets. Lending at a risk-free rate is allowed, and investors can borrow at a slightly higher rate. Using an indifference curve, show an example of Investor E, who chooses to borrow. Label this point E. On the same graph show where the investor's indifference curve would be if she could borrow at the lending rate. Label this point F.

Ans: The graph of investors A and B should resemble Figure 8-15 on page 237. The graph of investors C and D should look like Figure 8-8 on page 222, with C lying to the left of P and point D to the right of P. The graph with points E and F is similar to Figure 8-16 on page 237.

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12. Given an optimal risky portfolio with expected return of 14% and standard deviation of 22% and a risk free rate of 6%, what is the slope of the best feasible CAL?
- A) 0.64
 - B) 0.14
 - C) 0.08
 - D) 0.33
 - E) 0.36

Ans: E

13. Security X has expected return of 12% and standard deviation of 20%. Security Y has expected return of 15% and standard deviation of 27%. If the two securities have a correlation coefficient of 0.7, what is their covariance?
- A) 0.038
 - B) 0.070
 - C) 0.018
 - D) 0.013
 - E) 0.054

Ans: A

14. What is an Exchange-traded fund? Give two examples of specific ETFs. What are some advantages they have over ordinary open-end mutual funds? What are some disadvantages?

Ans: ETFs allow investors to trade index portfolios. Some examples are spiders (SPDR), which track the S&P500 index, diamonds (DIA), which track the Dow Jones Industrial Average, and qubes (QQQ), which track the Nasdaq 100 index. Other examples are listed in Table 4-3, page 117. (It is anticipated that there may soon be ETFs that track actively managed funds as well as the current ones that track indexes.)

Advantages -

1. ETFs may be bought and sold during the trading day at prices that reflect the current value of the underlying index. This is different from ordinary open-end mutual funds, which are bought or sold only at the end of the day NAV (Net Asset Value).
2. ETFs can be sold short.
3. ETFs can be purchased on margin.
4. ETFs may have tax advantages. Managers are not forced to sell securities from a portfolio to meet redemption demands, as they would be with open-end funds. Small investors simply sell their ETF shares to other traders without affecting the composition

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of the underlying portfolio. Institutional investors who want to sell their shares receive shares of stock in the underlying portfolio.

5. ETFs may be cheaper to buy than mutual funds because they are purchased from brokers. The fund doesn't have to incur the costs of marketing itself, so the investor incurs lower management fees.

Disadvantages -

1. ETF prices can differ from NAV by small amounts because of the way they trade. This can lead to arbitrage opportunities for large traders.

2. ETFs must be purchased from brokers for a fee. This makes them more expensive than mutual funds that can be purchased at NAV.

15. Of the items listed, which have the new SEC regulations designated as required disclosures?

I) tax-adjusted returns over the last 10 years

II) the fund's best and worst quarterly returns during the last 10 years

III) the managers' ownership in the fund

IV) the specific assets held by the fund

A) I and II

B) I and III

C) III and IV

D) I, III, and IV

E) none of the above – the reporting of each of these items will be voluntary

Ans: A and E are considered correct answers. The book contains on two places conflicting answers on the same topic.