

VANDERBILT UNIVERSITY
The Owen Graduate School of Management

Management 6435
Applied Investment Management

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Spring 2023 Mod 4

ASSIGNMENT 2 (Due: 11AM, Monday, March 27, 2023)

General knowledge (5 points each)

- 1) The *utility of wealth function* for a risk-averse individual has:
 - a. Increasing positive marginal utility of wealth.
 - b. Diminishing positive marginal utility of wealth.
 - c. Negative marginal utility of wealth.
 - d. None of the above.

- 2) A *risk averter* will always choose a portfolio that has:
 - a. The highest level of expected return.
 - b. The lowest level of expected volatility for a given level of expected return.
 - c. The highest expected return for a given level of expected volatility.
 - d. The lowest level of expected utility.

- 3) A *risk-neutral individual* will choose a portfolio that has:
 - a. The highest level of expected return.
 - b. The lowest level of expected volatility for a given level of expected return.
 - c. The highest expected return for a given level of expected volatility.
 - d. The lowest level of expected utility.

- 4) Other factors being held constant, investors do not enjoy:
 - a. Higher expected return.
 - b. Lower expected volatility.
 - c. Lower expected skewness.
 - d. Higher expected return relative to expected volatility.

- 5) Which of the following statements is not true?
 - a. Individuals prefer more wealth to less wealth but at a decreasing rate.
 - b. Individuals will demand a higher expected return for each additional unit of expected volatility but at a decreasing rate.
 - c. Individuals will demand a higher expected return for each additional unit of expected volatility but at an increasing rate.
 - d. A risk averter will not accept a fair bet.

- 6) A bet is *fair* if:
- Its expected outcome is 0.
 - The expected satisfaction after taking the bet equals current satisfaction.
 - The sum of the outcomes is 0.
 - Neither the buyer nor the seller benefit.
- 7) A *zero-sum game* refers to an investment in which:
- Neither the buyer nor the seller gains.
 - What the buyer gains the seller loses, and vice versa.
 - The cash equivalent equals 0.
 - The expected utility of wealth remains constant.
- 8) When presented with a fair bet, a risk averter will:
- Be indifferent.
 - Always accept.
 - Always decline.
 - Either accept or decline the bet based on the situation.
- 9) The basic assumption of the utility theory in the context of investments is that:
- Investors are risk takers.
 - Investors are irrational.
 - Investors are rational.
 - Investors are risk neutral.
- 10) Derivative trades are:
- Zero-sum games where both parties in the trade can generate benefits.
 - Zero-sum games where only one party in the trade can generate benefits at the expense of the other.
 - Fair games where both parties in the trade can generate benefits.
 - None of the above.
- 11) An efficient portfolio is a portfolio which has:
- The highest expected return for a given level of risk.
 - The lowest risk for a given level of expected return.
 - The lowest level of risk regardless of expected return.
 - Both a. and b.

- 12) In a portfolio allocation problem, the *wealth constraint*:
- Is the maximum amount of cash that can be invested.
 - Is equivalent to risk tolerance.
 - Establishes that all available capital is invested in securities.
 - None of the above.
- 13) *Risk tolerance* is defined as the maximum amount of risk someone is willing to take and is usually expressed as:
- Variance of return.
 - Probability of loss.
 - Dollars at risk.
 - Standard deviation of return.
- 14) According to Federal Reserve Regulation T, what is the maximum leverage ratio for a portfolio?
- 20%
 - 30%
 - 40%
 - 50%
- 15) Markowitz's efficiency frontier is created by:
- Minimizing portfolio variance across all levels of expected return.
 - Analyzing potential returns given different leverage ratios.
 - Examining the impact of short selling on portfolio returns.
 - Maximizing the portfolio's Sharpe ratio.
- 16) For many large investors like endowments or pensions funds, what is the primary reason for a short sale constraint?
- Short sales are restricted by broker.
 - Short sales are barred.
 - Short selling is costly.
 - There are not short sale constraints for endowments or pension funds.
- 17) What is a factor that affects risk tolerance?
- Slope of the utility function
 - Curvature of the utility function
 - Investment horizon
 - All the above.

- 18) Which of the following is true about university endowments?
- a. They manage endowments in manner to maximize return subject to constraint principal does not fall.
 - b. There are no maximum allocation constraints for different asset classes.
 - c. Excess return on income is taken out of the endowment.
 - d. Endowments do not specify risk tolerance.
- 19) A higher indifference curve means:
- a. Higher expected return.
 - b. Lower expected return.
 - c. Constant expected returns.
 - d. None of the above.
- 20) Risk tolerance is:
- a. The minimum annualized return an investor can accept to generate.
 - b. The highest amount of annualized volatility an investor is willing to accept.
 - c. The lowest amount of annualized volatility an investor is willing to accept.
 - d. The maximum number of investments an investor is willing to make.

ETP portfolio allocation (21 thru 27, 5 points each; 28 thru 31, ten points each)

The Excel file, **Five ETF decision-making.xlsx**, contains about 15 years of daily total return index data for five popular, low-cost ETPs, each representing a different asset category.

| | |
|-----|-------------------------------------|
| IVV | stock portfolio (BlackRock iShares) |
| BND | bond portfolio (Vanguard) |
| GLD | gold (State Street) |
| VNQ | real estate (Vanguard) |
| SHV | cash equivalent (BlackRock iShares) |

Based on the data, compute summary statistics for daily returns and answer the following questions.

- 21) The ETF with the highest CAGR is:
- a. IVV
 - b. BND
 - c. GLD
 - d. VNQ

- 22) The ETF with the highest return volatility is:
- a. IVV
 - b. BND
 - c. GLD
 - d. VNQ
- 23) The volatility of SHV relative to GLD is about:
- a. 0.018
 - b. 0.076
 - c. 0.021
 - d. 0.628
- 24) The ETF with returns most skewed to the left is:
- a. SHV
 - b. BND
 - c. IVV
 - d. VNQ
- 25) Assuming short sales are allowed and holding other factors constant, the correlation estimates suggest that the best diversifier for an individual holding exclusively IVV is:
- a. BND
 - b. GLD
 - c. VNQ
 - d. SHV
- 26) Assuming short sales are not allowed and holding other factors constant, the correlation estimates suggest that the best diversifier for an individual holding exclusively IVV is:
- a. BND
 - b. GLD
 - c. VNQ
 - d. SHV
- 27) Assuming short sales are not allowed and holding other factors constant, the correlation estimates suggest that the best diversifier for an individual holding exclusively GLD is:
- a. BND
 - b. IVV
 - c. VNQ
 - d. SHV

Assume you have just received \$100,000 gift and want to invest it in a well-diversified portfolio. To accomplish your goal, you will diversify across five asset categories, using the five low-cost ETFs whose return/risk properties you estimated with the data in **Five ETF decision-making.xlsx**. Based on the annualized means and standard deviations of the ETFs, together with their pairwise correlations, answer the following questions.

- 28) Assuming (a) you have no plans for using the funds in the next 10 years and, therefore are willing to tolerate a risk (volatility) level as high as 24% and (b) you are willing to short sell, the expected return on the optimal portfolio is closest to:
- a. 6%
 - b. 10%
 - c. 21%
 - d. 23%
- 29) In reviewing the allocation results in 8), you decide you are unwilling to short sell any ETF except SHV. After all, shorting SHV is tantamount to borrowing money at a nearly risk-free rate. The expected return on the optimal portfolio is now closest to:
- a. 16%
 - b. 18%
 - c. 20%
 - d. 22%
- 30) Upon further review, you decide that investing more than \$100,000 in any single ETF is inappropriate. After imposing this additional constraint, the expected return on the optimal portfolio is now closest to:
- a. 16%
 - b. 18%
 - c. 20%
 - d. 22%
- 31) Just before investing in the portfolio from 30), you change your assessment of your holding period. Specifically, you now think the prospect of buying a new home in the next couple of years is quite high, hence you want to be protective of the funds and reduce your risk tolerance to 8%. After imposing this additional constraint, the expected return on the optimal portfolio is now closest to:
- a. 6%
 - b. 7%
 - c. 8%
 - d. 9%

Random diversification (20 points)

Risk reduction occurs naturally if the rates of return of the securities in the portfolio decision are not perfectly positively correlated. (20 points)

- 32) Assume all risky securities have identical expected returns, identical volatilities, and zero pairwise correlations. How many securities are required to reduce portfolio volatility to a level of 50% of the individual security volatility?
- a. 2
 - b. 4
 - c. 8
 - d. 16

Securities lending IHAK (33 thru 36, 5 points each; 37 thru 40, 10 points each)

The Excel file, **Securities lending rates 20210115.xlsx**, contains securities lending rates as of the close on 20210115. It is available on the course website. Also, download the fact sheet for the IHAK ETF. Based on the data file and the fact sheet, answer the following questions.

- 33) The lending fee for IHAK is:
- a. Less than 1%
 - b. Between 1 and 10%
 - c. Between 10 and 20%
 - d. Greater than 20%
- 34) The expense ratio of IHAK is about:
- a. 0.03%
 - b. 0.10%
 - c. 0.50%
 - d. 1.00%
- 35) As of 20211231, IHAK had \$AUM of about: is about:
- a. 50M
 - b. 250M
 - c. 600M
 - d. 6B
- 36) As of 20211231, IHAK held about how many individual stocks?
- a. 40
 - b. 50
 - c. 60
 - d. 500

- 37) Assuming the lender charges a 2% haircut on a loan of 10,000 shares and the share price is 41.06 on 20210115, what is the approximate amount of the rebate payment to the borrower on 20210119?
- a. \$4
 - b. \$331
 - c. -\$327
 - d. -\$419
- 38) Assuming the IHAK borrower sells the shares of IHAK at the close on 20210115 and the share price closes at \$41.90 on 20210119, the rate of return on the short sale is about:
- a. 0.10%
 - b. -2.0%
 - c. -2.1%
 - d. 2.1%
- 39) The highest securities lending fee of the IHAK's ten largest stock holdings is:
- a. Less than 1%
 - b. Between 1 and 10%
 - c. Between 10 and 20%
 - d. Greater than 20%
- 40) The securities lending data and the fact sheet, it seems reasonable to conclude that there is significant interest in:
- a. Short selling Juniper Networks Inc.
 - b. Buying cybersecurity stocks.
 - c. Diversifying across cybersecurity stocks.
 - d. Short selling cybersecurity stocks.