Bionic Turtle FRM Practice Questions

P1.T3. Financial Markets and Products

Chapter 3. Fund Management

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Chapter 3. Fund Management

P1.T3.705. MUTUAL FUNDS 3
P1.T3.706 HEDGE FUNDS 7
CHAPTER 4 END OF CHAPTER QUESTIONS & ANSWERS 10

Chapter 3. Fund Management

P1.T3.705. Mutual funds
P1.T3.706 Hedge funds

P1.T3.705. Mutual funds

Learning Objectives: Differentiate among open-end mutual funds, closed-end mutual funds, and exchange-traded funds (ETFs). Calculate the net asset value (NAV) of an open-end mutual fund. Explain the key differences between hedge funds and mutual funds.

705.1 America's Best Fund (Class A) is an open-ended mutual fund with 1.20 million shares outstanding. Currently, it is 10 am U.S. eastern standard time (EST) in the morning and the fund owns the following:

- $9.30 million in large cap equities,
- $1.0 million in short-term U.S. Treasury bills; aka, the risk-free asset, and
- $500,000 in cash

Which of the following statements is **TRUE**?

a) The fund's net asset value (NAV) is about $7.75 per share
b) If the fund reinvests dividends earned on the equities, the fund's investors are not taxed on these reinvested dividends
c) An immediate order to buy shares, at 10 am, can specify the total dollar amount but will know neither the exact NAV nor exact number of shares purchased
d) Unless and until the fund issues additional shares in a secondary offering or initiates a share buyback, the number of shares outstanding will remain fixed at 1.20 million

705.2. The Investment Committee at your endowment just analyzed the historical performance of its asset allocation to hedge funds, which was 20.0% of the fund. It has determined that net of fees these hedge funds did not outperform the S&P 500 on a risk-adjusted basis. Consequently, the Committee wants to re-allocate this portion to a fund that tracks the S&P 500 index; and the Committee is comfortable mirroring the index with minimum tracking error. An outside consultant proposes an exchange-traded fund (ETF) such as the "Spider" (ticker SPY), but some members want to compare the ETF to an open-ended or closed-ended mutual fund that tracks the S&P 500.

In addition to highlighting the fact that the expense ratios tend to be lower for ETFs than mutual funds, the consultant offers the following arguments in favor of an ETF:

I. In contrast to an open-ended mutual fund, advantage of the SPDR ETF can be traded at any time, can be shorted, and does not have to be partially liquidated to accommodate redemptions

II. II. In contrast to a closed-ended mutual fund whose price tends to trade at a discount to its fair market value, there is never any appreciable difference between the traded price of the SPDR EFT and its fair market value.

Which of the consultant's argument(s) is (are) **TRUE**?

a) Neither is true
b) Only I. is true, but II. is false
c) Only II. is true, but I. is false
d) Both are true.

705.3 Quadholding Mutual is a mutual fund in the United States who reports the following sequence of per annum returns over the last five years: +7.0%, +15.0%, +20.0%, +5.0%, +18.0%. Quadholding Mutual charges a back-end load of 2.0%. Each of the following statements about this mutual fund is true **EXCEPT** which is false?

a) Quadholding's five-year geometric mean must be less than 13.0%
b) Unlike a hedge fund, Quadholding must disclose its investment policies, must limit it its use of leverage, must calculate NAV daily, and must make its shares redeemable at any time
c) When purchasing shares in Quadholding, a 2.0% fee will be charged to the investor; and if the shares are held for five years then subsequently sold, then the total expense ratio amortizes to about 40 basis points per year
d) Quadholding is heavily regulated primarily by the Securities and Exchange Commission (SEC) who does not permit the illegal practice of "late trading;" although investors can legally engage in "market timing" or "front running" the fund but only if such trades are based on publicly available information

Answers:

705.1. C. TRUE: An immediate order to buy shares, at 10 am, can specify the total dollar amount but will know neither the exact NAV nor exact number of shares purchased.

Hull: "An investor in a long-term mutual fund owns a certain number of shares in the fund. The most common type of mutual fund is an open-end fund. This means that the total number of shares outstanding goes up as investors buy more shares and down as shares are redeemed. Mutual funds are valued at 4 P.M. each day. This involves the mutual fund manager calculating the market value of each asset in the portfolio so that the total value of the fund is determined. This total value is divided by the number of shares outstanding to obtain the value of each share. The latter is referred to as the net asset value (NAV) of the fund. Shares in the fund can be bought from the fund or sold back to the fund at any time. When an investor issues instructions to buy or sell shares, it is the next-calculated NAV that applies to the transaction. For example, if an investor decides to buy at 2 P.M. on a particular business day, the NAV at 4 P.M. on that day determines the amount paid by the investor.

The investor usually pays tax as though he or she owned the securities in which the fund has invested. Thus, when the fund receives a dividend, an investor in the fund has to pay tax on the investor's share of the dividend, even if the dividend is reinvested in the fund for the investor. When the fund sells securities, the investor is deemed to have realized an immediate capital gain or loss, even if the investor has not sold any of his or her shares in the fund. "

In regard to (A), (B) and (D), each is FALSE. In regard to false (A), the fund's NAV is about ($9.30 + 0.50 + 1.0)/1.20 mm = $9.00 but it will fluctuate throughout the day.

705.2. D. Both [statements] are true.

Hull on ETFs: "Exchange-traded funds (ETFs) have existed in the United States since 1993 and in Europe since 1999. They often track an index and so are an alternative to an index mutual fund for investors who are comfortable earning a return that is designed to mirror the index. One of the most widely known ETFs, called the Spider, tracks the S& P 500 and trades under the symbol SPY. In a survey of investment professionals conducted in March 2008, 67% called ETFs the most innovative investment vehicle of the previous two decades and 60% reported that ETFs have fundamentally changed the way they construct investment portfolios. In 2008, the SEC in the United States authorized the creation of actively managed ETFs.

ETFs are created by institutional investors. Typically, an institutional investor deposits a block of securities with the ETF and obtains shares in the ETF (known as creation units) in return. Some or all of the shares in the ETF are then traded on a stock exchange. This gives ETFs the characteristics of a closed-end fund rather than an open-end fund. However, a key feature of ETFs is that institutional investors can exchange large blocks of shares in the ETF for the assets underlying the shares at that time. They can give up shares they hold in the ETF and receive the assets or they can deposit new assets and receive new shares. This ensures that there is never any appreciable difference between the price at which shares in the ETF are trading on the stock exchange and their fair market value. This is a key difference between ETFs and closed-end funds and makes ETFs more attractive to investors than closed-end funds.

ETFs have a number of advantages over open-end mutual funds. ETFs can be bought or sold at any time of the day. They can be shorted in the same way that shares in any stock are shorted. (See Chapter 5 for a discussion of short selling.) ETF holdings are disclosed twice a day, giving investors full knowledge of the assets underlying the fund. Mutual funds by contrast only have to disclose their holdings relatively infrequently. When shares in a mutual fund are sold, managers often have to sell the stocks in which the fund has invested to raise the cash that is paid to the investor. When shares in the ETF are sold, this is not necessary as another investor is providing the cash. This means that transactions costs are saved and there are less unplanned capital gains and losses passed on to shareholders. Finally, the expense ratios of ETFs tend to be less than those of mutual funds. "

705.3. C. False. The front-end load fee is charged when the investor first buys the fund, and the total expense ratio is the total annual fee which includes at least management expenses and distribution costs.

In regard to (A), (B) and (D), each is TRUE.

- ***In regard to true (A)***, the geometric mean is 12.841%, which is less than the arithmetic mean by about one-half the variance of the series
- ***In regard to true (B),*** Hull: "4.2 Hedge funds: Hedge funds are different from mutual funds in that they are subject to very little regulation. This is because they accept funds only from financially sophisticated individuals and organizations. Examples of the regulations that affect mutual funds are the requirements that: 1. Shares be redeemable at any time, 2. NAV be calculated daily, 3. Investment policies be disclosed, and 4. The use of leverage be limited. Hedge funds are largely free from these regulations. This gives them a great deal of freedom to develop sophisticated, unconventional, and proprietary investment strategies. Hedge funds are sometimes referred to as alternative investments. "
- ***In regard to true (D),*** see Hull's Regulation and Mutual fund Scandals.

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P1.T3.706 Hedge funds

Learning Objectives: Calculate the return on a hedge fund investment and explain the incentive fee structure of a hedge fund including the terms hurdle rate, high-water mark, and clawback. Describe various hedge fund strategies, including long/short equity, dedicated short, distressed securities, merger arbitrage, convertible arbitrage, fixed income arbitrage, emerging markets, global macro, and managed futures, and identify the risks faced by hedge funds. Describe hedge fund performance and explain the effect of measurement biases on performance measurement.

706.1. A fund of funds divides its money *equally* between four hedge funds who earn –3.0%, +1.0%, +11.0%, and +21.0% before fees in a particular year. The fund of funds charges "1% plus 10%" and the hedge funds charge "1% plus 20%" (due to competitive pressures this is reduced from "2% plus 20%"). The hedge funds' incentive fees are calculated on the return after management fees. The fund of funds incentive fee is calculated on the net (after management and incentive fees) average return of the hedge funds in which it invests and after its own management fee has been subtracted. Which is **nearest** to the return to investors in the fund of funds? (please note this is variation on Hull's EOC Question 4.17)

a) 1.40%
b) 3.60%
c) 5.00%
d) 7.50%

706.2. Hedge fund fees are notoriously high, although recently the traditional "2 and 20" fee structure has been under much pressure. Clauses in fee structure agreements can help make the incentive fees more palatable for clients. In regard to these fee structure agreement clauses, each of the following is a true description **EXCEPT** which is inaccurate?

a) Hurdle rate is the minimum return necessary for an incentive fee to be applicable
b) High-water market requires previous losses to be recouped before an incentive fee is applicable
c) Clawback refers to investors being able to use some (or all) previous incentive fees, held in a recovery account, to offset current losses
d) Proportional adjustment clause allows the hedge fund manager, in the event of style drift, to replace the fund's benchmark, ex post, in order to reduce the funds reported tracking error

706.3. In regard to various hedge fund strategies, each of the following statements is generally true **EXCEPT** which statement is false?

a) Although prior to 2009, hedge fund returns lagged the S&P 500, since 2009 hedge funds have outperformed the S&P 500
b) A Distressed Securities hedge fund investor is more likely to earn an illiquidity risk premium than a typical Global Macro manager
c) A Merger Arbitrage (aka, risk arb) hedge fund investors should have a lower correlation to the broad equity markets than a typical Long/Short Equity manager
d) A Systematic Managed Futures hedge fund investor is more likely to employ technical analysis than an Emerging Markets manager

Answers:

706.1. B. 3.60%. Please see the calculations below, in particular:

- Gross return = (-3.0% + 1.0% + 11.0% + 21.0%)/4 = 7.50%
- Total hedge fund fees = 1.0% management fee + 1.50% (average) performance fee = 2.50%
- Fund of fund fees = 1.0% management + 0.40% performance = 1.40%
- Return to investor = 7.50% - 2.50% - 1.40% = 3.60%

	Hedge Funds					
	Gross Returns	Mgmt Fee	Return after Fee	Perform Fee	Total Fee	Net Return
	(A)			20%	(B)	(A-B)
1	-3.0%	1.0%	-4.0%	0.0000%	1.00%	-4.00%
2	1.0%	1.0%	0.0%	0.0000%	1.00%	0.00%
3	11.0%	1.0%	10.0%	2.0000%	3.00%	8.00%
4	21.0%	1.0%	20.0%	4.0000%	5.00%	16.00%
Avg	7.50%	1.000%		1.500%	2.500%	5.000%

Fund of Funds	
Management fee	1.000%
+ 10% Peformance fee	0.400%
*= 10% * (5.00% - 1.00%)*	
Total FOF fees	1.400%
Return earned by hedge funds	7.500%
Fees to hedge funds	2.500%
Fees to fund of funds	1.400%
Return to investor	3.600%

706.2. D. False. A proportional adjustment clause is related to a high-water mark. In regard to (A), (B) and (C), each is TRUE. Hull: "The agreements offered by hedge funds may include clauses that make the incentive fees more palatable. For example:

- There is sometimes a **hurdle rate**. This is the minimum return necessary for the incentive fee to be applicable.
- There is sometimes a high-water mark clause. This states that any previous losses must be recouped by new profits before an incentive fee applies. Because different investors place money with the fund at different times, the high-water mark is not necessarily the same for all investors. There may be a proportional adjustment clause stating that, if funds are withdrawn by investors, the amount of previous losses that has to be recouped is adjusted proportionally. Suppose a fund worth $ 200 million loses $ 40 million and $ 80 million of funds are withdrawn. The high-water mark clause on its own would require $ 40 million of profits on the remaining $ 80 million to be achieved before the incentive fee applied. The proportional adjustment clause would reduce this to $ 20 million because the fund is only half as big as it was when the loss was incurred.
- There is sometimes a clawback clause that allows investors to apply part or all of previous incentive fees to current losses. A portion of the incentive fees paid by the investor each year is then retained in a recovery account. This account is used to compensate investors for a percentage of any future losses."

706.3. A. False. Prior to 2009, hedge fund returns generally beat the S&P 500, but since 2009 hedge funds have generally lagged behind the S&P 500

In regard to (B), (C) and (D), each is TRUE.

- ***In regard to true (B)***, Distressed Securities an an event-driven strategy that typically requires high level of skill making investments that lack liquidity; i.e., alpha and illiquidity risk premiums. On the other hand, Global Macro tends to make directional bets in highly efficient markets.
- ***In regard to true (C)***, Merger Arbitrage is an event-driven strategy but Long/Short Equity is directional with market exposure; please note the difference between long/short equity and equity market neutral.
- ***In regard to true (D)***, Managed Futures classically divided into discretionary versus systematic (albeit with blurring lines recently) where the Systematic Managed Futures strategy tends to be highly technical. Emerging Markets, on the other hand, tends to require more fundamental analysis. Writes Hull about Managed Futures: "Managed Futures Hedge fund managers that use managed futures strategies attempt to predict future movements in commodity prices. Some rely on the manager's judgment; others use computer programs to generate trades. Some managers base their trading on technical analysis, which analyzes past price patterns to predict the future. Others use fundamental analysis, which involves calculating a fair value for the commodity from economic, political, and other relevant factors. When technical analysis is used, trading rules are usually first tested on historical data. This is known as back-testing. If (as is often the case) a trading rule has come from an analysis of past data, trading rules should be tested out of sample (that is, on data that are different from the data used to generate the rules). Analysts should be aware of the perils of data mining. Suppose thousands of different trading rules are generated and then tested on historical data. Just by chance a few of the trading rules will perform very well— but this does not mean that they will perform well in the future. "

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Hull RMFI[1] Chapter 4 End of Chapter Questions & Answers

Question 4.1

What is the difference between an open-end and closed-end mutual fund?

Answer:

The number of shares of an open-end mutual fund increases as investments in the fund increase and decreases as investors withdraw their funds. A closed-end fund is like any other corporation with a fixed number of shares that trade.

Question 4.2

How is the NAV of an open-end mutual fund calculated? When is it calculated?

Answer:

The net asset value (NAV) of an open-end mutual fund is calculated at 4 p.m. each day as the value of the assets held by the fund divided by the number of shares outstanding.

Question 4.3

An investor buys 100 shares in a mutual fund on January 1, 2015, for $30 each. The fund makes capital gains in 2015 and 2016 of $3 per share and $1 per share, respectively, and earns no dividends. The investor sells the shares in the fund during 2017 for $32 per share. What capital gains or losses is the investor deemed to have made in 2015, 2016, and 2017?

Answer:

The investor is deemed to have made capital gains of $300 and $100 in 2015 and 2016, respectively. In 2017, the investor is deemed to have made a capital loss of $200.

Question 4.4

What is an index fund? How is it created?

Answer:

An index fund is a fund that is designed so that its value tracks the performance of an index such as the S&P 500. It can be created by buying all the stocks (or a representative subset of the stocks) that underlie the index. Sometimes futures contracts on the index are used.

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[1] John C. Hull, Risk Management and Financial Institutions, 5th edition (Hoboken, New Jersey: John Wiley & Sons, 2018).

Question 4.5

What is a mutual fund's (a) front-end load and (b) back-end load?

Answer:

The front-end load is the amount an investor pays, as a percentage of his or her investment, when shares of the fund are purchased. The back-end load is the amount an investor pays, as a percentage of his or her investment, when shares of the fund are redeemed.

Question 4.6

Explain how an exchange-traded fund that tracks an index works. What are the advantages of an exchange-traded fund over (a) an open-end mutual fund and (b) a closed-end mutual fund?

Answer:

An exchange-traded fund (ETF) that tracks an index is created when an institutional investor deposits a portfolio of shares that is designed to track the index and receives shares in the ETF. Institutional investors can at any time exchange shares in the ETF for the underlying shares held by the ETF, or vice versa. The advantages over an open-end mutual fund that tracks the index are that the fund can be traded at any time, the fund can be shorted, and the fund does not have to be partially liquidated to accommodate redemptions. The advantage over a closed-end mutual fund is that there is very little difference between the ETF share price and the net asset value per share of the fund.

Question 4.7

What is the difference between the geometric mean and the arithmetic mean of a set of numbers? Why is the difference relevant to the reporting of mutual fund returns?

Answer:

The arithmetic mean of a set of n numbers is the sum of the numbers divided by n. The geometric mean is the nth root of the product of the numbers. The arithmetic mean is always greater than or equal to the geometric mean. The return per year realized when an investment is held for several years is calculated using a geometric mean, not an arithmetic mean. (The procedure is to calculate the geometric mean of one plus the return in each year and then subtract one.)

Question 4.8

Explain the meaning of (a) late trading, (b) market timing, (c) front running, and (d) directed brokerage.

Answer:

Late trading is the illegal practice of putting in an order to buy or sell an openend mutual fund at the 4 p.m. price after 4 p.m. Market timing is a practice where favored clients are allowed to buy and sell a mutual fund frequently to take advantage of the fact that some prices used in the calculation of the 4 p.m. net asset value are stale. Front running is the practice of trading by individuals ahead of a large institutional trade that is expected to move the market. Directed brokerage describes the situation where a mutual fund uses a brokerage house for trades when the brokerage house recommends the fund to clients.

Question 4.9

Give three examples of the rules that apply to mutual funds, but not to hedge funds.

Answer:

Mutual funds must disclose their investment policies; their use of leverage is limited; they must calculate NAV daily; their shares must be redeemable at any time.

Question 4.10

“If 70% of convertible bond trading is by hedge funds, I would expect the profitability of that strategy to decline.” Discuss this viewpoint.

Answer:

If a hedge fund is making money out of trading convertible bonds, it must be doing so at the expense of its counterparties. If most of the traders are hedge funds, they cannot all be making money.

Question 4.11

Explain the meanings of the terms hurdle rate, high-water mark clause, and clawback clause when used in connection with the incentive fees of hedge funds.

Answer:

Hurdle rate is the minimum return necessary for an incentive fee to be applicable. High-water mark refers to the previous losses that must be recouped before incentive fees are applicable. Clawback refers to investors being able to use some of the past incentive fees they have paid as an offset to current losses.

Question 4.12

A hedge fund charges 2 plus 20%. Investors want a return after fees of 20%. How much does the hedge fund have to earn, before fees, to provide investors with this return? Assume that the incentive fee is paid on the net return after management fees have been subtracted.

Answer:

If the return is $X(>2\%)$, the investors pay $0.02 + 0.2(X - 0.02)$ in fees. It must therefore be the case that

$$X - 0.02 - 0.2(X - 0.02) = 0.2$$

so that $0.8X = 0.216$ or $X = 0.27$. A return of 27% is necessary.

Question 4.13

"It is important for a hedge fund to be right in the long term. Short-term gains and losses do not matter." Discuss this statement.

Answer:

Short-term gains and losses do matter if the hedge fund is highly levered. Short term losses can lead to margin calls that destroy the hedge fund.

Question 4.14

"The risks that hedge funds take are regulated by their prime brokers." Discuss this statement.

Answer:

The leverage a hedge fund is allowed to take is limited by its prime broker. This in turn influences the risks that the hedge fund can take.

Question 4.15

An investor buys 100 shares in a mutual fund on January 1, 2015, for $50 each. The fund earns dividends of $2 and $3 per share during 2015 and 2016. These are reinvested in the fund. The fund's realized capital gains in 2015 and 2016 are $5 per share and $3 per share, respectively. The investor sells the shares in the fund during 2017 for $59 per share. Explain how the investor is taxed.

Answer:

The investor pays tax on dividends of $200 and $300 in year 2015 and 2016, respectively. The investor also has to pay tax on realized capital gains by the fund. This means tax will be paid on capital gains of $500 and $300 in year 2015 and 2016, respectively. The result of all this is that the basis for the shares increases from $50 to $63. The sale at $59 in year 2017 leads to a capital loss of $4 per share or $400 in total.

Question 4.16

Good years are followed by equally bad years for a mutual fund. It earns +8%,–8%,+12%, –12% in successive years. What is the investor's overall return for the four years?

Answers:

The investors overall return is

$$1.08 \times 0.92 \times 1.12 \times 0.88 - 1 = -0.0207$$

or − 2.07% for the four years

Question 4.17

A fund of funds divides its money between five hedge funds that earn –5%, 1%, 10%, 15%, and 20% before fees in a particular year. The fund of funds charges 1 plus 10% and the hedge funds charge 2 plus 20%. The hedge funds' incentive fees are calculated on the return after management fees. The fund of funds incentive fee is calculated on the net (after management and incentive fees) average return of the hedge funds in which it invests and after its own management fee has been subtracted. What is the overall return on the investments? How is it divided between the fund of funds, the hedge funds, and investors in the fund of funds?

Answer:
The overall return on the investments is the average of −5%, 1%, 10%, 15%, and 20% or 8.2%. The hedge fund fees are 2%, 2%, 3.6%, 4.6%, and 5.6%. These average 3.56%. The returns earned by the fund of funds after hedge fund fees are therefore −7%, −1%, 6.4%, 10.4%, and 14.4%. These average 4.64%. The fund of funds fee is 1% + 0.364% or 1.364% leaving 3.276% for the investor. The return earned is therefore divided as shown in the table below.

Return earned by hedge funds	8.200%
Fees to hedge funds	3.560%
Fees to fund of funds	1.364%
Return to investor	3.276%

Question 4.18

A hedge fund charges 2 plus 20%. A pension fund invests in the hedge fund. Plot the return to the pension fund as a function of the return to the hedge fund.

Answer:

The plot is shown in the chart below. If the hedge fund return is less than 2% , the pension fund return is 2% less than the hedge fund return. If it is greater than 2%, the pension fund return is less than the hedge fund return by 2% plus 20% of the excess of the return above 2%.