LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

QUESTION 1 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 35 MINUTES.

Elisa Lima is a 34-year-old widow residing in a country that uses U.S. dollars (USD) as its currency. She has two children: age 10 and age 6. Lima works as the director of marketing at Relex Corporation. Exhibit 1 presents details of the financial environment in Lima's home country.

Exhibit 1
Selected Data from Lima's Home Country

Taxes	• Flat income tax rate of 25%.
	• Wages, realized capital gains, and interest are taxed as income.
	• Dividends are not taxed.
	• Realized losses may be offset against income and may be carried forward to offset income in future years.
Health insurance	• Government provides at no direct cost to citizens.
Tax-deferred accounts (TDAs)	• Contributions are pretax and annual maximum is USD 40,000.
	• Income and gains grow tax-deferred and portfolio reallocations are not subject to tax.
	• Income taxes are paid on full amount of withdrawals.
	• No penalties on withdrawals for housing or education.

Lima's current pretax annual compensation is USD 140,000 and her current annual living expenses are USD 96,000. Her future salary increases are expected to match any increases in living expenses on a pretax basis. Lima is in good health, owns her home, and has no debt.

Lima is a disciplined investor, but a recent equity market decline caused her great anxiety. She is worried about her ability to fund her children's education and her retirement. Lima meets with her financial advisor, Mark DuBord, to review her financial plan.

DuBord notes the following factors:

- Lima invests USD 12,000 (pretax) in a TDA at the end of every year and intends to continue doing so until she retires. The current value of the TDA is USD 250,000.
- Lima makes annual contributions to charity of USD 6,000. These contributions are included in her annual living expenses.
- She will prepay her children's future education costs at the end of this year.
- Lima participates in Relex's executive retirement program. At the mandatory retirement age of 60, she will receive a pretax payment of USD 1,000,000.

LEVEL III

Question: # 1
Topic: Individual Portfolio Management
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DuBord determines that the prepaid education costs for both children will require a total of USD 50,000, including all taxes. He recommends that Lima purchase a life annuity to fund her retirement. DuBord calculates she will need USD 3,000,000 (pretax) to purchase the annuity at age 60. Lima agrees with DuBord's recommendation.

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

A.   **Formulate** *each* of the following constraints of Lima's investment policy statement (IPS):

    i.   liquidity
    ii.   time horizon

(4 minutes)

One year later, after prepaying her children's education costs and after making her annual TDA contribution, Lima has USD 225,000 invested in her TDA. Lima's other financial information remains the same.

B.   i.   **State** the return objective portion of Lima's IPS.
       ii.   **Calculate** Lima's required average annual pretax nominal rate of return until her retirement in 25 years. **Show** your calculations.

(12 minutes)

DuBord also advises Abella Rual, Lima's sister, a 37-year-old single woman with no children. Rual works as a bankruptcy lawyer and is president of her own firm. Rual's annual income is USD 450,000 and her annual living expenses are USD 180,000. She is in good health, owns her home, and has no debt.

Rual's investment portfolio is currently valued at USD 1,500,000. Rual is confident that long-term equity market returns will more than offset losses in market downturns. She continues to invest regularly. Rual plans to retire at age 52, sell her business, and donate the proceeds to charity. Her investment portfolio will fund her retirement expenses.

C.   i.   **Identify** *two* factors that increase Lima's ability to take risk.
       ii.   **Identify** *two* factors that increase Rual's ability to take risk.

(8 minutes)

D.   **Determine** whether Lima or Rual has a greater willingness to take risk. **Justify** your response with *one* reason.

(3 minutes)

During a recent review with Rual, DuBord notes that tax law changes, effective next year, will lower the tax on capital gains to 15% but eliminate the ability to offset income with realized losses. To minimize Rual's tax liability, DuBord is considering the optimal location (tax-

LEVEL III

Question:	1
Topic:	Individual Portfolio Management
Minutes:	35

deferred or taxable) for her assets prior to the tax law changes. DuBord and Rual agree to maintain Rual's current asset allocation. Rual's investment portfolio and asset location are shown in Exhibit 2.

Exhibit 2
Rual's Investment Portfolio

Asset Class	Tax-deferred Account	Taxable Account	
	Current Value (USD)	Current Value (USD)	Cost Basis (USD)
Bonds	250,000	500,000	550,000
Equities	500,000	250,000	150,000
Total	750,000	750,000	700,000

DuBord recommends the transactions necessary to achieve the most tax efficient asset allocation of bonds and equities in each account.

E.   i.   **Determine** the "sell" amount of bonds and the "sell" amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).

ii.   **Determine** the "buy" amount of bonds and the "buy" amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).

iii.   **Justify**, with *two* reasons, why this is the *most* tax-efficient allocation.

Note: Assume no transaction costs or liquidity needs.

ANSWER QUESTION 1-E IN THE TEMPLATE PROVIDED ON PAGE 5.

(8 minutes)

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

Template for Question 1-E
Note: Assume no transaction costs or liquidity needs.

Asset class	i. Determine the "sell" amount of bonds and the "sell" amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).	
	Tax-deferred Account	**Taxable Account**
Bonds		
Equities		

Asset class	ii. Determine the "buy" amount of bonds and the "buy" amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).	
	Tax-deferred Account	**Taxable Account**
Bonds		
Equities		

iii. Justify, with *two* reasons, why this is the *most* tax-efficient allocation.
1.
2.

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

Reading References:
14. "Managing Individual Investor Portfolios," *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, James W. Bronson, Matthew H. Scanlan, and Jan R. Squires (CFA Institute, 2007).
15. "Taxes and Private Wealth Management in a Global Context" Steve M. Horan and Thomas R. Robinson CFA (CFA Institute, 2009).

Purpose:
To test the candidate's: (1) understanding of the investment policy statement for an individual investor, (2) ability to assess pertinent factors for an investor's ability to assume risk, (3) ability to calculate an investor's required return, (4) understanding of an investor's other constraint factors (5) ability to assess the benefit of Tax Loss harvesting, and (6) ability to distinguish key differences between human and financial capital.

LOS 2010 –III-3-14-a,h, i, j, k, l "Managing Individual Investor Portfolios"
The candidate should be able to:
a) **discuss how source of wealth, measure of wealth, and stage of life affect individual investors' risk tolerance;**
b) explain the role of situational and psychological profiling in understanding individual investors;
c) compare and contrast the traditional finance and behavioral finance models of investor decision making;
d) explain the influence of investor psychology on risk tolerance and investment choices;
e) explain the use of a personality typing questionnaire for identifying an investor's personality type;
f) compare and contrast risk attitudes and decision-making styles across distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
g) explain the potential benefits, for both clients and investment advisors, of having a formal investment policy statement;
h) **explain the process involved in creating an investment policy statement;**
i) **distinguish between required return and desired return and explain the impact these have on the individual investor's investment policy;**
j) **explain how to set risk and return objectives for individual investors and discuss the impact that ability and willingness to take risk have on tolerance;**
k) **identify and explain each of the major constraint categories included in an individual investor's investment policy statement;**
l) **formulate and justify an investment policy statement for an individual investor;**

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

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    m)   determine the strategic asset allocation that is most appropriate for an individual investor's specific investment objectives and constraints;
    n)   compare and contrast traditional deterministic versus Monte Carlo approaches to retirement planning and explain the advantages of a Monte Carlo approach.

LOS 2010 –III-3-15-e, h "Taxes and Private Wealth Management in a Global Context"
    The candidate should be able to:
    a)   compare and contrast basic global taxation regimes as they relate to the taxation of dividend income, interest income, realized capital gains, and unrealized capital gains;
    b)   determine the impact of different types of taxes and tax regimes on future wealth accumulation;
    c)   calculate accrual equivalent tax rates and after-tax rates;
    d)   explain how investment return and investment horizon affect the tax impact associated with an investment;
    e)   **discuss the tax profiles of different types of investment accounts and explain their impact on after-tax returns and future accumulations;**
    f)   explain how taxes affect investment risk;
    g)   discuss the relationship between after-tax returns and different types of investor trading behavior;
    h)   **explain the benefits of tax loss harvesting and highest-in/first-out (HIFO) tax lot accounting;**
    i)   demonstrate how taxes and asset location relate to mean-variance optimization;

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

Guideline Answer:

PART A

i. Liquidity Needs for Elisa Lima:
Lima will fund education expenses for her children in one year at a cost of USD 50,000. Lima has no other liquidity needs.

ii. Time Horizon Constraint for Elisa Lima:
Lima has a long-term, multi-stage time horizon. The first stage is one year until education costs are paid. The next stage is Lima's employment years, 25 years, until her retirement. The last stage begins at her retirement.

PART B

i. Return Objective Statement
Lima's return objective is to grow the investable tax-deferred portfolio to purchase a
USD 3,000,000 pretax annuity in 25 years at age 60. Since she will receive a pretax payment of USD 1,000,000 upon retirement from Relex, the investment portfolio needs to provide USD 2,000,000 of the necessary USD 3,000,000.

Lima's expenses are USD 96,000. Given the tax rate of 25%, Lima will need 96,000 / (1 - 0.25) or USD 128,000 of pre-tax income to generate the after-tax income for meeting these expenses. Therefore Lima's current pretax annual compensation of USD 140,000 will support a tax-deferred contribution of 140,000 – 128,000 or USD 12,000. Lima's income is expected to grow with her expenses over the remainder of her working life; therefore, the USD 12,000 contribution to the TDA can be continued annually.

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

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ii. <u>Return Calculation</u>
Investment Portfolio (pretax)

Current portfolio	USD225,000

Assets Needed to Purchase Annuity at age 60 (pretax)

Required portfolio value	3,000,000
Lump-sum benefit at age 60	1,000,000
Required value of TDA	2,000,000

Required Return Calculation

Present Value (PV)	(225,000)
Future Value (FV)	2,000,000
Annual Savings (PMT)	(12,000)
Number of Years (N)	25

CPT I/Y – TVM registry of calculator   7.05% pretax nominal

PART C

i. <u>Factors that increase Lima's ability to take risk:</u>
Lima has a long time horizon until retirement (25 years) **--** a long investment time horizon.
Lima receives a USD 1,000,000 payment at age 60 (retirement).
Lima has the flexibility to stop the annual payments to charity of USD 6,000.
Lima has no debt.

ii. <u>Factors that increase Rual's ability to take risk:</u>
Rual's current income significantly exceeds her current level of spending.
She only needs to provide for herself.
Rual's current portfolio value (USD 1,500,000) is large relative to her living expenses.
Rual does not have to make the charitable contribution upon the sale of her business.
Rual has a flexible retirement date **--** a long (15 years) investment horizon.
Rual has no debt.

PART D

<u>Rual has a greater willingness to take risk because:</u>
Rual owns her business.
Rual plans to retire relatively early at age 52.
Rual is confident that equities will deliver positive returns.

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

PART E

The appropriate division of funds that would maximize Rual's advantage from the new tax law change is accomplished by holding all of the bonds in the TDA, and all of the equities in the taxable account.

The resulting investment portfolio of both taxable and tax-deferred accounts is as follows:

Abella Rual's New Asset Location

Asset Class	Tax-deferred Account (TDA)	Taxable Account
Bonds	750,000	0
Equities	0	750,000
Total	750,000	750,000

LEVEL III

Question: 1
Topic: Individual Portfolio Management
Minutes: 35

Template for Question 1-E
Note: Assume no transaction costs or liquidity needs.

Asset class	i. Determine the "sell" amount of bonds and the "sell" amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).	
	Tax-deferred Account	**Taxable Account**
Bonds	0	USD 500,000
Equities	USD 500,000	0

Asset class	ii. Determine the "buy" amount of bonds and the "buy" amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).	
	Tax-deferred Account	**Taxable Account**
Bonds	USD 500,000	0
Equities	0	USD 500,000

iii. Justify, with *two* reasons, why this is the *most* tax-efficient allocation.

Selling the bonds in the taxable account results in realizing taxable losses equal to USD 50,000 at the current tax rate of 25%, which can then be used to offset income. After the tax law change, the loss cannot be used to offset or reduce taxable income.

Under the new tax laws, interest income will continue to be taxed at 25%, realized capital gains will be taxed at 15% and dividends will not be taxed. These trades place the higher taxed income-oriented assets in the tax-deferred account and the lower taxed capital gain and dividend paying assets in the taxable account. In addition, choosing to defer sales of equities that appreciated in value is justified because gains will be taxed at a lower rate in the future.

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

QUESTION 2 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 25 MINUTES.

Island Life Assurance is a specialty life insurance company that markets its products globally. Its sole business is selling fixed-rate and variable annuity contracts. Island Life maintains accounting records in U.S. dollars (USD) and segments its fixed-rate and variable contract assets into separate investment portfolios to better match assets and liabilities.

Both fixed-rate and variable contracts have surrender clauses. The clauses allow the owner to terminate the contract for the original investment plus accrued earnings at the two-year anniversary of the contract. After the two-year period, the contracts cannot be surrendered for the remainder of the original term.

Island Life's fixed-rate annuities are sold with an initial 10-year term. Earning rates are guaranteed and are based on the 10-year U.S. Treasury bond yield at the time the contract is sold. Island Life invests its fixed-rate portfolio in government bonds issued by G7 countries and investment grade corporate bonds. Island Life currently has a small surplus in its fixed rate business. The weighted average duration of the assets is lower than the weighted average duration of the liabilities. Island Life's economist forecasts that global interest rates will rise over the next two years.

Island Life's variable annuity products are sold with an initial 20-year term. These contracts pay a return at maturity based on one of several global stock market index returns over that period.

Island Life pays its corporate tax liabilities at year end. Local tax regulations require:

- insurance companies that consolidate investment portfolios to pay a 10% tax on realized gains from equity investments;
- insurance companies that segment investment portfolios to pay a 10% tax on income and realized gains from all investments.

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

A. **Determine** the effect (increase, no change, decrease) on *each* of the following
    characteristics of the fixed-rate portfolio if Island Life's global interest rate forecast is
    correct:

    i.   surplus
    ii.   reinvestment risk
    iii. expected surrender rate

    Justify *each* response with *one* reason.

    ANSWER QUESTION 2-A IN THE TEMPLATE PROVIDED ON PAGE 15.

    (9 minutes)

B. **Identify** *two* of Island Life's investment policy constraints that are affected by the
    surrender clause. **Explain** how *each* constraint is affected.

    (6 minutes)

Kyle Stewart manages Island Life's fixed-rate portfolio. Stewart previously managed a fixed
income portfolio during a period of rising interest rates. The portfolio experienced large losses
that took years to recover.

Global interest rates have ranged from 0.4 to 0.8 times the historical average over the past two
years. Based on this information, Stewart forecasts interest rates to rise into a narrow band
between 1.15 and 1.20 times the historical average. As a result, Stewart reallocates the fixed-rate
portfolio assets to a very short duration relative to the duration of Island Life's fixed-rate
liabilities. The government bond portion of Stewart's portfolio reflects his longstanding
preference to equally weight all G7 countries.

In the months since he first moved to a short duration strategy, market interest rates have
consistently decreased. Stewart continues to maintain his interest rate forecast and portfolio
strategy. He states:

> "The primary objective of Island Life's fixed income portfolio is to avoid
> potential interest rate risk. Since our fixed-rate portfolio is currently at only a 5%
> surplus, a short duration strategy relative to our fixed-rate liabilities is necessary
> to prevent a shortfall."

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

C.   **Explain** how Stewart exhibits *each* of the following behavioral biases:

  i.   gambler's fallacy
  ii.   naïve diversification
  iii.   regret

(6 minutes)

D.   **Describe** *two* examples of Stewart's behavioral bias of overconfidence.

(4 minutes)

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

Template for Question 2-A

Characteristic	Determine the effect (increase, no change, decrease) on *each* of the following characteristics of the fixed-rate portfolio if Island Life's global interest rate forecast is correct. (circle one)	Justify *each* response with *one* reason.
i. surplus	Increase No change Decrease	
ii. reinvestment risk	Increase No change Decrease	
iii. expected surrender rate	Increase No change Decrease	

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

Reading References:
"Managing Institutional Investor Portfolios," Ch. 3, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, R. Charles Tschampion, Laurence B. Siegel, Dean J. Takahashi, and John L. Maginn (CFA Institute, 2007).
"Heuristic-Driven Bias: The First Theme," Ch. 2, *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University Press, 2002).
"Frame Dependence: The Second Theme," Ch. 3, *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University Press, 2002).
"Inefficient Markets: The Third Theme," Ch. 4, *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University Press, 2002).
"Portfolios, Pyramids, Emotions, and Biases," Ch.10, *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University Press, 2002).

Purpose:
To test knowledge and use of investment policies for insurance companies and general behavioral finance issues as they relate to institutional investors.

LOS: 2010-III-20-j,l,m
"Managing Institutional Investor Portfolios"
　　The candidate should be able to
　　a)　contrast a defined-benefit plan to a defined-contribution plan, from the perspective of the employee and employer and discuss the advantages and disadvantages of each;
　　b)　discuss investment objectives and constraints for defined-benefit plans;
　　c)　evaluate pension fund risk tolerance when risk is considered from the perspective of the (1) plan surplus, (2) sponsor financial status and profitability, (3) sponsor and pension fund common risk exposures, (4) plan features, and (5) workforce characteristics;
　　d)　formulate an investment policy statement for a defined-benefit plan;
　　e)　evaluate the risk management considerations in investing pension plan assets;
　　f)　formulate an investment policy statement for a defined-contribution plan;
　　g)　discuss hybrid pension plans (e.g., cash balance plans) and employee stock ownership plans;
　　h)　distinguish among various types of foundations, with respect to their description, purpose, source of funds, and annual spending requirements;
　　i)　compare and contrast the investment objectives and constraints of foundations, endowments, insurance companies, and banks;
　　j)　formulate an investment policy statement for a foundation, an endowment, an insurance company, and a bank;

LEVEL III

Question:	2
Topic:	PM – Institutional/Behavioral - Insurance
Minutes:	25

k) contrast investment companies, commodity pools, and hedge funds to other types of institutional investors;

l) discuss the factors that determine investment policy for pension funds, foundations, endowments, life and nonlife insurance companies, and banks;

m) compare and contrast the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;

n) compare and contrast the investment objectives and constraints of institutional investors given relevant data, such as descriptions of their financial circumstances and attitudes toward risk.

2010-III-7-a
"Heuristic-Driven Bias: The First Theme"
>   The candidate should be able to
>   **a)**   **evaluate the impact of heuristic-driven biases on investment decision making, including representativeness, overconfidence, anchoring-and-adjustment, and aversion to ambiguity.**

2010-III-8-b
"Frame Dependence: The Second Theme"
>   The candidate should be able to
>   a)   explain how loss aversion can result in investors' willingness to hold on to deteriorating investment positions;
>   **b)**   **evaluate the impact that the emotional frames of self-control, regret minimization, and money illusion have on investor behavior.**

2010-III-9-a,b
"Inefficient Markets: The Third Theme"
>   The candidate should be able to
>   **a)**   **evaluate the impact that representativeness, conservatism (anchoring-and-adjustment), and frame dependence may have on security pricing and discuss the implications for market efficiency;**
>   **b)**   **discuss the implications of investor overconfidence when trading.**

2010-III-10-c
"Portfolios, Pyramids, Emotions, and Biases"
>   The candidate should be able to
>   a)   discuss the influence of hope and fear on investors' desire for security and investment potential;
>   b)   explain how portfolios can be structured as layered pyramids and how such structures address needs associated with security, potential, and aspiration;
>   **c)**   **evaluate the impact of excessive optimism and overconfidence on investors' decisions regarding portfolio construction.**

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

Guideline Answer:

PART A

Characteristic	Determine the effect (increase, no change, decrease) on *each* of the following characteristics of the fixed-rate portfolio if Island Life's global interest rate forecast is correct. (circle one)	Justify *each* response with *one* reason.
i. surplus	(Increase) No change Decrease	All else equal, the surplus would increase in a rising interest rate environment. Given the current asset/liability structure, i.e., a shorter average duration of assets versus liabilities, as interest rates increase the value of the assets will decline by less than the value of the liabilities. Thus, the portfolio surplus would increase.
ii. reinvestment risk	Increase No change (Decrease)	Island Life's annuity contracts are written with expected rates of return on reinvested income during the life of the contract. All else equal, rising interest rates would reduce reinvestment risk since income from the investment portfolio can be reinvested at rates higher than currently available.
iii. expected surrender rate	(Increase) No change Decrease	All else equal, contracts not yet past the surrender date offer an inferior expected return versus that of competing investments with higher interest rates. Annuity owners can be expected to surrender their current contracts to reinvest in competing investments offering higher yields.

LEVEL III

Question: 2
Topic: PM – Institutional/Behavioral - Insurance
Minutes: 25

PART B

The surrender clause creates the potential for significant changes in time horizon and liquidity constraints. Potential surrenders at the two-year anniversary would shorten the investment time horizon and require sufficient liquidity to meet these surrenders.

PART C

Gambler's Fallacy	Stewart's uses a small sample of observations of below-average interest rates (two years) to forecast above-average interest rates, thus expecting a reversion to the mean in the short run, rather than the long run. This is an example of gambler's fallacy.
Naïve Diversification	Stewart's preference to equally weight government bonds from all G-7 countries reflects naïve diversification.
Regret	Stewart exhibits the bias of Regret or Regret Avoidance in two actions. First, Stewart's previous bad experience managing fixed income assets in a rising rate environment has undue influence in his selection of a short duration strategy. In addition, after interest rates continued to decrease, resulting in underperformance, Stewart decides to maintain his current strategy.

PART D

Stewart's forecasting and decision making reflect the behavioral bias of overconfidence in the following ways:

- The narrow range of potential outcomes in his forecast.
- His decision to maintain his forecast as additional information emerges. This anchoring around his initial expectations reflects his overconfidence in his forecast and forecasting abilities.
- His failure to include other factors, such as a non-parallel shift in the yield curve or a change in spreads between different types of bonds, that can affect the portfolio's surplus.

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

QUESTION 3 HAS TWO PARTS (A, B) FOR A TOTAL OF 24 MINUTES.

Ed Schlipp is a pension fund consultant. Clients include Apax Bakers, CarbX Corp, and DataComp. He works with all clients to link assets and liabilities for their respective pension plans.

Apax is a major supplier of bread to retailers and restaurants. Apax generates all of its revenues in the U.S. and has been profitable in recent years. The outlook for future profitability of the company is positive.

Apax operates a defined benefit pension plan with 1 billion U.S. dollars (USD) in assets. Strong investment performance created a pension surplus of USD 95 million. The Apax pension plan has a growing ratio of inactive to active members and is now closed to new participants. Plan benefits are not inflation indexed.

A.   **Identify** *three* factors that affect Apax pension plan's ability to take risk. **Determine** whether *each* factor increases or decreases the plan's ability to take risk. **Justify** *each* response with *one* reason.

ANSWER QUESTION 3-A IN THE TEMPLATE PROVIDED ON PAGE 22.

(12 minutes)

CarbX Corp is an unprofitable U.S.-based producer of automobile engine components. Its defined benefit pension plan has been in deficit for 10 years. A recent agreement between the company and the participants of the CarbX pension plan resulted in the plan being frozen in exchange for CarbX making a one-time payment to fully fund the plan. The plan has a high ratio of inactive to active participants and plan benefits are not inflation indexed.

DataComp is a growing and profitable U.S.-based software company that markets its products globally. Its defined benefit pension plan was recently established and has a surplus. The plan has no inactive participants and is open to future participants. Plan benefits are not inflation indexed.

Schlipp has gathered data on the current asset allocation for each of the three pension plans, which are shown in Exhibit 1.

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

Exhibit 1
Current Pension Plan Asset Allocations

Asset Class	Apax Bakers	CarbX Corp	DataComp
Nominal bonds	90%	90%	60%
Real rate bonds	10%	0%	20%
Equity	0%	10%	20%

Schlipp's recommendation for all three clients is to create an asset portfolio that better mimics liabilities. He examines various potential trades (shown in Exhibit 2) to achieve this recommendation.

Exhibit 2
Potential Trades

Trade	Sell	Buy
A	10% nominal bonds	10% real rate bonds
B	10% nominal bonds	10% equity
C	10% real rate bonds	10% nominal bonds
D	10% real rate bonds	10% equity
E	10% equity	10% nominal bonds
F	10% equity	10% real rate bonds

B.   **Determine**, from the potential trades in Exhibit 2, which trade would be *most* appropriate to achieve Schlipp's recommendation for *each* company:

i.   Apax Bakers (Trade A, B, C, or D)
ii.   CarbX Corp (Trade A, B, E, or F)
iii.   DataComp (Trade B, C, E, or F)

Justify *each* response with *one* reason.

ANSWER QUESTION 3-B IN THE TEMPLATE PROVIDED ON PAGE 23.

(12 minutes)

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

Template for Question 3-A

Identify *three* factors that affect Apax pension plan's ability to take risk.	Determine whether *each* factor increases or decreases the plan's ability to take risk. (circle one)	Justify *each* response with *one* reason.
1.	increases decreases	
2.	increases decreases	
3.	increases decreases	

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

Template for Question 3-B

Company	Determine, from the potential trades in Exhibit 2, which trade would be *most* appropriate to achieve Schlipp's recommendation for *each* company. (circle one)	Justify *each* response with *one* reason.
i. Apax Bakers	Trade A Trade B Trade C Trade D	
ii. CarbX Corp	Trade A Trade B Trade E Trade F	
iii. DataComp	Trade B Trade C Trade E Trade F	

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

Reading References:
2010 Level III, Volume 2, Study Session 5, Reading 20, pp 366-382
"Managing Institutional Investor Portfolios," *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, R. Charles Tschampion, CFA, Laurence B. Siegel, Dean J. Takahashi, and John L. Maginn, CFA (CFA Institute, 2007)

2010 Level III, Volume 2, Study Session 5, Reading 21, pp 455-470
"Linking Pension Liabilities to Assets," Aaron Meder and Renato Staub (UBS Global Asset Management, 2006)

Purpose: To test knowledge and understanding of various aspects of risk as it relates to defined benefit pension plans.

LOS: 2010-III-20
20. "Managing Institutional Investor Portfolios"
    The candidate should be able to:
    a)   contrast a defined-benefit plan to a defined-contribution plan, from the perspective of the employee and employer and discuss the advantages and disadvantages of each;
    b)   discuss investment objectives and constraints for defined-benefit plans;
    c)   **evaluate pension fund risk tolerance when risk is considered from the perspective of the (1) plan surplus, (2) sponsor financial status and profitability, (3) sponsor and pension fund common risk exposures, (4) plan features, and (5) workforce characteristics;**
    d)   formulate an investment policy statement for a defined-benefit plan;
    e)   **evaluate the risk management considerations in investing pension plan assets;**
    f)   formulate an investment policy statement for a defined-contribution plan;
    g)   discuss hybrid pension plans (e.g., cash balance plans) and employee stock ownership plans;
    h)   distinguish among various types of foundations, with respect to their description, purpose, source of funds, and annual spending requirements;
    i)   compare and contrast the investment objectives and constraints of foundations, endowments, insurance companies, and banks;
    j)   formulate an investment policy statement for a foundation, an endowment, an insurance company, and a bank;
    k)   contrast investment companies, commodity pools, and hedge funds to other types of institutional investors;
    l)   discuss the factors that determine investment policy for pension funds, foundations, endowments, life and nonlife insurance companies, and banks;

LEVEL III

Question:	3
Topic:	Institutional (Pension)
Minutes:	24

    m) compare and contrast the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;

    o) compare and contrast the investment objectives and constraints of institutional investors given relevant data, such as descriptions of their financial circumstances and attitudes toward risk.

LOS: 2010-III-21

21. "Linking Pension Liabilities to Assets"
    The candidate should be able to:
    a) contrast the assumptions concerning pension liability risk in asset-only and liability-relative approaches to asset allocation;
    b) discuss the fundamental and economic exposures of pension liabilities and identify asset types that mimic these liability exposures;
    c) compare pension portfolios built from a traditional asset-only perspective to portfolios designed relative to liabilities and discuss why corporations may choose not to implement fully the liability mimicking portfolio.

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

Guideline Answer:

PART A

Template for Question 3-A
NOTE: Three factors are required but there are five possible answers.

Identify *three* factors that affect Apax pension plan's ability to take risk.	Determine whether *each* factor increases or decreases the plan's ability to take risk. (circle one)	Justify *each* response with *one* reason.
1. Pension surplus	(increases) decreases	Apax's pension plan has a USD95 surplus. The plan can experience some level of negative returns without jeopardizing the coverage of plan liabilities. This allows the plan to take greater risk.
2. Company profitability	(increases) decreases	Apax is profitable and the outlook is positive. A financially strong sponsor has a higher ability to fund potential shortfalls than a financially weak sponsor.
3. Pension plan is closed to new participants	increases (decreases)	A closed plan will not be adding younger participants. A plan with increasing average age will have shorter duration liabilities and higher liquidity requirements, implying lower risk tolerance.
4. A growing ratio of inactive to active plan members	increases (decreases)	The higher the proportion of inactive to active members, the shorter the duration of the plan's liabilities. Shorter duration liabilities imply lower risk tolerance.
5. No inflation indexing	(increases) decreases	In an inflationary environment, a plan not inflation-indexed would most likely grow its nominal asset base faster than its pension liability as payments to current retirees will not increase. Lower liabilities, as compared with a plan with inflation indexed benefits, allows the plan to take greater risk.

LEVEL III

Question: 3
Topic: Institutional (Pension)
Minutes: 24

PART B

Company	Determine, from the potential trades in Exhibit 2, which trade would be *most* appropriate to achieve Schlipp's recommendation for *each* company. (circle one)	Justify *each* response with *one* reason.
i. Apax Bakers	Trade A (Trade B) Trade C Trade D	Active members in the Apax plan will likely see future wage growth. Since the inflation component of wage growth is highly correlated with returns on real rate bonds, Apax should retain its real rate bond holdings. Future real wage growth is best mimicked by equities which are not present in the current portfolio. The sale of some nominal bonds and purchase of equities would add this liability mimicking asset into the mix.
ii. CarbX Corp	Trade A Trade B (Trade E) Trade F	The CarbX pension plan is frozen, so there is no need for equity. Because there is no inflation indexation, the accrued benefit liability is the ultimate liability of the plan. This liability can be mimicked entirely with nominal bonds. This is accomplished by a sale of equities and purchase of nominal bonds.
iii. DataComp	(Trade B) Trade C Trade E Trade F	DataComp's pension plan is new with no inactive members minimal accrued benefits. This greatly reduces the need for nominal bonds. As the plan is in surplus, and the company is profitable and growing, a higher weighting in equities is appropriate to better mimic future real wage growth.

LEVEL III

Question: 4
Topic: Economics
Minutes: 14

QUESTION 4 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 14 MINUTES.

Francisco Martin and Emma Liu are analysts at the same firm. Martin uses the cyclical indicator approach to formulate his equity market outlook, whereas Liu uses microvaluation analysis to develop her equity market outlook. Martin and Liu have conflicting views on the current outlook for the U.S. equity market.

Martin prepares Exhibit 1, a table of recent values of selected U.S. cyclical indicators. He makes the following observation: "Several leading indicators suggest further deterioration in economic conditions. Based on the cyclical indicator approach, these developments are clearly unfavorable for the U.S. equity market."

Exhibit 1
Selected U.S. Cyclical Indicators

Indicator	Value as of 31 December 2009	Value as of 31 March 2010
Average duration of unemployment (weeks)	18.1	18.2
Average prime rate	5.0%	5.0%
Average weekly hours of manufacturing workers	40.3	39.2
Index of consumer expectations	59.8	49.2
Labor cost per unit of output, manufacturing	124.1	125.3
Index of new private housing starts authorized by local building permits	2429	2120
Manufacturing and trade sales (in U.S. dollar billions)	989	920
Ratio of consumer installment credit outstanding to personal income	0.175	0.186
Consumer price index (inflation rate) for services	217.7	216.8
Interest rate spread, 10-year Treasury bonds less federal funds rate	2.22%	2.45%

A. **Identify** *two* leading cyclical indicators in Exhibit 1 that support Martin's observation regarding the U.S. equity market. **Explain** how the change in value of *each* of these indicators supports Martin's observation.

(6 minutes)

B. **Describe** *two* general limitations of Martin's approach to formulating an equity market outlook.

(4 minutes)

LEVEL III

Question:	4
Topic:	Economics
Minutes:	14

Liu responds to Martin's observation: "The economy appears to be weakening, but I believe this has already been priced into the market. The S&P 500 Index is currently at 760. Inflation is low

and corporate earnings of the S&P 500 Index constituents are $51.80. The dividend yield (on a trailing annual basis) is 3.5% and I expect the dividend growth rate to be constant at 5%. With the risk-free rate at 2%, if I assume a 6% equity risk premium, both the dividend discount model and the earnings multiplier approach indicate that the equity market is undervalued at these levels."

C.   **Calculate** the intrinsic value of the S&P 500 Index using the constant growth dividend discount model of market valuation and the information provided by Liu. **Show** your calculations.

(4 minutes)

LEVEL III

Question:	4
Topic:	Economics
Minutes:	14

Reading References:
2010 Level III, Volume 3, Study Sessions 6 – 7
23. "Capital Market Expectations," Ch. 4, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, John P. Calverley, Alan M. Meder, Brian D. Singer, and Renato Staub (CFA Institute, 2007).
24. "Macroanalysis and Microvaluation of the Stock Market," Ch. 12, *Investment Analysis and Portfolio Management*, 8th edition, Frank K. Reilly and Keith C. Brown (South Western, 2006).

LOS: 2010-III-6-23-e,f
23. "Capital Market Expectations"
The candidate should be able to
a) discuss the role of, and a framework for, capital market expectations in the portfolio management process;
b) discuss, in relation to capital markets expectations, the limitations of economic data, data measurement errors and biases, the limitations of historical estimates, *ex post* risk as a biased measure of *ex ante* risk, biases in analysts' methods, the failure to account for conditioning information, the misinterpretation of correlations, psychological traps, and model uncertainty;
c) demonstrate the application of formal tools for setting capital market expectations, including statistical tools, discounted cash flow models, the risk premium approach, and financial equilibrium models;
d) explain the use of survey and panel methods and judgment in setting capital market expectations;
e) discuss the inventory and business cycles, the impact of consumer and business spending, and monetary and fiscal policy on the business cycle;
f) discuss the impact that the phases of the business cycle have on short-term/long-term capital market returns;
g) explain the relationship of inflation to the business cycle and the implications of inflation for cash, bonds, equity, and real estate returns;
h) demonstrate the use of the Taylor rule to predict central bank behavior;
i) evaluate (1) the shape of the yield curve as an economic predictor and (2) the relationship between the yield curve and fiscal and monetary policy;
j) identify and interpret the components of economic growth trends and demonstrate the application of economic growth trend analysis to the formulation of capital market expectations;
k) discuss the risks faced by investors in emerging-market securities and the country risk analysis techniques used to evaluate emerging market economies;
l) identify and interpret macroeconomic and interest and exchange rate links between economies;
m) compare and contrast the major approaches to economic forecasting;

LEVEL III

Question: 4
Topic: Economics
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n) demonstrate the use of economic information in forecasting asset class returns;

o) evaluate how economic and competitive factors affect investment markets, sectors, and specific securities;

p) identify and interpret the major approaches to forecasting exchange rates;

q) recommend and justify changes in the component weights of a global investment portfolio based on trends and expected changes in macroeconomic factors.

LOS: 2010-III-7-24-a,c
24. "Macroanalysis and Microvaluation of the Stock Market"
     The candidate should be able to
     a) contrast leading, lagging, and coincident economic indicators and explain the relationship between these cyclical indicator categories and stock market valuation;
     b) demonstrate how changes in money supply, inflation, and interest rates influence stock and bond prices;
     c) demonstrate the use of the dividend discount model, the free cash flow to equity model, and the earnings multiplier approach in estimating the value of the aggregate stock market;
     d) compare and contrast alternative approaches with the estimation of earnings per share;
     e) formulate and explain the "direction of change" and the "specific estimate" approaches to estimating an earnings multiplier for a stock market series;
     f) evaluate the intrinsic value and estimated rate of return of the stock market by estimating future earnings per share and determining an appropriate earnings multiplier.

LEVEL III

Question:	4
Topic:	Economics
Minutes:	14

Guideline Answer:

PART A

There are three leading cyclical indicators in Exhibit 1 that support Martin's observation:

1.   Average weekly hours of manufacturing workers
2.   Index of consumer expectations
3.   Index of new private housing starts authorized by local building permits

The only other leading indicator is Interest rate spread. The widening of the spread over the last three months does not support Martin's observation about the direction of the economy, since it indicates that the yield curve has steepened. A flattening yield curve would be indicative of a weakening economy.

The other indicators in Exhibit 1 are coincident or lagging indicators.

A leading economic indicator (LEI) is an economic time series that varies with the business cycle, but at a fairly consistent time interval before a turn in the business cycle. LEIs usually reach peaks or troughs before corresponding peaks or troughs in aggregate economic activity. Analysts are interested in LEIs because they may provide information about upcoming changes in economic activity, inflation, interest rates, and security prices.

The leading indicators referenced by Martin focus on business activity and consumer sentiment and activity. Each indicator shows a decrease during the quarter, suggesting that the economy is weakening. The weakening economy should have a negative effect on equity market returns as expectations are priced into the market.

PART B

Limitations of the Cyclical Indicator Approach are as follows:

- False Signals – This occurs when a series that is moving in one direction suddenly reverses and nullifies a prior signal, or hesitates, which is difficult to interpret.
- Currency of the Data and Revisions – Some data series are reported with a lag. Also, revisions in data can change the magnitude of the signal, and even change the direction implied by the original data.
- Economic Sectors Not Reported – Examples include the service sector, import-exports, and many international series.
- Changes in Relationships among Economic Variables – unstable relationships might invalidate assumptions about the effects of changes in a variable.

LEVEL III

Question: 4
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PART C

The dividend discount model formula is defined as follows:

$P = D_1 / (k-g)$

Where:

P = intrinsic value
D_0 = current dividend rate
D_1 = dividend rate in period 1
g = constant growth rate of dividends
k = the required rate of return for stock market (risk free rate + equity risk premium)

Calculate $D_1 = D_0 * (1+g)$:
$D_1 = (760*.035)*(1+.05)$
=27.93

Calculate k-g:
k-g = (.02+.06)-(.05)
=.03

DDM:
$D_1 / (k-g) = 27.93 / .03 = 931$

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 15

QUESTION 5 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 15 MINUTES.

Bill Tubduhl is a consultant to the board of directors of the U.S.-based Thompson Foundation. The board asks Tubduhl to recommend an asset allocation for Thompson. Tubduhl reviews key objectives of the Thompson investment policy statement shown in Exhibit 1.

Exhibit 1
Thompson Foundation
Key Objectives of Investment Policy Statement

Return objective:
- Required annual rate of return on investment portfolio is 9.6%.

Risk objectives:
- Diversify the portfolio consistent with prudent investment practices.
- Minimize portfolio risk while achieving return objective.
- Leverage is not allowed.

For the strategic asset allocation analysis, Tubduhl has generated the corner portfolios shown in Exhibit 2.

Exhibit 2
Corner Portfolios
(Risk-free Rate = 3.0%)

Corner Portfolio Number	Annual Expected Return (%)	Annual Expected Standard Deviation (%)	Sharpe Ratio	Asset Class Portfolio Weights (%)					
				U.S. Equities	Non-U.S. Equities	Long-term U.S. Bonds	Inter-mediate-term U.S. Bonds	Non-U.S. Bonds	Real Estate
1	10.9	16.3	0.48	100.0	0.0	0.0	0.0	0.0	0.0
2	10.5	14.7	0.51	82.4	0.0	0.0	0.0	0.0	17.6
3	10.2	13.7	0.53	74.1	4.0	0.0	0.0	0.0	21.9
4	9.4	10.1	0.63	33.7	12.0	36.7	0.0	0.0	17.6
5	8.8	8.6	0.67	31.4	12.0	26.7	13.0	0.0	16.9
6	8.2	7.3	0.71	25.0	11.8	0.0	45.3	3.4	14.5
7	6.9	5.3	0.74	0.0	13.7	0.0	53.0	27.1	6.2
8	6.4	4.9	0.69	0.0	11.2	0.0	53.0	31.5	4.3

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 15

Answer Questions 5-A, 5-B, and 5-C using mean-variance analysis:

A.   **Select** the *two* adjacent corner portfolios to be used in finding the *most* appropriate strategic asset allocation for Thompson's investment portfolio.

(3 minutes)

B.   **Determine** the *most* appropriate allocation between the two adjacent corner portfolios selected in Part A.

(3 minutes)

C.   **Determine** the percentage that would be invested in real estate based on the *most* appropriate strategic asset allocation.

(3 minutes)

Tubduhl also advises Jack Slifer, a U.S. investor, who is considering the addition of high yield bonds to his portfolio. Based on Tubduhl's research, U.S. high yield bonds have an expected return of 6.5%, an expected standard deviation of 10.5%, and a predicted correlation with Slifer's portfolio of 0.6. Slifer's portfolio has a Sharpe ratio of 0.46. The risk-free rate is 3.0%.

D.   **Determine**, based on the Sharpe ratio criterion, if Tubduhl should include U.S. high yield bonds in Slifer's portfolio. **Justify** your response with *one* reason. **Show** your calculations.

(3 minutes)

At his next meeting with Slifer, Tubduhl proposes adding Chinese equities to the portfolio. The expected return on Chinese equities is 14.0% with an expected standard deviation of 23.5% (both in local currency). The expected standard deviation of the U.S. dollar/Chinese yuan exchange rate is 6.0% and the predicted correlation between Chinese equity returns in local currency and exchange rate movements is 0.2.

E.   **Calculate** the risk of Slifer's investment in Chinese equities measured in U.S. dollar terms. **Show** your calculations.

(3 minutes)

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 15

Reading References:
"Asset Allocation," Ch. 5, *Managing Investment Portfolios: A Dynamic Process,* 3rd edition, William F. Sharpe, Peng Chen, Jerald E. Pinto, and Dennis W. McLeavey (CFA Institute, 2007)

"The Case for International Diversification," Ch. 9, *Global Investments,* 6th edition, Bruno Solnik and Dennis McLeavey (Addison Wesley, 2008)

Purpose:

To test the candidate's ability to determine an appropriate asset allocation for an investor.

LOS: 2010-III-8-26- g, h, I, j, m, n, o

> The candidate should be able to:
> a) summarize the function of strategic asset allocation in portfolio management and discuss its role in relation to specifying and controlling the investor's exposures to systematic risk;
> b) compare and contrast strategic and tactical asset allocation;
> c) appraise the importance of asset allocation for portfolio performance;
> d) contrast the asset-only and asset/liability management (ALM) approaches to asset allocation;
> e) explain the advantage of dynamic over static asset allocation and evaluate the trade-offs of complexity and cost;
> f) explain how loss aversion, mental accounting, and fear of regret may influence asset allocation policy;
> **g) evaluate return and risk objectives in relation to strategic asset allocation;**
> h) evaluate whether an asset class or set of asset classes has been appropriately specified;
> i) select and justify an appropriate set of asset classes for an investor;
> **j) evaluate the theoretical and practical effects of including additional asset classes in an asset allocation;**
> **k) formulate and implement the major steps in asset allocation;**
> l) discuss the strengths and limitations of the following approaches to asset allocation: mean–variance, resampled efficient frontier, Black–Litterman, Monte Carlo simulation, ALM, and experience based;
> **m) discuss the structure of the minimum-variance frontier with a constraint against short sales;**
> **n) formulate and justify a strategic asset allocation, given an investment policy statement and capital market expectations;**

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Question: 5
Topic: Asset Allocation
Minutes: 15

o) contrast the characteristic issues relating to asset allocation for individual investors versus institutional investors and critique a proposed asset allocation in light of those issues;

p) formulate and justify tactical asset allocation (TAA) adjustments to strategic asset-class weights, given a TAA strategy and expectational data

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 15

LOS: 2010-III-8-27-b, c, f

The candidate should be able to:
a) **evaluate the implications of international diversification for domestic equity and fixed income portfolios, based on the traditional assumptions of low correlations across international markets;**
b) **distinguish between the asset return and currency return for an international security;**
c) **evaluate the contribution of currency risk to the volatility of an international security position**;
d) explain and justify the impact of international diversification on the efficient frontier;
e) evaluate the potential performance and risk-reduction benefits of adding bonds to a globally diversified stock portfolio;
f) explain why currency risk should not be a significant barrier to international investment;
g) critique the traditional case against international diversification;
h) discuss the barriers to international investments and their impact on international investors;
i) distinguish between global investing and international diversification and discuss the growing importance of global industry factors as a determinant of risk and performance;
j) summarize the basic case for investing in emerging markets, as well as the risks and restrictions often associated with such investments.

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 15

Guideline Answer:

PART A

Corner portfolios 3 and 4 are the corner portfolios to be used in determining the most appropriate strategic asset allocation for the Thompson Foundation.

The portfolio that satisfies Thompson's return and risk objectives must lie on the portion of the efficient frontier located between corner portfolio 3 and corner portfolio 4.

PART B

Using the corner portfolio theorem and the expected returns for corner portfolio 3 and corner portfolio 4, solve the following equation for w:

$9.6 = 10.2w + 9.4(1 − w)$
The solution yields:
$w = 0.25$ and $1 − w = 0.75$
where w represents the weight allocated to corner portfolio 3.

Therefore, most appropriate strategic asset allocation is 25% in corner portfolio 3 and 75% in corner portfolio 4.

PART C

The percent age invested in real estate given the most appropriate allocation equals the weighted average of the real estate allocations in corner portfolios 3 and 4:

Real estate weight = $0.25 \times 21.9\% + 0.75 \times 17.6\% = 18.675\% \approx 18.7\%$.

PART D

In order to achieve a superior portfolio of risky assets by adding high-yield U.S. bonds, the Sharpe ratio for the high yield bonds must exceed the product of Slifer's existing portfolio and the correlation of the high-yield bonds with the current portfolio. Therefore, U.S. high yield bonds should be added because the asset class Sharpe ratio = $(.065 - .03)/.105 = 0.33$ is higher than the Sharpe ratio of the existing portfolio multiplied by the correlation between the new asset class and the existing portfolio $(.46 \times .60) = .28$.

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 15

PART E

The risk of an investment in Chinese equities measured in U.S. Dollar terms is measured by the standard deviation of returns, 25.4%.

This is calculated as follows:

The variance of the returns on foreign asset in U.S. Dollar terms = variance of foreign asset in local currency + Variance of the exchange rate + (2 × correlation between Foreign asset return and exchange rate movement × standard deviation of foreign asset in local currency × standard deviation of the exchange rate)

As given in the problem:

The standard deviation of Chinese equities (in Yuan) = 23.5%
The standard deviation of U.S. Dollar/Chinese Yuan exchange rate = 6%
The correlation between foreign asset return and exchange rate movement = 0.2

Therefore, the variance = $(23.5\%)^2 + (6\%)^2 + (2 \times 0.2 \times 23.5\% \times 6\%) = 644.7\%^2$ and the Standard deviation = 25.4%.

LEVEL III

Question: 6
Topic: Fixed Income
Minutes: 18

QUESTION 6 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 18 MINUTES.

George Frost is a portfolio manager at ALIAB Bank, which has just issued a guaranteed investment contract (GIC). He needs to immunize this GIC, which guarantees a single payment of 80,000,000 U.S. dollars (USD) in 4 years and provides a bond equivalent yield of approximately 3.50%. Frost calculates the present value of the GIC to be USD 69,640,000. This is the amount he intends to invest today to immunize the GIC. He is not permitted to use leverage.

Frost is building a suitable portfolio and already holds the U.S. government bonds shown in Exhibit 1.

Exhibit 1
Existing Portfolio Bonds

Bond	Market Price (USD)	Total Market Value (USD)	Total Dollar Duration
Bond A	102.32	24,556,800	477,139
Bond B	94.90	29,815,000	2,104,939

Frost must choose a U.S. government bond to complete the immunized portfolio. He has gathered the data shown in Exhibit 2.

Exhibit 2
Bonds Available to Complete Immunized Portfolio

Bond	Market Price (USD)	Yield to Maturity	Modified Duration
Bond X	99.97	3.52%	1.333
Bond Y	99.36	3.80%	2.154
Bond Z	99.35	3.85%	1.890

A.   **Determine** which bond (X, Y, or Z) is the *most* suitable for Frost to complete the immunized portfolio. **Justify** your response with *one* reason. **Show** your calculations.

(8 minutes)

A client of Frost, Farm Technology (FT), has entered into a transaction requiring a payment of USD 250,000,000 in two years. FT has USD 235,000,000 available to meet this liability.

LEVEL III

Question: 6
Topic: Fixed Income
Minutes: 18

Frost recommends a technique called contingent immunization. Under certain market conditions, this technique can provide FT with a safety margin or cushion in meeting its liability. He notes that a U.S. government bond with a bond equivalent yield of 3.82% is available. FT agrees to implement contingent immunization using this bond.

B.   i.   **Determine** the initial dollar safety margin. **Show** your calculations.
      ii.   **Identify** the main advantage to FT of using contingent immunization rather than classical immunization.

(6 minutes)

Frost discusses other opportunities to use immunization with Victor Smith, a financial manager at FT. Smith makes the following statements:

Statement 1:   "FT should use corporate bonds for immunization in the future as this will achieve a lower cost of immunization."

Statement 2:   "Whenever FT implements a multiple-liability immunization plan, the market value of the assets should be compared with the present value of the remaining liabilities by discounting the liabilities using zero coupon U.S. Treasury yields."

C.   **Explain** why *each* of Smith's statements is incorrect.

      Note: Simply reversing the statements will receive no credit.

(4 minutes)

LEVEL III

Question: 6
Topic: Fixed Income
Minutes: 18

Reading References:
28. "Fixed-Income Portfolio Management-Part I," Ch. 6, sections 1–4 (pp. 1–40) *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, H. Gifford Fong and Larry D. Guin (CFA Institute, 2007).

Purpose:
To test understanding of single liability immunization and contingent immunization. To test application considerations for construction of immunized and cash flow matched portfolios.

LOS: 2010-III-9-28-f-m

Fixed-Income Portfolio Management-Part I
The candidate should be able to
  a) compare and contrast, with respect to investment objectives, the use of liabilities as a benchmark and the use of a bond index as a benchmark;
  b) compare and contrast pure bond indexing, enhanced indexing, and active investing with respect to the objectives, techniques, advantages, and disadvantages of each;
  c) discuss the criteria for selecting a benchmark bond index and justify the selection of a specific index when given a description of an investor's risk aversion, income needs, and liabilities;
  d) review and justify the means, such as matching duration and key rate durations, by which an enhanced indexer may seek to align the risk exposures of the portfolio with those of the benchmark bond index;
  e) contrast and illustrate the use of total return analysis and scenario analysis to assess the risk and return characteristics of a proposed trade.
  f) **design a bond immunization strategy that will ensure funding of a predetermined liability and evaluate the strategy under various interest rate scenarios;**
  g) **demonstrate the process of rebalancing a portfolio to re-establish a desired dollar duration;**
  h) explain the importance of spread duration;
  i) **discuss the extensions that have been made to classical immunization theory, including the introduction of contingent immunization;**
  j) critique the risks associated with managing a portfolio against a liability structure, including interest rate risk, contingent claim risk, and cap risk;
  k) compare and contrast immunization strategies for a single liability, multiple liabilities, and general cash flows;
  l) **compare and contrast risk minimization with return maximization in immunized portfolios;**

LEVEL III

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Minutes: 18

m) **demonstrate the use of cash flow matching to fund a fixed set of future liabilities and contrast the advantages and disadvantages of cash flow matching to those of immunization strategies.**

LEVEL III

Question: 6
Topic: Fixed Income
Minutes: 18

Guideline Answer

PART A

There are two approaches that Frost can use to determine the bond that is most suitable to complete the immunized portfolio, the Dollar Duration Approach and the Modified Duration Approach.

The Dollar Duration Approach

Under this approach, there are two conditions for an immunized bond portfolio:

1. The dollar duration of the asset portfolio equals the dollar duration of the liability.
2. The PV of the assets equals the PV of the liabilities.

The dollar duration of the single-pay liability, the GIC, equals USD 2,785,600 and has a present value of USD 69,640,000.

(USD 69,640,000 x 4 x 0.01 = USD 2,785,600)

Since the present value of the existing bonds in the portfolio is USD 54,371,800, the dollar value of the most suitable bond must equal USD 15,268,200.

The dollar duration of the existing bonds in the portfolio equals 2,582,078 (477,139 + 2,104,939). The dollar duration of the most suitable bond must be closest to the difference between the dollar duration of the GIC and the existing bond portfolio, USD 203,522 (USD 2,785,600 - USD 2,582,078).

The dollar durations of the bonds available to complete the immunized portfolio are:

Dollar duration of Bond X = 1.333 x 15,268,200 x 0.01 = 203,525.
Dollar duration of Bond Y = 2.154 x 15,268,200 x 0.01 = 328,877.
Dollar duration of Bond Z = 1.890 x 15,268,200 x 0.01 = 288,569.

Therefore, Frost should complete his immunization process by buying USD 15,268,200 of Bond X.

LEVEL III

Question: 6
Topic: Fixed Income
Minutes: 18

The Modified Duration Approach

Under this approach, there are two conditions for an immunized bond portfolio:

1. The modified duration of the asset portfolio equals the modified duration of the liability.
2. The PV of the assets equals the PV of the liabilities.

The single-payment liability (GIC) has a modified duration equal to 4.0 and a present value of USD 69,640,000. Since the present value of the existing bonds in the portfolio is USD 54,371,800, the dollar value of the most suitable bond must equal USD 15,268,200 and will constitute 21.92% of the bond portfolio.

The modified durations of the existing bonds in the portfolio are:

Modified duration of Bond A = 477,139 / 24,556,800 / 0.01 = 1.943
Modified duration of Bond B = 2,104,939 / 29,815,000 / 0.01 = 7.060

Since the modified duration of the immunized portfolio, 4.0, equals the weighted average of the modified durations of the bonds in the portfolio, the most suitable bond must have a modified duration of 1.333. This is given by:

= [4.0 – (1.943)(0.3526) – (7.060)(0.4281)]/(0.2192) = 1.333
Where:
0.3526 = the portion currently invested in Bond A
0.4281 = the portion currently invested in Bond B
0.2192 = the portion to be invested in most suitable bond

Therefore Frost should complete his immunization process by buying USD 15,268,200 of Bond X.

LEVEL III

Question: 6
Topic: Fixed Income
Minutes: 18

PART B

i. The government bond yields 3.82%.
    FT needs a maturity value of USD 250,000,000 so the amount it needs to invest now is

    $$\frac{250,000,000}{(1+0.0382/2)^{2*2}} = \text{USD } 231,778,316.$$

    Therefore the initial dollar safety margin or cushion, is USD 235,000,000 – USD 231,778,316 = USD 3,221,684.

ii. The primary objective of classical immunization is risk control. The main advantage to FT using contingent immunization is that it provides the flexibility to increase returns.

PART C

Statement 1: Smith is incorrect to state that using corporate bonds will lower the cost of immunization. Corporate bonds have default risk. Immunization assumes no defaults; using corporate bonds could raise the cost of immunization. Corporate bonds are also less liquid and subject to credit spread risk which can increase the cost of rebalancing, which would also increase the cost of immunization.

Statement 2: Smith is incorrect to state that the liabilities should be discounted using zero-coupon Treasury rates. Liabilities should be discounted by the internal rate of return on the immunized portfolio.

LEVEL III

Question: 7
Topic: Risk
Minutes: 20

QUESTION 7 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 20 MINUTES.

Chantal Jacob is a portfolio manager in the U.K. The U.K. has bid to be the host country for a major international sports tournament. The host country will be announced in three weeks.

Jacob believes that the share price of Severn Hospitality plc, a hotel operating company, will be significantly influenced by the outcome of the bid to host the tournament. If the U.K. is selected, she believes that Severn's share price would rise significantly. If the U.K. is not selected, she believes that Severn's share price would fall significantly. Jacob wants to profit from her beliefs by implementing a straddle. She gathers the information shown in Exhibit 1.

Exhibit 1
Severn Hospitality plc Share and Options Data
(GBP = British pound)

Current share price of Severn Hospitality plc	GBP 8.80
Annual risk-free rate	1.50%
Price of one month call option, exercise price GBP 9.00	GBP 0.38
Price of one month put option, exercise price GBP 9.00	GBP 0.57

A.   **Determine** *each* of the following:

   i.   the profit per share on the straddle if the U.K. wins the bid and Severn's share price doubles.
   ii.   the *two* share prices of Severn at which breakeven for the straddle occurs.

   Show your calculations.

(4 minutes)

B.   **Explain** why *each* of the following option strategies is *less* appropriate than a straddle, given Jacob's beliefs:

   i.   bull spread
   ii.   short butterfly spread
   iii.   zero cost collar

(6 minutes)

LEVEL III

Question:	7
Topic:	Risk
Minutes:	20

Jacob manages the equity portion of the Bold Beverages Pension Fund, which is converting its pension plan from defined benefit to defined contribution, effective three months from now. Plan participants have three months to elect various investments for the new plan. The trustees inform Jacob that they wish to keep the value of the pension fund stable during these three months.

Accordingly, Jacob wants to eliminate systematic risk in the equity portion of the fund by using futures on the FTSE 100 Index, which is the benchmark for the fund's equity portfolio. She collects the information shown in Exhibit 2.

Exhibit 2
Bold Beverages Pension Fund and Market Data

Value of Bold Beverages Pension Fund equity portfolio	GBP 235,400,000
Level of FTSE 100 Index	4,650
Level of three-month FTSE 100 futures contract	4,667
Futures multiplier	GBP 10
Beta of Bold Beverages Pension Fund equity portfolio	1.04
Beta of FTSE 100 futures contract	0.98

C.   i.   **State** the target beta for Jacob's hedging strategy.
    ii.   **Determine** the number of futures contracts that Jacob should sell to achieve the target. **Show** your calculations.

(5 minutes)

Three months after Jacob implements the hedge, the FTSE 100 Index is up 3.75%. The equity portion of the Bold Beverages Pension Fund is up 3.50% and the level of the expiring three-month FTSE 100 futures contract that Jacob sold is 4,824. The trustees ask Jacob to assess the effectiveness of the hedge that has been in place.

D.   **Determine** the effective beta of the Bold Beverages Pension Fund equity portfolio, including the futures, assuming that Jacob sold 5,200 futures contracts. **Show** your calculations.

(5 minutes)

LEVEL III

Question: 7
Topic: Risk
Minutes: 20

Reading References:
41.   "Risk Management Applications of Forward and Futures Strategies," Ch. 6 (pp. 356–391) *Analysis of Derivatives for the CFA® Program*, Don M. Chance (AIMR, 2003).
42.   "Risk Management Applications of Option Strategies," Ch. 7 (pp. 430–484), *Analysis of Derivatives for the CFA® Program*, Don M. Chance (AIMR, 2003) [change sec. 2.2.1 and 2.2.2 from optional to required]
43.   "Risk Management Applications of Swap Strategies," Ch. 8, *Analysis of Derivatives for the CFA® Program*, Don M. Chance (AIMR, 2003).

Purpose:
To test knowledge and use of equity option strategies. To test knowledge and use of futures to alter risk exposure in an equity portfolio.

LOS: 2010-III-15-41-a-c,e-42a,b,e,f
41.   **"Risk Management Applications of Forward and Futures Strategies"**
        The candidate should be able to
        a)   demonstrate the use of equity futures contracts to achieve a target beta for a stock portfolio and calculate and interpret the number of futures contracts required;
        b)   construct a synthetic stock index fund using cash and stock index futures (equitizing cash);
        c)   create synthetic cash by selling stock index futures against a long stock position;
        d)   demonstrate the use of equity and bond futures to adjust the allocation of a portfolio between equity and debt;
        e)   demonstrate the use of futures to adjust the allocation of a portfolio across equity sectors and to gain exposure to an asset class in advance of actually committing funds to the asset class;
        f)   discuss the three types of exposure to exchange rate risk and demonstrate the use of forward contracts to reduce the risk associated with a future transaction (receipt or payment) in a foreign currency;
        g)   explain the limitations to hedging the exchange rate risk of a foreign market portfolio and discuss two feasible strategies for managing such risk.

42.   **"Risk Management Applications of Option Strategies"**
        The candidate should be able to
        a)   Compare and contrast the use of covered calls and protective puts to manage risk exposure to individual securities;
        b)   **determine and interpret the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and general shape of**

LEVEL III

Question:	7
Topic:	Risk
Minutes:	20

> **the graph for the major option strategies (bull spread, bear spread, butterfly spread, collar, straddle, box spread);**
>
> c)   determine the effective annual rate for a given interest rate outcome when a borrower (lender) manages the risk of an anticipated loan using an interest rate call (put) option;
>
> d)   determine the payoffs for a series of interest rate outcomes when a floating rate loan is combined with (1) an interest rate cap, (2) an interest rate floor, or (3) an interest rate collar;
>
> e)   explain why and how a dealer delta hedges an option position, why delta changes, and how the dealer adjusts to maintain the delta hedge;
>
> f)   interpret the gamma of a delta-hedged portfolio and explain how gamma changes as in-the-money and out-of-the-money options move toward expiration.

LEVEL III

Question: 7
Topic: Risk
Minutes: 20

Guideline Answer:

PART A

i. The share price of Severn Hospitality plc becomes GBP 8.80 × 2 = GBP 17.60, in which case the profit per share on the straddle is:

Call option's profit of GBP 17.60 – GBP 9.00 = GBP 8.60, less the cost of both options (GBP 0.38 + GBP 0.57) = GBP 7.65.

ii. The breakeven prices of Severn shares are GBP 9.95 and GBP 8.05. The upside breakeven point occurs when the profit from the call option is just sufficient to cover the costs of both options, namely (stock price – call strike price) = (price of call option + price of put option). Solving for the stock price yields stock price of GBP 9.95. The downside breakeven point occurs when the profit from the put option is just sufficient to cover the cost of both options, (put strike price – stock price) = (price of call option + price of put option). Solving for the stock price yields = GBP 8.05.

PART B

i. A bull spread would lose money if the U.K. loses the bid and the share price falls sharply, and would make only limited profits (compared to a straddle) if the U.K. wins the bid and the share price appreciates sharply.

ii. A short butterfly spread would make only limited gains when the share price either increases or decreases beyond the breakeven points.

iii. A zero cost collar would lose a limited amount of money if the U.K. loses the bid, and would make only a limited profit (compared to a straddle) if the U.K. wins the bid.

LEVEL III

Question: 7
Topic: Risk
Minutes: 20

PART C

i.   Jacob wishes to eliminate all systematic risk in the Bold Beverages Pension Fund's equity portfolio, so the target beta must be zero. $\beta_T = 0$

ii.   The price of a futures contract = GBP $10 \times 4{,}667$ = GBP 46,670.

The number of futures contracts required is:

N_f = $[(\beta_T - \beta_S)/\beta_f] \times (S/f)$, where S = stock portfolio, f = futures contract.

            = $[(0 - 1.04)/0.98] \times$ (GBP 235,400,000/GBP 46,670)

            = - 5,352.74

As fractions of futures cannot be traded, Jacob should sell 5,353 FTSE 100 futures contracts.

PART D

The new value of the equity portfolio is GBP $235{,}400{,}000 \times 1.035$ = GBP 243,639,000 or a gain of GBP 8,239,000.

The profit on the futures is $(4{,}824 - 4{,}667)$ x GBP $10 \times (-5{,}200)$ = - GBP 8,164,000 or a profit of -3.468%.

So, the overall profit is GBP 8,239,000 – GBP 8,164,000 = GBP 75,000 and the ending value of the overall portfolio is GBP 235,475,000.

This is an overall return of GBP 75,000/GBP 235,400,000 = 0.0003 or 0.03%

Since the market was up 3.75%, the effective beta was 0.0003/0.0375 = 0.0085.

LEVEL III

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

QUESTION 8 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 17 MINUTES.

Rav Malik, an investment advisor, meets with a new client in the U.K., Ian Brown, to discuss his investment portfolio. Brown has managed his own assets in the past and rebalances his portfolio to target weights at the beginning of each month.

Malik suggests that Brown consider percentage-of-portfolio rebalancing with daily monitoring and rebalancing to target weights. He offers to demonstrate how the two approaches would differ after rebalancing on 1 April, given the allocations shown in Exhibit 1, with tolerance bands or corridor widths set at ± 10% of the target allocation.

Exhibit 1
Brown Asset Allocation

Asset Class	Strategic Asset Allocation: Target Weights	Closing 31 March Allocation
Large-cap U.K. equity	30%	27%
International equity	30%	28%
U.K. fixed income	40%	45%

A.   **Determine** whether Brown's calendar rebalancing method would result in a higher, lower, or the same weighting in international equity holdings on 1 April, as compared to Malik's percentage-of-portfolio rebalancing method. **Explain** your response.

(4 minutes)

Malik tells Brown, "Before adopting percentage-of-portfolio rebalancing, we need to determine the optimal corridor width for each asset class based on market conditions and your circumstances." Malik notes the following information:

- Brown's tolerance for risk has declined as volatility in the international equity markets has increased.

- Brown is concerned about taxes and transaction costs associated with frequent rebalancing. Transaction costs for international equity investments are higher than for Brown's other asset classes.

LEVEL III

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

- Global equity market correlations are increasing and the correlation of international equity with the rest of the portfolio is higher than the correlation of U.K. fixed income with the rest of the portfolio.

Malik then tells Brown, "The optimal corridor width for U.K. fixed income should be narrower than the optimal corridor width for international equity."

B. **Determine** *two* factors that support Malik's conclusion regarding the optimal corridor width for U.K. fixed income relative to international equity.

(4 minutes)

Malik notes that Brown's domestic equity allocation consists of only large-cap equity. He discusses the possibility of adding small-cap equity to the portfolio and Brown agrees.

Malik reviews Brown's portfolio holdings and enters two trades, shown in Exhibit 2, into the firm's order management system.

Exhibit 2
Trading Orders and Market Data on 1 April
(GBP = British pound)

Symbol	Trade	Size (shares)	Average Daily Volume	Last Price (GBP)	Bid-Ask Spread (%)
ABCD	Buy	5,000	13,000	4.15	0.79
EFGH	Buy	40,000	475,000	9.14	0.06

Sean Granger, a trader at Malik's firm, reviews the planned trades for 1 April and notes the following:

- Malik wants to establish a long-term position in ABCD for Brown.
- Malik believes EFGH's earnings report, scheduled to be released tomorrow afternoon, will have a favorable effect on the share price of EFGH.

Granger considers executing the orders using a crossing system, implementation shortfall algorithm, or volume-weighted average price (VWAP) algorithm.

LEVEL III

Question:	8
Topic:	Portfolio Management: Monitor/Rebalance/Execution
Minutes:	17

C.   **Recommend** the *most* appropriate trade execution tactic (crossing system, implementation shortfall, or VWAP) for *each* order.

   i.   Buy 5,000 shares ABCD
   ii.   Buy 40,000 shares EFGH

Justify *each* recommendation with *one* reason.

ANSWER QUESTION 8-C IN THE TEMPLATE PROVIDED ON PAGE 57.

(6 minutes)

That afternoon, Malik reads a research report recommending purchase of small-cap RB Holdings Corporation (RBHC) and decides to take a position. The following sequence of events occurs:

- On 1 April, RBHC closes at GBP 10.25.
- The next morning, Malik directs Granger to enter a limit order expiring at the end of the day to purchase 20,000 shares at GBP 10.25.
- Granger purchases a total of 6,000 shares at GBP 10.24 with commissions of GBP 400.
- On 2 April, RBHC closes at GBP 10.32, and VWAP is GBP 10.27.
- No additional shares were purchased and the remaining order is cancelled.

Granger informs Malik that his trading was successful because he paid less than the day's (2 April) VWAP of GBP 10.27. Malik notes that VWAP does not consider the costs of missed trade opportunities.

D.   **Calculate** the missed trade opportunity cost, in basis points, for the RBHC trade. **Show** your calculations.

(3 minutes)

LEVEL III

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

Part C

Template for Question 8-C

Order	Recommend the *most* appropriate trade execution tactic (crossing system, implementation shortfall, or VWAP) for *each* order. (circle one)	Justify *each* recommendation with *one* reason.
i. Buy 5,000 shares ABCD	Crossing system Implementation shortfall VWAP	
ii. Buy 40,000 shares EFGH	Crossing system Implementation shortfall VWAP	

LEVEL III

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

Reading References:
Reading 44: Execution of Portfolio Decisions
Managing Investment Portfolios: A Dynamic Process, Third
Edition, John L. Maginn, CFA, Donald L. Tuttle, CFA,
Jerald E. Pinto, CFA, and Dennis W. McLeavey, CFA, editors (CFA Institute, 2007)

Reading 45: Monitoring and Rebalancing
Managing Investment Portfolios: A Dynamic Process, Third
Edition, John L. Maginn, CFA, Donald L. Tuttle, CFA,
Jerald E. Pinto, CFA, and Dennis W. McLeavey, CFA, editors (CFA Institute, 2007)

Purpose:
To test candidates' knowledge and understanding of monitoring and rebalancing portfolios as well as the execution of portfolio decisions.

LOS: 2010-III-16-44-g, h, j, k, l and LOS-2010-III-16-45-d, e, f
The candidate should be able to:
a. compare and contrast market orders with limit orders, including the price and execution uncertainty of each;
b. calculate and interpret the effective spread of a market order and contrast it to the quoted bid–ask spread as a measure of trading cost;
c. compare and contrast alternative market structures and their relative advantages;
d. compare and contrast the roles of brokers and dealers;
e. explain the criteria of market quality and evaluate the quality of a market when given a description of its characteristics;
f. review the components of execution costs, including explicit and implicit costs, and evaluate a trade in terms of these costs;
g. calculate, interpret, and explain the importance of implementation shortfall as a measure of transaction costs;
h. contrast volume weighted average price (VWAP) and implementation shortfall as measures of transaction costs;
i. explain the use of econometric methods in pretrade analysis to estimate implicit transaction costs;
j**. discuss the major types of traders, based on their motivation to trade, time versus price preferences, and preferred order types;**
k. describe the suitable uses of major trading tactics, evaluate their relative costs, advantages, and weaknesses, and recommend a trading tactic when given a description of the investor's motivation to trade, the size of the trade, and key market characteristics;
l. explain the motivation for algorithmic trading and discuss the basic classes of algorithmic trading strategies;

LEVEL III

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

m. discuss and justify the factors that typically determine the selection of a specific algorithmic trading strategy, including order size, average daily trading volume, bid–ask spread, and the urgency of the order;
n. explain the meaning and criteria of best execution;
o. evaluate a firm's investment and trading procedures, including processes, disclosures, and record keeping, with respect to best execution;
p. discuss the role of ethics in trading.

Reading 45: Monitoring and Rebalancing
The candidate should be able to:
a. explain and justify a fiduciary's responsibilities in monitoring an investment portfolio;
b**.** describe and justify the monitoring of investor circumstances, market/economic conditions, and portfolio holdings and explain the effects that changes in each of these areas can have on the investor's portfolio;
c. recommend and justify revisions to an investor's investment policy statement and strategic asset allocation, given a change in investor circumstances;
d. discuss the benefits and costs of rebalancing a portfolio to the investor's strategic asset allocation;
e. contrast calendar rebalancing to percentage-of-portfolio rebalancing;
f. discuss the key determinants of the optimal corridor width of an asset class in a percentage-of-portfolio rebalancing program, including transaction costs, risk tolerance, correlation, asset class volatility, and the volatility of the remainder of the portfolio, and evaluate the effects of a change in any of these factors;
g. compare and contrast the benefits of rebalancing an asset class to its target portfolio weight versus rebalancing the asset class to stay within its allowed range;
h. explain the performance consequences in up, down, and nontrending markets of 1) rebalancing to a constant mix of equities and bills, 2) buying and holding equities, and 3) constant proportion portfolio insurance (CPPI);
i. distinguish among linear, concave, and convex rebalancing strategies;
j. judge the appropriateness of constant mix, buy-and-hold, and CPPI rebalancing strategies when given an investor's risk tolerance and asset return expectations.
i. compare and contrast venture capital funds to buyout funds;
j. discuss the use of convertible preferred stock in direct venture capital investment;

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

Guideline Answer:

PART A

The two approaches, Brown's calendar rebalancing and Malik's percentage-of-portfolio rebalancing, would result in rebalancing to equal weightings in international equities (30%) on 1 April. The monthly calendar rebalancing approach requires that the portfolio is rebalanced to the strategic allocation target weights at the beginning of each month, so on 1 April, Brown's holdings in international equities would be increased from 28% to 30%.

Although the 28% weighting in international equities is within the tolerance band under the percentage of portfolio rebalancing approach, the 45% weighting in U.K. fixed income is outside the tolerance band. Thus, all asset classes would be rebalanced to target weights.

PART B

Brown's optimal corridor width for U.K. fixed income should be narrower than the optimal corridor width for international equities because of the following factors:

1) Higher transaction costs for international investments: High transaction costs set a high hurdle for rebalancing benefits to overcome. Since transaction costs for international equity are higher than transaction costs for U.K. fixed income, the optimal corridor width for U.K. fixed income will be narrower than the optimal corridor width for international equities.

2) Higher correlation with the rest of the portfolio: International equities have a higher correlation with the rest of the portfolio than U.K. fixed income with the rest of the portfolio. When asset classes move together, further divergence from targets is less likely, allowing a wider optimal corridor width for international equities compared with U.K. fixed income.
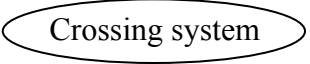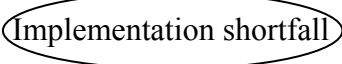
With regard to the other information noted by Malik:
Brown's lower risk tolerance supports narrower optimal corridor widths for all asset classes, not U.K. fixed income relative to international equities.

Increased volatility in the international equity markets would support a narrower, not wider, optimal corridor width for international equities.

Question: 8
Topic: Portfolio Management: Monitor/Rebalance/Execution
Minutes: 17

PART C

Template for Question 8-C

Order	Recommend the *most appropriate trade execution tactic* (crossing system, implementation shortfall, or VWAP) for *each* order. (circle one)	Justify *each* recommendation with *one* reason.
i. Buy 5,000 shares ABCD	⟨Crossing system⟩ Implementation shortfall VWAP	The ABCD order is large relative to average daily volume and has a large spread. It is not suitable for algorithmic trading and, given its low urgency, it would be most appropriate to use a broker or crossing system to mitigate the large spreads. This will also prevent information leakage and protect the client's anonymity.
ii. Buy 40,000 shares EFGH	Crossing system ⟨Implementation shortfall⟩ VWAP	The EFGH order is small relative to average daily volume, but given the high urgency, it would be most appropriate to use an implementation shortfall algorithm with a high urgency setting to aggressively execute the purchase. Such a trading strategy breaks up the order and seeks to minimize the weighted average of market impact costs and missed trade opportunity costs.

PART D

Missed trade opportunity cost reflects the difference between the trade cancellation price and the original benchmark price based on the amount of the order that was not filled,
or: % unfilled × (difference between new closing price and benchmark price/ benchmark price) =

14,000/20,000 × ((10.32 – 10.25)/10.25) = .70 × .0068294 = .0047805% or 48 basis points

LEVEL III

Question: 9
Topic: Performance Evaluation
Minutes: 12

QUESTION 9 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 12 MINUTES.

P&M Capital has been selected to manage a U.S. equity portfolio for a Japanese institutional investor, Tamui Life Company. P&M intends to use an active strategy to manage Tamui's portfolio of approximately 300 equities. Tomoko Sato, an analyst in Tamui's international investment division, is determining a benchmark to evaluate the portfolio's performance. Sato seeks the highest quality benchmark so that investment risk may be effectively managed. Sato concludes that a custom benchmark would be too costly for Tamui. Both parties agree that a broad market index would be most appropriate for this mandate. Sato is asked to evaluate the quality of three possible benchmarks:

- S&P 500
- Russell 1000
- Russell 3000

Sato produces Exhibit 1 to compare Tamui's portfolio to the three possible benchmarks.

Exhibit 1
Comparison of Tamui's Portfolio to Possible Benchmarks

Statistic	Tamui Portfolio	S&P 500	Russell 1000	Russell 3000
Average price-to-book ratio	1.95	2.06	2.13	2.09
Beta relative to the benchmark	---	1.03	0.85	0.92
Median market capitalization (U.S. dollar billions)	5.60	7.98	3.28	0.59
Volatility (annual)	12.0%	18.7%	10.3%	10.4%
Tracking error relative to the benchmark	---	1.87%	4.72%	2.07%
Dividend yield	1.86%	2.45%	2.08%	1.76%

A. **Recommend**, from among the three possible benchmarks presented in Exhibit 1, the highest quality benchmark for Tamui's portfolio. **Justify** your recommendation with *two* reasons, using information provided in Exhibit 1.

(5 minutes)

Sato is directed by management to prepare a micro-attribution report for Tamui's portfolio using a fundamental factor model. She uses portfolio analysis software to produce Exhibit 2.

LEVEL III

Question: 9
Topic: Performance Evaluation
Minutes: 12

Exhibit 2
Fundamental Factor Model Micro-attribution Report for Tamui's Portfolio
for the Quarter Ended 31 March

Returns and Attribution	Portfolio Exposure	Normal Exposure	Active Exposure	Active Impact	Return
Market return					–8.42%
Normal portfolio return					–7.81%
Cash timing	3.20	0.00	3.20	0.16%	
Beta timing	1.17	1.00	0.17	–0.17%	
Total market timing					–0.01%
Growth	1.23	0.87	0.36	–0.30%	
Size	–0.20	0.34	–0.54	0.20%	
Leverage	–0.36	–0.72	0.36	0.09%	
Yield	–0.10	0.00	–0.10	0.35%	
Total fundamental risk factors					0.34%
Total economic sectors					–0.15%
Specific (unexplained)					–0.58%
Actual portfolio return					–8.21%

B.   i.   **Determine** which overweight exposure added the *most* active value to Tamui's portfolio.

     ii.   **Determine** which underweight exposure added the *most* active value to Tamui's portfolio.

(4 minutes)

C.   **Calculate** the value added to Tamui's portfolio through active management for the quarter ended 31 March.

(3 minutes)

LEVEL III

Question: 9
Topic: Performance Evaluation
Minutes: 12

Reading References:
2010 Level III, Volume 6, Study Session 17
46.   "Evaluating Portfolio Performance," Ch. 12, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Jeffrey V. Bailey, Thomas M. Richards, and David E. Tierney (CFA Institute, 2007).

Purpose:
To test the candidate's knowledge of performance evaluation and attribution

LOS: 2010-III-17-46-e,f,i,m

46.   **"Evaluating Portfolio Performance"**
The candidate should be able to
a)   demonstrate the importance of performance evaluation from the perspective of fund sponsors and the perspective of investment managers;
b)   explain the basic components of portfolio evaluation (performance measurement, performance attribution, and performance appraisal);
c)   calculate, interpret, and contrast time-weighted and money-weighted rates of return and discuss how each is affected by cash contributions and withdrawals;
d)   identify and explain potential data quality issues as they relate to calculating rates of return;
e)   **demonstrate the analysis of portfolio returns into components attributable to the market, to style, and to active management;**
f)   **discuss the properties of a valid benchmark and evaluate the advantages and disadvantages of alternative types of performance benchmarks;**
g)   summarize the steps involved in constructing a custom security-based benchmark;
h)   judge the validity of using manager universes as benchmarks;
i)   **evaluate benchmark quality by applying tests of quality to a variety of possible benchmarks;**
j)   discuss the issues that arise when assigning benchmarks to hedge funds;
k)   distinguish between macro and micro performance attribution and discuss the inputs typically required for each;
l)   demonstrate, justify, and contrast the use of macro and micro performance attribution methodologies to evaluate the drivers of investment performance;
m)   **discuss the use of fundamental factor models in micro performance attribution;**
n)   differentiate between the effect of the external interest rate environment and the effect of active management on fixed-income portfolio returns;
o)   explain the management factors that contribute to a fixed-income portfolio's total return and interpret the results of a fixed-income performance attribution analysis;

LEVEL III

Question:	9
Topic:	Performance Evaluation
Minutes:	12

    p)   calculate, interpret, and contrast alternative risk-adjusted performance measures, including (in their *ex post* forms) alpha, information ratio, Treynor measure, Sharpe ratio, and M^2;

    q)   explain how a portfolio's alpha and beta are incorporated into the information ratio, Treynor measure, and Sharpe ratio;

    r)   demonstrate the use of performance quality control charts in performance appraisal;

    s)   discuss the issues involved in manager continuation policy decisions, including the costs of hiring and firing investment managers;

    t)   contrast Type I and Type II errors in manager continuation decisions.

LEVEL III

Question: 9
Topic: Performance Evaluation
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Guideline Answer

PART A

S&P 500 is the highest quality benchmark for Tamui's portfolio. This recommendation is based on the following factors:

- The beta of Tamui's portfolio relative to the S&P 500 Index is 1.03. Over time, there should be minimal systematic biases or risks in the benchmark relative to the portfolio. One measure of this criterion is the historical beta of the portfolio relative to the benchmark; on average, it should be close to 1.0.

- The tracking error of Tamui's portfolio relative to the S&P 500 Index is the lowest (1.87%) of the three alternative benchmarks, indicating that the S&P 500 Index is largely capturing the portfolio's investment style. Tracking error measures the standard deviation of $(P_t – B_t)$, where P_t is the portfolio return in time period t and B_t is the benchmark return in time period t. This is a different concept than the standard deviation or volatility of the individual indices, which are not factors in determining the highest quality benchmark. A high quality benchmark should reduce the "noise" in the performance evaluation process. Therefore, the tracking error of the portfolio relative to a high quality benchmark should be lower than the tracking error relative to alternative benchmarks.

- Market capitalization is used as a method of evaluating the appropriateness of a benchmark given a manager's investment style, rather than as a test of benchmark quality.

PART B

i.
The overweight exposure to Cash Timing contributed the most active value, +0.16%. The micro attribution analysis in Exhibit 2 attributes the value added by the manager to four primary sources: market timing, fundamental risk factors, economic sectors, and a stock-specific or unexplained return component. The Active Exposure column in Exhibit 2 indicates that there are four overweight exposures, two of which contributed active value, Leverage and Cash Timing. Leverage contributed 0.09% of active value, while Cash Timing contributed 0.16%. The other two overweight exposures, Beta Timing and Growth, contributed negative value to the portfolio.

LEVEL III

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ii.
The underweight exposure to Yield contributed most to active value, + 0.35%. The micro attribution analysis in Exhibit 2 attributes the value added by the manager to four primary sources: market timing, fundamental risk factors, economic sectors, and a stock-specific or unexplained return component. The Active Exposure column indicates that there are two underweight exposures, both fundamental risk factors: Size and Yield. Size contributed 0.20% of active value, while Yield contributed 0.35%.

PART C

The value added to Tamui's portfolio through active management was -0.40%. The portfolio return was -8.21% compared to the normal portfolio of -7.81%. P&M reduced value through active management because the total return attributable to active decisions made by the manager (market timing, fundamental risk factors, economic sectors, and stock specific risk or unexplained) sums to -0.40%.