

CFA 三级

CASE BOOK

(2009~2014)

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The Morning Session of the 2009 Level III CFA[®] Examination has 11 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Question	Topic	Minutes
1	Portfolio Management – Individual	26
2	Portfolio Management – Individual	9
3	Portfolio Management – Institutional	24
4	Portfolio Management – Institutional	11
5	Portfolio Management – Economics	19
6	Portfolio Management – Asset Allocation	10
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9	Portfolio Management – Risk Management	16
10	Portfolio Management – Monitoring and Rebalancing	15
11	Portfolio Management – Performance Evaluation	18
Total:		180

Questions 1 and 2 relate to Patricia and Alexander Tracy. A total of 35 minutes is allocated to these questions. Candidates should answer these questions in the order presented.

QUESTION 1 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 26 MINUTES.

Patricia and Alexander Tracy, both age 59, are residents of Canada. They have twin sons who will enter a four-year university program in one year. Patricia is a long-time employee of a telecommunications company. Alexander is a self-employed sales consultant.

Alexander's annual income is now steady after years of extreme highs and lows. The Tracys have built an investment portfolio through saving in Alexander's high income years. The Tracys' current annual income is equal to their total expenses; as a result, they cannot add to savings currently. They expect that both their expenses and income will grow at the inflation rate. All medical costs, now and in the future, are fully covered through government programs.

The Tracys worry about whether they have saved enough for retirement, and whether they will be able to maintain the real value of their portfolio. Inflation is expected to average 4% for the foreseeable future.

The Tracys have approached Darren Briscoe to help them analyze their investment strategy and retirement choices. The Tracys disagree about the appropriate investment strategy. Patricia prefers not losing money over making a high return. This is partly a result of continuing regret for a loss experienced in an equity mutual fund several years ago. Alexander's history of making frequent changes in their portfolio greatly annoyed Patricia. She thinks Alexander focused only on potential return and paid little attention to risk.

The Tracys currently have all their assets in inflation-indexed, short-term bonds that are expected to continue to earn a return that would match the inflation rate after taxes. After retirement, they are willing to consider changing their investment strategy if necessary to maintain their lifestyle.

The Tracys are eligible to retire next year at age 60. If they do, Patricia will receive annual payments from her company's defined-benefit pension plan and both Patricia and Alexander will receive payments from the Canadian government pension plan. Alexander does not participate in any company or individual retirement plan. Briscoe has compiled financial data and market expectations for the Tracys' retirement, shown in Exhibit 1. Currently, Briscoe estimates that the Tracys' investment portfolio will grow to 1,100,000 Canadian dollars (CAD) by their retirement date next year.

Exhibit 1
Financial Data and Market Expectations
Patricia and Alexander Tracy

	Retirement at Age 60 (2010)
Expected annual expenses	CAD 125,000
Annual pension income (after-tax)	
Patricia's company plan	CAD 40,000
Combined government pension	CAD 40,000
Total annual pension income	CAD 80,000
Expected annual inflation	4.0%
Expected annual after-tax portfolio return	4.0%

Pension income from both Patricia's company plan and the government pension plan is fully indexed for inflation. Briscoe expects a tax rate of 20% to apply to the Tracys' withdrawals from the investment account. The Tracys expect to earn no employment income after retirement. The Tracys' residence is not considered part of their investable assets.

The Tracys have the option to delay retirement until age 65. The Tracys intend to retire together, whether it is in 2010 at age 60 or in 2015 at age 65.

Briscoe determines that if the Tracys retire at age 60, their risk tolerance is below average. If they retire at age 60, they plan to pay off their mortgage and associated taxes by withdrawing CAD 100,000 from their portfolio upon retirement.

Another consideration for the Tracys relates to funding university expenses for their sons. If the Tracys retire at age 60, each son will receive a scholarship available to retiree families from Patricia's company that will cover all university costs.

If the Tracys retire at age 65, all pension income would increase and would almost meet their annual spending needs. If they retire at age 65, the Tracys would pay all university expenses from their investment portfolio through an arrangement with the university. The arrangement, covering both sons, would require the Tracys to make a single payment of CAD 200,000 at age 60.

- A.
 - i. **Prepare** the return objectives portion of the Tracys' investment policy statement (IPS) that will apply if they retire at age 60.
 - ii. **Calculate** the pre-tax nominal rate of return that is required for the Tracys' first year of retirement if they retire at age 60. **Show** your calculations.

(12 minutes)

B. **Indicate** specific factors for the Tracys, for *each* of the following, which support Briscoe's conclusion that the Tracys' risk tolerance is below average:

- i. Ability to take risk. **Indicate** *two* factors.
- ii. Willingness to take risk. **Indicate** *one* factor.

(6 minutes)

C. **Prepare** the current (2009) liquidity constraint for the Tracys' IPS:

- i. if they retire at age 60.
- ii. if they retire at age 65.

(4 minutes)

D. **Prepare** the current (2009) time horizon constraint for the Tracys' IPS:

- i. if they retire at age 60.
- ii. if they retire at age 65.

(4 minutes)

Questions 1 and 2 relate to Patricia and Alexander Tracy. A total of 35 minutes is allocated to these questions. Candidates should answer these questions in the order presented.

QUESTION 2 HAS ONE PART FOR A TOTAL OF 9 MINUTES.

Patricia and Alexander Tracy both retired five years ago at age 65 and their sons now support themselves. As a result of better than expected investment returns over the past five years, the Tracys' investment portfolio has significantly increased in value. They now think that their future after-tax investment returns will exceed their expenses for their remaining joint life expectancy. Their new investment objective is to maximize the assets their sons will inherit, subject to a review of the Tracys' risk tolerance by their financial advisor.

During retirement, the Tracys' medical costs are fully covered by the government. The Tracys have no earned income during retirement. They have previously paid off all debt and expect to remain debt-free.

Determine whether *each* of the following measures has increased, decreased, or remained unchanged for the Tracys since just prior to retirement:

- i. implied assets
- ii. implied liabilities
- iii. risk tolerance

Justify *each* response with *one* reason.

Answer Question 2 in the Template provided on page 11.

(9 minutes)

Answer Question 2 on This Page

Template for Question 2

Measure	Determine whether <i>each</i> of the following measures has increased, decreased, or remained unchanged for the Tracys since just prior to retirement. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. implied assets	<p>Increased</p> <p>Decreased</p> <p>Remained unchanged</p>	
ii. implied liabilities	<p>Increased</p> <p>Decreased</p> <p>Remained unchanged</p>	
iii. risk tolerance	<p>Increased</p> <p>Decreased</p> <p>Remained unchanged</p>	

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QUESTION 3 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 24 MINUTES.

Wirth-Moore Corporation is a U.S.-based publisher of educational media. Wirth-Moore sponsors a defined-benefit pension plan. The plan's assets are invested in a broadly diversified portfolio of government and investment grade corporate bonds. Pension plan participants include both active workers and retirees. Pension benefits payments are not adjusted for inflation. The duration and market value of the pension plan's assets are equal to the duration and market value of the plan's projected benefits obligation (PBO). Wirth-Moore believes that it has adequate financial strength and profitability to maintain annual pension contributions based on the pension plan's features and Wirth-Moore's workforce characteristics.

Wirth-Moore recently established the Foundation for the Future (FF), a company-sponsored charitable foundation. FF's mandate from Wirth-Moore is to promote sustainable living through education and research on renewable resources.

FF employs one person to administer grant applications, but does not employ full-time investment professionals. Wirth-Moore donated 10 million U.S. dollars (USD) to FF as a permanent endowment. FF is not restricted to spending only investment income. Wirth-Moore does not plan to make additional donations to FF in the foreseeable future, although FF is permitted to accept donations from others.

FF's board retains Allyson Joy, an investment advisor, to make recommendations for its endowment fund. She summarizes her understanding of FF's investment objectives and related information in Exhibit 1.

Exhibit 1
FF Investment Information

- To minimize taxes under U.S. law, FF's board intends to make annual distributions equal to 5% of its average asset market value.
- The board adopted a goal to increase the value of the endowment by seeking a rate of return exceeding the rate needed to maintain the real purchasing power of the portfolio.
- FF's investment policy limits the amount that can be invested in any single issuer's securities to no more than 5% of the portfolio.
- FF's annual investment management expenses are 0.45% of assets.
- The annual rate of inflation is expected to be 3% in both FF's overhead and in the fields of education and research that FF supports.

A. **Prepare** FF's return objective for next year. **Show** your calculations.

(4 minutes)

- B. i. **Determine** whether FF or the Wirth-Moore pension plan has greater ability to take risk. **Justify** your determination with *one* reason.
- ii. **Determine** whether FF or the Wirth-Moore pension plan has greater willingness to take risk. **Justify** your determination with *one* reason.

(6 minutes)

- C. **Formulate** the following investment policy constraints for FF:

- i. Liquidity.
Show your calculations.
- ii. Time horizon.
Justify your response with *one* reason.

(6 minutes)

FF presently bases its annual spending on the average market value of its assets each year. Noland Reichert, a member of FF's board, is concerned about recent market volatility. Reichert proposes a spending rule based on a rolling three-year average market value. In response to Reichert's proposal, Joy recommends a geometric spending rule, where spending is based on a geometrically declining average of trailing endowment values. FF's external tax counsel advises that there would be no adverse tax consequence from adopting either smoothing rule.

- D. **Explain** the effect on FF's spending of adopting Joy's smoothing rule rather than Reichert's smoothing rule.

(4 minutes)

Reichert also serves on the board of Headwaters University Foundation, an endowment with more than USD 1 billion in assets. Headwaters recently invested in a private equity venture based on the recommendation of its internal investment staff. The venture requires a USD 2.5 million minimum investment by each participant, with a five-year lock-up provision. The private equity venture is not expected to generate income, but has the potential to increase in value at a rate of 20% per year over the next five years. Reichert recommends that FF should participate in this private equity venture.

- E. **Justify**, with *two* reasons, why Reichert's recommendation is inappropriate for FF.

(4 minutes)

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QUESTION 4 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 11 MINUTES.

Setzer is a U.S.-based chain of department stores with operating assets of 1 billion U.S. dollars (USD) in market value terms. Setzer sponsors a defined-benefit pension plan (Pension Plan) that invests exclusively in domestic equities and domestic investment grade corporate bonds. Selected Setzer and Pension Plan financial data are shown in Exhibit 1.

Exhibit 1
Setzer and Pension Plan Financial Data

Setzer (excluding Pension Plan)	
Measure	Value
Debt/equity ratio (market value)	1.0
Operating assets market value (USD billion)	1.0
Equity beta	2.0
Debt beta	0.0
Pension Plan	
Measure	Value
Equity portfolio beta	1.0
Debt investments beta	0.0
Market value (USD million)	800
Equity allocation (%)	60
Surplus (USD million)	0.0

Setzer hires Tim Bearne to study the implications of the asset allocation of the Pension Plan's investment portfolio on Setzer's financial and operating characteristics. Bearne notes that a defined-benefit pension plan's assets and liabilities can directly affect the sponsoring company's equity price, the equity price volatility, and the amount of operational risk the company is able to assume.

The risk-free rate of return is 3% and the equity risk premium is 9%. Bearne's preliminary analysis does not take the effects of taxes into consideration.

Setzer bases its capital budgeting decisions on the internal rate of return (IRR) and accepts capital projects with IRR greater than Setzer's weighted average cost of capital (WACC). Setzer does not include the Pension Plan's assets and liabilities when calculating its WACC.

A. **Calculate** Setzer's WACC including the Pension Plan's assets and liabilities.

(4 minutes)

B. **Discuss** the implications of **not** including the Pension Plan's assets and liabilities in Setzer's capital budgeting decision-making process.

Note: No calculations are required.

(4 minutes)

Six months have passed. As a result of negative returns on the Pension Plan's investment portfolio, the Pension Plan is now underfunded by USD 50 million. The Pension Plan's investment committee, seeking to raise expected returns, increases the investment portfolio's equity allocation to 70%. Immediately after this decision is implemented, Setzer's equity price volatility and beta increase. Assume Setzer's operational assets and its debt/equity ratio (market value) remained constant during the six-month period.

- C. **Discuss** why Setzer's equity beta increases in response to the Pension Plan's change in the asset allocation.

(3 minutes)

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QUESTION 5 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 19 MINUTES.

Robert Spencer is a market forecaster with Windsor Investment Management, a U.K.-based wealth management firm. Spencer is asked to review the current economic conditions and market outlook for the U.K. and to set long-term market return expectations for domestic equities. These expectations will form the basis of Windsor's future client asset allocations. Spencer gathers the U.K. capital market data displayed in Exhibit 1.

Exhibit 1
U.K. Capital Market Data

Historical Data (past 100 years)	
Equity compounded annual growth rate (%)	11.2
Equity risk premium (%)	5.3
Dividend yield (%)	4.0
Equity repurchase yield (%)	-0.5
Nominal earnings growth return (%)	4.6
Current and Forward Looking Data	
Current equity price-to-earnings ratio	14.6
Expected equities real earnings growth rate (%)	2.7
Expected long-term inflation rate (%)	2.5

- A. **Determine**, using the information in Exhibit 1 and the Grinold-Kroner model, the component sources of the historical nominal return for U.K. equities:
- i. income return
 - ii. earnings growth
 - iii. repricing return

(6 minutes)

A year has passed. The Bank of England (the U.K.'s central bank) has been raising the short-term interest rate. Business confidence is starting to decline. Spencer is asked to analyze the U.K. economy and consider how the Bank of England might respond in the short term to economic conditions. He gathers the economic data shown in Exhibit 2.

Exhibit 2
U.K. Economic Data (%)

Neutral value of the short-term interest rate	3.5
Forecast U.K. GDP growth rate	0.3
Trend U.K. GDP growth rate	2.2
Yield to maturity on 10-year gilt (government bond)	4.2
Yield to maturity on 1-year gilt (government bond)	5.5
Bank of England short-term interest rate	5.5
Target U.K. inflation rate	2.0
Forecast U.K. inflation rate	4.4

- B. i. **Determine** the target short-term interest rate for the Bank of England using the Taylor rule and the data in Exhibit 2. **Show** your calculations.
- ii. **Describe** the *most likely* potential negative economic result if the Bank of England bases its interest rate policy on the Taylor rule.

(5 minutes)

Nine more months have passed and the U.K. economy has fallen into a recession. Under pressure to aid the economy, the U.K. Chancellor of the Exchequer (finance minister) announces a four-part economic plan aimed at improving the long-term growth trend of the U.K. economy (GDP). The plan includes the following initiatives:

- Introduction of incentives encouraging companies to increase their use of information technology;
 - An increase in the mandatory retirement age from 65 to 70 years of age;
 - A broad increase in taxes to fund programs that provide support for low-income families;
 - A one-time tax rebate to stimulate consumer spending.
- C. **Determine**, for *each* part of the economic plan, whether the initiative is *most likely* to increase, decrease, or leave unchanged the long-term growth trend of the U.K. economy (GDP). **Justify** *each* response with *one* reason.

Note: No calculations are required.

Answer Question 5-C in the Template provided on page 36.

(8 minutes)

Answer Question 5 on This Page

Template for Question 5-C

Note: No calculations are required.

Initiative	Determine, for each part of the economic plan, whether the initiative is <i>most likely</i> to increase, decrease, or leave unchanged the long-term growth trend of the U.K. economy (GDP). (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Introduction of incentives encouraging companies to increase their use of information technology;	<p>Increase</p> <p>Decrease</p> <p>Leave unchanged</p>	
An increase in the mandatory retirement age from 65 to 70 years of age;	<p>Increase</p> <p>Decrease</p> <p>Leave unchanged</p>	
A broad increase in taxes to fund programs that provide support for low-income families;	<p>Increase</p> <p>Decrease</p> <p>Leave unchanged</p>	
A one-time tax rebate to stimulate consumer spending.	<p>Increase</p> <p>Decrease</p> <p>Leave unchanged</p>	

QUESTION 6 HAS ONE PART FOR A TOTAL OF 10 MINUTES.

Kallis Employees Pension Plan (KEPP) is the pension fund of a Finland-based mining company. KEPP is fully funded with 8 billion euros (EUR) in assets and has the following investment policy objectives:

- Earn a 10.3% annual portfolio return.
- Have a maximum Roy's safety-first ratio with a minimum return threshold of 8%.
- Maintain a cash balance sufficient to meet liquidity requirements.
- Maintain a maximum of 10% of assets in a passively managed sub-portfolio that is indexed to the S&P GSCI Precious Metals Index (SPMI).

KEPP expects to pay EUR 320 million in pension benefits this year.

At an investment committee meeting regarding possible changes to KEPP's strategic asset allocation policy, the committee reviews five alternative portfolio allocations that meet KEPP's return objectives. These alternatives are shown in Exhibit 1.

Exhibit 1
KEPP
Alternative Portfolio Allocations (%)

Asset Class	Portfolio Allocations				
	V	W	X	Y	Z
Cash equivalents	3	5	6	5	6
SPMI	10	12	8	7	9
Global bonds	40	40	47	45	41
Global equities	47	43	39	43	44
Total	100	100	100	100	100
Portfolio Measures	V	W	X	Y	Z
Expected total annual return	11.26	11.19	10.44	10.60	10.87
Expected standard deviation	14.90	14.82	13.93	14.15	14.52

Determine the *most* appropriate portfolio for KEPP. **State**, for *each* portfolio **not** selected, *one* reason why it is **not** the most appropriate.

Answer Question 6 in the Template provided on page 39.

(10 minutes)

Answer Question 6 on This Page

Template for Question 6

<p>Determine the <i>most</i> appropriate portfolio for KEPP. (circle one)</p>	<p>State, for <i>each</i> portfolio not selected, <i>one</i> reason why it is not the most appropriate.</p>
V	
W	
X	
Y	
Z	

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QUESTION 7 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 17 MINUTES.

Chandra Pabst, CFA, is an equity portfolio manager at an advisory firm that provides asset management services to nonprofit organizations. The firm was recently hired by the U.S.-based Aberdeen Family Foundation. Aberdeen's board of directors was dissatisfied with its previous equity manager. Pabst is assigned to develop a strategy for the equity portion of the portfolio.

In her initial meeting with the Aberdeen investment committee, Pabst compiled the following notes:

- The committee agrees that security prices reflect publicly available information.
- The committee expects a decline in interest rates.
- The board fired the previous equity manager because the portfolio had tracking risk exceeding 1%.
- Aberdeen pays taxes on interest, dividends, and realized capital gains.
- The board is willing to accept a low information ratio as long as returns are sufficient to maintain targeted spending.

At the end of the meeting, Pabst recommends that the Aberdeen portfolio be managed using a passive approach. The committee agrees with Pabst's recommendation.

- A. **Justify**, with *three* reasons based only on Pabst's notes, why the use of a passive investment approach is the *most* appropriate for Aberdeen's equity portfolio.

Answer Question 7-A in the Template provided on page 45.

(6 minutes)

Pabst next begins to transition Aberdeen's portfolio holdings. She is constructing the portfolio using individual equities and is considering the following methods: full replication, stratified sampling, and optimization. The benchmark for the portfolio is the Russell 3000 Index, which is based on market capitalization and consists of 3,000 large U.S. publicly-traded companies. The value of Aberdeen's equity portfolio is 3,000,000 U.S. dollars (USD). The board prefers not to use complicated mathematical models that would be challenging to explain to donors.

- B. **Determine**, from the three methods Pabst is considering, the *most* appropriate method for constructing the equity portfolio. **Justify** your response with *two* reasons related to Aberdeen's specific circumstances.

Answer Question 7-B in the Template provided on page 46.

(5 minutes)

Pabst was just hired to manage the endowment fund for the Forest Trust. The Forest Trust is actively managed and its holdings are shown in Exhibit 1.

Exhibit 1
Forest Trust Portfolio and Benchmark Data

	Portfolio	Portfolio Benchmark
Average market capitalization of stocks	USD 34 billion	USD 72 billion
Number of stocks	150	3,000
Price-to-book ratio	0.9	2.2
Long-term earnings growth rate (median analyst forecast)	5%	13%
Average earnings per share (EPS)	USD 0.02	USD 1.74
Dividend yield	1.3%	1.7%

Pabst is asked to classify the portfolio in one of the four value and growth substyles:

- contrarian
- high yield
- consistent growth
- earnings momentum

C. **Identify** the substyle that *best* represents the portfolio. **Justify** your response with *two* reasons related to the characteristics of the portfolio relative to the benchmark.

Answer Question 7-C in the Template provided on page 47.

(6 minutes)

Answer Question 7 on This Page

Template for Question 7-A

Justify, with *three* reasons based only on Pabst's notes, why the use of a passive investment approach is the *most* appropriate for Aberdeen's equity portfolio.

1.

2.

3.

Answer Question 7 on This Page

Template for Question 7-B

<p>Determine, from the three methods Pabst is considering, the <i>most</i> appropriate method for constructing the equity portfolio. (circle one)</p>	<p>Justify your response with <i>two</i> reasons related to Aberdeen’s specific circumstances.</p>
<p>full replication</p>	<p>1.</p>
<p>stratified sampling</p>	<p>2.</p>
<p>optimization</p>	

Answer Question 7 on This Page

Template for Question 7-C

Identify the substyle that <i>best</i> represents the portfolio. (circle one)	Justify your response with <i>two</i> reasons related to the characteristics of the portfolio relative to the benchmark.
<div>contrarian</div> <div>high yield</div> <div>consistent growth</div> <div>earnings momentum</div>	1.
	2.

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QUESTION 8 HAS TWO PARTS (A, B) FOR A TOTAL OF 15 MINUTES.

Hank Smith is the portfolio manager of U.S.-based PM Hedge Fund (PM), which focuses on precious metals, fixed income, and derivatives. Smith has a strategy of rolling forward a long position in short-dated platinum futures traded on NYMEX. Smith's expectations are as follows:

- Electricity supply disruptions in South Africa, the world's dominant platinum producer, will cause platinum supply to fall and spot prices to rise.
- Interest rates will rise.
- The convenience yield on platinum will increase.

Smith observes that his expectations are not yet reflected in platinum futures prices.

A. **Determine**, given that Smith's market expectations are correct, whether an increase, a decrease, or no change in *each* of the following return components should be expected:

- i. spot return (price return)
- ii. collateral return (collateral yield)
- iii. roll return (roll yield)

Justify *each* response with *one* reason.

Answer Question 8-A in the Template provided on page 55.

(9 minutes)

PM holds a four-year 120,000,000 U.S. dollars (USD), 6% fixed rate bond that pays interest semi-annually. Smith expects four-year USD interest rates to rise. He wants to reduce the duration of the bond position. Lizelle Hoorn, an analyst at PM, suggests that Smith can reduce the modified duration of this position, which is currently 3, to a more acceptable 0.3 by using an interest rate swap. Smith wants the notional principal on the swap to be as close as possible to the USD 120,000,000 principal of the original bond. Hoorn provides Smith with four possible swaps, shown in Exhibit 1. Assume that the modified duration of the fixed rate component of a swap is 75% of its maturity.

Exhibit 1
Available Swap Positions

Swap	Swap Type	Swap Term	Payment Frequency
1	Pay fixed, receive floating	2 years	Semi-annually
2	Pay floating, receive fixed	4 years	Quarterly
3	Pay fixed, receive floating	4 years	Quarterly
4	Pay floating, receive fixed	2 years	Semi-annually

- B. **Determine** which swap *best* achieves Smith's stated goals. **Justify** your response with *two* reasons.

Answer Question 8-B in the Template provided on page 56.

(6 minutes)

Answer Question 8 on This Page

Template for Question 8-A

Return component	Determine, given that Smith's market expectations are correct, whether an increase, a decrease, or no change in <i>each</i> of the following return components should be expected. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. spot return (price return)	<p>Increase</p> <p>Decrease</p> <p>No change</p>	
ii. collateral return (collateral yield)	<p>Increase</p> <p>Decrease</p> <p>No change</p>	
iii. roll return (roll yield)	<p>Increase</p> <p>Decrease</p> <p>No change</p>	

Answer Question 8 on This Page

Template for Question 8-B

<p>Determine which swap <i>best</i> achieves Smith’s stated goals. (circle one)</p>	<p>Justify your response with <i>two</i> reasons.</p>
<p>Swap 1</p> <p>Swap 2</p>	<p>1.</p>
<p>Swap 3</p> <p>Swap 4</p>	<p>2.</p>

QUESTION 9 HAS TWO PARTS (A, B) FOR A TOTAL OF 16 MINUTES.

Maple Leaf International is a Canadian corporation with business in Europe and Japan. Maple Leaf's business transactions generate exchange rate risk between the Canadian dollar (CAD) and both the euro (EUR) and Japanese yen (JPY). In order to hedge their exchange rate risk, management endorses the use of currency forwards, options, and swaps. Ian McKinley, chief risk officer, has been asked to present an analysis of the company's currency exposures to Maple Leaf's board of directors and senior managers.

Maple Leaf is long a forward contract on EUR 50 million at 1.63 CAD/EUR, expiring in six months. It is also long 100 JPY put options (European style) with expiration in six months, a strike price of 100 JPY/CAD, and a contract size of JPY 12.5 million. The current spot exchange rates are 1.64 CAD/EUR and 102.5 JPY/CAD. All of Maple Leaf's currency derivatives are traded over the counter (OTC) with North Bank. Key interest rates are displayed in Exhibit 1.

Exhibit 1
Six-month Risk-free Interest Rates
(Annualized)

CAD	3.0%
EUR	4.5%
JPY	0.5%

McKinley makes the following statements regarding the credit risk on currency swaps.

Statement 1: "The credit risk on currency swaps is greatest at the middle of the swap term."

Statement 2: "The credit risk on currency swaps is bilateral and isolated to the Maple Leaf-North Bank contracts."

- A. i. **Determine** *one* reason related to credit risk that makes *each* of McKinley's statements incorrect.

Note: Simply reversing the statements will receive no credit.

- ii. **Discuss** *one* method to reduce credit risk associated with Maple Leaf's OTC currency derivative positions.

(6 minutes)

- B. i. **Calculate** the amount at risk from a credit loss on the long EUR forward contract. **Determine** which party bears the credit risk. **Show** your calculations.
- ii. **Calculate** the amount at risk from a credit loss on the long JPY put option contract. **Determine** which party bears the credit risk. **Show** your calculations.

(10 minutes)

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QUESTION 10 HAS TWO PARTS (A, B) FOR A TOTAL OF 15 MINUTES.

Jackson Miller, a portfolio manager at Big Trust Bank, arranges a meeting with a client, Jin Huang, to review the performance of her portfolio and discuss Big Trust's market outlook.

At the meeting, Miller suggests examining Huang's portfolio rebalancing strategy to ensure that her portfolio stays consistent with her long-term objectives. The target strategic asset allocation for her portfolio and the corridor widths for Huang's percentage-of-portfolio rebalancing strategy are shown in Exhibit 1.

Exhibit 1
Huang's Strategic Asset Allocation and Corridor Widths

Asset Class	Target Weight	Corridor Widths
Domestic equity	25%	+/- 2.5%
Non-domestic equity	30%	+/- 3.0%
Domestic bonds	30%	+/- 3.0%
Risk-free securities	10%	+/- 1.0%
Alternative investments	5%	+/- 0.5%

Miller informs Huang that Big Trust recently revised its market outlook. Revised expectations are as follows:

- An increase in the price of gold, which is a component of the alternative investments asset class;
- Lower volatility of domestic bond prices as the economy becomes less sensitive to changes in oil prices;
- Lower transactions costs for non-domestic equities resulting from expanded electronic trading.

Huang asks how these revisions will affect the corridor widths associated with the percentage-of-portfolio approach to rebalancing.

- A. **Determine**, for *each* revised expectation, whether the stated asset class corridor width in Exhibit 1 should be wider, narrower, or unchanged. **Justify** *each* of your responses with *one* reason.

Note: No calculations are required.

Answer Question 10-A in the Template provided on page 67.

(9 minutes)

Miller meets with another client, Harriet Kilpatrick. Kilpatrick recently married and plans to have children in the near future. Her current portfolio, which has a value of 2 million U.S. dollars (USD), is invested in equities and risk-free securities. She asks Miller to develop a rebalancing strategy that will prevent her portfolio from dropping below USD 1.25 million.

Miller states that Big Trust's investment outlook predicts that equity prices will be trending upward. Kilpatrick says that she also wants to minimize her allocation to risk-free securities during a rising market in equities.

Miller tells Kilpatrick that his clients use one of three types of rebalancing strategies: a buy-and-hold strategy, a constant mix strategy, or a constant-proportion portfolio insurance (CPPI) strategy.

- B. **Select** the *most* appropriate rebalancing strategy for Kilpatrick's portfolio. **Justify** your selection with *two* reasons.

Answer Question 10-B in the Template provided on page 68.

(6 minutes)

Answer Question 10 on This Page

Template for Question 10-A

Note: No calculations are required.

Asset class and revised expectation	Determine, for <i>each</i> revised expectation, whether the stated asset class corridor width in Exhibit 1 should be wider, narrower, or unchanged. (circle one)	Justify <i>each</i> of your responses with <i>one</i> reason.
<p>Alternative investments:</p> <p>An increase in the price of gold, which is a component of the alternative investments asset class;</p>	<p>Wider</p> <p>Narrower</p> <p>Unchanged</p>	
<p>Domestic bonds:</p> <p>Lower volatility of domestic bond prices as the economy becomes less sensitive to changes in oil prices;</p>	<p>Wider</p> <p>Narrower</p> <p>Unchanged</p>	
<p>Non-domestic equity:</p> <p>Lower transactions costs for non-domestic equities resulting from expanded electronic trading.</p>	<p>Wider</p> <p>Narrower</p> <p>Unchanged</p>	

Answer Question 10 on This Page

Template for Question 10-B

<p>Select the <i>most</i> appropriate rebalancing strategy for Kilpatrick’s portfolio. (circle one)</p>	<p>Justify your selection with <i>two</i> reasons.</p>
<p>buy-and-hold</p>	<p>1.</p>
<p>constant mix</p>	<p>2.</p>
<p>CPPI</p>	

QUESTION 11 HAS TWO PARTS (A, B) FOR A TOTAL OF 18 MINUTES.

A fund sponsor has adopted a formal policy to guide its manager evaluations. Cecilia Velasco and Alberto Roca, two staff members, are discussing the performance of hedge fund managers and traditional fund managers.

Velasco and Roca begin by discussing how to evaluate hedge fund managers. Velasco suggests that hedge fund performance should be evaluated by comparing the manager's performance with the median of a universe of hedge funds with similar mandates.

- A. **Justify**, with *three* reasons, why Velasco's suggestion for evaluating hedge fund manager performance is inappropriate.

(6 minutes)

Velasco and Roca also appraise the performance of two traditional European equity managers. As part of the monitoring process, they have collected the information shown in Exhibit 1. Assume that it is appropriate to compare the performance of the two managers.

Exhibit 1
Five-year Performance Data ending 30 April 2009
(Annualized)

Performance Measure	Manager #1	Manager #2
Rate of return (%)	21.13	21.13
Sharpe ratio	1.17	1.21
M ² (%)	18.72	19.27
Active risk (%)	2.17	4.18
Information ratio	0.52	0.27
Treynor measure (%)	19.15	17.17
Risk-free rate (%)	2.75	2.75

- B. **Determine**, for *each* case below, the *most* appropriate performance measure from Exhibit 1 to compare Manager #1 and Manager #2. **Identify**, in *each* case, which manager outperformed. **Explain** what caused the difference in performance between the two managers.
- i. Reward per unit of systematic risk incurred
 - ii. Reward per unit of total risk incurred
 - iii. Reward per unit of risk earned by deviating from the benchmark's holdings

Answer Question 11-B in the Template provided on page 74.

(12 minutes)

Answer Question 11 on This Page

Template for Question 11-B

Case	Determine, for <i>each</i> case, the <i>most</i> appropriate performance measure from Exhibit 1 to compare Manager #1 and Manager #2.	Identify, in <i>each</i> case, which manager outperformed. (circle one)	Explain what caused the difference in performance between the two managers.
i. Reward per unit of systematic risk incurred		Manager #1 Manager #2	
ii. Reward per unit of total risk incurred		Manager #1 Manager #2	
iii. Reward per unit of risk earned by deviating from the benchmark's holdings		Manager #1 Manager #2	

The Morning Session of the 2010 Level III CFA[®] Examination has 9 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Question	Topic	Minutes
1	Portfolio Management – Individual	35
2	Portfolio Management – Institutional/Behavioral	25
3	Portfolio Management – Institutional	24
4	Portfolio Management – Economics	14
5	Portfolio Management – Asset Allocation	15
6	Portfolio Management – Fixed Income	18
7	Portfolio Management – Risk Management	20
8	Portfolio Management – Monitor/Rebalance/Execution	17
9	Portfolio Management – Performance Evaluation	12
Total:		180

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Government provides at no direct cost to citizens.
Tax-deferred accounts (TDAs)	<ul style="list-style-type: none"> • 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.

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.

- 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-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 9.

(8 minutes)

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Answer Question 1 on This Page

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 <i>most</i> tax-efficient allocation in <i>each</i> 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 <i>most</i> tax-efficient allocation in <i>each</i> account (tax-deferred and taxable).	
	Tax-deferred Account	Taxable Account
Bonds		
Equities		
iii. Justify, with <i>two</i> reasons, why this is the <i>most</i> tax-efficient allocation.		
1.		
2.		

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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.

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."

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)

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Answer Question 2 on This Page

Template for Question 2-A

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

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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 23.

(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.

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:
- Apax Bakers (Trade A, B, C, or D)
 - CarbX Corp (Trade A, B, E, or F)
 - DataComp (Trade B, C, E, or F)

Justify *each* response with *one* reason.

ANSWER QUESTION 3-B IN THE TEMPLATE PROVIDED ON PAGE 24.

(12 minutes)

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Answer Question

3

 on This Page

Template for Question 3-A

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

Answer Question 3 on This Page

Template for Question 3-B

Company	Determine, from the potential trades in Exhibit 2, which trade would be <i>most</i> appropriate to achieve Schlipp’s recommendation for <i>each</i> company. (circle one)	Justify <i>each</i> response with <i>one</i> 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	

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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)

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)

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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

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)

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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.

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)

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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)

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)

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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 $\pm 10\%$ 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.
- 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.

- 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 63.

(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)

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Answer Question 8 on This Page

Template for Question 8-C

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

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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.

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)

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The Morning Session of the 2011 Level III CFA[®] Examination has 9 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Question	Topic	Minutes
1	Portfolio Management – Individual/Behavioral	15
2	Portfolio Management – Individual	23
3	Portfolio Management – Institutional	26
4	Portfolio Management – Economics	23
5	Portfolio Management – Asset Allocation	20
6	Portfolio Management – Fixed Income	19
7	Portfolio Management – Equity Investments	22
8	Portfolio Management – Risk Management	16
9	Portfolio Management – Performance Evaluation	<u>16</u>
Total:		180

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Questions 1 and 2 relate to the Becker family. A total of 38 minutes is allocated to these questions. Candidates should answer these questions in the order presented.

QUESTION 1 HAS TWO PARTS (A, B) FOR A TOTAL OF 15 MINUTES.

Robert Becker, age 75, retired 5 years ago from the building products business that he founded. After his business, Buildco, went public in the 1990's, he remained as CEO and continued to hold shares in the company. After his wife's death, Becker hires Emily Frost, a portfolio manager and trust specialist, to help with his estate planning. Becker establishes a revocable trust and an irrevocable trust.

Income, realized capital gains, and estate assets (at death) are all taxed at a flat 20% rate. For the revocable trust, the cost basis of investments increases to the market value on the date of Becker's death, and the assets are subject to estate taxes. For the irrevocable trust, the cost basis of investments does not change, and the assets are not subject to estate taxes.

Currently, the two trusts each have 2.0 million U.S. dollars (USD) of their assets in Buildco shares, with a cost basis of USD 200,000 each. All Buildco shares have unrealized capital gains.

Becker has the following two immediate objectives as part of his estate planning:

Objective 1: Sell USD 1.0 million of Buildco shares while minimizing total taxes.

Objective 2: Put additional assets into a trust to protect those assets from potential future legal claims against Becker.

A. **Determine** which trust (irrevocable, revocable, or both equally) is more appropriate for *each* objective:

- i. Objective 1
- ii. Objective 2

Justify your response with *one* reason for *each* objective.

Note: Consider *each* objective independently.

Answer Question 1-A in the Template provided on page 5.

(6 minutes)

Frost meets with Becker to compare their views on investing. Four discussions from that meeting are shown in Exhibit 1.

Exhibit 1
Selected Discussions from Becker – Frost Meeting

Discussion Number	Speaker	Discussion
1	Becker:	The first thing you might notice about my investment style is that I favor growth investments over income-producing assets.
	Frost:	I don't think that is the right approach. Equities might deliver higher long-term returns. However, for a trust portfolio, I prefer that the client knows the size and timing of the cash flows he will be receiving. That's what an investor gets with bonds.
2	Frost:	I notice you hold a significant position in Rolling Mix Cement shares.
	Becker:	Rolling Mix Cement's CEO used to run the western operations for Buildco. He did a wonderful job for us, so I think Rolling Mix shares are great to own.
3	Frost:	I was looking at the mutual funds in your portfolio and can see that you purchased an equal amount across four mutual funds.
	Becker:	I think that mutual fund family offers four great products. So I bought all of them: an EAFE large-cap fund, a U.S. growth fund, a U.S. small-cap fund, and a U.S. corporate bond fund.
4	Frost:	I notice you have many portfolio positions where the current values have been below cost for awhile.
	Becker:	Investing requires patience. You have to give things time to work out.

B. **Identify** the discussion in which one of the participants *best* illustrates *each* of the following behavioral biases:

- i. representativeness
- ii. frame dependence
- iii. aversion to ambiguity

Justify *each* response with *one* reason.

Note: Consider *each* bias independently. Use each discussion only *once*.

Answer Question 1-B in the Template provided on page 6.

(9 minutes)

Answer Question 1 on This Page

Template for Question 1-A

Note: Consider *each* objective independently.

Objective	Determine which trust (irrevocable, revocable, or both equally) is more appropriate for <i>each</i> objective. (circle one)	Justify your response with <i>one</i> reason for <i>each</i> objective.
1. Sell USD 1.0 million of Buildco shares while minimizing total taxes.	<div>irrevocable</div> <div>revocable</div> <div>both equally</div>	
2. Put additional assets into a trust to protect those assets from potential future legal claims against Becker.	<div>irrevocable</div> <div>revocable</div> <div>both equally</div>	

Answer Question 1 on This Page

Template for Question 1-B

Note: Consider *each* bias independently. Use each discussion only *once*.

Behavioral bias	Identify the discussion in which one of the participants <i>best</i> illustrates <i>each</i> of the following behavioral biases (circle the discussion number from Exhibit 1).	Justify <i>each</i> response with <i>one</i> reason.
i. representativeness	<div>1</div> <div>2</div> <div>3</div> <div>4</div>	
ii. frame dependence	<div>1</div> <div>2</div> <div>3</div> <div>4</div>	
iii. aversion to ambiguity	<div>1</div> <div>2</div> <div>3</div> <div>4</div>	

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Questions 1 and 2 relate to the Becker family. A total of 38 minutes is allocated to these questions. Candidates should answer these questions in the order presented.

QUESTION 2 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 23 MINUTES.

Five years have passed. Robert Becker recently died and left his estate to his only child, Michael. Michael and his wife are both 50 years old and have no children. Michael expects to receive his after-tax inheritance of 8.0 million U.S. dollars (USD) at the end of this year. The Beckers both plan to retire at that time, and are meeting with Emily Frost to help them establish an investment plan.

The Beckers currently do not have an investment portfolio and they own a home valued at USD 3.7 million. At the end of this year, the Beckers' outstanding debt will be USD 3.5 million (home mortgage) and USD 150,000 (consumer debts). The Beckers will pay off their mortgage and their consumer debts soon after the inheritance is received.

The Beckers currently have a combined after-tax salary of USD 475,000, current-year living expenses of USD 250,000, plus annual mortgage payments (principal + interest) of USD 225,000. Michael's company pension will pay him USD 48,000 after-tax next year, and then payments will grow at the rate of inflation, which is expected to be 3% annually. His employer will continue to pay all of the Beckers' medical costs until death. Both the pension and health benefits will continue to accrue to Becker's wife, if he dies first. The Beckers expect their living expenses will also continue to grow at the rate of inflation until one of them dies. At that time, they expect the survivor's living expenses will decrease to 75% of their combined expenses, and then continue to grow at the rate of inflation.

The Beckers intend to fund their living expenses with Michael's pension and investment income generated from their investable assets, which do not include their home. The Beckers consider their investment base to be large, and want their portfolio to be invested conservatively. They want to maintain the real value of their investable assets over time, and plan to leave their estate to charity. All income and realized capital gains are taxed at 20%.

- A. **Calculate** the after-tax nominal rate of return required for the Beckers' first year of retirement. **Show** your calculations.

(8 minutes)

- B. **Discuss** *two* factors specific to the Beckers' situation that decrease their risk tolerance.

(4 minutes)

C. **Formulate** *each* of the following constraints for the Beckers' investment policy statement (IPS):

- i. liquidity
- ii. time horizon

(4 minutes)

Several years later, the Beckers again meet with Frost. Their investable portfolio is now valued at USD 7.0 million. The Beckers state that their primary goal is to maintain their current living standard as long as they live. The Beckers also want to leave a charitable gift of at least USD 5.0 million from their investable assets after they have both died. However, they are not willing to risk running out of money in their old age to achieve this secondary goal. The Beckers agree with Frost to assume a 25-year time horizon.

Frost produces Monte Carlo simulations for the Beckers using two portfolios with different asset allocations. The simulations use a long series of historical index data for each asset class in the two portfolios. The resulting distributions of terminal values are shown in Exhibit 1. All terminal values are after expected taxes and spending needs have been met.

Exhibit 1
Monte Carlo Simulation Results
Projected Portfolio Terminal Values at 25 Years

Percentile	Terminal Values (USD thousands)	
	Portfolio A	Portfolio B
95 th	17,808	35,814
90 th	11,916	21,729
75 th	9,192	14,454
50 th	4,896	8,813
25 th	2,154	5,016
10 th	294	0
5 th	39	0

- D. i. **Determine**, based on the Monte Carlo simulations, which portfolio (A or B) will better allow the Beckers to achieve their goals. **Justify** your response with *one* reason related to risk.
- ii. **Discuss** *two* improvements Frost could make in her Monte Carlo simulations.

(7 minutes)

QUESTION 3 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 26 MINUTES.

Stacy Bergen is a consultant for the endowments of two American universities – Weymount University (WU) and Slate University (SU). WU is a private university with annual operating expenses of 150.0 million U.S. dollars (USD). WU has an endowment currently valued at USD 750.0 million. Bergen gathers the following information about WU and its endowment:

- The WU endowment's primary goal is to maintain the real value of its assets over the long term.
- The WU endowment's secondary goal is to continue to fund 25% of WU's annual operating expenses, by means of its spending rule.
 - Tuition and grants fund the remainder of the annual operating expenses.
 - As a private institution, WU receives no government financial support.
- The WU endowment:
 - uses a simple spending rule with a 5% annual spending rate based on the endowment's beginning-of-year market value.
 - receives private donations and uses these donations, in part, for its liquidity needs.
 - evaluates its investment managers based on the endowment's three-year average annual return.
 - forecasts the inflation rate of WU's operating expenses to be equal to the growth rate of the Higher Education Price Index (HEPI), which is expected to be 4% annually.
 - has an annual 0.55% management expense rate.

- A. i. **Formulate** the return objective for the WU endowment.
- ii. **Calculate** the required return for the WU endowment. **Show** your calculations.

(4 minutes)

- B. **Determine** how a change in *each* of the following factors, holding all else constant, affects the risk tolerance (increases, decreases, does not change) for the WU endowment:

- i. private donations
- ii. expected inflation

Justify *each* response with *one* reason.

Note: Consider *each* factor independently.

Answer Question 3-B in the Template provided on page 20.

(6 minutes)

C. **Formulate** *each* of the following constraints for the WU endowment's investment policy statement (IPS):

- i. liquidity
- ii. time horizon

(4 minutes)

A year has passed since Bergen's initial review. Due to significant losses in the market value of the portfolio, the WU endowment now provides less than 25% of WU's operating expenses. In addition, donations have declined. The investment committee asks Bergen to propose measures to maintain the long-term real value of the endowment, and reduce the volatility of the endowment's funding of WU's operating expenses. In response, Bergen suggests the following strategic actions:

- Strategic action 1: Decrease the endowment's spending rate.
- Strategic action 2: Adopt a rolling three-year average spending rule, based on the endowment's beginning-of-year market value for the last three years.
- Strategic action 3: Revise the portfolio's asset allocation to decrease its risk.

D. **Determine** which *one* of Bergen's strategic actions is:

- i. *least likely* to assist the endowment in achieving its primary goal.
- ii. *most likely* to reduce the volatility of the endowment's funding of WU's operating expenses.

Justify *each* response with *one* reason.

Answer Question 3-D in the Template provided on page 22.

(6 minutes)

Bergen's other institutional client, SU, is a growing public university. SU has an annual operating budget of USD 210.0 million. The SU endowment is currently valued at USD 700.0 million. Bergen gathers the following information about SU and its endowment:

- The SU endowment's primary goal is to maintain the real value of its assets over the long term.
- The SU endowment's secondary goal is to continue to fund SU's annual operating budget shortfall (currently 10% of the operating budget), so long as that does not violate its spending rule.
 - 90% of SU's operating budget is funded by government funding and tuition, and this is expected to continue.

- The SU endowment:
 - funds SU's operating budget shortfall, but caps its contribution at its spending maximum.
 - has a spending maximum that is 5% of the average of the last three years' beginning-of-year market value.
 - has experienced significant growth in private donations over the last 10 years.
 - evaluates its investment managers based on the endowment's six-year average annual return.
 - forecasts the inflation rate of SU's operating budget at 1 percentage point below the growth rate of the HEPI. The HEPI is expected to grow at 4% annually.

E. **Discuss** *three* factors that suggest the SU endowment has greater risk tolerance than the WU endowment.

(6 minutes)

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Answer Question 3 on This Page

Template for Question 3-B

Note: Consider *each* factor independently.

Factor	Determine how a change in <i>each</i> of the factors, holding all else constant, affects the risk tolerance (increases, decreases, does not change) for the WU endowment. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. private donations	<p>increases</p> <p>decreases</p> <p>does not change</p>	
ii. expected inflation	<p>increases</p> <p>decreases</p> <p>does not change</p>	

Answer Question 3 on This Page

Template for Question 3-D

Determine which <i>one</i> of Bergen's strategic actions is:	Bergen's strategic actions (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. <i>least likely</i> to assist the endowment in achieving its primary goal.	<div>1</div> <div>2</div> <div>3</div>	
ii. <i>most likely</i> to reduce the volatility of the endowment's funding of WU's operating expenses.	<div>1</div> <div>2</div> <div>3</div>	

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QUESTION 4 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 23 MINUTES.

Daniel Wallbank is the chief investment officer of a large global asset management firm. He is considering equity investments in a specific developing country. His primary concern is to determine the intrinsic value of that country's broad equity index relative to its current market value. Wallbank asks the firm's market strategist, Judy Shipp, to assist him with the valuation process.

Shipp suggests using the Cobb-Douglas production function, under the assumption of constant returns to scale, to model the growth in real economic output. Her previous research shows that, over the long term and in a developing country, the growth rate of corporate earnings and dividends, adjusted for inflation, should closely track the growth of real gross domestic product (GDP). Her research on this country provides the projections shown in Exhibit 1.

Exhibit 1
Country Projections (2011 – 2025)

Average annual growth in total factor productivity (TFP)	2.8%
Average annual growth in capital stock	3.6%
Average annual growth in labor input	2.2%
Average unemployment rate	2.0%
Output elasticity of capital	0.4

- A. **Calculate** the projected average annual real GDP growth rate using the Cobb-Douglas production function and the information in Exhibit 1. **Show** your calculations.

(4 minutes)

Shipp tells Wallbank that the Cobb-Douglas projection of GDP growth may be affected by two actions the country's government is considering:

- Action 1: Issue new regulations to reduce environmental pollution by manufacturers.
- Action 2: Decrease the minimum retirement age by three years for all workers.

- B. **Determine** the *initial* effect (increase, decrease, or no change) *each* action would most likely have on the country's GDP growth trend. **Justify** *each* response with *one* reason.

Note: No calculations are required. Consider *each* action independently.

Answer Question 4-B in the Template provided on page 28.

(6 minutes)

Shipp compiles the data to estimate the intrinsic value of the country's broad equity index. The current annual dividend for the index is 10.00 U.S. dollars (USD). She assumes the initial dividend growth rate is 6.0% and that over 15 years the dividend growth rate will decline linearly by a total of 50%. The assumed discount rate to perpetuity is 5.5%.

- C. **Calculate** the country's broad equity index price level implied by the H-Model. **Show** your calculations.

(4 minutes)

Shipp tells Wallbank there are two alternative models that can be used to determine the fair value of an equity market. These models are the Fed Model and the Yardeni Model. She compiles the data in Exhibit 2 to use with these two models.

Exhibit 2
Capital Market Data

10-year government bond yield	4.05%
10-year A-rated corporate bond yield	4.70%
Forward broad equity index earnings yield	3.95%
Consensus long-term earnings growth forecast	7.50%
Weighting factor, d	0.10

After listening to Shipp explain the differences between the two models, Wallbank questions the use of the Fed Model, since it excludes important factors that the Yardeni Model includes.

- D. **Identify** *one* factor that is excluded from the Fed Model, but is included in the Yardeni Model. **Discuss** whether the Yardeni Model accurately addresses that factor.

(3 minutes)

- E. **Determine**, using the data in Exhibit 2, if the broad equity market is overvalued, fairly valued, or undervalued according to the:

- i. Fed Model
- ii. Yardeni Model

Justify *each* response with *one* reason. **Show** your calculations.

Answer Question 4-E in the Template provided on pages 31 and 32.

(6 minutes)

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Answer Question 4 on This Page

Template for Question 4-B
 Note: No calculations are required. Consider *each* action independently.

Action	Determine the <i>initial</i> effect (increase, decrease, or no change) <i>each</i> action would most likely have on the country's GDP growth trend. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
1. Issue new regulations to reduce environmental pollution by manufacturers.	<div>increase</div> <div>decrease</div> <div>no change</div>	
2. Decrease the minimum retirement age by three years for all workers.	<div>increase</div> <div>decrease</div> <div>no change</div>	

Answer Question 4 on This Page

Template for Question 4-E

Model	Determine, using the data in Exhibit 2, if the broad equity market is overvalued, fairly valued, or undervalued according to the models indicated. (circle one)	Justify <i>each</i> response with <i>one</i> reason. Show your calculations.
i. Fed Model	<div>overvalued</div> <div>fairly valued</div> <div>undervalued</div>	

Template for Question 4-E continued on page 32.

Answer Question 4 on This Page

Template for Question 4-E (continued)

Model	Determine, using the data in Exhibit 2, if the broad equity market is overvalued, fairly valued, or undervalued according to the models indicated. (circle one)	Justify <i>each</i> response with <i>one</i> reason. Show your calculations.
ii. Yardeni Model	<div>overvalued</div> <div>fairly valued</div> <div>undervalued</div>	

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QUESTION 5 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 20 MINUTES.

Colleen Finnegan is 32 years old and lives in Ireland. She worked as an equity analyst for 10 years, but lost her job during a recent bear market. Finnegan's compensation was highly correlated with equity market returns and she expects this will be true for the rest of her working life. She continues to manage her personal portfolio of European equities and bonds, currently valued at 300,000 euros (EUR). Finnegan optimizes and rebalances her portfolio using mean-variance optimization (MVO). Her current allocation is 70% equities and 30% fixed income, including cash. In managing her portfolio, she has been dissatisfied with the frequency of rebalancing required and the amount of transaction costs incurred.

Finnegan has a variable-rate mortgage on her home. If she fails to make her mortgage payments for three months, she risks losing her home. Finnegan does not want to sell assets in her investment portfolio to pay her monthly mortgage payments. She hopes to find a new job before her cash is depleted. Because she is unemployed, her effective tax rate is currently very low, but will increase significantly once she finds a new job.

Finnegan seeks advice on her asset allocation approach from Seamus Welch, a portfolio manager with her former employer. Finnegan tells Welch that she had above-average risk tolerance while she was employed. She now thinks she has below-average risk tolerance until she finds a new job. She also explains that if she starts a new job within the year, she intends to make a deposit of EUR 30,000 on a home for her physically disabled sister. This deposit would be funded by liquidating some assets. Finnegan tells Welch that, as an analyst, she covered European clothing retailers. She continues to maintain a positive view on many firms in this sector and she would like to incorporate these views into her investment strategy.

Welch suggests to Finnegan that, based on her circumstances, the standard MVO process can be improved upon by using a resampled efficient frontier, the Black-Litterman approach, or a Monte Carlo simulation.

A. **Explain**, compared to the standard MVO process, and based on Finnegan's circumstances:

- i. *two* advantages of using a resampled efficient frontier.
- ii. *one* advantage of using the Black-Litterman approach.
- iii. *two* advantages of using a Monte Carlo simulation.

(10 minutes)

Welch explains to Finnegan that she is currently following an asset-only (AO) approach to strategic asset allocation. He strongly advises her to adopt an asset/liability management (ALM) approach.

B. **Discuss** *three* reasons, based on Finnegan's circumstances, why an ALM approach would be more appropriate than an AO approach.

(6 minutes)

Welch also suggests that Finnegan consider her human capital in the asset allocation process. He believes that Finnegan should reduce her allocation to equities at this time.

- C. **Discuss** *two* reasons, based on her human capital, why Finnegan's current allocation to equities should be lower.

(4 minutes)

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QUESTION 6 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 19 MINUTES.

David Andrews, a fixed income portfolio manager at SM Capital, is meeting with a defined benefit pension fund client. The client has asked Andrews to match the dollar duration of its government bond portfolio to the dollar duration of its liability benchmark. Because of the nature of the liabilities, the duration of the liability benchmark remains constant. At the beginning of the current year, the bond portfolio's dollar duration was equal to the dollar duration of the liability benchmark. At the end of each year, the manager is required to rebalance the portfolio so that the dollar duration of the assets again matches the dollar duration of the liability benchmark, while keeping the portfolio proportions of each bond unchanged. Andrews gathers the data in Exhibit 1 to prepare for rebalancing.

Exhibit 1
Pension Fund Government Bond Portfolio

	End of Year		Beginning of Year	
	Price	Duration	Price	Duration
Bond 1	94.00	4.3	94.50	4.9
Bond 2	93.00	6.3	90.00	7.0
Bond 3	102.00	5.0	103.50	5.5

Note: Each bond has a total par value of 1 million U.S. dollars (USD).
Bond prices are shown as a percentage of par.

A. **Calculate** for the pension fund's government bond portfolio:

- i. the rebalancing ratio.
- ii. the amount of cash required for rebalancing.

Show your calculations.

(7 minutes)

Jim Wang, another portfolio manager at SM Capital, actively manages a fixed income portfolio that invests in a particular region of Europe. The firm's chief economist just released her forecast for this region. Contrary to market expectations, she forecasts the following:

- Consumer confidence will increase.
- Unemployment will fall.
- Short-term interest rates will remain unchanged, while long-term rates will increase by 200 basis points.
- Corporate defaults will decrease substantially.

Wang's benchmark index contains three sectors of investment-grade corporate bonds. Relative to his benchmark index, Wang may alter his sector weights, credit quality, and duration. He is

restricted to investing in investment-grade bonds, and only in the three sectors included in the benchmark index. Exhibit 2 provides details of his portfolio versus the benchmark index.

Exhibit 2
Regional European Actively Managed Corporate Bonds
Portfolio and Benchmark Index Summary

Portfolio Characteristics	Wang's Portfolio	Benchmark Index
Sector weights: consumer cyclicals	46.0%	33.3%
consumer non-cyclicals	21.0%	33.3%
utilities	33.0%	33.3%
Average credit quality*	A	A
Duration**	4.8	4.8

* Bonds in both the portfolio and the benchmark index range in credit quality from BBB (lowest investment grade) to AAA (highest investment grade).

** Short-, mid-, and long-term bonds are each 1/3 of both the portfolio and the benchmark index.

- B. **Determine**, assuming the economist's forecast is accurate, whether Wang's portfolio is *most likely* to match, underperform, or outperform its benchmark. **Justify** your response with *one* reason.

(3 minutes)

Given the economist's forecast, Wang is now considering the following trading strategies within his portfolio:

Trading strategy 1: sector rotation trades
 Trading strategy 2: credit adjustment trades
 Trading strategy 3: yield curve adjustment trades

- C. **Describe** the trades that Wang could use (buy/sell bonds as appropriate) to implement *each* trading strategy. **Justify** *each* trade, based on the economist's forecast.

Note: Consider *each* strategy independently.

Answer Question 6-C in the Template provided on page 45.

(9 minutes)

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Answer Question 6 on This Page

Template for Question 6-C

Note: Consider *each* strategy independently.

Trading strategy	Describe the trades that Wang could use (buy/sell bonds as appropriate) to implement <i>each</i> trading strategy.	Justify <i>each</i> trade, based on the economist's forecast.
1. sector rotation trades	Bonds to buy:	
	Bonds to sell:	
2. credit adjustment trades	Bonds to buy:	
	Bonds to sell:	
3. yield curve adjustment trades	Bonds to buy:	
	Bonds to sell:	

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QUESTION 7 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 22 MINUTES.

Nationwide Advisors is considering the purchase of Orca Corporation shares. Over the past several years, Orca, an industrial electronics manufacturer, has experienced a gradual decline in market share. While Orca has maintained profitability, its share price performance over the last 10 years has been significantly below the industry average. Nationwide attributes Orca's loss of market share and poor share price performance to under-investment in new products and new production technologies.

Orca is 65% debt-financed, with a large portion of its debt held by Manley Bank. The market for Orca equity is liquid, with shares trading on both national and foreign exchanges. A mutual fund company, Horizon World Investments, is the largest shareholder. Horizon currently holds its target weighting of 4% of Orca's outstanding equity. Horizon is known for its active trading style, and has above-average portfolio turnover in each of its funds.

Orca's CEO and board chairman is Richard Krass. He and the other key executives of Orca have been at the firm since it was founded 25 years ago. Executive compensation consists of salary, cash bonuses, and relatively small stock grants. For each executive, the cash bonus represents a significant part of total compensation. The cash bonus is based on the firm meeting year-over-year earnings growth targets that are set at the beginning of each year.

Orca's board of directors consists of 10 directors, five of whom are classified as "independent directors" in Orca's annual report. Two of the independent directors are executives of Manley Bank. The other three independent directors are each CEOs of large publicly-traded companies and directors of several other companies. The compensation of Orca's board of directors is a fixed fee of 50,000 U.S. dollars (USD) per year, per director.

- A. **Recommend** *two* measures to improve the management incentive system at Orca. **Justify** *each* response with *one* reason.

(6 minutes)

- B. **Discuss** *two* reasons why Orca's board of directors *most likely* does not represent the best interests of shareholders.

(4 minutes)

- C. **Discuss** *two* benefits that may be realized by Orca replacing some of its debt with equity.

(4 minutes)

- D. **Discuss** *two* reasons why Horizon is *not likely* to be an effective active monitor of Orca.

(4 minutes)

Nationwide is also considering purchasing shares of Acorn Co., a timber harvesting firm in an emerging market. Nationwide believes that Acorn's external corporate governance framework provides poor legal protection of shareholder rights. Nationwide knows that Acorn has been considering the issuance of a cross-listed security such as an American Depositary Receipt (ADR). Nationwide believes that a cross listing could improve Acorn's corporate governance.

- E. **Explain** *two* reasons why the issuance of ADRs could have a positive effect on Acorn's corporate governance.

(4 minutes)

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QUESTION 8 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

Sofia Lipka is a risk analyst at Warsaw Bank (WB), an investment bank with operations in Poland, Germany, and Russia. WB is currently expanding its operations to include proprietary trading and is reviewing its risk management policies. WB uses Value at Risk (VaR) models to monitor its risk exposures.

WB's current portfolio of Polish equities contains only long positions. The volatility of Polish equities has recently increased, and Lipka expects volatility to remain high over the next several quarters. As a result, she has hedged the portfolio using equity index options.

A. **Determine** whether the use of the following VaR models is appropriate for the WB Polish equity portfolio:

- i. Historical VaR
- ii. Analytical VaR

Justify *each* response with *one* reason.

(6 minutes)

Lipka is modifying the VaR model used for WB's government bond portfolio. She is required to estimate a monthly VaR to comply with new regulations. The current information for WB's bond portfolio is shown in Exhibit 1. Standard normal z -values for the 0.05 and 0.01 probability levels are 1.65 and 2.33, respectively.

Exhibit 1
Warsaw Bank
Government Bond Portfolio

Portfolio value in Polish zloty (PLN millions)	1,400
Expected annualized return	6%
Standard deviation of annualized return	7%

B. **Calculate** the 1% monthly VaR in PLN for the portfolio in Exhibit 1. **Show** your calculations.

(5 minutes)

Lipka's manager asks her to evaluate the risks of a potential new portfolio denominated in Lithuanian litas (LHS) shown in Exhibit 2. Lipka performs a stress test on the portfolio over a three-month horizon and estimates a total return in PLN using the following assumptions:

- The bonds increase in value by 10%.
- The equities decrease in value by 20%.

- The principal value of the portfolio is currency-hedged using a three-month forward contract.
- Both the spot and forward exchange rates are 0.87 PLN = 1 LHS at the beginning of month 0.
- The spot exchange rate is 0.80 PLN = 1 LHS at the end of month 3.

Exhibit 2
Warsaw Bank
Lithuanian Litas Portfolio

Security	Market Value (LHS millions)
Bonds	25.0
Equities	10.0
Notional value of currency hedge	35.0

- C. **Calculate** the profit or loss in PLN for the Lithuanian portfolio in Exhibit 2, under the assumptions in Lipka's stress test. **Show** your calculations.

(5 minutes)

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QUESTION 9 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

Monique Cobalt is chairman of the investment committee for the Gladwyne Manufacturing defined benefit pension fund (the Fund), which uses several asset management firms for its investments. Cobalt hired analyst, Lee Chin, to improve the Fund's performance attribution reporting. Chin begins by gathering portfolio returns, valuations, and external cash flows for each asset manager, and then designs new manager attribution reports. Once that is complete, he conducts an asset/liability analysis for the Fund. He then works with the committee to re-evaluate the Fund's risk tolerance, reviewing participant demographic information and Gladwyne's financial stability.

- A. i. **Identify** the performance attribution methodology that Chin should use to complete his performance attribution reporting.
- ii. **Discuss** *two* additional inputs needed to complete this type of analysis.

(6 minutes)

Exhibit 1 presents the performance results for one of the Fund's asset managers, Vermillion Asset Management. This manager invests in a small number of sectors within a broad equity universe. Vermillion's investment objective is to outperform a custom benchmark determined by Gladwyne's investment committee.

Exhibit 1
Vermillion Asset Management
Gladwyne Manufacturing Pension Fund Specialized Equity Portfolio
Performance Results
1 January – 31 March 2011

Industry Sector	Weight (%)		Return (%)	
	Portfolio	Custom Benchmark	Portfolio	Custom Benchmark
Consumer durables	26.30	21.90	4.55	4.90
Consumer nondurables	31.00	34.80	3.60	3.10
Financial	21.20	20.90	3.90	3.30
Technology	21.50	22.40	1.30	-0.20
Total portfolio	100.00	100.00	3.42	2.80

- B. i. **Calculate** the pure sector allocation return for the consumer durables sector of the portfolio for the quarter. **Show** your calculations.
- ii. **Calculate** the within-sector allocation (security selection) return for the technology sector of the portfolio for the quarter. **Show** your calculations.

(4 minutes)

As part of the annual review of the Fund, the investment committee is considering two new fixed income managers. Exhibit 2 presents historic data provided by the managers for portfolios managed to the same benchmark.

Exhibit 2
Potential Fixed Income Managers for
Gladwyne Manufacturing Pension Fund
Performance Attribution Analysis for the Year Ended 31 December 2010

Effect	Manager A (%)	Manager B (%)
Interest rate effect:		
Expected	4.26	4.26
Unexpected	−0.72	−0.72
Subtotal	3.54	3.54
Interest rate management effect	−0.08	0.12
Other management effects	0.11	0.32
Trading activity return	0.14	0.13
Total return	3.71	4.11

To gain insight into their active management practices, Cobalt reviews their performance results. She notes the following statements made by the managers in their proposals:

Manager A: “Our strategy is to add value by actively managing the duration of the fixed income securities in the portfolio.”

Manager B: “Our strategy is to add value by identifying undervalued securities and sectors to take advantage of bonds that are mispriced by the market.”

- C. **Conclude** (yes, no, cannot determine with the information provided) whether *each* statement made by the managers is consistent with the data in Exhibit 2. **Justify** *each* response with *one* reason.

Answer Question 9-C in the Template provided on page 65.

(6 minutes)

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Answer Question 9 on This Page

Template for Question 9-C

Statement	Conclude (yes, no, cannot determine with the information provided) whether <i>each</i> statement made by the managers is consistent with the data in Exhibit 2. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
<p>Manager A:</p> <p>“Our strategy is to add value by actively managing the duration of the fixed income securities in the portfolio.”</p>	<p>yes</p> <p>no</p> <p>cannot determine with the information provided</p>	
<p>Manager B:</p> <p>“Our strategy is to add value by identifying undervalued securities and sectors to take advantage of bonds that are mispriced by the market.”</p>	<p>yes</p> <p>no</p> <p>cannot determine with the information provided</p>	

The Morning Session of the 2012 Level III CFA[®] Examination has 9 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Question	Topic	Minutes
1	Portfolio Management – Individual	27
2	Portfolio Management – Individual	9
3	Portfolio Management – Monitor/Rebalance/Execution	21
4	Portfolio Management – Individual/Behavioral	17
5	Portfolio Management – Economics	24
6	Portfolio Management – Institutional	34
7	Portfolio Management – Fixed Income	23
8	Portfolio Management – Derivatives	13
9	Portfolio Management – Derivatives	12
Total:		180

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Questions 1 and 2 relate to Juan Pablo Alonso. A total of 36 minutes is allocated to these questions. Candidates should answer these questions in the order presented.

QUESTION 1 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 27 MINUTES.

Juan Pablo Alonso, age 40, is the manager of a national, publicly-funded soccer team located in a country that uses the U.S. dollar (USD) as its currency. This country's debt is rated AAA. Alonso has a one-year employment contract that has been renewed for several years. He is confident that he can maintain this job, or a similar managing position, until his planned retirement at age 55. Alonso is divorced and the father of teenage children. He wants to fund a dedicated trust to provide for his children's needs until they reach age 25. He will need USD 250,000 within the next few months to fund the trust.

Alonso's income tax rate is 30%. Other than a small cash reserve, he holds all of his investment assets in a tax-exempt account with a current value of USD 900,000. Contributions to this account are made after tax. Withdrawals are entirely tax-free, without penalty. Alonso saves USD 25,000 of his after-tax income every year, and plans to continue doing so until retirement. His next contribution will be made in one year. As part of his normal expenses, Alonso annually provides approximately USD 30,000 of support to local youth sporting leagues.

When Alonso retires in 15 years, he plans to purchase a 25-year annuity that pays USD 100,000 after tax annually. He will need USD 1,600,000 at retirement to fund the annuity. Alonso expects the annual payout to be sufficient to meet all his needs on an inflation-adjusted basis. He does not plan to leave any estate at his death.

- A. **Calculate** the required annual return that would enable Alonso to purchase the retirement annuity at age 55. **Show** your calculations.

Note: Assume all cash flows occur at the end of each period.

(5 minutes)

- B. **Discuss** two reasons why Alonso's ability to take risk could be considered above average.

(4 minutes)

Five years have passed, and Alonso, age 45, signs a 10-year employment contract, which includes a one-time signing bonus, with a corporate-owned professional soccer club. His annual base salary with this club is higher than his previous salary and is indexed to inflation. Because the club has had financial difficulties in the past, the owner agrees to guarantee Alonso's salary over the life of the contract. Alonso intends to keep his living expenses unchanged and increase his annual savings.

Alonso still plans to retire at the end of the 10-year contract. Given his improved financial position, he now plans to depend on cash flow from his investment portfolio to meet retirement expenses rather than purchase the 25-year annuity.

- C. i. **Describe** *one* change in Alonso's circumstances that has *decreased* his earnings risk and *one* change that has *increased* his earnings risk.
- ii. **Describe** *one* change in Alonso's circumstances that has *decreased* his financial market risk in retirement and *one* change that has *increased* his financial market risk in retirement.

ANSWER QUESTION 1-C IN THE TEMPLATE PROVIDED ON PAGE 7.

(8 minutes)

- D. **Discuss** how *each* of the following investment constraints has changed for Alonso:
- i. time horizon
- ii. liquidity needs

(4 minutes)

Alonso has a buy-and-hold portfolio of individual securities, including treasury bills, asset-backed securities (ABS), government bonds, and equities. His current portfolio allocation is shown in Exhibit 1.

Exhibit 1
Alonso's Current Portfolio Allocation

Asset Class	Portfolio Weight
Treasury bills	5%
A-rated corporate amortizing ABS	10%
AAA-rated government bonds	10%
Small-cap domestic equities	25%
Large-cap international equities	50%

- E. **Determine** which *one* asset class in Alonso's portfolio *most* closely resembles his current human capital. **Justify** your response with *two* reasons.

ANSWER QUESTION 1-E IN THE TEMPLATE PROVIDED ON PAGE 9.

(6 minutes)

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Answer Question 1 on This Page

Template for Question 1-C

i. Describe <i>one</i> change in Alonso's circumstances that has:	
<i>decreased</i> his earnings risk.	
<i>increased</i> his earnings risk.	
ii. Describe <i>one</i> change in Alonso's circumstances that has:	
<i>decreased</i> his financial market risk in retirement.	
<i>increased</i> his financial market risk in retirement.	

Answer Question 1 on This Page

Template for Question 1-E

Determine which <i>one</i> asset class in Alonso’s portfolio <i>most</i> closely resembles his current human capital. (circle one)	Justify your response with <i>two</i> reasons.
<div>Treasury bills</div> <div>A-rated corporate amortizing ABS</div> <div>AAA-rated government bonds</div> <div>Small-cap domestic equities</div> <div>Large-cap international equities</div>	1.
	2.

Questions 1 and 2 relate to Juan Pablo Alonso. A total of 36 minutes is allocated to these questions. *Candidates should answer these questions in the order presented.*

QUESTION 2 HAS TWO PARTS (A, B) FOR A TOTAL OF 9 MINUTES.

Juan Pablo Alonso is now age 54 and anticipating retirement. Approximately 60% of his total investments are currently held in a tax-exempt account and 40% in a taxable account. Contributions into both accounts are made with after-tax income. In the tax-exempt account, withdrawals are entirely tax-free and without penalty. In the taxable account, Alonso now incurs a 20% tax on both income and realized capital gains. Realized losses can be used to offset current or future income and capital gains.

Alonso experienced substantial losses in both of his investment accounts over the past year. He estimates that he will need to postpone retirement and questions whether his investments were structured optimally. Alonso meets with his advisor to discuss the effects of the tax regime on his portfolios. The advisor suggests that over the last year, both Alonso's after-tax return and investment risk would have been higher if a larger proportion of assets had been held in the taxable account.

- A. **Determine**, based *only* on tax considerations, whether Alonso's advisor is correct or incorrect with respect to Alonso's:
- i. after-tax return.
 - ii. investment risk.

Justify *each* response with *one* reason.

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

(6 minutes)

Alonso's advisor proposes a 100,000 U.S. dollar (USD) investment in a portfolio of dividend-paying equities in the taxable account. All dividend income and realized capital gains would be taxed at 20% and reinvested. The advisor suggests a strategy of realizing no more than half of the available capital gains annually. He estimates the 3-year and 15-year accrual equivalent returns on the proposed portfolio to be 5.8% and 6.3%, respectively.

- B. **Explain** why the estimated accrual equivalent returns differ for the two time periods.

Note: No calculations are required.

(3 minutes)

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Answer Question 2 on This Page

Template for Question 2-A

Determine, based <i>only</i> on tax considerations, whether Alonso's advisor is correct or incorrect (circle one) with respect to Alonso's:		Justify <i>each</i> response with <i>one</i> reason.
i. after-tax return	<div>correct</div> <div>incorrect</div>	
ii. investment risk	<div>correct</div> <div>incorrect</div>	

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QUESTION 3 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 21 MINUTES.

Wendy Kadar, CFA, manages an equity fund that invests globally. Among the countries she invests in are Alphastan and Betania. Both countries use the euro (EUR) as their currency. Information about each equity market is shown in Exhibit 1.

Exhibit 1
Alphastan and Betania Equity Markets

	Alphastan	Betania
Market type	Quote-driven	Quote-driven
Average daily volume	25 million shares	15 million shares
Market volatility	22%	16%
Latest 12-month market return	5.3%	15.1%
Number of member firms	5	32
Market hours	Tuesday - Thursday: 9:00am - 4:00pm	Monday - Friday: 9:00am - 4:00pm
Founding year	1973	1903

The order books for typical Alphastan and Betania equities with identical market capitalizations and free floats appear in Exhibits 2 and 3.

Exhibit 2
Limit Order Book for a Typical Alphastan Equity

Dealer	Bid		Dealer	Ask	
	Price (EUR)	Size		Price (EUR)	Size
A	49.82	200	C	50.11	200
B	49.73	400	D	50.26	1000
C	48.22	600	A	51.31	500
D	47.68	500	B	51.55	600

Exhibit 3
Limit Order Book for a Typical Betania Equity

Dealer	Bid			Ask		
	Price (EUR)	Size		Dealer	Price (EUR)	Size
A	49.88	800		C	50.13	900
B	49.81	1000		D	50.19	1000
C	49.75	1900		A	50.31	1500
D	49.50	1700		B	50.38	2600

From the information provided in Exhibits 1, 2, and 3, Kadar concludes that Betania has a higher quality market.

- A. **Identify** *three* market characteristics that support Kadar's conclusion that Betania has a higher quality market. **Justify** *each* response with *one* reason.

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

(9 minutes)

Kadar expects to receive a large inflow of cash into her fund from a new client. When investing the new money, she intends to use algorithmic execution for the trades. Global equity markets have been volatile and trending upwards and Kadar forecasts this will continue.

- B. **Determine** which algorithmic participation strategy [volume-weighted average price (VWAP), time-weighted average price (TWAP), or implementation shortfall] is *most* appropriate for Kadar's trades. **Justify** your response with *two* reasons.

ANSWER QUESTION 3-B IN THE TEMPLATE PROVIDED ON PAGE 24.

(6 minutes)

Kadar's firm offers clients the ability to reduce their risk exposure by investing in a mix of risk-free securities and Kadar's global equity fund. Clients are able to select a rebalancing strategy that best suits their preferences. The available rebalancing strategies are buy-and-hold, constant-mix, and constant-proportion portfolio insurance (CPPI).

A new client, Guy Marsden, agrees with Kadar's forecast for the global equity markets. He invests EUR 250,000 from his tax-exempt account in a mix of risk-free securities and Kadar's global equity fund. He does not want the value of his portfolio to fall below EUR 175,000, but is willing to accept additional risk as his portfolio value increases.

- C. **Determine** which of the available rebalancing strategies (buy-and-hold, constant-mix, or CPPI) is *most* appropriate for Marsden. **Justify** your response with *two* reasons.

ANSWER QUESTION 3-C IN THE TEMPLATE PROVIDED ON PAGE 25.

(6 minutes)

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Answer Question 3 on This Page

Template for Question 3-A

Identify <i>three</i> market characteristics that support Kadar’s conclusion that Betania has a higher quality market.	Justify <i>each</i> response with <i>one</i> reason.
Characteristic 1:	
Characteristic 2:	
Characteristic 3:	

Answer Question 3 on This Page

Template for Question 3-B

Determine which algorithmic participation strategy [volume-weighted average price (VWAP), time-weighted average price (TWAP), or implementation shortfall] is <i>most</i> appropriate for Kadar's trades. (circle one)	Justify your response with <i>two</i> reasons.
<div>volume-weighted average price (VWAP)</div> <div>time-weighted average price (TWAP)</div> <div>implementation shortfall</div>	1.
	2.

Answer Question 3 on This Page

Template for Question 3-C

<p>Determine which of the available rebalancing strategies (buy-and-hold, constant-mix, or CPPI) is <i>most</i> appropriate for Marsden. (circle one)</p>	<p>Justify your response with <i>two</i> reasons.</p>
<p>buy-and-hold</p>	<p>1.</p>
<p>constant-mix</p>	<p>2.</p>
<p>CPPI</p>	

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QUESTION 4 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 17 MINUTES.

An advisor for Alesi Capital Management is working with a new client, Melanie Stoffer. Prior to meeting with her, the advisor asks Stoffer a series of diagnostic questions to determine whether she may have any of the following investment behavioral biases:

- anchoring
- hindsight
- regret aversion
- representativeness
- status quo

Sample diagnostic questions are shown in Exhibit 1.

Exhibit 1
Alesi Capital Management
Sample Diagnostic Questions

1. Would a prior investment decision that resulted in a loss stop you from making a similar decision, even if the new investment appears to be the best alternative?
2. How frequently do you review your investment portfolio?
3. Would you sell a recent equity investment following a management announcement of a significant decline in the expected growth rate of revenue?

- A. **Identify** the behavioral bias that *each* diagnostic question in Exhibit 1 is *most likely* to reveal.

Note: Each diagnostic question is designed to reveal a different bias.

ANSWER QUESTION 4-A IN THE TEMPLATE PROVIDED ON PAGE 33.

(6 minutes)

At their initial meeting, the advisor learns that Stoffer is a mid-level manager at a bank and has built an investment portfolio by accumulating savings, stock options, and restricted stock from her company. Stoffer believes she currently has a sufficient level of wealth to achieve her primary goal of maintaining her current lifestyle until her death.

In discussing her investment philosophy, Stoffer explains that she likes to keep separate investment accounts for her savings, stock options, and restricted stock. She has a distinct investment strategy for each account. In addition, Stoffer says that she always follows her father's investment advice of "invest only in what you know." Stoffer also believes that she is

personally contributing to the performance of her bank's stock price. Combined, these factors have led Stoffer to keep a large percentage of her total portfolio in her bank's stock and options. The advisor tells Stoffer that this concentrated holding represents significant risk in achieving her primary goal. Stoffer refuses to consider the suggestion that she partially hedge the risk of her bank's stock.

After evaluating Stoffer's investment philosophy, the advisor is concerned that Stoffer is exhibiting some of the following cognitive biases:

- endowment
- conservatism
- mental accounting
- illusion of control

B. **Identify** *two* cognitive biases exhibited by Stoffer. **Justify** *each* response with *one* reason.

ANSWER QUESTION 4-B IN THE TEMPLATE PROVIDED ON PAGE 34.

(6 minutes)

C. **Recommend** whether the advisor should primarily attempt to moderate Stoffer's biases, or adapt his recommendations to better reflect Stoffer's biases. **Justify** your response with *two* reasons.

(5 minutes)

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Answer Question 4 on This Page

Template for Question 4-A

Note: Each diagnostic question is designed to reveal a different bias.

Diagnostic Question	Identify the behavioral bias that <i>each</i> diagnostic question in Exhibit 1 is <i>most likely</i> to reveal. (circle one)
<p>1. Would a prior investment decision that resulted in a loss stop you from making a similar decision, even if the new investment appears to be the best alternative?</p>	<p>anchoring</p> <p>hindsight</p> <p>regret aversion</p> <p>representativeness</p> <p>status quo</p>
<p>2. How frequently do you review your investment portfolio?</p>	<p>anchoring</p> <p>hindsight</p> <p>regret aversion</p> <p>representativeness</p> <p>status quo</p>
<p>3. Would you sell a recent equity investment following a management announcement of a significant decline in the expected growth rate of revenue?</p>	<p>anchoring</p> <p>hindsight</p> <p>regret aversion</p> <p>representativeness</p> <p>status quo</p>

Answer Question 4 on This Page

Template for Question 4-B

Identify <i>two</i> cognitive biases exhibited by Stoffer. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
First cognitive bias: endowment conservatism mental accounting illusion of control	
Second cognitive bias: endowment conservatism mental accounting illusion of control	

QUESTION 5 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 24 MINUTES.

Emergistan is a developing country founded 50 years ago that has exhibited significant economic growth. In its first 38 years, Emergistan had low inflation. At that time, the country established a central bank with a primary mandate to encourage economic growth. The resulting monetary policy has led to 12 years of high and volatile inflation. Its equity market is well-established and liquid. By contrast, secondary market transactions for bonds are small and infrequent.

Joe Cooke is an economist for a pension advisory firm. He is analyzing Emergistan to identify investment opportunities. Cooke performs several analyses of Emergistan's economy. Exhibit 1 contains a description of five of his analyses and selected comments from his report.

Exhibit 1
Economic Analyses of Emergistan

Analysis	Description of Each Analysis and Selected Comments
1	Cooke creates an econometric model to forecast inflation, using the full 50-year history of Emergistan. He states: "Based on my model, I expect future inflation to be much lower than the level we have seen in recent years."
2	Cooke analyzes purchasing manager surveys to estimate the level of industrial production in future quarters. He states: "Survey information of current conditions and new orders both suggest rising industrial production in the next two quarters."
3	Cooke performs a regression analysis on today's developed economies when they were at a similar stage of development as Emergistan is now. He states: "Based on this analysis, Emergistan is likely to achieve average real GDP growth of 5% for the next 10 years."
4	Cooke constructs a daily series of bond prices for Emergistan's bond market. He interpolates prices between actual transaction data points. He states: "Based on this analysis, Emergistan's bond market has historically provided excellent returns for the level of volatility experienced."
5	Cooke examines Emergistan's balance of payments and notes a small current account deficit balanced by capital inflows. He states: "I expect this to continue and the composition of the balance of payments to remain unchanged."

A. **Determine** which of Cooke's analyses in Exhibit 1 is *most likely* to be affected by *each* of the following sources of error:

- i. survivorship bias
- ii. regime changes
- iii. appraisal data

Justify *each* response with *one* reason.

Note: Consider *each* source of error independently.

ANSWER QUESTION 5-A IN THE TEMPLATE PROVIDED ON PAGE 43.

(9 minutes)

Cooke prepares an analysis of Emergistan's currency, the Emergistan Dinar (EMD), relative to the U.S. dollar (USD). He collects the current economic data and five-year consensus forecasts in Exhibit 2.

Exhibit 2
Current and Five-Year Forecasted Economic Data for Emergistan

Economic Factor	Current (2012)	Consensus Forecast (2017)
Interest rate differential versus the U.S.	+4.7%	+6.4%
Inflation rate differential versus the U.S.	+4.1%	+5.8%
Unemployment rate	8.6%	8.4%
Foreign direct investment	1.9% of GDP	1.7% of GDP
GDP per capita (in EMD)	15,157	15,325
GDP growth (annualized)	4.3%	4.6%

B. **Determine** whether the EMD is *most likely* to become stronger, weaker, or remain unchanged relative to the USD, based on *each* of the following methodologies:

- i. purchasing power parity
- ii. capital flows

Justify *each* response with *one* reason.

Note: Consider *each* methodology independently and use *only* the economic data in Exhibit 2.

ANSWER QUESTION 5-B IN THE TEMPLATE PROVIDED ON PAGE 44.

(6 minutes)

Cooke analyzes the Emergistan equity market. He notes that Emergistan companies are currently experiencing annual growth of 12% in earnings and dividends. He expects the growth rate to decline linearly to 4% per year over a period of fifteen years, and then continue at 4% per year. He gathers additional equity market information shown in Exhibit 3.

Exhibit 3
Emergistan Equity Market Information

Market Characteristic	Value
Equity index level	1144
Forecast index earnings per share (next 12 months)	EMD 81
Current index dividend per share (current year)	EMD 46
Risk-free rate	6.7%
Equity discount rate	10.2%
Assets at liquidation value (EMD billions)	109
Assets at replacement cost (EMD billions)	152
Equities at book value (EMD billions)	119
Equities at market value (EMD billions)	224
Debt at book value (EMD billions)	103
Debt at market value (EMD billions)	116

- C. **Calculate** the fair value of the Emergistan equity market using the H-model and the information in Exhibit 3. **Show** your calculations.

(4 minutes)

- D. i. **Calculate** Tobin's q using the information in Exhibit 3. **Show** your calculations.
- ii. **Judge** whether Tobin's q will *most likely* be higher, lower, or the same in the long term. **Justify** your response with *one* reason.
Note: No calculations are required.

(5 minutes)

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Answer Question 5 on This Page

Template for Question 5-A

Note: Consider *each* source of error independently.

Source of error	Determine which of Cooke's analyses in Exhibit 1 is <i>most likely</i> to be affected by <i>each</i> of the following sources of error. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. survivorship bias	1 2 3 4 5	
ii. regime changes	1 2 3 4 5	
iii. appraisal data	1 2 3 4 5	

Answer Question 5 on This Page

Template for Question 5-B

Note: Consider *each* methodology independently and use *only* the economic data in Exhibit 2.

Methodology	Determine whether the EMD is <i>most likely</i> to become stronger, weaker, or remain unchanged relative to the USD, based on <i>each</i> of the following methodologies. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. purchasing power parity	<p>stronger</p> <p>weaker</p> <p>remain unchanged</p>	
ii. capital flows	<p>stronger</p> <p>weaker</p> <p>remain unchanged</p>	

QUESTION 6 HAS SIX PARTS (A, B, C, D, E, F) FOR A TOTAL OF 34 MINUTES.

Aquiline Chemical Corporation supplies chemicals for a wide range of industry applications. The company has a mature product line and declining profitability. The company's pension plan administrator, Michael Trout, is revising the investment policy statement for Aquiline's defined benefit pension plan (the Plan). The following information applies to the Plan:

- Discount rate applied to determine the present value of the Plan's liabilities: 5.0%
- Expected average annual inflation rate: 1.25%
- Active lives as a percent of participants: 65%
- Average age of workforce: 54 years
- Plan status: fully funded

Aquiline has not had to make any contributions to the Plan in recent years. Although currently fully funded, the Plan was in surplus until this year when an economic slowdown resulted in a decline in the value of the Plan's assets. Given Aquiline's declining profitability, Trout believes that the need to make future contributions would have a significant negative effect on the company's stock price. Pension asset returns are positively correlated with Aquiline's operating earnings.

The company has a mandatory retirement age of 65 and until recently, retirees received inflation-adjusted pension payments. Effective 1 January of this year, Aquiline amended the Plan to eliminate inflation adjustments for any future retirees. The amendment does not affect current retirees or former employees with deferred benefits.

Starting next month, Aquiline will offer employees an early-retirement option. To be eligible, employees must have 30 years of employment with the company and have reached the age of 60. Trout is confident that many employees will choose early retirement. While this would increase pension payments over the medium term, Aquiline believes that the labor force reduction will allow the company to improve profitability.

- A. **State** the return objective of the Plan. **Calculate** the return requirement. **Show** your calculations.

(4 minutes)

- B. **Discuss** *two* factors that contribute to the Plan's low risk tolerance.

(4 minutes)

Trout is using an asset-only approach with an asset allocation of 70% equities and 30% fixed income. He believes there is little risk to the fully-funded status of the Plan with this allocation.

Aquiline hires a pension consultant, Morris Rayburn, to evaluate the Plan's asset allocation. Rayburn disagrees with Trout's view of the risk characteristics of the current asset-only approach. Rayburn recommends that Aquiline use a liability-relative approach in allocating the Plan's assets.

- C. **Discuss** *two* reasons why the Plan's current asset allocation may lead to a funding shortfall.

(6 minutes)

- D. **Describe** the primary characteristic of pension investments that would be considered low risk under:
- i. Trout's asset-only approach.
 - ii. Rayburn's liability-relative approach.

(4 minutes)

Rayburn estimates the components of the Plan's benefit payments, as shown in Exhibit 1. He uses data from the first quarter, after the Plan was changed to no longer offer inflation-adjusted payments to new retirees. Since the beginning of the year, no employees have left the company. Rayburn recommends a liability-relative approach for the Plan's portfolio using three asset classes: equities, nominal bonds, and real-rate bonds.

Exhibit 1
Estimated Components
of the Plan's Benefit Payments

Retirees	35%
Deferred	10%
Active accrued	40%
Future wage inflation	10%
Future real wage growth	5%

- E. **Determine** which asset class (equities, nominal bonds, or real-rate bonds) in Rayburn's recommended portfolio should have the:
- i. highest weighting.
 - ii. lowest weighting.

Justify *each* response with *one* reason.

ANSWER QUESTION 6-E IN THE TEMPLATE PROVIDED ON PAGE 57.

(8 minutes)

Aquiline is considering freezing its defined benefit (DB) plan and moving to a participant-directed defined contribution (DC) plan. The DC plan would be funded by a combination of company and employee contributions, with immediate vesting for all employees. Trout is considering the advantages for both Aquiline and its employees.

- F. i. **Discuss** *two* advantages to Aquiline if it were to freeze its DB plan and offer a participant-directed DC plan.
- ii. **Discuss** *two* advantages to employees if Aquiline were to freeze its DB plan and offer a participant-directed DC plan.

(8 minutes)

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Answer Question 6 on This Page

Template for Question 6-E

Weighting	Determine which asset class (equities, nominal bonds, or real-rate bonds) in Rayburn's recommended portfolio should have the: (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. highest weighting	<p>equities</p> <p>nominal bonds</p> <p>real-rate bonds</p>	
ii. lowest weighting	<p>equities</p> <p>nominal bonds</p> <p>real-rate bonds</p>	

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QUESTION 7 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 23 MINUTES.

Janet Brown manages a 200 million U.S. dollar (USD) portfolio of government bonds. She expects the portfolio will return 3.20% over the next year. However, her clients require a one-year return of 4.40%. She believes she can enhance returns by leveraging the portfolio. She can borrow funds at 2.40% and invest the proceeds in government bonds identical to those held in the portfolio. The duration of the bond portfolio is 8.50 and the duration of the borrowed funds is 0.80.

- A. i. **Determine** the amount Brown needs to borrow to increase the one-year return from 3.20% to 4.40%, assuming all invested funds earn 3.20%. **Show** your calculations.
- ii. **Determine** the duration of the leveraged portfolio. **Show** your calculations.

(8 minutes)

Brown also considers leveraging the portfolio by using repurchase agreements (repos). As the potential borrower of funds, she wants to obtain the lowest possible repo rate. She identifies two factors she believes affect the repo rate: the availability of the collateral and the quality of the collateral.

- B. **Determine**, for *each* factor that Brown has identified, the characteristic given in the template that would lead to a lower repo rate. **Justify** *each* response with *one* reason.

ANSWER QUESTION 7-B IN THE TEMPLATE PROVIDED ON PAGE 66.

(6 minutes)

A few months later, the portfolio has a market value of USD 211 million and is not leveraged. Its duration remains at 8.50. Brown believes bond yields will fall and considers buying bond futures to increase the portfolio's duration to 11.00. The cheapest-to-deliver bond has a duration of 16.70, a price of USD 100,000, and a conversion factor of 1.02.

- C. **Determine** the number of futures contracts Brown should buy to increase the portfolio's duration to 11.00. **Show** your calculations.

(3 minutes)

Brown also considers using call options on bonds to increase the portfolio's duration. She selects a suitable 90-day call option, which has a delta of 0.40 and a price of USD 27,568. The underlying bond has a duration of 16.93 and a price of USD 1,037,560.

- D. **Determine** the duration of the call option. **Show** your calculations.

(3 minutes)

A year passes, and Brown is managing a portfolio consisting of government bonds and mortgage-backed securities (MBS). All of the securities in this portfolio have the same duration. Brown forecasts interest rate volatility will rise significantly and the yield curve will shift downward in a parallel fashion. She is very confident in her volatility forecast but less confident in her yield curve forecast. She considers the option-adjusted spread (OAS) on the MBS to be attractive. To isolate the OAS, she decides to hedge the interest rate risk of the MBS.

- E. **Determine** whether it would be better for Brown to use dynamic hedging or options hedging, given Brown's forecasts of volatility and interest rates and her confidence in those forecasts. **Justify** your response with *one* reason.

(3 minutes)

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Answer Question 7 on This Page

Template for Question 7-B

Factor	Determine, for <i>each</i> factor that Brown has identified, the characteristic that would lead to a lower repo rate. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
availability of the collateral	<p>easy to obtain</p> <p>difficult to obtain</p> <p>has no effect</p>	
quality of the collateral	<p>high quality</p> <p>low quality</p> <p>has no effect</p>	

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QUESTION 8 HAS TWO PARTS (A, B) FOR A TOTAL OF 13 MINUTES.

Ari Patheo, a portfolio manager for Astute Investments, manages a 280 million U.S. dollar (USD) investment portfolio. Astute's investment committee has recently become more risk averse in anticipation of a major announcement regarding monetary policy. To reflect this view, Patheo wishes to temporarily make the following changes in the portfolio:

- decrease the portfolio's equity allocation and decrease its equity beta;
- increase the portfolio's bond allocation and decrease its modified duration.

The portfolio's current and target characteristics are shown in Exhibit 1.

Exhibit 1
Investment Portfolio Characteristics

Current Portfolio				Target Portfolio			
Asset Class	Modified Duration	Equity Beta	Allocation (USD millions)	Asset Class	Modified Duration	Equity Beta	Allocation (USD millions)
Equities	---	1.08	182	Equities	---	0.90	154
Bonds	7.2	---	98	Bonds	6.0	---	126

Patheo does not want to incur high trading costs for a temporary reallocation and decides to use the following futures contracts to achieve the portfolio targets.

- equity futures - currently priced at USD 129,000 per contract (after accounting for the multiplier), with an equity beta of 0.97;
- bond futures - currently priced at USD 103,000 per contract, with a modified duration of 7.70 and a yield beta of 1.00.

A. **Determine** the action (buy or sell) and the number of futures contracts required to achieve the:

- equity targets.
- bond targets.

Show your calculations.

(8 minutes)

Patheo also manages the Peterson family investment portfolio, which initially consists of USD 46 million of equities and USD 32 million of bonds. As a result of a change in family circumstances, the Peterson portfolio is rebalanced using the transactions shown in Exhibit 2.

Exhibit 2
Transactions for Rebalancing the Peterson Portfolio

Type of Futures Contracts	Action	Number of Futures Contracts to Buy/Sell	Price per Futures Contract (USD)
Equity futures contract	Buy	42	160,000
Bond futures contract	Sell	35	190,000

Three months after these transactions, the market value of the Peterson portfolio's equities has increased by 3.00%, and the market value of its bonds has decreased by 2.40%. The prices of the equity and bond futures contracts are now USD 165,000 and USD 185,250, respectively.

- B. **Calculate** the profit or loss of the Peterson portfolio over the past three months. **Show** your calculations.

(5 minutes)

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

James Delpont is an options trader at a large bank. He sold to a client one-month put options on 2,000 shares of an underlying equity. The options have an exercise price of 1,300 euros (EUR) and an option premium of EUR 19.09 per share. The underlying equity is trading at EUR 1,340 per share.

The options were priced using a volatility of 24%. Delpont calculates the delta of the options to be -0.3088 .

Delpont needs to hedge his exposure and decides to trade in the underlying equity's shares.

- A. i. **Determine** whether Delpont should buy or sell shares of the underlying equity.
- ii. **Calculate** the number of shares he should trade. **Show** your calculations.

(4 minutes)

The bank's risk manager wants to understand the sensitivity of the price of the put options that have been sold. Delpont explains that traders frequently use option deltas to estimate the sensitivity of options to changes in the price of the underlying equity. However, actual option price changes will differ.

- B. **Determine** whether the change in the price of the put option will be greater for an increase or decrease in the price of the underlying equity. **Justify** your response with *one* reason.

Note: Assume the increase and decrease are immediate and of equal value.

(3 minutes)

Delpont sells to another client 3,000 three-month equity call options with an exercise price of EUR 825. The underlying equity is priced at EUR 800 per share. Each call option has a premium of EUR 29.42. Delpont hedges this position by buying 1,322 shares of the underlying equity. He calculates his net cash outlay to be EUR 969,340. Delpont sets his performance benchmark as the net cash outlay continuously compounding at the risk-free rate of 2.25% (using days in period/365).

Five days later, the price of the equity is EUR 815, and Delpont calculates the new fair value of the call options to be EUR 35.30.

- C. **Determine** the percentage difference between the hedged position's value and Delpont's benchmark. **Show** your calculations.

(5 minutes)

The Morning Session of the 2013 Level III CFA[®] Examination has 11 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Question	Topic	Minutes
1	Portfolio Management – Individual	20
2	Portfolio Management – Individual	15
3	Portfolio Management – Individual/Behavioral	16
4	Portfolio Management – Equity	17
5	Portfolio Management – Economics	20
6	Portfolio Management – Institutional	18
7	Portfolio Management – Institutional	14
8	Portfolio Management – Fixed Income	17
9	Portfolio Management – Fixed Income	9
10	Portfolio Management – Risk Management	18
11	Portfolio Management – Performance Evaluation	<u>16</u>
Total:		180

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QUESTION 1 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 20 MINUTES.

Thomas and Elizabeth Voort, both age 45, are meeting with their financial advisor, Marc Lenard. Lenard is creating an investment policy statement for the Voorts. Thomas sold his consulting business at year-end and retired. The Voorts will rely on their investment portfolio to meet future expenses in excess of Thomas' retirement income. Elizabeth is not employed. Financial details include:

Income

Thomas will receive retirement payments of USD 125,000 per year for his lifetime from the business he sold. The retirement payments are not indexed for future inflation and are fully taxable as ordinary income.

Expenses

The Voorts' total living expenses last year were USD 300,000, and they are expected to grow each year at the inflation rate. Taxes are due immediately on the gain from the sale of the business at a rate of 15%. The Voorts do not expect any other significant cash outflows in the future.

The tax rate on ordinary income and all investment returns is 30%. The inflation rate is expected to be 2.5% per year.

Assets

The Voorts own their home, valued at USD 1,250,000, mortgage-free. They have a taxable investment portfolio with a current market value of USD 2,500,000. This portfolio has no previous tax liability due in the coming year. Thomas received a lump-sum USD 10,000,000 payment from the sale of his business; his cost basis is zero. The net proceeds of the sale will be added to the Voorts' investment portfolio. Their goals are to grow the asset base of the portfolio over time to maintain its after-tax purchasing power and to establish and maintain a cash reserve of USD 250,000.

- A. **Determine** the Voorts' nominal after-tax required rate of return for the coming year. **Show** your calculations.

(8 minutes)

- B. **State** *two* reasons why the Voorts' ability to assume risk in their investment portfolio is above average.

(4 minutes)

- C. **Determine** the Voorts' liquidity requirement (in USD) for the coming year. **Show** your calculations.

(3 minutes)

Two years later, the Voorts ask Lenard to construct a new long-term strategic asset allocation with a more aggressive goal of achieving at least 3.5% annualized growth in the after-tax

purchasing power of the portfolio. They indicate that the portfolio should have only a small probability of declining more than 10% in nominal pre-tax terms in any one year. Lenard explains to the Voorts that a normal distribution can be used to model the portfolio returns. The Voorts agree to use a two-standard-deviation approach to monitor the shortfall risk of the portfolio.

Expected inflation remains 2.5% per year and the tax rate remains 30%. Based on his current market outlook, Lenard considers three potential portfolio allocations for the Voorts as shown in Exhibit 1.

Exhibit 1
Potential Long-Term Strategic Portfolios

Asset Class	Expected Annual Return	Portfolio X	Portfolio Y	Portfolio Z
Stocks	11.0%	70%	55%	60%
Bonds	6.0%	25%	35%	35%
Cash	2.5%	5%	10%	5%
Pre-tax expected return (nominal)		9.3%	8.4%	8.8%
Expected standard deviation (nominal)		11.0%	8.7%	9.3%

- D. **Determine** the *most* appropriate portfolio from Exhibit 1 for the Voorts, given their objectives and constraints. **Justify** your response with *two* reasons.

(5 minutes)

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Answer Question 1 on This Page

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QUESTION 2 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 15 MINUTES.

Gerardo Puente, age 70, is a retired entrepreneur with a desire for privacy in his financial affairs. His wife is 45 years old and they have three young sons. Puente has one daughter from a previous marriage.

The Puentes live in a country that is a community property regime with the U.S. dollar as its currency. The community property regime entitles a surviving spouse to receive a one-half interest in assets accumulated during the marriage. Puente's total estate has grown from USD 12 million to USD 26 million during his current marriage. The forced heirship rules in Puente's country entitle his current wife to receive a minimum of 25% of the total estate and all children to equally share a minimum of 25% of the total estate.

Puente would like to secure a sound financial future for his family. He worries about potential legal claims from outside the family and disputes among his children. As a result, Puente consults his investment advisor, who recommends that Puente establish a trust.

- A. **Determine** the minimum amount that Puente's current wife would be entitled to receive, before estate taxes are considered, if he were to die today. **Show** your calculations.

(4 minutes)

- B. **Discuss** *two* benefits, specific to Puente's circumstances, of establishing a trust.

(4 minutes)

Puente's daughter from his previous marriage is 30 years old. Her income tax rate is lower than Puente's. Puente asks his investment advisor about the tax benefit of making a current gift to his daughter rather than transferring wealth to her through a bequest upon his death. The country's gift tax rate is flat, with no annual or lifetime exemptions. The estate tax rate is also flat and equal to the gift tax rate. The laws of the country require the donor to pay any gift taxes. The investment advisor makes the following assumptions:

- Puente's estate will be subject to estate tax.
- His daughter's estate will not be taxed because its value will be below the minimum taxable threshold.
- His daughter's pre-tax investment returns on any gifted assets will be equal to Puente's.

- C. **Justify** with *two* reasons why tax considerations favor Puente making a current gift to his daughter rather than transferring wealth to her upon his death.

Note: No calculations are required.

(4 minutes)

Five years have passed and Puente's daughter now has a three-year-old son who is Puente's only grandchild. Puente believes he has USD 1 million of excess capital that could be transferred to his grandson. Due to a change in financial circumstances, the investment advisor now assumes that Puente's daughter's estate will be subject to estate tax.

D. **Explain** the tax benefit of a direct transfer of assets from Puente to his grandson.

Note: No calculations are required.

(3 minutes)

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QUESTION 3 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

Joyce Siosan is a 42-year-old lawyer at a prestigious law firm. She is meeting with Joel Murray, a financial advisor, to organize her finances. During the interview process, Siosan tells Murray that she has been purchasing short-term, out-of-the-money call and put options. Siosan acknowledges these options have a low probability of paying off and that the expected return from her options trading is negative. However, she states that she is attracted by the possibility of high returns when she can exercise in-the-money options. At the same time, Murray notes that Siosan has been purchasing low-payoff earthquake insurance on her home, which is located in a low-probability earthquake zone.

- A. **Describe** Siosan's utility function. **Contrast** her utility function with that assumed in traditional finance theory.

(5 minutes)

Siosan purchases a new luxury vehicle every two years and takes expensive annual vacations. She has a reputation for paying the entire bill at the upscale restaurants where she dines regularly with her friends. Siosan's annual consumption, options trading, and housing expenditures are paid for entirely out of her salary income and half of her modest annual bonus. She deposits the other half of her annual bonus and any other non-salary sources of income into her relatively small retirement account, which excludes her options trading. Siosan is reluctant to incur debt and has only a small mortgage on her home, despite the fact that she will soon be made a partner in her firm and will have much higher earnings. Murray believes that Siosan exhibits behavioral biases that interfere with an optimal savings and consumption allocation. In particular, he thinks that she is not saving enough for retirement.

ANSWER QUESTION 3-B IN THE TEMPLATE PROVIDED ON PAGES 22 AND 23.

- B. **Discuss** how Siosan's behavior reflects the bias of:

- i. self-control.
- ii. mental accounting.

Explain how a rational economic individual in traditional finance would behave differently with respect to *each* bias.

(6 minutes)

Siosan's retirement portfolio is allocated 50% to money-market securities and 50% to a few speculative stocks that she read about in an investment newsletter. Murray observes that Siosan's retirement portfolio allocation is consistent with Behavioral Portfolio Theory and not consistent with a mean–variance framework.

- C. **Determine** whether Murray's observation about Siosan's retirement portfolio allocation is correct. **Justify** your response with *two* reasons.

(5 minutes)

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Answer Question 3 on This Page

Template for Question 3-B

Behavioral bias	Discuss how Siosan’s behavior reflects <i>each</i> bias.	Explain how a rational economic individual in traditional finance would behave differently with respect to <i>each</i> bias.
i. self-control		

Template for Question 3-B continued on page 23

Answer Question 3 on This Page

Template for Question 3-B (continued)

Behavioral bias	Discuss how Siosan’s behavior reflects <i>each</i> bias.	Explain how a rational economic individual in traditional finance would behave differently with respect to <i>each</i> bias.
ii. mental accounting		

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QUESTION 4 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 17 MINUTES.

Kimi Capital Group is a provider of index services. A key growth strategy for Kimi is to develop market indices for use as benchmarks for exchange-traded index funds. Kimi's management realizes that the criteria it uses to construct its indices will influence the resulting transaction costs incurred by funds attempting to track the indices. The lower the potential transaction costs of an index, the more attractive it will be to an index fund and to investors.

Kimi regularly compares its index construction criteria to those of other index service providers to evaluate the competitiveness of its products. Exhibit 1 summarizes Kimi's current criteria and the criteria currently used by its main competitor.

Exhibit 1
Comparison of Index Construction Criteria

Index Construction Criterion	Current Criterion for Kimi Capital	Criterion Used by Main Competitor
Index breadth as percent of total market capitalization	minimum 95%	minimum 80%
Float adjustment	float bands	single point
Selection of index constituents	objective, clearly stated rules	subjective, flexible rules

ANSWER QUESTION 4-A IN THE TEMPLATE PROVIDED ON PAGE 29.

- A. **Determine** if *each* of Kimi Capital's index construction criteria in Exhibit 1 will *most likely* result in lower, no difference in, or higher transaction costs relative to *each* of the criteria of its main competitor. **Justify** *each* response with *one* reason.

(9 minutes)

Kimi Capital is evaluating the country of Badaar for inclusion in either its Developed Market Index or its Emerging Market Index, which are both capitalization-weighted. Badaar's equity market has characteristics that make it a possible fit for either index. Relevant characteristics of Badaar's equity market and of Kimi's two indices are provided in Exhibit 2.

Exhibit 2
Equity Market and Index Characteristics
(amounts in USD billions)

Characteristic	Badaar Equity Market	Developed Market Index	Emerging Market Index
Average market capitalization	1.5	22.1	1.3
Total market capitalization	300	10,000	550
Stability of currency	Stable	Stable	Mostly stable
Liquidity	Moderate	Very high	Moderate

B. **Discuss** *one* reason that supports *each* of the following statements:

- i. Badaar's equity market will be positively impacted by Badaar's inclusion in the Developed Market Index.
- ii. Index funds that track the Emerging Market Index will be negatively impacted by Badaar's inclusion in that index.

(4 minutes)

Kimi Capital is planning to introduce style indices based on its Developed Market Index. The companies that make up the Developed Market Index will be placed into either a Growth Index or a Value Index, but not both. The placement of firms into either index will be based on an assessment of multiple growth and valuation characteristics. Kimi will rebalance the indices with no buffering. Holding companies will be excluded from both style indices.

C. **Discuss** *two* aspects of Kimi Capital's style index construction that will *most likely* produce higher turnover between the style indices.

(4 minutes)

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Answer Question 4 on This Page

Template for Question 4-A

Index construction criterion	Determine if <i>each</i> of Kimi Capital's index construction criteria in Exhibit 1 will <i>most likely</i> result in lower, no difference in, or higher transaction costs relative to <i>each</i> of the criteria of its main competitor. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Index breadth as percent of total market capitalization	<p>lower</p> <p>no difference</p> <p>higher</p>	
Float adjustment	<p>lower</p> <p>no difference</p> <p>higher</p>	
Selection of index constituents	<p>lower</p> <p>no difference</p> <p>higher</p>	

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QUESTION 5 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 20 MINUTES.

Andrew Reed is a market strategist with a U.S.-based asset management firm. He is currently evaluating several emerging market economies in order to identify undervalued markets.

Reed uses the Cobb-Douglas production function (under the assumption of constant returns to scale) to estimate the long-term growth in real GDP for the country of Westria. Exhibit 1 summarizes the projections that Reed has gathered for Westria.

Exhibit 1
Annualized Economic Projections for Westria
(2013–2043)

Growth in total factor productivity	1.3%
Output elasticity of capital	0.7
Growth in total population	1.8%
Growth in capital stock	5.5%
Growth in labor input	2.5%
Unemployment rate	8.2%

- A. **Calculate** the projected annual growth in real GDP for Westria using the Cobb-Douglas production function and the information in Exhibit 1. **Show** your calculations.

(4 minutes)

Reed knows that economic growth forecasts are sensitive to the inputs to the Cobb-Douglas production function. He wants to assess the effect of two potential new economic policies on Westria's future growth path. The newly elected government in Westria has proposed the following policies:

- Policy 1: Offer incentives to limit the average number of children per family.
- Policy 2: Increase the maximum allowable annual contribution to tax-free retirement accounts.

ANSWER QUESTION 5-B IN THE TEMPLATE PROVIDED ON PAGE 36.

- B. **Determine** whether *each* proposed policy will *most likely* decrease, have no effect on, or increase the long-run Cobb-Douglas growth projection for Westria. **Justify each** response with *one* reason.

(6 minutes)

Reed is discussing the valuation of Westria's stock market with the firm's equity strategist, Jill Shepherd. He produces the data for Westria shown in Exhibit 2. Reed tells Shepherd that he believes the Fed model is appropriate for valuing Westria's stock market. Shepherd disagrees, stating that the Yardeni model is more suitable because the Fed model has several limitations.

Exhibit 2
Capital Markets Data for Westria

10-year government bond yield	5.1%
Yardeni weighting factor	0.2
Average 10-year A-rated corporate bond yield	5.9%
Broad equity index level (current)	800
Broad equity index earnings (last four quarters)	35
Projected long-term earnings growth rate	7.0%

ANSWER QUESTION 5-C IN THE TEMPLATE PROVIDED ON PAGE 37.

C. **Determine** whether Westria's stock market (using the broad equity index as a proxy) is undervalued, fairly valued, or overvalued using the:

- i. Fed model.
- ii. Yardeni model.

Justify *each* response with *one* reason.

(6 minutes)

Reed asks Shepherd about the extent to which the Fed and Yardeni models incorporate risk. Shepherd proposes using the average 10-year BB-rated corporate bond yield instead of the average 10-year A-rated corporate bond yield to assess the valuation of Westria's stock market.

D. **Explain** the effect of substituting the BB-rated corporate bond yield for the A-rated corporate bond yield on the fair value of Westria's stock market as determined by the:

- i. Fed model.
- ii. Yardeni model.

(4 minutes)

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Template for Question 5-B

Policy	Determine whether <i>each</i> proposed policy will <i>most likely</i> decrease, have no effect on, or increase the long-run Cobb-Douglas growth projection for Westria. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
<p>Policy 1:</p> <p>Offer incentives to limit the average number of children per family.</p>	<p>decrease</p> <p>no effect</p> <p>increase</p>	
<p>Policy 2:</p> <p>Increase the maximum allowable annual contribution to tax-free retirement accounts.</p>	<p>decrease</p> <p>no effect</p> <p>increase</p>	

Answer Question 5 on This Page

Template for Question 5-C

Model	Determine whether Westria's stock market (using the broad equity index as a proxy) is undervalued, fairly valued, or overvalued using <i>each</i> model. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. Fed model	<p>undervalued</p> <p>fairly valued</p> <p>overvalued</p>	
ii. Yardeni model	<p>undervalued</p> <p>fairly valued</p> <p>overvalued</p>	

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

Jason Pearce founded a social media company. When the company went public, Pearce became wealthy. He now wishes to start the Pearce Foundation to support the university he attended. Pearce wants the Foundation to make contributions to the university in perpetuity.

The Foundation will be a tax-exempt entity. Pearce makes an initial gift to the Foundation of USD 100 million on 1 January of Year 1. In addition, Pearce intends to make ongoing annual contributions to the Foundation of USD 2 million on 1 January of each subsequent year. The Foundation will make a one-time distribution of USD 3 million at the beginning of Year 1 to fund a new computer lab at the university.

Beginning in Year 2, the Foundation will have an annual spending requirement of 6% of the market value of its portfolio at the end of the preceding year. The annual contributions from the Foundation to the university will be used to cover a portion of the university's operating expenses. The university's expected inflation rate is 3.5% per year.

The Foundation's goal is to preserve the real value of its investment portfolio and any future contributions while also meeting its spending requirement. Pearce hires Maxine Smith as the investment advisor to the Foundation. Smith's management fees will be 0.40% per year. These fees will be calculated based on the year-end value of the portfolio and paid in arrears on the first day of the following year.

Pearce instructs Smith to prepare an investment policy statement (IPS) for the Foundation. Smith concludes that the Foundation has an above-average risk tolerance.

- A. **Identify** *two* factors that support Smith's conclusion regarding the Foundation's risk tolerance.

(4 minutes)

- B. **Determine** the nominal required rate of return for the Foundation in Year 2.

(3 minutes)

In the first year of the Foundation's operation, the return on the benchmark was 9.8% and the return on the Foundation's portfolio was 9.0%. The Foundation received the planned USD 2 million contribution on 1 January of Year 2.

- C. **Determine** the liquidity requirement (in USD) of the Foundation in Year 2. **Show** your calculations.

(5 minutes)

Three years have passed. During that time, the Foundation operated as planned. However, the social media company Pearce founded went bankrupt. Because Pearce had retained virtually all

his personal assets in shares of the company, he lost all of his wealth. He will not be able to make additional contributions to the Foundation. Smith is preparing a revised IPS to reflect the Foundation's changed circumstances.

ANSWER QUESTION 6-D IN THE TEMPLATE PROVIDED ON PAGE 46.

- D. **Determine** the effect (decrease, no change, increase) of these changed circumstances on the Foundation's return objective and liquidity requirement. **Justify** *each* response with *one* reason.

(6 minutes)

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Template for Question 6-D

IPS component	Determine the effect (decrease, no change, increase) of these changed circumstances on the Foundation's return objective and liquidity requirement. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Return objective	<p>decrease</p> <p>no change</p> <p>increase</p>	
Liquidity requirement	<p>decrease</p> <p>no change</p> <p>increase</p>	

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QUESTION 7 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 14 MINUTES.

Shire Manufacturing and Vermillion Enterprises are specialty steel fabricators based in Europe. Both companies provide defined benefit pension plans for their employees. Beth Hagar, Chief Financial Officer of Shire, is reviewing a consultant's report that compares Shire's and Vermillion's pension plans. Both plans are large relative to each company's total market capitalization, have a high percentage of inactive participants, match the duration of fixed-income investments to the duration of pension liabilities, and are closed to new participants. Exhibit 1 presents selected attributes of the two pension plans.

Exhibit 1
Pension Plan Attributes as of 31 December 2012

Pension Plan Attribute	Shire Manufacturing	Vermillion Enterprises
Average age of workforce	44	39
Average age of plan participants	56	56
Mandatory retirement age	65	65
Plan surplus	EUR 30,000,000	EUR 50,000,000
Market value of plan assets	EUR 200,000,000	EUR 500,000,000
Plan asset allocation	60% equity, 40% fixed income	30% equity, 70% fixed income
Prior year service cost	EUR 14,375,000	EUR 35,000,000

A. **Describe one** attribute of Vermillion's pension plan that contributes to:

- i. *lower* shortfall risk relative to Shire's pension plan.
- ii. *higher* shortfall risk relative to Shire's pension plan.

(4 minutes)

Shire's pension management process has historically followed an asset-only approach. However, the company is considering adopting a liability-relative approach. One of the firm's investment advisors recently presented three structured products to Hagar as potential pension fund investments. Exhibit 2 presents selected data for the three structured products.

Exhibit 2
Structured Products Available to Shire Manufacturing Pension Plan

Structured Product	Expected Annualized Return	Expected Standard Deviation of Returns	Expected Correlation of Returns with Pension Liabilities	Expected Correlation of Returns with Pension Assets
X	7.42%	2.80%	0.92	0.35
Y	8.44%	2.36%	0.22	0.75
Z	8.12%	3.02%	0.51	0.12

- B. **Determine** which structured product Shire should add to its pension plan assets to achieve the *lowest* shortfall risk if it adopts the liability-relative approach. **Justify** your response with *one* reason.

(3 minutes)

One year has passed and Shire's pension plan assets now equal its liabilities. Hagar wants to determine the effect on her capital budgeting decisions of incorporating Shire's pension plan assets and liabilities into a full economic balance sheet of the firm.

Shire's updated standard balance sheet is presented in Exhibit 3 and its full economic balance sheet is presented in Exhibit 4.

Exhibit 3
Shire Manufacturing (excluding pension plan)
Standard Balance Sheet
(EUR values in millions)

	Value (EUR)	Risk (Beta)		Value (EUR)	Risk (Beta)
Operating assets	400	0.71	Debt	196	0.00
			Equity	204	1.40
Total assets	400	0.71	Total liabilities & equity	400	0.71

Exhibit 4
Shire Manufacturing (including pension plan)
Full Economic Balance Sheet
(EUR values in millions)

	Value (EUR)	Risk (Beta)		Value (EUR)	Risk (Beta)
Operating assets	400	0.42	Debt	196	0.00
Pension assets	200	0.60	Pension liabilities	200	0.00
			Equity	204	1.40
Total assets	600	0.48	Total liabilities & equity	600	0.48

- C. **Determine** the *most likely* effect on Shire's future firm value (lower, no effect, higher) of using the full economic balance sheet, rather than the standard balance sheet, when making capital budgeting decisions. **Justify** your response with *one* reason.

(4 minutes)

Hagar decides to decrease the equity allocation in the pension plan from 60% of plan assets to 40%, by shifting 20% of the portfolio from equity into fixed income.

- D. **Explain** the *most likely* effect on Shire's cost of equity capital of making the change in the plan's asset allocation while using the full economic balance sheet.

Note: No calculations are required.

(3 minutes)

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

Klaus Bergen manages a portfolio of government bonds for a reinsurance company. The portfolio funds long-term liabilities that originated from the company's book of reinsurance. The required return for the portfolio and the discount rate for the liabilities are each 2.75%. The duration of the liabilities is currently 9.7, although this figure is revised frequently because of significant and unexpected variations in the amount and timing of claims. Bergen manages the portfolio using a classical immunization strategy, allocating to government bonds across a broad range of maturities. The market value of the portfolio is EUR 400 million, which is equal to the present value of the liabilities. The portfolio's immunized rate of return is 3.80%.

- A. **Determine** whether a cash flow matching strategy would be more effective than Bergen's current strategy. **Justify** your response with *two* reasons.

(5 minutes)

- B. **Determine** the initial safety margin (in EUR) assuming a three-year investment horizon. **Show** your calculations.

Note: Assume semi-annual compounding.

(6 minutes)

Bergen realizes that the spread between the portfolio's immunized rate of return and its required rate of return provides a cushion. He proposes a contingent immunization strategy that utilizes a 20% allocation to corporate bonds. Bergen knows that if he implements this strategy and credit spreads widen while government bond yields remain constant, he may be required to classically immunize the portfolio again.

- C. **Explain** why this widening of credit spreads after the implementation of Bergen's proposed strategy may require him to classically immunize the portfolio again.

(3 minutes)

After further consideration, Bergen decides to maintain the classical immunization strategy. He also decides to perform a scenario analysis that includes one scenario in which the yield curve shifts upward in a parallel move by 75 basis points. During the analysis, Bergen notes that the durations of the assets and liabilities remain matched but the convexity of the assets remains greater than the convexity of the liabilities.

- D. **Explain** the effect of the yield curve shift on the economic surplus.

(3 minutes)

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

Catena Advisors manages a broadly diversified portfolio of global investment-grade and high-yield corporate bonds for its clients. Catena's fixed-income research team consists of a portfolio manager and three credit analysts who review and manage the portfolio. The portfolio manager uses a top-down approach while the credit analysts use a bottom-up methodology.

- A. **Contrast** the approach used by the portfolio manager and the approach used by the credit analysts.

(3 minutes)

Catena's research team is currently considering the following trades:

- Trade 1: Sell a 3-year maturity AAA corporate bond and buy a 30-year maturity AAA bond of the same issuer based on the expectation that credit spreads will tighten uniformly by 10 basis points across the credit curve.
- Trade 2: Sell a new-issue 5-year maturity bond and buy a 5-year maturity bond (originally a 10-year maturity issue) with a slightly higher yield. Both bonds are from the same issuer and have the same issue size and terms.

- B. **Discuss** the *most* significant risk of Trade 1 assuming that the expectation about credit spreads is correct.

(3 minutes)

- C. **Explain** the *primary* disadvantage of Trade 2.

(3 minutes)

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QUESTION 10 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 18 MINUTES.

Lyle Watson is Chief Executive Officer of Capital Cubed, a U.K.-based investment bank that was recently formed by the merger of three investment banks. Each of the original trading teams, now known as Capital 10, Capital 20, and Capital 30, continues to operate independently. All three teams report trading profits and losses in British pounds (GBP). Their trading strategies are as follows:

- Capital 10's strategy is to trade long-only large-capitalization U.S. equities with currency exposures unhedged.
- Capital 20's strategy is to trade long-only European investment-grade bonds with currency exposures hedged.
- Capital 30's strategy is to trade options on U.K. equities.

Each team has its own director of business development. These directors all report to Capital Cubed's head of business development. The head trader on each team is in charge of monitoring the team's risk. Each head trader provides a calculation of value at risk (VAR) and Watson adds them together to calculate Capital Cubed's VAR. Because the teams trade different instruments, the back offices have not been combined and the manager of each back office reports to both his head trader and to Watson. Lastly, to save costs, all three data warehouses have been integrated into a central data warehouse.

ANSWER QUESTION 10-A IN THE TEMPLATE PROVIDED ON PAGE 69.

- A. **Identify** *three* weaknesses in Capital Cubed's enterprise risk management (ERM). **Describe**, for *each* weakness, *one* method to improve Capital Cubed's ERM.

(9 minutes)

The following are excerpts from a recent internal Capital Cubed risk report:

1. The weekly 1% VAR calculation for Capital 10 is GBP 1.2 million, so there is a 1% probability that it will lose at most GBP 1.2 million in a single week.
2. Capital 20 calculates VAR at a probability of 1% rather than 5% to get a more conservative measure of the magnitude of its potential losses.
3. The variance-covariance method of calculating VAR is unreliable for capturing the risk exposure of Capital 30.
4. Capital 30 sends its largest client a weekly VAR estimate using a probability of 5%. Currently this estimate is GBP 0.8 million, so Capital 30 has advised the client to be prepared for losses greater than this amount up to five weeks every three years.

- B. **Identify** *two* excerpts that contain errors. **Justify** *each* response with *one* reason.

(6 minutes)

One year later, market conditions have resulted in greater and more frequent losses than predicted by each team's VAR estimates. Watson instructs each team to add stress testing to its risk management process. He specifies three scenarios for Capital 10:

- Scenario 1: U.S. equity market moves by $\pm 10\%$.
- Scenario 2: Implied volatility of U.S. equities declines by 15%.
- Scenario 3: GBP moves relative to USD by $\pm 15\%$.

- C. **Determine** which *one* of the scenarios would lead to the largest loss in Capital 10's stress test. **Justify** your response with *one* reason.

(3 minutes)

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Template for Question 10-A

Identify <i>three</i> weaknesses in Capital Cubed's enterprise risk management (ERM).	Describe, for <i>each</i> weakness, <i>one</i> method to improve Capital Cubed's ERM.
1.	
2.	
3.	

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QUESTION 11 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

Gunnar Dahl is an analyst at the Scandinavian asset management firm Ibsen Capital. He is asked to evaluate the performance of the firm's flagship fund, Lux, by analyzing its return components. From the fund's prospectus, Dahl reads:

- Lux seeks long-term growth of capital by investing in a diversified portfolio of equities across the Scandinavian region.
- Lux uses a broad Scandinavian equity market index as its benchmark.

Lux's total return was -5.7% during its most recent full year of performance, while the benchmark's total return was -6.5% . The risk-free rate was 2.1% over the same period.

A. **Calculate** the value of *each* of the following components of Lux's total return:

- i. Style return
- ii. Active return

(4 minutes)

Ibsen manages three global energy sector funds that all use the same sector index as their benchmark. Despite using the same benchmark, the managers of the three funds have distinct investment styles that are expected to persist. The following prospective clients have expressed interest in investing in these funds to increase their exposure to the energy sector:

- Client 1: He has a positive view of this sector and wants to invest all of his assets in an energy sector fund.
- Client 2: She holds a well-diversified portfolio and wants to only slightly increase her exposure to the energy sector.

Dahl is asked to identify, based on risk-adjusted performance, which fund would be most appropriate for each of the two clients. Dahl notes that the global energy sector index achieved a 6.7% annualized total return with a 16.0% standard deviation of returns over the six-year measurement period. The average risk-free rate over the measurement period was 1.7% . The performance data for Ibsen's funds are shown in Exhibit 1.

Exhibit 1
Ibsen Capital Global Energy Sector Funds
Performance Data for Six Years (Annualized)

Fund	Active Return	Fund Beta	Standard Deviation of Fund Returns	Sharpe Ratio	Treynor Measure
Orion	3.9%	0.93	17.0%	0.52	9.57
Procyon	4.4%	0.95	19.2%	0.49	9.89
Rigel	5.1%	1.12	18.1%	0.56	9.02

- B. **Determine** which fund in Exhibit 1 is *most* appropriate, on a risk-adjusted basis, for:
- Client 1.
 - Client 2.

Explain, for *each* client, why the choice is *most* appropriate.

(6 minutes)

Ibsen also distributes externally managed funds with different regional focuses. Five years ago, the firm adopted a manager continuation policy (MCP) to evaluate its external managers. The MCP consists of a number of criteria against which Ibsen evaluates its external managers. Several external managers have recently underperformed but have still been retained. Dahl proposes new MCP guidelines for two of the criteria with the objective of reducing the risk of misclassifying zero- or negative-value-added managers as skilled (Type I error). He outlines the existing and proposed guidelines in Exhibit 2.

Exhibit 2
Selected MCP Criteria

Criterion	Existing MCP Guideline	Proposed MCP Guideline
Statistical significance for zero-value-added return outcomes	15%	5%
Exceptions allowed for MCP guideline violations	No	Yes

ANSWER QUESTION 11-C IN THE TEMPLATE PROVIDED ON PAGE 79.

- C. **Determine** the *most likely* effect on the risk of committing a Type I error (decrease, no effect, increase) for *each* criterion if the proposed guideline is implemented. **Justify** *each* response with *one* reason.

Note: Consider *each* criterion independently.

(6 minutes)

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Template for Question 11-C

Note: Consider *each* criterion independently.

Criterion	Determine the <i>most likely</i> effect on the risk of committing a Type I error (decrease, no effect, increase) for <i>each</i> criterion if the proposed guideline is implemented. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Statistical significance for zero-value-added return outcomes	<div>decrease</div> <div>no effect</div> <div>increase</div>	
Exceptions allowed for MCP guideline violations	<div>decrease</div> <div>no effect</div> <div>increase</div>	

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The Morning Session of the 2014 Level III CFA[®] Examination has 11 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Question	Topic	Minutes
1	Portfolio Management – Individual	20
2	Portfolio Management – Individual	19
3	Portfolio Management – Equity	17
4	Portfolio Management – Economics	15
5	Portfolio Management – Institutional	16
6	Portfolio Management – Institutional	16
7	Portfolio Management – Fixed Income	11
8	Portfolio Management – Asset Allocation	15
9	Portfolio Management – Risk Management	15
10	Portfolio Management – Trading, Monitoring, and Rebalancing	19
11	Portfolio Management – Individual/Behavioral	17
Total:		180

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QUESTION 1 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 20 MINUTES.

Andres Scolari is a private wealth advisor who works at a large asset management firm in a country where the USD is the local currency. Scolari is preparing an IPS for Louis and Marie Crusoe, ages 53 and 51.

The Crusoes are married and have both worked for the same company their entire careers. They would like to retire in four years and spend time traveling. The Crusoes have one daughter who is preparing to attend university.

Scolari reviews the Crusoes' assets. Their taxable investment portfolio totals USD 1,400,000 and is currently allocated 22% to equities and 78% to fixed income. The Crusoes have accumulated an asset base that they think will be large enough to meet their retirement needs. Neither Louis nor Marie is eligible for a defined benefit pension.

The Crusoes earn a combined after-tax salary of USD 135,000 per year and do not expect any changes in their employment income during the next four years. Their annual savings are USD 35,000, which are transferred directly into their investment portfolio and immediately invested in the existing asset allocation. Their only debt is a home mortgage of USD 25,000, which they plan to pay off in the next few weeks. The Crusoes also plan to establish a USD 60,000 fund in the next few weeks to cover the university tuition for their daughter.

In preparing the IPS, Scolari concludes that the Crusoes have a below-average risk tolerance.

- A. **Justify**, with *two* reasons, Scolari's conclusion that the Crusoes have a below-average risk tolerance.

(4 minutes)

- B. **Determine** the Crusoes' liquidity requirement (in USD) from their portfolio for the coming year. **Show** your calculations.

(3 minutes)

A few weeks later, after the planned cash outflows, the current value of the Crusoes' investment portfolio is USD 1,330,000. Scolari has determined that when the couple retires four years from today, a portfolio valued at USD 2,200,000 could sustain them through their retirement years.

Given their risk tolerance, Scolari expects the Crusoes to earn an after-tax return of 4.5% per year on their current portfolio and any additions to the portfolio prior to retirement. The Crusoes believe they can continue to save an after-tax total of USD 35,000 per year during the next four years.

- C. **Demonstrate**, given the current assumptions, that the Crusoes will *not* be able to retire in four years in accordance with their existing plan. **Show** your calculations.

Note: For the purpose of this calculation, annual savings should be considered an end-of-year cash flow.

(5 minutes)

The Crusoes realize that to retire in four years, they could choose to increase their annual savings or earn additional income. Scolari states that another option would be to sell their house or borrow against their home equity.

- D. **Identify** *two* other options available to the Crusoes that could allow them to retire in four years.

Note: No calculations are required.

(4 minutes)

Over the following year, the Crusoes' USD 1,330,000 investment portfolio earned a 6% before-tax return. This return included interest of USD 40,698, dividends of USD 10,374, and realized capital gains of USD 21,546. The tax rate on dividends and realized capital gains is 15%, and the tax rate on interest earned is 25%.

- E. **Calculate** the investment portfolio's percentage return after taxes. **Show** your calculations.

(4 minutes)

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QUESTION 2 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 19 MINUTES.

Nicole Greene has just retired from her position as Chief Financial Officer of Panther Corporation, a large publicly traded company. During her career, she accumulated a large number of Panther shares through share-based grant compensation. Greene's one million shares are currently valued at USD 20 million and represent the majority of her wealth. Panther shares do not pay a dividend.

As a top executive at Panther, Greene was restricted from liquidating or hedging her equity holdings in the company. Now that she is retired, she wants to achieve the following immediate objectives with regard to her Panther shares:

- reduce the risk associated with her wealth concentration;
- defer capital gains taxes;
- retain upside return potential.

Greene is meeting with her financial advisor, Rob Reynaldo, for advice on how to accomplish these objectives. Reynaldo first notes that Greene's Panther shares have a very low cost basis. The jurisdiction in which Greene resides levies capital gains taxes only on the sale or disposal of a security. Therefore, any outright sales of shares would result in significant long-term capital gains which would be taxed at 30%.

The first strategy that Reynaldo suggests to Greene is to buy put options on her Panther shares. He identifies put options on Panther shares that have a strike price of USD 20.00, one year to expiration, and an option price of USD 1.95 per Panther share.

- A. **Explain** how *each* of Greene's three objectives is achieved by Reynaldo's suggested put option strategy.

(6 minutes)

Greene calculates that the put option strategy Reynaldo suggests would cost USD 1.95 million. She asks Reynaldo whether there are any alternatives to reduce the cost of hedging by using different put options on Panther shares. Reynaldo suggests using put options that expire sooner, but Greene rejects this alternative because she does not want to have to roll over her position more frequently.

- B. **Identify** *two* other strategies, using *only* Panther put options, to reduce Greene's cost of hedging. **Discuss** *one* disadvantage of *each* alternative.

(6 minutes)

Greene tells Reynaldo that a former colleague used a cashless collar strategy after his retirement. Reynaldo determines that the pairs of options shown in Exhibit 1 are available, all with the same expiration dates. Panther's share price is currently USD 20.00.

Exhibit 1
Strike Prices of Available Panther Options (in USD)

Option Pair	Put	Call
F	17.50	23.50
G	22.50	22.50
H	23.50	17.50

- C. **Identify** which option pair is *most likely* to create a cashless collar position for Greene. **Justify** your response.

Note: No calculations are required.

(3 minutes)

Greene would also like to explore ways to generate liquidity from her Panther holdings without an outright sale of shares. Reynaldo suggests that she could generate liquidity by using a forward conversion with options.

- D. **Formulate** a forward conversion with options strategy for Greene. **Describe** how this will allow her to generate liquidity from her position in Panther shares.

Note: No calculations are required.

(4 minutes)

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QUESTION 3 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 17 MINUTES.

Rachel Wang works for a global fund manager. She is assessing the investment style of the firm's largest equity fund, Fund A.

Fund A is described as a U.S. actively managed value fund. It has remained fully invested and currently holds 50 U.S. stocks with a weighted-average market capitalization of USD 20 billion. The fund hired a new manager three years ago, and Wang is evaluating the manager's investment style using a returns-based analysis.

Wang uses six indices in her regression analysis, which is based on monthly observations from the past 36 months. The regression output indicates that Fund A's selection is 0.28. Detailed results of her analysis are shown in Exhibit 1.

Exhibit 1
Returns-Based Style Analysis for Fund A

Index	Style Weights
U.S. large-cap growth	19%
U.S. large-cap value	23%
U.S. mid-cap growth	18%
U.S. mid-cap value	8%
U.S. small-cap growth	18%
U.S. small-cap value	14%

- A. **Justify**, with *two* reasons, why Wang's choice of indices is appropriate for a returns-based style analysis.

(4 minutes)

- B. **Determine**, using the results of the returns-based style analysis, whether the description of Fund A's investment style is accurate. **Justify** your response with *one* reason.

(3 minutes)

Wang reviews the performance of one of the firm's market-neutral funds, Fund B. She compares Fund B's returns to benchmark returns. Fund B follows a pairs trading strategy using equities of U.S. energy companies in the S&P 500 Index. The market beta for the broad U.S. energy index is 1.05. The current risk-free rate is 2% and the expected market risk premium is 6%.

- C. **Determine** the appropriate benchmark for Fund B. **Justify** your response with *one* reason.

(3 minutes)

Wang now focuses her attention on the performance record of Sarah Brown, who manages two funds for the firm: Fund C and Fund D. Fund C follows a long-short strategy and Fund D is a long-only fund. Both funds are limited to U.S. industrial stocks.

Wang collects historical data on the two funds' alphas as shown in Exhibit 2.

Exhibit 2
Historical Alphas

	2011	2012	2013
Fund C			
Alpha (long-side)	0.3%	0.5%	0.4%
Alpha (short-side)	2.2%	2.8%	2.5%
Fund D			
Alpha	0.2%	0.3%	0.2%

Wang notices that Brown has consistently delivered positive alphas in both Fund C and Fund D during the past three years. However, the short-side alphas were significantly greater than the long-side alphas. This performance difference confirms Wang's view that more price inefficiencies can be found on the short side of the market than on the long side.

Wang also notes that Fund D's alphas are lower than Fund C's long-side alphas, even though both funds are managed by the same person and are invested in similar long portfolios of U.S. industrial stocks.

D. **Support**, with *two* reasons, Wang's view regarding price inefficiencies.

(4 minutes)

E. **Explain** the *most likely* reason that Fund D's alphas were lower than Fund C's long-side alphas.

(3 minutes)

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QUESTION 4 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 15 MINUTES.

Étienne Leroy is a global investment strategist for a French investment advisory firm. He is currently reviewing the asset allocation of the firm's largest global fund. Leroy estimates the expected returns for three asset classes: North American equities, Eurozone fixed income, and Asia-Pacific real estate. He uses the Singer-Terhaar approach to the international capital asset pricing model for his analysis. Leroy gathers data for each asset class as shown in Exhibit 1.

Exhibit 1
Capital Market Expectations

Asset Class	Standard Deviation (annualized)	Correlation with the Global Investable Market (GIM)	Degree of Integration with the GIM
North American equities	18%	0.83	0.80
Eurozone fixed income	7%	0.69	0.70
Asia-Pacific real estate	13%	0.47	0.60

Leroy makes the following assumptions in his analysis:

- The expected return for the GIM is 6.0%.
- The expected standard deviation for the GIM is 12.5%.
- The risk-free interest rate is 2.0%.
- The Asia-Pacific real estate asset class has an illiquidity premium of 0.4%.

A. **Calculate** the expected return for the Asia-Pacific real estate asset class, using the Singer-Terhaar approach. **Show** your calculations.

(5 minutes)

Leroy researches the current monetary policy environment in a developed country where the fund invests. This country's central bank has been pursuing a low interest rate policy in an effort to accelerate economic growth following the global financial crisis. A report issued by the firm's research department indicates that the central bank's interest rate policy closely follows the Taylor rule.

The central bank recently updated its GDP growth rate and inflation rate forecasts, as shown in Exhibit 2. As a result, Leroy believes that the central bank is likely to change its target short-term interest rate. The central bank has stated publicly that it expects no changes in the GDP trend growth rate, target inflation rate, or neutral short-term interest rate.

Exhibit 2
Selected Macroeconomic Data

Economic Measure	Trend	Target	Previous Forecast	Updated Forecast
GDP growth rate	3.5%	---	1.4%	1.3%
Inflation rate	---	2.0%	0.8%	0.7%

- B. **Calculate** the expected change (direction and amount) in the central bank's target short-term interest rate based on the Taylor rule. **Show** your calculations.

(4 minutes)

Leroy then researches the fund's investment in Workia sovereign debt. Workia is an emerging market country and a major producer of iron ore. Due to higher growth in other areas of the economy, the contribution of iron ore production to Workia's GDP declined from 20% to 18% in the past year. Leroy reviews the information shown in Exhibit 3 and calculates appropriate ratios to develop further insights into Workia. The local currency is the Workia dollar (WOD).

Exhibit 3
Selected Macroeconomic Data for Workia
(in WOD billions)

Economic Measure	Previous Year	Current Year
GDP (nominal)	90.0	95.4
External debt	37.2	48.0
Foreign exchange reserves	12.0	12.9
Short-term debt	8.0	8.6

- C. **Discuss** *one* factor whose change during the current year:
- weakens Workia's ability to service its debt.
 - strengthens Workia's ability to service its debt.

(6 minutes)

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QUESTION 5 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

Kevin Jardine is Chief Financial Officer of GHPL, a pharmaceutical firm that develops insulin delivery devices for use in treating diabetes. GHPL operates a defined benefit (DB) pension plan that is open to new participants. The DB plan is entirely funded by contributions from GHPL.

The firm's risk committee asks Jardine to assess how GHPL's DB plan compares to the plans of two competitors, MWOL and QYDL. He summarizes selected financial data in Exhibit 1 and plan characteristics in Exhibit 2 for each of the three firms.

Exhibit 1
Selected Financial Data
(amounts in USD millions, except ratios)

	GHPL	MWOL	QYDL
For the Year Ended 31 December 2013			
Sales	500	300	800
Net income	135	90	120
As of 31 December 2013			
Projected benefit obligation	520	409	201
Debt-to-equity ratio	1.3	1.1	1.4

Exhibit 2
DB Plan Characteristics

	GHPL	MWOL	QYDL
Provision allowing lump-sum distributions	Yes	No	No
Provision allowing early retirement	No	No	Yes
Proportion of active lives	62%	57%	69%
Plan funded status	Surplus	Deficit	Surplus

ANSWER QUESTION 5-A IN THE TEMPLATE PROVIDED ON PAGE 35.

A. **Determine**, for *each* category below, which company's pension plan *most likely* has the lowest risk tolerance:

- i. Sponsor financial status/profitability
- ii. Workforce characteristics

Justify *each* response with *one* reason.

Note: Consider *each* category independently.

(6 minutes)

The growth rates of GHPL's revenue and number of employees are expected to exceed the sector's annual growth rate over the next several years. As a result, Jardine concludes that GHPL's proportion of active lives will increase over the next two years. He also reviews the details of GHPL's DB plan and notes that the provision allowing lump-sum distributions will expire in 18 months.

ANSWER QUESTION 5-B IN THE TEMPLATE PROVIDED ON PAGE 36.

B. **Determine**, for *each* factor below, whether the DB plan's liquidity requirement in two years will be lower, the same, or higher relative to its liquidity requirement today, holding all else constant:

- i. Change in proportion of active lives
- ii. Change in provision allowing lump-sum distributions

Justify *each* response with *one* reason.

Note: Consider *each* factor independently.

(6 minutes)

One year later, GHPL's DB plan is in deficit. GHPL's management wants to eliminate the plan's current funding shortfall without having to make additional contributions to the plan. Jardine considers two alternative investment approaches for GHPL: a liability mimicking investment approach and an asset-only investment approach.

C. **Discuss** whether *each* of the following investment approaches could achieve GHPL's objective:

- i. Liability mimicking
- ii. Asset-only

(4 minutes)

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Template for Question 5-A

Note: Consider *each* category independently.

Category	Determine, for <i>each</i> category, which company's pension plan <i>most likely</i> has the lowest risk tolerance. (circle <i>one</i>)	Justify <i>each</i> response with <i>one</i> reason.
i. Sponsor financial status/profitability	GHPL MWOL QYDL	
ii. Workforce characteristics	GHPL MWOL QYDL	

Answer Question 5 on This Page

Template for Question 5-B

Note: Consider *each* factor independently.

Factor	Determine, for <i>each</i> factor, whether the DB plan's liquidity requirement in two years will be lower, the same, or higher relative to its liquidity requirement today, holding all else constant. (circle <i>one</i>)	Justify <i>each</i> response with <i>one</i> reason.
i. Change in proportion of active lives	<p>lower</p> <p>the same</p> <p>higher</p>	
ii. Change in provision allowing lump-sum distributions	<p>lower</p> <p>the same</p> <p>higher</p>	

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QUESTION 6 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

The Munoz Symphony is a non-profit organization. Munoz has an endowment, currently valued at USD 20 million, that supports its operating budget. The primary objective of the endowment is to maintain the long-term purchasing power of its portfolio while also meeting its spending requirement.

The endowment's spending rule requires the endowment to distribute 2.0% of its beginning portfolio value to Munoz each year. Munoz currently receives enough funds from the endowment to meet its spending needs, and in recent years Munoz has had a budget surplus. On average, Munoz's operating expenses grow 1.5 percentage points faster than the general inflation rate. Other than a 0.5% management fee, the cash flows for the endowment in recent years have been entirely composed of investment income inflows and distribution outflows. However, Munoz's board is confident that it could raise funds through donor contributions, if necessary.

Investment returns for the endowment are volatile, but during the past three years, market conditions produced investment returns that exceeded the return objective. Despite this recent outperformance, Munoz's board is concerned about the level of fluctuation in year-to-year distributions from the endowment.

A small number of directors recently demanded a more aggressive investment strategy that could allow the Munoz endowment to match the returns of other endowments they oversee. However, Munoz's board voted to maintain the current strategy.

Elmar Asset Management, the Munoz endowment's investment manager, prepared an abbreviated IPS for the endowment as summarized in Exhibit 1. Elmar derives the 5.0% annual required return for the Munoz endowment by combining the 2.0% annual spending rule with the 3.0% expected general inflation rate.

Exhibit 1
Abbreviated IPS for Munoz Endowment

Required return	5.0% nominal annual return
Risk tolerance	Above-average
Liquidity requirement	Annual distribution of 2.0% of the endowment's beginning-of-year market value
Time horizon	Long-term
Taxes	Tax-exempt
Legal and regulatory	"Ordinary care and prudence" standard
Unique circumstances	Preference for socially responsible investments

- A. **Support**, with *three* reasons, Elmar's conclusion that the Munoz endowment has an above-average risk tolerance.

(6 minutes)

B. **Describe** *two* deficiencies in Elmar's calculation of the required return for the IPS.

(4 minutes)

Elmar also manages a portfolio valued at USD 20 million for Logano Transport Insurance, a casualty insurance company. The amount and timing of loss claims by Logano's clients are uncertain from year to year. Logano calculates a new return requirement on its investment portfolio each year that encompasses current claim activity, pricing trends, and surplus level. The current real return requirement of 5.0% is approximately equal to expected net cash outflows from the portfolio. Logano's average duration of claim liabilities through final payment of a claim is 4 years. Elmar is developing an IPS for Logano.

ANSWER QUESTION 6-C IN THE TEMPLATE PROVIDED ON PAGE 45.

C. **Determine** whether *each* of the following components of Logano's IPS is lower than, the same as, or higher than that of the Munoz endowment:

- i. Risk tolerance
- ii. Liquidity requirement

Justify *each* response with *one* reason.

(6 minutes)

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Template for Question 6-C

IPS component	Determine whether <i>each</i> component of Logano's IPS is lower than, the same as, or higher than that of the Munoz endowment. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. Risk tolerance	<div>lower</div> <div>the same</div> <div>higher</div>	
ii. Liquidity requirement	<div>lower</div> <div>the same</div> <div>higher</div>	

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QUESTION 7 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 11 MINUTES.

Jay Gupta is a fixed income portfolio manager based in the UK whose firm reports in GBP. His portfolio consists entirely of UK government bonds. Gupta wants to improve the portfolio's risk–return profile by investing in emerging market bonds. He intends to invest in the local-currency government bonds of Alphastan, an emerging market country whose currency is the Alphastan currency unit (ACU).

Gupta summarizes relevant current market information in Exhibit 1.

Exhibit 1
Bond Portfolio and Market Data

Average yield of Gupta's existing UK bond portfolio	3.00%
Average yield of targeted Alphastan government bonds	6.20%
Duration of Gupta's existing UK bond portfolio	5.0
Duration of targeted Alphastan government bonds (local market)	5.0
6-month risk-free interest rate in UK (annualized)	2.5%
6-month risk-free interest rate in Alphastan (annualized)	5.0%
Alphastan country beta relative to UK	0.35

The economist at Gupta's firm forecasts that the spread between the yields of the targeted Alphastan government bonds and the existing UK government bonds in Gupta's portfolio will widen by 90–100 basis points during the next year.

- A. **Calculate** the minimum spread widening (in basis points) during the next year that would eliminate Alphastan's yield advantage. **Explain**, based *only* on breakeven spread analysis, whether Gupta should invest in the targeted Alphastan government bonds.

Note: Ignore the effect of currency movements.

(4 minutes)

After additional research, Gupta decides to allocate 7% of his overall portfolio to the targeted Alphastan government bonds. He wants to maintain his overall portfolio's sensitivity to UK interest rates following this new allocation.

- B. **Calculate** the new UK (domestic) bond portfolio duration required to keep the overall portfolio's sensitivity to UK interest rates unchanged. **Show** your calculations.

(4 minutes)

After implementing the 7% allocation to the Alphastan government bonds, Gupta is evaluating whether to use a forward contract to hedge their currency risk. His firm's economist forecasts

that the ACU will depreciate relative to the GBP by 1.0% over the next six months. Gupta assumes that the current forward exchange rate reflects interest rate parity.

- C. **Determine** whether Gupta should hedge the currency risk in Alphastan government bonds over the next six months, assuming the economist's currency forecast is correct. **Justify** your response.

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QUESTION 8 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 15 MINUTES.

Samar Merabet is the investment advisor for the SimplyTech defined benefit pension plan, which is based in a developed country. The current asset allocation of the plan is 65% domestic equities and 35% domestic fixed income. The plan uses an asset-only investment approach and is overseen by a risk-averse board. The numerical risk aversion level for the board is estimated to be equal to 6 on a scale of 1 to 8, where 8 represents the highest degree of risk aversion.

Merabet advises the board that the risk–return profile of the portfolio could be improved by adding non-domestic equities and bonds. Some members of the board believe that portfolio selection should focus on maximizing expected utility, but others think that shortfall risk is more important. The board uses Roy’s safety-first criterion as a measure of shortfall risk and has specified a minimum return threshold of 5.0%. The risk-free rate is 2.0%.

In presenting her case for diversification to the board, Merabet provides the expected returns and standard deviations of the two global portfolios shown in Exhibit 1.

Exhibit 1
Portfolio Risk–Return Profiles

Portfolio	Expected Return	Standard Deviation
Jade	6.5%	10.0%
Ruby	7.5%	13.5%

- A. **Determine** which portfolio the board should select based *only* on expected utility. **Justify** your response.

(4 minutes)

- B. **Determine** which portfolio the board should select based *only* on Roy’s safety-first criterion. **Justify** your response.

(4 minutes)

Merabet is advising another client, the EduFund Endowment, on adding non-domestic assets to its portfolio. The EduFund Endowment is based in the same country as the SimplyTech pension plan. The asset allocation of the endowment is 60% domestic equities and 40% domestic fixed income. The current portfolio has an expected return of 6.25% with a standard deviation of 9.5%.

Merabet is evaluating two new asset classes that might provide a mean–variance improvement for the endowment. She provides the endowment trustees with the data shown in Exhibit 2.

Exhibit 2
Asset Class Expectations

Asset Class	Expected Return	Standard Deviation	Correlation with Current Portfolio
Non-domestic developed market equity	8.0%	14.0%	0.70
Emerging market equity	9.0%	18.0%	0.50

The correlations provided in Exhibit 2 reflect normal market conditions. Merabet believes that the use of conditional return correlations is valuable in stress testing.

- C. **Determine** if adding non-domestic developed market equity would provide a mean–variance improvement for the current endowment portfolio. **Justify** your response.

(4 minutes)

- D. **Support**, with *one* reason, Merabet’s belief about the use of conditional return correlations.

(3 minutes)

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QUESTION 9 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 15 MINUTES.

Russell Hood is a portfolio manager at Bullseye Asset Management. He oversees two funds: a balanced fund and a tactical equity fund. The balanced fund has a current market value of USD 700 million and a current allocation of 65% equity (equity beta of 1.12) and 35% fixed income (modified duration of 6.55).

Hood believes that reported earnings in the upcoming quarter will be better than anticipated by the market. Based on this short-term market view, he decides to use futures contracts to adjust the allocation of the balanced fund to 80% equity and 20% fixed income for the next three months. Hood wants to maintain the balanced fund's current equity beta and modified duration.

Hood plans to use the Aries equity index futures contract and the Taurus bond futures contract to execute his transaction. He gathers the data shown in Exhibit 1 for the two contracts. Both contracts expire three months from today. The risk-free rate is 1.85%.

Exhibit 1
Selected Futures Contract Data

Contract	Price (in USD)	Futures Beta	Implied Modified Duration	Underlying Index
Aries	94,505	0.97	---	Broad equity
Taurus	99,100	---	7.15	Broad fixed income
Note: Contract prices include multipliers. Yield beta for the Taurus contract is 1.00.				

- A. **Determine**, to achieve Hood's adjusted allocation, the number of:
- i. Taurus contracts he should sell.
 - ii. Aries contracts he should buy.

Show your calculations.

(8 minutes)

Three months later, the futures contracts have expired and the balanced fund's allocation has returned to 65% equity and 35% fixed income. Hood believes that bond yields will begin an upward trend and wants to adjust the duration of the balanced fund's fixed income portfolio for the next two years. Bullseye's head trader informs Hood that he can implement this duration adjustment using a pay-fixed, receive-floating interest rate swap.

Hood considers the selected swap contracts shown in Exhibit 2. He knows that he can obtain the required interest rate exposure using any one of these contracts, but his objective is to minimize the notional principal of the swap.

Exhibit 2
Selected Pay-Fixed, Receive-Floating Swap Contracts

Counterparty	Maturity	Payment Frequency
Orion	3 years	Quarterly
Ursa	3 years	Semiannual
Canis	5 years	Quarterly
Lupus	5 years	Semiannual

- B. **Determine** which counterparty's swap contract will *best* achieve Hood's objective. **Justify** your response.

(3 minutes)

Hood's tactical equity fund has a current allocation of 50% small-cap equity and 50% mid-cap equity. He wants to change the fund's allocation to 70% small-cap equity and 30% mid-cap equity for the next three months. To implement this change, Hood executes a futures overlay strategy of buying small-cap and selling mid-cap equity index futures contracts that expire in three months. The underlying for each contract is a broad small-cap equity total return index and a broad mid-cap equity total return index, respectively.

At the end of the three-month period, Hood calculates that his fund's return, including the futures overlay strategy, was different than it would have been had he used a cash-market strategy of buying and selling equity securities. Bullseye's head trader demonstrates that the difference in return between the strategies was not a result of transaction costs, rounding of fractional futures contracts, or inefficient execution prices.

- C. **Explain**, with *two* reasons, why the return of Hood's futures overlay strategy was not the same as that of the cash-market strategy.

(4 minutes)

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QUESTION 10 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 19 MINUTES.

Nadine Raffo is Chief Investment Officer at Titanium Re, a reinsurance company that reports in GBP. The company uses the calendar rebalancing method on a semiannual basis for its investment portfolio. The most recent rebalancing occurred at the beginning of January based on the weights as of 31 December. Raffo is considering changing the rebalancing method to percentage-of-portfolio rebalancing with corridor widths as shown in Exhibit 1.

Exhibit 1
Titanium Re Investment Portfolio Asset Allocation

Asset Class	Strategic Asset Allocation: Target Weight	Strategic Asset Allocation: Corridor Width	Strategic Asset Allocation: Target Weight Range	Closing 30 June Allocation
Fixed income	73%	$\pm 4\%$	69%–77%	71%
Cash	21%	$\pm 2\%$	19%–23%	24%
Large-cap equity	6%	$\pm 1\%$	5%–7%	5%

A. **Determine** Titanium Re’s fixed income allocation on 1 July under *each* of the following rebalancing methods:

- i. Calendar rebalancing
- ii. Percentage-of-portfolio rebalancing

(4 minutes)

Titanium Re decides to adopt the percentage-of-portfolio rebalancing method using the corridor widths in Exhibit 1. Two months later, Raffo receives a request from the company’s Board of Directors to adjust the fixed income corridor width based on expected changes in market conditions as detailed below:

- Transaction costs for fixed income are expected to decrease.
- The volatility of fixed income is expected to increase.
- The correlations of fixed income with other asset classes are expected to increase.

Raffo reviews the expectations and replies with the following statement:

“Based on these expected changes in market conditions, a definitive conclusion cannot be reached as to whether the fixed income corridor should be narrowed or should be widened.”

B. **Explain** why Raffo’s statement is correct.

(4 minutes)

Raffo reviews the holdings of Titanium Re's large-cap equity portfolio and asks her trader, Gareth Reynolds, to sell the four securities in Exhibit 2.

Exhibit 2
Trade Orders and Market Data

Security	Order Size (shares)	Average Daily Volume (shares)	Bid-Ask Spread	Share Price (in GBP)	Urgency to Complete Trade
UWOE	15,000	812,000	Wide	15.50	Low
STPR	48,000	972,000	Narrow	12.50	Low
TORN	3,000	77,000	Narrow	9.80	High
ZEHP	19,000	59,000	Narrow	7.50	High

ANSWER QUESTION 10-C IN THE TEMPLATE PROVIDED ON PAGE 73.

C. **Determine** the security for which *each* of the following trade execution tactics is *most* appropriate:

- i. Volume-weighted average price (VWAP) algorithm
- ii. Implementation shortfall algorithm

Justify *each* response with *three* features of the selected trade.

Note: Consider *each* trade execution tactic independently.

(8 minutes)

Raffo is analyzing several equities to add to the portfolio. She finds a cement company, CTAC, that she believes is trading at an attractive valuation. In establishing the CTAC position, the sequence of events is as follows:

- On Monday, CTAC shares close at GBP 12.24.
- On Tuesday afternoon, Raffo directs Reynolds to buy 15,000 shares of CTAC. The decision price is GBP 12.45. He purchases 6,000 shares at GBP 12.51. Trading fees total an additional GBP 0.01 per share purchased. CTAC's closing price on Tuesday is GBP 12.50.
- On Wednesday, Reynolds decides to cancel the buy order for the remaining 9,000 shares and records a cancellation price of GBP 12.90.

D. **Calculate** the component of the implementation shortfall (in basis points) that is attributable to realized profit/loss. **Show** your calculations.

(3 minutes)

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TEMPLATE FOR QUESTION 10-C IS ON PAGE 73

Answer Question 10 on This Page

Template for Question 10-C

Note: Consider *each* trade execution tactic independently.

Trade execution tactic	Determine the security for which <i>each</i> trade execution tactic is <i>most</i> appropriate. (circle <i>one</i>)	Justify <i>each</i> response with <i>three</i> features of the selected trade.
i. Volume-weighted average price (VWAP) algorithm	<div>UWOE</div> <div>STPR</div> <div>TORN</div> <div>ZEHP</div>	1.
		2.
		3.
ii. Implementation shortfall algorithm	<div>UWOE</div> <div>STPR</div> <div>TORN</div> <div>ZEHP</div>	1.
		2.
		3.

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QUESTION 11 HAS TWO PARTS (A, B) FOR A TOTAL OF 17 MINUTES.

Charlotte Taylor is an investment advisor in the U.S. She is meeting with two clients: Paul Lam and Thomas Ashland.

Lam is a 35-year-old attorney. He recently purchased a home, where he and his wife live with their young child. The home has a mortgage of USD 300,000. Lam has been saving for several years but is behind schedule to ultimately fund his retirement. Through his experience representing corporations in legal matters, he often invests in companies that remind him of his most successful clients because “they know what works.” The rest of his investment ideas come from advertisements by industry trade groups and blogs sponsored by the companies he is researching. He has repeatedly declined Taylor’s suggestion to consider additional independent sources of information. To justify this, he claims to have avoided stocks that were part of “obvious bubbles” in recent years. Based on previous conversations, Taylor notes that Lam had never considered investing in such stocks.

Ashland is a retired software engineer. He is 60 years old, married, and has two adult children. Ashland lives in the same inexpensive home he bought 30 years ago, and has fully paid off the mortgage. He and his wife take only one vacation each year, to visit their grandchildren. Ashland’s investment portfolio, valued at USD 8,000,000, is 30% invested in the shares of the small company his father founded. He won’t consider diversifying any of this risk, stating, “it’s a source of family pride and worth every penny.” Taylor is concerned that Ashland rarely trades after making an initial investment, but when she suggests periodic reallocation, Ashland responds, “my portfolio will do best if I leave it alone.” He has also told Taylor that he would be upset to sell an investment, only to then see it appreciate further in value.

ANSWER QUESTION 11-A IN THE TEMPLATE PROVIDED ON PAGE 77.

- A. **Identify** *two* of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by:
- i. Lam.
 - ii. Ashland.

Justify *each* identified bias with *one* example from the information provided.

(12 minutes)

Taylor has prepared materials to educate her clients on the implications of behavioral biases so that she may help them moderate the impact of their biases on investment performance. She believes this to be a more appropriate approach for some of her clients, rather than trying to adapt their portfolios to their biases.

- B. **Determine** whether Taylor’s educational approach is *more* appropriate for Lam or Ashland. **Justify** your response with *one* reason related to the client’s behavior, and *one* reason related to the client’s financial circumstances.

(5 minutes)

Answer Question 11 on This Page

Template for Question 11-A

i. Identify <i>two</i> of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by Lam.	Justify <i>each</i> identified bias with <i>one</i> example from the information provided.
1.	
2.	
ii. Identify <i>two</i> of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by Ashland.	Justify <i>each</i> identified bias with <i>one</i> example from the information provided.
1.	
2.	

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LEVEL III

Question: 1
Topic: Portfolio Management – Individual
Minutes: 26

Questions 1 and 2 relate to Patricia and Alexander Tracy. A total of 35 minutes is allocated to these questions. Candidates should answer these questions in the order presented.

QUESTION 1 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 26 MINUTES.

Patricia and Alexander Tracy, both age 59, are residents of Canada. They have twin sons who will enter a four-year university program in one year. Patricia is a long-time employee of a telecommunications company. Alexander is a self-employed sales consultant.

Alexander's annual income is now steady after years of extreme highs and lows. The Tracys have built an investment portfolio through saving in Alexander's high income years. The Tracys' current annual income is equal to their total expenses; as a result, they cannot add to savings currently. They expect that both their expenses and income will grow at the inflation rate. All medical costs, now and in the future, are fully covered through government programs.

The Tracys worry about whether they have saved enough for retirement, and whether they will be able to maintain the real value of their portfolio. Inflation is expected to average 4% for the foreseeable future.

The Tracys have approached Darren Briscoe to help them analyze their investment strategy and retirement choices. The Tracys disagree about the appropriate investment strategy. Patricia prefers not losing money over making a high return. This is partly a result of continuing regret for a loss experienced in an equity mutual fund several years ago. Alexander's history of making frequent changes in their portfolio greatly annoyed Patricia. She thinks Alexander focused only on potential return and paid little attention to risk.

The Tracys currently have all their assets in inflation-indexed, short-term bonds that are expected to continue to earn a return that would match the inflation rate after taxes. After retirement, they are willing to consider changing their investment strategy if necessary to maintain their lifestyle.

The Tracys are eligible to retire next year at age 60. If they do, Patricia will receive annual payments from her company's defined-benefit pension plan and both Patricia and Alexander will receive payments from the Canadian government pension plan. Alexander does not participate in any company or individual retirement plan. Briscoe has compiled financial data and market expectations for the Tracys' retirement, shown in Exhibit 1. Currently, Briscoe estimates that the Tracys' investment portfolio will grow to 1,100,000 Canadian dollars (CAD) by their retirement date next year.

LEVEL III

Question: 1
Topic: Portfolio Management – Individual
Minutes: 26

Exhibit 1
Financial Data and Market Expectations
Patricia and Alexander Tracy

	Retirement at Age 60 (2010)
Expected annual expenses	CAD 125,000
Annual pension income (after-tax)	
Patricia's company plan	CAD 40,000
Combined government pension	CAD 40,000
Total annual pension income	CAD 80,000
Expected annual inflation	4.0%
Expected annual after-tax portfolio return	4.0%

Pension income from both Patricia's company plan and the government pension plan is fully indexed for inflation. Briscoe expects a tax rate of 20% to apply to the Tracys' withdrawals from the investment account. The Tracys expect to earn no employment income after retirement. The Tracys' residence is not considered part of their investable assets.

The Tracys have the option to delay retirement until age 65. The Tracys intend to retire together, whether it is in 2010 at age 60 or in 2015 at age 65.

Briscoe determines that if the Tracys retire at age 60, their risk tolerance is below average. If they retire at age 60, they plan to pay off their mortgage and associated taxes by withdrawing CAD 100,000 from their portfolio upon retirement.

Another consideration for the Tracys relates to funding university expenses for their sons. If the Tracys retire at age 60, each son will receive a scholarship available to retiree families from Patricia's company that will cover all university costs.

If the Tracys retire at age 65, all pension income would increase and would almost meet their annual spending needs. If they retire at age 65, the Tracys would pay all university expenses from their investment portfolio through an arrangement with the university. The arrangement, covering both sons, would require the Tracys to make a single payment of CAD 200,000 at age 60.

LEVEL III

Question: 1
Topic: Portfolio Management – Individual
Minutes: 26

- A. i. **Prepare** the return objectives portion of the Tracys' investment policy statement (IPS) that will apply if they retire at age 60.
- ii. **Calculate** the pre-tax nominal rate of return that is required for the Tracys' first year of retirement if they retire at age 60. **Show** your calculations.

(12 minutes)

- B. **Indicate** specific factors for the Tracys, for *each* of the following, which support Briscoe's conclusion that the Tracys' risk tolerance is below average:

- i. Ability to take risk. **Indicate** *two* factors.
- ii. Willingness to take risk. **Indicate** *one* factor.

(6 minutes)

- C. **Prepare** the current (2009) liquidity constraint for the Tracys' IPS:

- i. if they retire at age 60.
- ii. if they retire at age 65.

(4 minutes)

- D. **Prepare** the current (2009) time horizon constraint for the Tracys' IPS:

- i. if they retire at age 60.
- ii. if they retire at age 65.

(4 minutes)

LEVEL III

Question: 1
Topic: Portfolio Management – Individual
Minutes: 26

Reading References:

8. “Frame Dependence: The Second Theme,” Ch. 3, *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University School Press, 2002)
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)

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, and (4) understanding of an investor’s other constraint factors.

LOS 2009 –III-3-8 -a, “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;

LOS 2009 –III-4-14-a,f,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;
- f) compare and contrast risk attitudes and decision-making styles across distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
- 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: Portfolio Management – Individual
Minutes: 26

Guideline Answer:

PART A

i.

Return Objective Statement

The Tracys' return objective is to provide sufficient after-tax cash flow in retirement to meet annual living expenses in excess of pension and other retirement income. Given the Tracys' concern about inflation eroding their purchasing power, the portfolio should also realize a return high enough to maintain the real (inflation adjusted) value of their asset base.

ii.

Return Calculations are:

	Retire Next Year at <u>Age 60</u>
<u>Cash Flows</u>	
Inflows	
Patricia's company pension	CAD 40,000
Combined government pension	<u>40,000</u>
Total Inflows	80,000
Outflows	
Estimated expenses	125,000
After-tax net income needed	(45,000)
Pretax net income needed (using 20% tax rate)	<u>(56,250)</u>
<u>Investable Assets</u>	
Estimated investment portfolio in one year	1,100,000
Mortgage payoff	(100,000)
Investment portfolio upon retirement	1,000,000
<u>Required Return Calculation</u>	
Pretax income need divided by investable assets	5.625%
Plus expected inflation	<u>4.000%</u>
Required Pretax Nominal Return (arithmetic)	9.625%
Required Pretax Nominal Return (geometric)	9.850%
[(1.05625 × 1.04) – 1 = .0985 = 9.850%] OR [(1.0563 × 1.04) – 1 = 9.86%]	

LEVEL III

Question: 1
Topic: Portfolio Management – Individual
Minutes: 26

PART B

These circumstances indicate a below average overall risk tolerance for the Tracys:

Ability to take risk

- Small amount of investable assets to support them in retirement relative to their spending levels, particularly if they choose to retire at age 60
- Because there will be no post-retirement employment income, there will be no further funds added to their portfolio (no human capital during retirement).
- With one year to retirement, there will be no further funds added to investable assets since current annual income equals expense.
- Alexander does not participate in any company or individual retirement plan.

Willingness to take risk

- Their desire for preservation of the real value of their portfolio
- Patricia's preference to avoid losses due to previous experience
- Conservative nature of current investments

PART C

Liquidity Needs

In 2009, the year before retirement, the Tracys have no liquidity constraints.

If they retire at age 60:

The Tracys will need significant annual distributions (CAD 56,250 pretax or CAD 45,000 after-tax) from their investment portfolio to support their living expenses. They will also need CAD 100,000 to pay off their mortgage and income taxes associated with the withdrawal upon retirement. They expect no other significant inflows or outflows.

If they retire at age 65:

The Traceys need CAD 250,000 [$\text{CAD } 200,000 / (1 - 0.2)$] to fund their sons' prepaid tuition plan in one year and pay taxes on the withdrawal. There will be no other liquidity needs because the Tracys expect to continue meeting their living expenses with their salary income until retirement.

PART D

Time Horizon

If they retire at age 60:

LEVEL III

Question: 1
Topic: Portfolio Management – Individual
Minutes: 26

The one year to retirement could be considered the first of a two-stage horizon. Otherwise, the Tracys have a long, single stage time horizon of 25 years or more in retirement based upon their current ages.

If they retire at age 65:

The Tracys have a two stage horizon. 1) The first covers the six-year period until retirement. 2) The second covers an estimated 20 years or more in retirement.

Alternatively, the Tracys could be said to have a multi-stage horizon consisting of 1) one year during which the University payment is due, 2) five additional years of work, and 3) an estimated 20 years or more in retirement.

LEVEL III

Question: 2
Topic: Portfolio Management – Individual
Minutes: 9

Questions 1 and 2 relate to Patricia and Alexander Tracy. A total of 35 minutes is allocated to these questions. *Candidates should answer these questions in the order presented.*

QUESTION 2 HAS ONE PART FOR A TOTAL OF 9 MINUTES.

Patricia and Alexander Tracy both retired five years ago at age 65 and their sons now support themselves. As a result of better than expected investment returns over the past five years, the Tracys' investment portfolio has significantly increased in value. They now think that their future after-tax investment returns will exceed their expenses for their remaining joint life expectancy. Their new investment objective is to maximize the assets their sons will inherit, subject to a review of the Tracys' risk tolerance by their financial advisor.

During retirement, the Tracys' medical costs are fully covered by the government. The Tracys have no earned income during retirement. They have previously paid off all debt and expect to remain debt-free.

Determine whether *each* of the following measures has increased, decreased, or remained unchanged for the Tracys since just prior to retirement:

- i. implied assets
- ii. implied liabilities
- iii. risk tolerance

Justify *each* response with *one* reason.

Answer Question 2 in the Template provided on page 9.

(9 minutes)

LEVEL III

Question: 2

Topic: Portfolio Management – Individual

Minutes: 9

Template for Question 2

Measure	Determine whether <i>each</i> of the following measures has increased, decreased, or remained unchanged for the Tracys since just prior to retirement. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. implied assets	Increased Decreased Remained unchanged	
ii. implied liabilities	Increased Decreased Remained unchanged	
iii. risk tolerance	Increased Decreased Remained unchanged	

LEVEL III

Question: 2
Topic: Portfolio Management – Individual
Minutes: 9

Reading References:

15. Excerpts from “Lifestyle, Wealth Transfer and Asset Classes,” Ch. 4, and “Techniques for Improving After-Tax Investment Performance,” Ch. 6, *Investment Management for Taxable Private Investors*, Jarrod Wilcox, Jeffrey E. Horvitz, and Dan diBartolomeo (The Research Foundation of CFA Institute, 2006)
19. “Life-Cycle Investing,” Ch. 3, *Investment Management for Taxable Private Investors*, Jarrod Wilcox, Jeffrey E. Horvitz, and Dan diBartolomeo (The Research Foundation of CFA Institute, 2006)
20. “Lifetime Financial Advice: Human Capital, Asset Allocation, and Insurance,” Roger G. Ibbotson, Moshe A. Milevsky, Peng Chen, *Financial Analyst Journal* (CFA Institute, January/February 2006)
46. “Monitoring and Rebalancing,” Ch. 11, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Robert D. Arnott, Terence E. Burns, Lisa Plaxco, and Philip Moore (CFA Institute, 2007)

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, and (4) understanding of an investor’s other constraint factors.

LOS 2009-III-4-15-b, Excerpts from *Investment Management for Taxable Private Investors*

The candidate should be able to:

- b) explain the expected effects of shrinking time horizons, as investors grow older, on (1) the risk tolerance for average investors and that of very wealthy investors with bequest goals, and (2) the desirability of realizing taxable gains;

LOS 2009-III-4-19-a,b, “Life-Cycle Investing”

The candidate should be able to:

- a) explain the importance of age and level of wealth in setting investment policy;
- b) explain how changes in the ratio of discretionary wealth to total assets can affect an investor’s asset allocation;

LOS 2009-III-4-20-a, “Lifetime Financial Advice”

The candidate should be able to:

- a) explain the concept and discuss the characteristics of “human capital” as a component of one’s total wealth;

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LEVEL III

Question: 2
Topic: Portfolio Management – Individual
Minutes: 9

LOS 2009-III-16-46-c, “Monitoring and Rebalancing”

The candidate should be able to:

- c) recommend and justify revisions to an investor’s investment policy statement and strategic asset allocation, given a change in investor circumstances;

LEVEL III**Question:** 2**Topic:** Portfolio Management – Individual**Minutes:** 9**Template for Question 2**

Measure	Determine whether <i>each</i> of the following measures has increased, decreased, or remained unchanged for the Tracys since just prior to retirement. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. implied assets	Increased <u>Decreased</u> Remained unchanged	The present value of the Tracys future employment income is zero. Their implied assets dropped to zero upon retirement and remain at zero.
ii. implied liabilities	Increased <u>Decreased</u> Remained unchanged	The Tracys' implied liabilities (the present value of their retirement expenses) peaked at the beginning of their retirement. Since then, the implied liabilities have regularly declined along with their life expectancy.
ii. risk tolerance	<u>Increased</u> Decreased Remained unchanged	The Tracys' risk tolerance has increased since retirement given their increasing discretionary wealth. Also, the Tracys' new investment objective is to maximize their sons' inheritance requires/allows for a longer, multigenerational time horizon, which increases risk tolerance.

LEVEL III

Question: 3
Topic: Institutional PM
Minutes: 24

QUESTION 3 HAS FIVE PARTS (A, B, C, D, E) FOR A TOTAL OF 24 MINUTES.

Wirth-Moore Corporation is a U.S.-based publisher of educational media. Wirth-Moore sponsors a defined-benefit pension plan. The plan's assets are invested in a broadly diversified portfolio of government and investment grade corporate bonds. Pension plan participants include both active workers and retirees. Pension benefits payments are not adjusted for inflation. The duration and market value of the pension plan's assets are equal to the duration and market value of the plan's projected benefits obligation (PBO). Wirth-Moore believes that it has adequate financial strength and profitability to maintain annual pension contributions based on the pension plan's features and Wirth-Moore's workforce characteristics.

Wirth-Moore recently established the Foundation for the Future (FF), a company-sponsored charitable foundation. FF's mandate from Wirth-Moore is to promote sustainable living through education and research on renewable resources.

FF employs one person to administer grant applications, but does not employ full-time investment professionals. Wirth-Moore donated 10 million U.S. dollars (USD) to FF as a permanent endowment. FF is not restricted to spending only investment income. Wirth-Moore does not plan to make additional donations to FF in the foreseeable future, although FF is permitted to accept donations from others.

FF's board retains Allyson Joy, an investment advisor, to make recommendations for its endowment fund. She summarizes her understanding of FF's investment objectives and related information in Exhibit 1.

Exhibit 1 **FF Investment Information**

- To minimize taxes under U.S. law, FF's board intends to make annual distributions equal to 5% of its average asset market value.
- The board adopted a goal to increase the value of the endowment by seeking a rate of return exceeding the rate needed to maintain the real purchasing power of the portfolio.
- FF's investment policy limits the amount that can be invested in any single issuer's securities to no more than 5% of the portfolio.
- FF's annual investment management expenses are 0.45% of assets.
- The annual rate of inflation is expected to be 3% in both FF's overhead and in the fields of education and research that FF supports.

A. **Prepare** FF's return objective for next year. **Show** your calculations.

(4 minutes)

LEVEL III

Question: 3
Topic: Institutional PM
Minutes: 24

- B. i. **Determine** whether FF or the Wirth-Moore pension plan has greater ability to take risk. **Justify** your determination with *one* reason.
- ii. **Determine** whether FF or the Wirth-Moore pension plan has greater willingness to take risk. **Justify** your determination with *one* reason.

(6 minutes)

- C. **Formulate** the following investment policy constraints for FF:

- i. Liquidity.
Show your calculations.
- ii. Time horizon.
Justify your response with *one* reason.

(6 minutes)

FF presently bases its annual spending on the average market value of its assets each year. Noland Reichert, a member of FF's board, is concerned about recent market volatility. Reichert proposes a spending rule based on a rolling three-year average market value. In response to Reichert's proposal, Joy recommends a geometric spending rule, where spending is based on a geometrically declining average of trailing endowment values. FF's external tax counsel advises that there would be no adverse tax consequence from adopting either smoothing rule.

- D. **Explain** the effect on FF's spending of adopting Joy's smoothing rule rather than Reichert's smoothing rule.

(4 minutes)

Reichert also serves on the board of Headwaters University Foundation, an endowment with more than USD 1 billion in assets. Headwaters recently invested in a private equity venture based on the recommendation of its internal investment staff. The venture requires a USD 2.5 million minimum investment by each participant, with a five-year lock-up provision. The private equity venture is not expected to generate income, but has the potential to increase in value at a rate of 20% per year over the next five years. Reichert recommends that FF should participate in this private equity venture.

- E. **Justify**, with *two* reasons, why Reichert's recommendation is inappropriate for FF.

(4 minutes)

LEVEL III

Question: 3
Topic: Institutional PM
Minutes: 24

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)

“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)

Purpose:

To test knowledge of investment objectives and constraints for foundations.

LOS: 2009-III-5-21-c, h, i, j, l, m, n

The candidate should be able to:

- 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;
- 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;
- l) discuss the factors that determine investment policy for pension funds, foundations, endowments, life and non-life 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.

LOS: 2009-III-8-26-i

The candidate should be able to:

- i) evaluate the theoretical and practical effects of including additional asset classes in an asset allocation;

LEVEL III

Question: 3
Topic: Institutional PM
Minutes: 24

Guideline Answer:

PART A

FF's board has stated a goal to earn a rate of return in excess of the rate needed to maintain the real purchasing power of the portfolio. The minimum objective for foundation return includes: 1) the 5% annual rate of spending that is planned, plus 2) investment management expenses (0.45%), and 3) the 3% rate of inflation that is expected.

- Multiplicative approach: $(1.05 \times 1.0045 \times 1.03) - 1 = 8.64\%$.
- Additive approach: $5\% + 0.45\% + 3\% = 8.45\%$.
- The multiplicative approach is more precise because it accounts for the effect of compounding in a multi-period setting. The additive approach is approximate.

PART B

i.

FF has greater *ability* to take risk than Wirth-Moore's pension plan. FF has a spending goal that is supported by an objective of minimizing taxes. In contrast, the pension plan must pay defined benefits, which constitutes legal liability. This difference increases FF's ability to take risk compared to Wirth-Moore's pension plan.

ii.

FF's *willingness* to take risk is greater than that of Wirth-Moore's pension plan, as illustrated by three facts:

1. FF's board has chosen to seek additional return to maintain the real purchasing power of the portfolio, or
2. Increase the size of the endowment in real terms.
3. Wirth-Moore pension plan's asset allocation is conservative (currently completely invested in bonds) indicating a low willingness to take risk.

PART C

i.

FF needs liquidity equal to its planned, annual spending (5%), plus the expenses of generating investment earnings (0.45%), less contributions. FF does not expect contributions from Wirth-Moore in the foreseeable future. Therefore, FF's liquidity requirement amounts to $5.00\% + 0.45\% = 5.45\%$ of assets

- $5.45\% \times \$10 \text{ million} = \$545,000$.

LEVEL III

Question: 3
Topic: Institutional PM
Minutes: 24

ii.

FF has a single-stage, long term investment time horizon. This conclusion is supported by the following 1) FF was established with the intent of lasting into perpetuity; 2) FF plans to maintain a 5% annual spending rate.

PART D

The objective of a smoothing rule is to reduce fluctuations in FF's operating budget by reducing the effect of a large change in the market value of the investment portfolio from one year to the next. Joy's recommended smoothing rule is a geometric spending rule in which spending is based on a geometrically declining average of trailing endowment values. This would result in greater emphasis on recent market values and less on past values.

One problem with Reichert's proposed smoothing rule, a spending rule based on a rolling three-year average market value, is that it places the same weight on market values three years ago as it does on recent market values. A single extraordinary return three years ago could still result in a large change in spending in the current year.

PART E

Differences in expertise or resources may constrain the types of investments FF's board should consider, compared to Headwaters. FF's portfolio of USD 10 million is much smaller than the USD 1 billion Headwaters endowment fund. Low-cost, easy-to-monitor, passive investment strategies are often the primary approach to implementing a strategic asset allocation for smaller portfolios. FF has only one administrative employee, affording it limited resources to deal with the costs and complexities of due diligence. In contrast, Headwaters has sufficient investment staff to find, evaluate, select and monitor alternative investments such as a private equity venture.

A minimum investment of USD 2.5 million would concentrate at least 25% of FF's endowment in the private equity venture, which is inconsistent with the investment policy limitation of no more than 5% in any single issuer's securities.

The 5-year lock-up provision and absence of income would not provide any liquidity, which may be inconsistent with FF's spending needs.

LEVEL III

Question: 4
Topic: Institutional PM
Minutes: 11

QUESTION 4 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 11 MINUTES.

Setzer is a U.S.-based chain of department stores with operating assets of 1 billion U.S. dollars (USD) in market value terms. Setzer sponsors a defined-benefit pension plan (Pension Plan) that invests exclusively in domestic equities and domestic investment grade corporate bonds. Selected Setzer and Pension Plan financial data are shown in Exhibit 1.

Exhibit 1
Setzer and Pension Plan Financial Data

Setzer (excluding Pension Plan)	
Measure	Value
Debt/equity ratio (market value)	1.0
Operating assets market value (USD billion)	1.0
Equity beta	2.0
Debt beta	0.0
Pension Plan	
Measure	Value
Equity portfolio beta	1.0
Debt investments beta	0.0
Market value (USD million)	800
Equity allocation (%)	60
Surplus (USD million)	0.0

Setzer hires Tim Bearne to study the implications of the asset allocation of the Pension Plan's investment portfolio on Setzer's financial and operating characteristics. Bearne notes that a defined-benefit pension plan's assets and liabilities can directly affect the sponsoring company's equity price, the equity price volatility, and the amount of operational risk the company is able to assume.

The risk-free rate of return is 3% and the equity risk premium is 9%. Bearne's preliminary analysis does not take the effects of taxes into consideration.

Setzer bases its capital budgeting decisions on the internal rate of return (IRR) and accepts capital projects with IRR greater than Setzer's weighted average cost of capital (WACC). Setzer does not include the Pension Plan's assets and liabilities when calculating its WACC.

A. **Calculate** Setzer's WACC including the Pension Plan's assets and liabilities.

(4 minutes)

B. **Discuss** the implications of **not** including the Pension Plan's assets and liabilities in Setzer's capital budgeting decision-making process.

LEVEL III

Question: 4
Topic: Institutional PM
Minutes: 11

Note: No calculations are required.

(4 minutes)

Six months have passed. As a result of negative returns on the Pension Plan's investment portfolio, the Pension Plan is now underfunded by USD 50 million. The Pension Plan's investment committee, seeking to raise expected returns, increases the investment portfolio's equity allocation to 70%. Immediately after this decision is implemented, Setzer's equity price volatility and beta increase. Assume Setzer's operational assets and its debt/equity ratio (market value) remained constant during the six-month period.

- C. **Discuss** why Setzer's equity beta increases in response to the Pension Plan's change in the asset allocation.

(3 minutes)

LEVEL III

Question: 4
Topic: Institutional PM
Minutes: 11

Reading References:

22. “Allocating Shareholder Capital to Pension Plans,” Robert C. Merton, Volume 18, *Journal of Applied Corporate Finance* (Morgan Stanley, Winter 2006)

Purpose:

To test the candidate’s ability to recognize and quantify the effects of asset allocation decisions in defined-benefit pension plans on a corporate sponsor’s capital structure and risk profile.

LOS: 2009-III-2-22-a,b,c

The candidate should be able to:

- a) compare and contrast funding shortfall and asset/liability mismatch as sources of risk faced by pension plan sponsors;
- b) explain how the weighted average cost of capital (WACC) for a corporation can be adjusted to incorporate pension risk and discuss the potential consequences of not making this adjustment;
- c) explain, in an expanded balance sheet framework, the effects of different pension asset allocations on total asset betas, the equity capital needed to maintain equity beta at a desired level, and the debt/equity ratio.

LEVEL III

Question: 4
Topic: Institutional PM
Minutes: 11

Guideline Answer:

PART A

Without adjusting for the effect of pension asset-risk mismatch, the beta for operating assets equals 1.0. The calculation is displayed below – Standard Balance Sheet Estimates.

Standard Balance Sheet Estimates									
Assets					Liabilities and Equity				
	Value	Risk (Beta)	Weight	Weighted Average		Value	Risk (Beta)	Weight	Weighted Average
Operating Assets	1,000	1.0	100%	1.0	Debt	500	0.0	50%	0.0
					Equity	500	2.0	50%	1.0
Total Assets	1,000			1.0	Total Debt + Equity	1,000			1.0

With an allocation of 60% to equities in the pension portfolio and a debt beta of zero, the beta for the asset base of the pension fund equals 0.60. For the liability side, Setzer has USD 500 million each in equity and debt (debt/equity of 1.0), and the Pension Plan has USD 800 million in debt (beta of zero).

Adjusting for the effect of pension asset-risk mismatch, the beta for operating asset equals 0.52. The calculation is displayed below – Full Economic Balance Sheet Estimates.

Full Economic Balance Sheet Estimates									
Assets					Liabilities and Equity				
	Value	Risk (Beta)	Weight	Weighted Average		Value	Risk (Beta)	Weight	Weighted Average
Operating Assets	1,000	0.52	55.6%	0.289	Debt	500	0.00	27.8%	0.000
Pension Assets	800	0.60	44.4%	0.267	Equity	500	2.00	27.8%	0.556
					Pension Liabilities	800	0.00	44.4%	0.000
Total Assets	1,800			0.556		1,800			0.556

$$\text{Operating Assets Beta} = \frac{(\text{Total Asset Beta} - \text{Weighted Pension Beta})}{\text{Operating Assets Weight}}$$
$$\text{Operating Assets Beta} = \frac{(0.556 - ((800/1,800) \times 0.6))}{(1000/1,800)} = 0.52$$

With a risk-free rate of 3.0% and an equity risk premium of 9.0%, Setzer's weighted average cost of capital (WACC) equals 7.68%, using the CAPM, $\text{WACC} = 3\% + 0.52 \times (9\%)$.

LEVEL III

Question: 4
Topic: Institutional PM
Minutes: 11

PART B

If Setzer management estimates WACC by the standard method, ignoring pension plan assets and liabilities, management will overestimate the WACC measure, which can lead to capital allocation distortion. Without using the Pension Plan's assets and liabilities (risk mismatch) in the calculations, Setzer's total risk is effectively being assigned to its business operations, when part of that risk comes from the Pension Plan's assets. Also, since the pension liabilities are disregarded, Setzer's leverage ratio is understated. Both of these factors will result in a WACC estimate that is higher than the Setzer's actual (adjusted for the effect of pension asset-risk mismatch) WACC.

Ignoring the Pension Plan's balance sheet, the WACC would be calculated as follows:

- Operating Assets Beta = $(500 \times 0 + 500 \times 2) / 1000 = 1.0$
- WACC = $3\% + 1 \times (9\%) = 12\%$, significantly higher than the actual WACC of 7.68%.

In the evaluation of new projects, the artificially inflated WACC would lead Setzer to apply a hurdle rate that is too high; Setzer might not undertake projects that would increase its value. This could result in underinvestment in the operating part of the business.

PART C

When a company, holding its operating assets and capital structure constant, increases the equity exposure in its pension assets, it increases the risk of the overall firm. As the risk of the asset side of the balance sheet increases, investors will require a higher expected return. The liability side of the balance sheet must compensate for this risk increase in assets. The equity risk (beta) for Setzer must go up.

LEVEL III

Question: 5
Topic: Economics
Minutes: 19

QUESTION 5 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 19 MINUTES.

Robert Spencer is a market forecaster with Windsor Investment Management, a U.K.-based wealth management firm. Spencer is asked to review the current economic conditions and market outlook for the U.K. and to set long-term market return expectations for domestic equities. These expectations will form the basis of Windsor's future client asset allocations. Spencer gathers the U.K. capital market data displayed in Exhibit 1.

Exhibit 1
U.K. Capital Market Data

Historical Data (past 100 years)	
Equity compounded annual growth rate (%)	11.2
Equity risk premium (%)	5.3
Dividend yield (%)	4.0
Equity repurchase yield (%)	-0.5
Nominal earnings growth return (%)	4.6
Current and Forward Looking Data	
Current equity price-to-earnings ratio	14.6
Expected equities real earnings growth rate (%)	2.7
Expected long-term inflation rate (%)	2.5

- A. **Determine**, using the information in Exhibit 1 and the Grinold-Kroner model, the component sources of the historical nominal return for U.K. equities:
- i. income return
 - ii. earnings growth
 - iii. repricing return

(6 minutes)

A year has passed. The Bank of England (the U.K.'s central bank) has been raising the short-term interest rate. Business confidence is starting to decline. Spencer is asked to analyze the U.K. economy and consider how the Bank of England might respond in the short term to economic conditions. He gathers the economic data shown in Exhibit 2.

LEVEL III

Question: 5
Topic: Economics
Minutes: 19

Exhibit 2
U.K. Economic Data (%)

Neutral value of the short-term interest rate	3.5
Forecast U.K. GDP growth rate	0.3
Trend U.K. GDP growth rate	2.2
Yield to maturity on 10-year gilt (government bond)	4.2
Yield to maturity on 1-year gilt (government bond)	5.5
Bank of England short-term interest rate	5.5
Target U.K. inflation rate	2.0
Forecast U.K. inflation rate	4.4

- B. i. **Determine** the target short-term interest rate for the Bank of England using the Taylor rule and the data in Exhibit 2. **Show** your calculations.
- ii. **Describe** the *most likely* potential negative economic result if the Bank of England bases its interest rate policy on the Taylor rule.

(5 minutes)

Nine more months have passed and the U.K. economy has fallen into a recession. Under pressure to aid the economy, the U.K. Chancellor of the Exchequer (finance minister) announces a four-part economic plan aimed at improving the long-term growth trend of the U.K. economy (GDP). The plan includes the following initiatives:

- Introduction of incentives encouraging companies to increase their use of information technology;
 - An increase in the mandatory retirement age from 65 to 70 years of age;
 - A broad increase in taxes to fund programs that provide support for low-income families;
 - A one-time tax rebate to stimulate consumer spending.
- C. **Determine**, for *each* part of the economic plan, whether the initiative is *most likely* to increase, decrease, or leave unchanged the long-term growth trend of the U.K. economy (GDP). **Justify** *each* response with *one* reason.

Note: No calculations are required.

Answer Question 5-C in the Template provided on page x.

(8 minutes)

LEVEL III

Question: 5
Topic: Economics
Minutes: 19

Template for Question 5-C

Note: No calculations are required.

Initiative	Determine, for <i>each</i> part of the economic plan, whether the initiative is <i>most likely</i> to increase, decrease, or leave unchanged the long-term growth trend of the U.K. economy (GDP). (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Introduction of incentives encouraging companies to increase their use of information technology;	Increase Decrease Leave unchanged	
An increase in the mandatory retirement age from 65 to 70 years of age;	Increase Decrease Leave unchanged	
A broad increase in taxes to fund programs that provide support for low-income families;	Increase Decrease Leave unchanged	

LEVEL III

Question: 5
Topic: Economics
Minutes: 19

A one-time tax rebate to stimulate consumer spending.	Increase Decrease Leave unchanged	
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Reading References:

23. “Capital Market Expectations,” John P. Calverley, Alan M. Meder, CFA, Brian D. Singer, CFA, and Renato Staub, *Managing Investment Portfolios: A Dynamic Process*, 3rd Edition (CFA Institute)

Purpose:

To test the candidate’s ability to appraise and apply economic data in setting capital market expectations.

LOS: Volume 3, 2009-III-23-c, h, i, j

23. “Capital Market Expectations”

The candidate should be able to:

- 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;
- 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.

LEVEL III

Question: 5
Topic: Economics
Minutes: 19

Guideline Answer:

PART A

The Grinold-Kroner model can be expressed as:

$$E(R_e) = (D/P - \Delta S) + (i + g) + \Delta PE$$

or

$$E(R_e) = \text{Income return} + \text{Earnings growth} + \text{Repricing return}$$

- i. Income return is the sum of the dividend yield (i.e., D/P , which is 4.0%) and the equity repurchase yield (i.e., the negative of the expected change in shares outstanding, $-\Delta S$) which is -0.5%. Therefore:
 $\text{Income return} = D/P - \Delta S = 4.0 - 0.5 = 3.5\%$
- ii. Earnings growth is the sum of real growth in earnings and the inflation rate. This sum is shown in Exhibit 1:
 $\text{Earnings growth} = 4.6\%$ (given in Exhibit 1)
- iii. Repricing return: Since the equity compounded annual growth rate is given in Exhibit 1 to be
 $E(R_e) = 11.2\%$, the Grinold-Kroner model can be rearranged to solve for repricing return:
 $11.2\% = 3.5\% + 4.6\% + \text{Repricing return}$
Rearranging the terms:
 $\text{Repricing return} = 11.2\% - 3.5\% - 4.6\% = 3.1\%$

PART B

- i. $R_{\text{optimal}} = R_{\text{neutral}} + [0.5 \times (\text{GDPg}_{\text{forecast}} - \text{GDPg}_{\text{trend}}) + 0.5 \times (I_{\text{forecast}} - I_{\text{target}})]$
 $R_{\text{optimal}} = 3.5 + [0.5 \times (0.3 - 2.2) + 0.5 \times (4.4 - 2.0)] = 3.75\%$
- ii. The Taylor rule suggests the Bank of England should target a short-term interest rate of 3.75% versus a current short-term interest rate of 5.5%. The most likely potential negative economic result of the Bank of England following the Taylor rule is increased inflation. Since the forecast inflation rate of 4.4% is currently above the target inflation rate of 2.0%, a cut in the interest rate could cause the inflation rate to rise even further away from the target inflation rate. Lowering short-term rates will stimulate output by lowering corporations' cost of capital.

LEVEL III

Question: 5
Topic: Economics
Minutes: 19

PART C

Template for Question 5-C

Note: No calculations are required.

Initiative	Determine, for <i>each</i> part of the economic plan, whether the initiative is <i>most likely</i> to increase, decrease, or leave unchanged the long-term growth trend of the U.K. economy (GDP). (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Introduction of incentives encouraging companies to increase their use of information technology;	<div>Increase</div> <div>Decrease</div> <div>Leave unchanged</div>	Increased use of information technology is likely to increase total factor productivity (TFP) growth in the economy. TFP growth also results from technical progress and efficiencies in using capital and labor inputs. TFP growth directly increases trend GDP growth.
An increase in the mandatory retirement age from 65 to 70 years of age;	<div>Increase</div> <div>Decrease</div> <div>Leave unchanged</div>	Increasing the retirement age increases both the potential labor force size and/or the actual labor force participation rate. This directly improves the trend GDP growth.
A broad increase in taxes to fund programs that provide support for low-income families;	<div>Increase</div> <div>Decrease</div> <div>Leave unchanged</div>	Taxes distort economic activity by reducing the equilibrium quantities of goods and services exchanged. A decrease in total societal income and efficiency is the cost of redistributing wealth to the least well-off. Long-term GDP will be reduced because of the impact that additional taxes will have on capital investment activity, thus diverting funds from productive purposes. Additional taxation provides disincentives to individuals and businesses and leads to inefficient allocation of resources.
A one-time tax rebate to stimulate consumer spending.	<div>Increase</div> <div>Decrease</div> <div>Leave unchanged</div>	A one-time stimulation of consumer spending can influence the business cycle. The effect is short-term or temporary in nature, but does not have an impact on the long-term trend growth rate of GDP. Milton Friedman's Permanent Income Hypothesis also holds that consumer spending behavior is largely determined by long-term income expectations.

LEVEL III

Question: 6
Topic: Portfolio Management – Asset Allocation
Minutes: 10

QUESTION 6 HAS ONE PART FOR A TOTAL OF 10 MINUTES.

Kallis Employees Pension Plan (KEPP) is the pension fund of a Finland-based mining company. KEPP is fully funded with 8 billion euros (EUR) in assets and has the following investment policy objectives:

- Earn a 10.3% annual portfolio return.
- Have a maximum Roy's safety-first ratio with a minimum return threshold of 8%.
- Maintain a cash balance sufficient to meet liquidity requirements.
- Maintain a maximum of 10% of assets in a passively managed sub-portfolio that is indexed to the S&P GSCI Precious Metals Index (SPMI).

KEPP expects to pay EUR 320 million in pension benefits this year.

At an investment committee meeting regarding possible changes to KEPP's strategic asset allocation policy, the committee reviews five alternative portfolio allocations that meet KEPP's return objectives. These alternatives are shown in Exhibit 1.

Exhibit 1
KEPP
Alternative Portfolio Allocations (%)

Asset Class	Portfolio Allocations				
	V	W	X	Y	Z
Cash equivalents	3	5	6	5	6
SPMI	10	12	8	7	9
Global bonds	40	40	47	45	41
Global equities	47	43	39	43	44
Total	100	100	100	100	100
Portfolio Measures	V	W	X	Y	Z
Expected total annual return	11.26	11.19	10.44	10.60	10.87
Expected standard deviation	14.90	14.82	13.93	14.15	14.52

Determine the *most* appropriate portfolio for KEPP. **State**, for *each* portfolio **not** selected, *one* reason why it is **not** the most appropriate.

Answer Question 6 in the Template provided on page x.

(10 minutes)

LEVEL III

Question: 6

Topic: Portfolio Management – Asset Allocation

Minutes: 10

Template for Question 6

Determine the <i>most</i> appropriate portfolio for KEPP. (circle one)	State, for <i>each</i> portfolio not selected, <i>one</i> reason why it is not the most appropriate.
V	
W	
X	
Y	
Z	

LEVEL III

Question: 6
Topic: Portfolio Management – Asset Allocation
Minutes: 10

Reading References:

26. “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)
27. “Linking Pension Liabilities to Assets,” Aaron Meder and Renato Staub (UBS Global Asset Management, 2006)

Purpose:

To test the candidate’s knowledge of institutional asset allocation.

LOS: 2009-III-8-26-f,h,m

26. “Asset Allocation”
The candidate should be able to:
 - f) evaluate return and risk objectives in relation to strategic asset allocation;
 - h) select and justify an appropriate set of asset classes for an investor;
 - m) formulate and justify a strategic asset allocation, given an investment policy statement and capital market expectations;

LEVEL III

Question: 6
Topic: Portfolio Management – Asset Allocation
Minutes: 10

Guideline Answer:

Template for Question 6

Note: Show your calculations.

Determine the most appropriate portfolio for KEPP. (circle one)	State, for <i>each</i> portfolio not selected, <i>one</i> reason why it is not the most appropriate.
V	Portfolio V's allocation to cash equivalents of 3% is insufficient to meet the annual liquidity requirement for pension benefits: EUR 320 million/EUR 8 billion=4%
W	Portfolio W's allocation to SPMI of 12% exceeds the maximum 10% limit allowed in KEPP's investment policy.
X	Portfolio X's Roy's safety-first ratio of 0.175 is lower than the other qualifying portfolios, Y and Z. Roy's safety-first ratio = $(E(R_p) - \text{Minimum Return Threshold}) / \text{Standard Deviation}$ Portfolio X: $(10.44\% - 8.00\%) / 13.93\% = 0.175$
Y	Portfolio Y's Roy's safety-first ratio of 0.184 is lower than the other qualifying portfolio, Z. Portfolio Y: $(10.60\% - 8.00\%) / 14.15\% = 0.184$
<div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">Z</div>	

LEVEL III

Question: 6
Topic: Portfolio Management – Asset Allocation
Minutes: 10

Note: Roy's safety first ratio for portfolio Z is:
 $(10.87\% - 8.00\%) / 14.52\% = 0.198$

Besides meeting the expected return requirement, Portfolio Z satisfies the following investment committee objectives:

- Allocation of 6% in cash equivalents is sufficient to meet liquidity requirement, equivalent to 4% (EUR 320 million/EUR 8 billion) of assets.
- Asset class allocation to SPMI of 9% is below the 10% maximum limit.
- Achieves the highest Roy's safety-first ratio of 0.198 amongst the qualifying portfolios X, Y and Z:

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

QUESTION 7 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 17 MINUTES.

Chandra Pabst, CFA, is an equity portfolio manager at an advisory firm that provides asset management services to nonprofit organizations. The firm was recently hired by the U.S.-based Aberdeen Family Foundation. Aberdeen's board of directors was dissatisfied with its previous equity manager. Pabst is assigned to develop a strategy for the equity portion of the portfolio.

In her initial meeting with the Aberdeen investment committee, Pabst compiled the following notes:

- The committee agrees that security prices reflect publicly available information.
- The committee expects a decline in interest rates.
- The board fired the previous equity manager because the portfolio had tracking risk exceeding 1%.
- Aberdeen pays taxes on interest, dividends, and realized capital gains.
- The board is willing to accept a low information ratio as long as returns are sufficient to maintain targeted spending.

At the end of the meeting, Pabst recommends that the Aberdeen portfolio be managed using a passive approach. The committee agrees with Pabst's recommendation.

- A. **Justify**, with *three* reasons based only on Pabst's notes, why the use of a passive investment approach is the *most* appropriate for Aberdeen's equity portfolio.

Answer Question 7-A in the Template provided on page x.

(6 minutes)

Pabst next begins to transition Aberdeen's portfolio holdings. She is constructing the portfolio using individual equities and is considering the following methods: full replication, stratified sampling, and optimization. The benchmark for the portfolio is the Russell 3000 Index, which is based on market capitalization and consists of 3,000 large U.S. publicly-traded companies. The value of Aberdeen's equity portfolio is 3,000,000 U.S. dollars (USD). The board prefers not to use complicated mathematical models that would be challenging to explain to donors.

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

- B. **Determine**, from the three methods Pabst is considering, the *most* appropriate method for constructing the equity portfolio. **Justify** your response with *two* reasons related to Aberdeen's specific circumstances.

Answer Question 7-B in the Template provided on page x.

(5 minutes)

Pabst was just hired to manage the endowment fund for the Forest Trust. The Forest Trust is actively managed and its holdings are shown in Exhibit 1.

Exhibit 1
Forest Trust Portfolio and Benchmark Data

	Portfolio	Portfolio Benchmark
Average market capitalization of stocks	USD 34 billion	USD 72 billion
Number of stocks	150	3,000
Price-to-book ratio	0.9	2.2
Long-term earnings growth rate (median analyst forecast)	5%	13%
Average earnings per share (EPS)	USD 0.02	USD 1.74
Dividend yield	1.3%	1.7%

Pabst is asked to classify the portfolio in one of the four value and growth substyles:

- contrarian
- high yield
- consistent growth
- earnings momentum

- C. **Identify** the substyle that *best* represents the portfolio. **Justify** your response with *two* reasons related to the characteristics of the portfolio relative to the benchmark.

Answer Question 7-C in the Template provided on page x.

(6 minutes)

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

Template for Question 7-A

Justify, with *three* reasons based only on Pabst's notes, why the use of a passive investment approach is the *most* appropriate for Aberdeen's equity portfolio.

1.

2.

3.

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

Template for Question 7-B

Determine, from the three methods Pabst is considering, the <i>most</i> appropriate method for constructing the equity portfolio. (circle one)	Justify your response with <i>two</i> reasons related to Aberdeen's specific circumstances.
full replication	1.
stratified sampling	2.
optimization	

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

Template for Question 7-C

Identify the substyle that <i>best</i> represents the portfolio. (circle one)	Justify your response with <i>two</i> reasons related to the characteristics of the portfolio relative to the benchmark.
contrarian	1.
high yield	
consistent growth	2.
earnings momentum	

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

Reading References:

“Equity Portfolio Management,” Ch. 7, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Gary L. Gastineau, Andrew R. Olma, CFA, and Robert G. Zielinski, CFA (CFA Institute, 2007)

Purpose:

To test knowledge of investment approaches (passive, semiactive, and active), methods of portfolio construction, and investment styles.

LOS: 2009-III-11-33-b, c, f, i

Learning Outcomes

33. **“Equity Portfolio Management”**

The candidate should be able to:

- b) discuss the rationales for passive, active, and semiactive (enhanced index) equity investment approaches and distinguish among those approaches with respect to expected active return and tracking risk;
- c) recommend an equity investment approach when given an investor’s investment policy statement and beliefs concerning market efficiency;
- f) compare and contrast full replication, stratified sampling, and optimization as approaches to constructing an indexed portfolio and recommend an approach when given a description of the investment vehicle and the index to be tracked;
- i) compare and contrast techniques for identifying investment styles and characterize the style of an investor when given a description of the investor’s security selection method, details on the investor’s security holdings, or the results of a returns-based style analysis;

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

Guideline Answer:

PART A

Template for Question 7-A

Justify, with <i>three</i> reasons based only on Pabst's notes, why the use of a passive investment approach is the <i>most</i> appropriate for Aberdeen's equity portfolio.
1. The firing of a manager for tracking risk exceeding 1% indicates that the Board considers this amount of risk to be excessive. A passive approach provides low tracking risk.
2. A passive approach typically has low turnover relative to active approaches. Because the Foundation is taxed on realized capital gains as well as investment income, the passive approach will result in lower taxes.
3. Committee members believe the stock market is efficient. Active approaches can be expected to be more successful when markets are inefficient.
4. The information ratio of the passive approach is 0. In the past, the Board found a low ratio to be acceptable as long as the returns were sufficient to maintain desired spending.

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

PART B

Template for Question 7-B

Determine, from the three methods Pabst is considering, the <i>most</i> appropriate method for constructing the equity portfolio. (circle one)	Justify your response with <i>two</i> reasons related to Aberdeen's specific circumstances.
full replication	1. The value of Aberdeen's equity portfolio is USD 3,000,000. The full replication approach requires owning each of the 3,000 stocks in the benchmark portfolio. Replication is not cost effective given the transaction costs for smaller cap stocks.
stratified sampling	
Optimization	2. The board prefers not to use complicated mathematical models, making the optimization approach inappropriate.

LEVEL III

Question: 7
Topic: Equity
Minutes: 17

PART C

Template for Question 7-C

Identify the substyle that <i>best</i> represents the portfolio. (circle one)	Justify your response with <i>two</i> reasons related to the characteristics of the portfolio relative to the benchmark.
<div>contrarian</div> <div>high yield</div>	<p>1. Equities favored by contrarian investors trade at low price-to-book ratios, typically below 1.</p> <p>Forest Trust's portfolio has a price-to-book ratio of 0.9 relative to 2.2 for the benchmark.</p>
<div>consistent growth</div> <div>earnings momentum</div>	<p>2. Equities favored by contrarian investors typically have little or no current earnings.</p> <p>Forest Trust's portfolio has a weighted-average EPS of USD 0.02 relative to USD 1.74 for the benchmark.</p>

LEVEL III

Question: 8
Topic: Alternative Assets
Minutes: 15

QUESTION 8 HAS TWO PARTS (A, B) FOR A TOTAL OF 15 MINUTES.

Hank Smith is the portfolio manager of U.S.-based PM Hedge Fund (PM), which focuses on precious metals, fixed income, and derivatives. Smith has a strategy of rolling forward a long position in short-dated platinum futures traded on NYMEX. Smith's expectations are as follows:

- Electricity supply disruptions in South Africa, the world's dominant platinum producer, will cause platinum supply to fall and spot prices to rise.
- Interest rates will rise.
- The convenience yield on platinum will increase.

Smith observes that his expectations are not yet reflected in platinum futures prices.

- A. **Determine**, given that Smith's market expectations are correct, whether an increase, a decrease, or no change in *each* of the following return components should be expected:
- i. spot return (price return)
 - ii. collateral return (collateral yield)
 - iii. roll return (roll yield)

Justify *each* response with *one* reason.

Answer Question 8-A in the Template provided on page x.
(9 minutes)

PM holds a four-year 120,000,000 U.S. dollars (USD), 6% fixed rate bond that pays interest semi-annually. Smith expects four-year USD interest rates to rise. He wants to reduce the duration of the bond position. Lizelle Hoorn, an analyst at PM, suggests that Smith can reduce the modified duration of this position, which is currently 3, to a more acceptable 0.3 by using an interest rate swap. Smith wants the notional principal on the swap to be as close as possible to the USD 120,000,000 principal of the original bond. Hoorn provides Smith with four possible swaps, shown in Exhibit 1. Assume that the modified duration of the fixed rate component of a swap is 75% of its maturity.

Exhibit 1
Available Swap Positions

Swap	Swap Type	Swap Term	Payment Frequency
1	Pay fixed, receive floating	2 years	Semi-annually
2	Pay floating, receive fixed	4 years	Quarterly
3	Pay fixed, receive floating	4 years	Quarterly
4	Pay floating, receive fixed	2 years	Semi-annually

LEVEL III

Question: 8
Topic: Alternative Assets
Minutes: 15

- B. **Determine** which swap *best* achieves Smith's stated goals. **Justify** your response with *two* reasons.

Answer Question 8-B in the Template provided on page x.

(6 minutes)

LEVEL III

Question: 8

Topic: Alternative Assets

Minutes: 15

Template for Question 8-A

Return component	Determine, given that Smith's market expectations are correct, whether an increase, a decrease, or no change in <i>each</i> of the following return components should be expected. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. spot return (price return)	Increase Decrease No change	
ii. collateral return (collateral yield)	Increase Decrease No change	
iii. roll return (roll yield)	Increase Decrease No change	

LEVEL III

Question: 8

Topic: Alternative Assets

Minutes: 15

Template for Question 8-B

Template for Question 6	
Determine which swap <i>best</i> achieves Smith's stated goals. (circle one)	Justify your response with <i>two</i> reasons.
Swap 1	1.
Swap 2	
Swap 3	2.
Swap 4	

LEVEL III

Question: 8
Topic: Alternative Assets
Minutes: 15

Reading References:

- 37. “Alternative Investments Portfolio Management”, Reading 37, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Jot K. Yau, CFA, Thomas Schneerweis, Thomas R. Robinson, CFA and Lisa R. Weiss, CFA, (CFA Institute, 2007).
- 38. “SWAPS”, Reading 38, Robert L. McDonald, *Derivatives Markets*, 2nd edition, Robert L. McDonald, (Pearson Education, 2006).
- 39. “Commodity Forwards and Futures”, Reading 39, Robert L. McDonald, *Derivatives Markets*, 2nd edition, Robert L. McDonald, (Pearson Education, 2006).
- 44. “Risk Management Applications of Swap Strategies”, Reading 44, Don M. Chance, CFA, *Analysis of Derivatives for the Chartered Financial Analyst® Program*, Don M. Chance, (AIMR, 2003).

Purpose:

To test knowledge and use of commodity futures.

LOS: 2009-III-13-37-m, n

- 37. “Alternative Investments Portfolio Management”
The candidate should be able to:
 - m) Compare and contrast indirect and direct commodity investment.
 - n) Explain the three components of return for a commodity futures contract and the effect that an upward or downward sloping term structure of futures prices will have on roll yield.

LOS: 2009-III-13-44-b, d

- 44. “Risk Management Applications of Swap Strategies”
The candidate should be able to:
 - b) Calculate and interpret the duration of an interest rate swap.
 - d) Determine the notional principal value needed on an interest rate swap to achieve a desired level of duration in a fixed income portfolio.

LEVEL III

Question: 8
Topic: Alternative Assets
Minutes: 15

Guideline Answer:

PART A

Template for Question 8-A

Return component	Determine, given that Smith's market expectations are correct, whether an increase, a decrease, or no change in <i>each</i> of the following return components should be expected. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. Spot return (price return)	<div><div>Increase</div><div>Decrease</div><div>No change</div></div>	This is the return related to changes in the underlying commodity (platinum) using the cost-of- carry model. Smith expects the spot price of platinum to rise which would cause short-dated futures prices to rise as arbitrage trading occurred.
ii. Collateral return (collateral yield)	<div><div>Increase</div><div>Decrease</div><div>No change</div></div>	This is the return that arises from investment in platinum futures rather than the physical platinum. Smith is able to invest the full value of the underlying contract to earn the risk-free interest rate. Since he expects interest rates to rise, this component of return will also rise.
iii. Roll return (roll yield)	<div><div>Increase</div><div>Decrease</div><div>No change</div></div>	This is the return that arises from rolling long platinum futures contracts over time. Smith expects convenience yields will rise, increasing roll return as a result of increased backwardation. Also, he expects interest rates will rise, thus decreasing roll return. In the cost-of-carry model, these two factors have opposite effects. If these effects are assumed to offset each other, then there will be net change in the roll return. Conversely, if the rise in convenience yield is more than the rise in interest rates, roll return will increase.

LEVEL III

Question: 8
Topic: Alternative Assets
Minutes: 15

PART B

Template for Question 8-B

Determine which swap <i>best</i> achieves Smith's stated goals. (circle one)	Justify your response with <i>two</i> reasons.
Swap 1	1. The swap needs to pay fixed, receive floating, eliminating further consideration of Swaps 2 & 4. Paying fixed will offset receiving fixed from the original bond. Swap 3 reduced duration of the bond position. Smith needs to add a negative-duration position to reduce duration from 3 to 0.3.
Swap 2	
Swap 3	2. Swap 3 has a notional principal close to the USD 120 million of the bond position. Swap 3 will have a duration of approximately -2.9 and a notional principal of approximately USD 113 million (compared with USD 259 million for Swap 1).
Swap 4	

Supporting Calculations:

Swap 1:

A two year pay-fixed, receive floating swap with semi-annual payments will have a duration of approximately:

$$(1/2/2) - 0.75(2) = 0.25 - 1.5 = -1.25$$

The required overall duration is 0.3 so the notional principal (NP) must satisfy:

$$\text{USD } 120,000,000(3) + \text{NP}(-1.25) = \text{USD } 120,000,000(0.3)$$

So NP = $[\text{USD } 120,000,000(3 - 0.3)] / 1.25 = \text{USD } 259,200,000$, more than double the original bond.

Swap 3:

A four year pay-fixed, receive floating swap with quarterly payments will have a duration of approximately:

$$(1/4/2) - 0.75(4) = 0.125 - 3.0 = -2.875.$$

The required overall duration is 0.3 so the notional principal (NP) must satisfy:

$$\text{USD } 120,000,000(3) + \text{NP}(-2.875) = \text{USD } 120,000,000(0.3)$$

So NP = $[\text{USD } 120,000,000(3 - 0.3)] / 2.875 = \text{USD } 112,695,652$, which is close to the amount of the original bond.

Conclusion

Swaps 2 and 4 increase duration and are therefore not appropriate.

Swaps 1 and 3 both decrease duration. Smith has stated that he would prefer the notional principal of the swap to be as close as possible to the amount of the original bond. Therefore Swap 3, the four-year quarterly, pay fixed, receive floating swap, is the appropriate swap.

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 16

QUESTION 9 HAS TWO PARTS (A, B) FOR A TOTAL OF 16 MINUTES.

Maple Leaf International is a Canadian corporation with business in Europe and Japan. Maple Leaf's business transactions generate exchange rate risk between the Canadian dollar (CAD) and both the euro (EUR) and Japanese yen (JPY). In order to hedge their exchange rate risk, management endorses the use of currency forwards, options, and swaps. Ian McKinley, chief risk officer, has been asked to present an analysis of the company's currency exposures to Maple Leaf's board of directors and senior managers.

Maple Leaf is long a forward contract on EUR 50 million at 1.63 CAD/EUR, expiring in six months. It is also long 100 JPY put options (European style) with expiration in six months, a strike price of 100 JPY/CAD, and a contract size of JPY 12.5 million. The current spot exchange rates are 1.64 CAD/EUR and 102.5 JPY/CAD. All of Maple Leaf's currency derivatives are traded over the counter (OTC) with North Bank. Key interest rates are displayed in Exhibit 1.

Exhibit 1
Six-month Risk-free Interest Rates
(Annualized)

CAD	3.0%
EUR	4.5%
JPY	0.5%

McKinley makes the following statements regarding the credit risk on currency swaps.

Statement 1: "The credit risk on currency swaps is greatest at the middle of the swap term."

Statement 2: "The credit risk on currency swaps is bilateral and isolated to the Maple Leaf-North Bank contracts."

- A. i. **Determine** *one* reason related to credit risk that makes *each* of McKinley's statements incorrect.

Note: Simply reversing the statements will receive no credit.

- ii. **Discuss** *one* method to reduce credit risk associated with Maple Leaf's OTC currency derivative positions.

(6 minutes)

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 16

- B. i. **Calculate** the amount at risk from a credit loss on the long EUR forward contract. **Determine** which party bears the credit risk. **Show** your calculations.
- ii. **Calculate** the amount at risk from a credit loss on the long JPY put option contract. **Determine** which party bears the credit risk. **Show** your calculations.

(10 minutes)

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 16

Reading References:

- 40. “Risk Management,” Ch. 9, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Don M. Chance, Kenneth Grant, and John Marsland, (CFA Institute, 2007)
- 41. “Currency Risk Management,” Ch. 11, *Global Investments*, 6th edition, Bruno Solnik and Dennis McLeavey (Addison Wesley, 2009)

Purpose:

To test the principles of Risk Management and credit/counterparty risk.

LOS: 2009-III-14-40-c, d, i, j, k

40. **“Risk Management”**

The candidate should be able to:

- c) evaluate the strengths and weaknesses of a company’s risk management processes and the possible responses to a risk management problem;
- d) evaluate a company’s or a portfolio’s exposures to financial and non-financial risk factors;
- i) evaluate the credit risk of an investment position, including forward contract, swap, and option positions;
- j) demonstrate the use of risk budgeting, position limits, and other methods for managing market risk;
- k) demonstrate the use of exposure limits, marking to market, collateral, netting arrangements, credit standards, and credit derivatives to manage credit risk;

LOS: 2009 III-14-41 e, f

41. **“Currency Risk Management”**

The candidate should be able to:

- e) explain the issues that arise when hedging multiple currencies;
- f) discuss the use of options rather than futures/forwards to insure and hedge currency risk;

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 16

Guideline Answer:

PART A

i.

Statement 1

Notional principal must be exchanged at the beginning and end of the contract. Because the notional principal tends to be a large amount relative to the periodic payments, the potential for loss caused by the counterparty defaulting on the final notional principal payment is great. The greatest credit risk on currency swaps tend to occur closer to the contract end date.

Statement 2

If Maple Leaf or North Bank defaults to a third party and must declare bankruptcy, the swap between Maple Leaf and North Bank may also go into default. Hence, the default risk is not isolated exclusive to the contract written between Maple Leaf and North Bank. However, the risk is bilateral as either party could end up as the net payer.

ii.

There are a variety of measures Maple Leaf can take to reduce its exposure to North Bank. Maple Leaf could:

- reduce exposure to a single party and diversify to other counterparties
- require daily bilateral settlement
- demand collateral to cover any exposure
- substitute exchange traded instruments for the OTC contracts
- insist its OTC positions be marked-to-market and settled periodically
- require payment netting
- utilize a variety of credit derivatives to hedge exposure to North Bank

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 16

PART B

i.

Maple Leaf is long the forward contract on EUR.

Term = 6 months until expiration

Spot rate = 1.64 CAD/EUR

Forward rate = 1.63 CAD/EUR

Canadian interest rate = 3%

EUR (European) interest rate = 4.5%

The value of the forward contract, CAD per EUR, is then equal to the spot exchange rate discounted at the foreign interest rate minus the forward rate discounted at the domestic interest rate.

$$\frac{1.64}{(1.045)^{0.5}} - \frac{1.63}{(1.03)^{0.5}} = -0.001786$$

$-0.001786 \times \text{EUR } 50,000,000 = \text{CAD } 89,300$ (or CAD 89,314.13 exactly) is the current amount at risk for a credit loss from default by the long party (Maple Leaf).

Alternatively, the credit loss can be calculated as PV (owned) – PV (owed)

With the change in exchange rates, a revised forward rate can be calculated:

$$\begin{aligned} F &= S \times (1+R_D)^{0.50} / (1 + R_F)^{0.50} \\ &= 1.64 \times (1+0.03)^{0.50} / (1 + 0.045)^{0.50} \\ &= 1.628187 \end{aligned}$$

The difference at maturity between what is owned and owed is:

$$1.628187 - 1.63 = -0.001813$$

The present value of the change will be:

$$\begin{aligned} \text{PV} &= -0.001813 / (1.03)^{0.50} = -0.001786 \times 50,000,000 \\ &= \text{CAD } 89,314 \end{aligned}$$

North Bank bears the credit risk that Maple Leaf will not pay because the EUR forward contract has negative value to Maple Leaf, the long party.

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 16

ii.

Maple Leaf is long a European put option, and thus it has the right to sell JPY at JPY 100 per CAD in six months.

All of the credit risk associated with a currency option is borne by the long side of the option contract, i.e., Maple Leaf. This is because the long party seeks a payoff from the writer of the option should the option finish in-the-money. Because this is an OTC European option, with no payments required until expiration, Maple Leaf does not face any current risk until then. It does, however, face potential credit (counterparty) risk.

If exchange rates remain unchanged until then, the risk to Maple Leaf can be calculated as:

$$\frac{1}{100} - \frac{1}{102.5} = 0.000244 \times 12,500,000 \text{ JPY} \times 100 \text{ contracts} = 305000 \text{ CAD}$$

On a per contract basis, Maple Leaf would expect a payoff of CAD 3,050 (or CAD 3,048.78 exactly).

For an exchange-traded option prior to expiration, the current market value of the put option would be the amount at risk.

LEVEL III

Question: 10
Topic: Monitor/Rebalance
Minutes: 15

QUESTION 10 HAS TWO PARTS (A, B) FOR A TOTAL OF 15 MINUTES.

Jackson Miller, a portfolio manager at Big Trust Bank, arranges a meeting with a client, Jin Huang, to review the performance of her portfolio and discuss Big Trust's market outlook.

At the meeting, Miller suggests examining Huang's portfolio rebalancing strategy to ensure that her portfolio stays consistent with her long-term objectives. The target strategic asset allocation for her portfolio and the corridor widths for Huang's percentage-of-portfolio rebalancing strategy are shown in Exhibit 1.

Exhibit 1
Huang's Strategic Asset Allocation and Corridor Widths

Asset Class	Target Weight	Corridor Widths
Domestic equity	25%	+/- 2.5%
Non-domestic equity	30%	+/- 3.0%
Domestic bonds	30%	+/- 3.0%
Risk-free securities	10%	+/- 1.0%
Alternative investments	5%	+/- 0.5%

Miller informs Huang that Big Trust recently revised its market outlook. Revised expectations are as follows:

- An increase in the price of gold, which is a component of the alternative investments asset class;
- Lower volatility of domestic bond prices as the economy becomes less sensitive to changes in oil prices;
- Lower transactions costs for non-domestic equities resulting from expanded electronic trading.

Huang asks how these revisions will affect the corridor widths associated with the percentage-of-portfolio approach to rebalancing.

- A. **Determine**, for *each* revised expectation, whether the stated asset class corridor width in Exhibit 1 should be wider, narrower, or unchanged. **Justify** *each* of your responses with *one* reason.

Note: No calculations are required.

Answer Question 10-A in the Template provided on page x.

(9 minutes)

LEVEL III

Question: 10
Topic: Monitor/Rebalance
Minutes: 15

Miller meets with another client, Harriet Kilpatrick. Kilpatrick recently married and plans to have children in the near future. Her current portfolio, which has a value of 2 million U.S. dollars (USD), is invested in equities and risk-free securities. She asks Miller to develop a rebalancing strategy that will prevent her portfolio from dropping below USD 1.25 million.

Miller states that Big Trust's investment outlook predicts that equity prices will be trending upward. Kilpatrick says that she also wants to minimize her allocation to risk-free securities during a rising market in equities.

Miller tells Kilpatrick that his clients use one of three types of rebalancing strategies: a buy-and-hold strategy, a constant mix strategy, or a constant-proportion portfolio insurance (CPPI) strategy.

- B. **Select** the *most* appropriate rebalancing strategy for Kilpatrick's portfolio. **Justify** your selection with *two* reasons.

Answer Question 10-B in the Template provided on page x.

(6 minutes)

LEVEL III

Question: 10
Topic: Monitor/Rebalance
Minutes: 15

Template for Question 10-A

Note: No calculations are required.

Asset class and revised expectation	Determine, for <i>each</i> revised expectation, whether the stated asset class corridor width in Exhibit 1 should be wider, narrower, or unchanged. (circle one)	Justify <i>each</i> of your responses with <i>one</i> reason.
Alternative investments: An increase in the price of gold, which is a component of the alternative investments asset class;	Wider Narrower Unchanged	
Domestic bonds: Lower volatility of domestic bond prices as the economy becomes less sensitive to changes in oil prices;	Wider Narrower Unchanged	
Non-domestic equity: Lower transactions costs for non-domestic equities resulting from expanded electronic trading.	Wider Narrower Unchanged	

LEVEL III

Question: 10

Topic: Monitor/Rebalance

Minutes: 15

Template for Question 10-B

Select the <i>most</i> appropriate rebalancing strategy for Kilpatrick's portfolio. (circle one)	Justify your selection with <i>two</i> reasons.
buy-and-hold	1.
constant mix	2.
CPPI	

LEVEL III

Question: 10
Topic: Monitor/Rebalance
Minutes: 15

Reading References:

“Monitoring and Rebalancing,” Ch. 11, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Robert D. Arnott, Terence E. Burns, Lisa Plaxco, and Philip Moore (CFA Institute, 2007)

Purpose:

To test knowledge and use of rebalancing strategies.

LOS: 2009-III-16-46-d, f, h, j

“Monitoring and Rebalancing”

The candidate should be able to:

- d) discuss the benefits and costs of rebalancing a portfolio to the investor’s strategic asset allocation;
- 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;
- 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);
- 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.

LEVEL III

Question: 10
Topic: Monitor/Rebalance
Minutes: 15

Guideline Answer:

PART A

Template for Question 10-A

Note: No calculations are required.

Asset class and revised expectation	Determine, for <i>each</i> revised expectation, whether the stated asset class corridor width in Exhibit 1 should be wider, narrower, or unchanged. (circle one)	Justify <i>each</i> of your responses with <i>one</i> reason.
Alternative investments: An increase in the price of gold, which is a component of the alternative investments asset class;	Wider Narrower <u>Unchanged</u>	A change in the forecast is unrelated to any variable that affects the optimal width of the corridor, including transaction costs, risk tolerance, correlations, and volatilities.
Domestic bonds: Lower volatility of domestic bond prices as the economy becomes less sensitive to changes in oil prices;	<u>Wider</u> Narrower Unchanged	The optimal corridor width is inversely related to asset class volatility. Movement away from the target weight is potentially more costly for a high volatility asset class.
Non-domestic equity: Lower transactions costs for non-domestic equities resulting from expanded electronic trading.	Wider <u>Narrower</u> Unchanged	Lower transaction costs make it easier for rebalancing benefits to offset the costs.

LEVEL III

Question: 10
Topic: Monitor/Rebalance
Minutes: 15

PART B

Template for Question 10-B

Select the <i>most</i> appropriate rebalancing strategy for Kilpatrick's portfolio. (circle one)	Justify your selection with <i>two</i> reasons.
buy-and-hold	1. The CPPI strategy dynamically provides a floor to the portfolio value, consistent with Kilpatrick's objectives.
constant mix	2. When equities are trending up, CPPI will buy equities, constant mix will sell equities, and buy-and-hold will make no transactions. The greater investment in equities with CPPI allows Kilpatrick to minimize exposure to risk-free securities in rising equity markets, consistent with her objectives.
<u>CPPI</u>	

LEVEL III

Question: 11
Topic: Performance Evaluation
Minutes: 18

QUESTION 11 HAS TWO PARTS (A, B) FOR A TOTAL OF 18 MINUTES.

A fund sponsor has adopted a formal policy to guide its manager evaluations. Cecilia Velasco and Alberto Roca, two staff members, are discussing the performance of hedge fund managers and traditional fund managers.

Velasco and Roca begin by discussing how to evaluate hedge fund managers. Velasco suggests that hedge fund performance should be evaluated by comparing the manager's performance with the median of a universe of hedge funds with similar mandates.

- A. **Justify**, with *three* reasons, why Velasco's suggestion for evaluating hedge fund manager performance is inappropriate.

(6 minutes)

Velasco and Roca also appraise the performance of two traditional European equity managers. As part of the monitoring process, they have collected the information shown in Exhibit 1. Assume that it is appropriate to compare the performance of the two managers.

Exhibit 1
Five-year Performance Data ending 30 April 2009
(Annualized)

Performance Measure	Manager #1	Manager #2
Rate of return (%)	21.13	21.13
Sharpe ratio	1.17	1.21
M ² (%)	18.72	19.27
Active risk (%)	2.17	4.18
Information ratio	0.52	0.27
Treynor measure (%)	19.15	17.17
Risk-free rate (%)	2.75	2.75

- B. **Determine**, for *each* case below, the *most* appropriate performance measure from Exhibit 1 to compare Manager #1 and Manager #2. **Identify**, in *each* case, which manager outperformed. **Explain** what caused the difference in performance between the two managers.
- Reward per unit of systematic risk incurred
 - Reward per unit of total risk incurred
 - Reward per unit of risk earned by deviating from the benchmark's holdings

Answer Question 11-B in the Template provided on page x.

(12 minutes)

LEVEL III

Question: 11

Topic: Performance Evaluation

Minutes: 18

Template for Question 11-B

Case	Determine, for <i>each</i> case, the <i>most</i> appropriate performance measure from Exhibit 1 to compare Manager #1 and Manager #2.	Identify, in <i>each</i> case, which manager outperformed. (circle one)	Explain what caused the difference in performance between the two managers.
i. Reward per unit of systematic risk incurred		Manager #1 Manager #2	
ii. Reward per unit of total risk incurred		Manager #1 Manager #2	
iii. Reward per unit of risk earned by deviating from the benchmark's holdings		Manager #1 Manager #2	

LEVEL III

Question: 11
Topic: Performance Evaluation
Minutes: 18

Reading References:

47. "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 mastery of performance appraisal measures and assessment of appropriate benchmarks for equity managers.

LOS: 2009-III-17-47-f, h, j, p, q

The candidate should be able to:

- f) discuss the properties of a valid benchmark and evaluate the advantages and disadvantages of alternative types of performance benchmarks;
- h) judge the validity of using manager universes as benchmarks;
- j) discuss the issues in assigning benchmarks to hedge funds;
- 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) compare and contrast the information ratio, Treynor measure, and Sharpe ratio and explain how a portfolio's alpha and beta are incorporated into these measures;

LEVEL III

Question: 11
Topic: Performance Evaluation
Minutes: 18

Guideline Answer:

PART A

A median manager benchmark fails all the tests of benchmark validity except for being measurable.

The median manager of a universe is an inappropriate benchmark because:

- it cannot be specified in advance
- it is not investable
- it is ambiguous or not unambiguous
- the appropriateness of the benchmark style cannot be verified
- it is subject to survivorship bias
- it does not reflect current investment opinion
- it is not owned; the fund manager cannot be aware of and accept accountability for the constituents and performance of the benchmark because it is not specified in advance

LEVEL III

Question: 11
Topic: Performance Evaluation
Minutes: 18

PART B

Template for Question 11-B

Case	Determine, for <i>each</i> case, the <i>most</i> appropriate performance measure from Exhibit 1 to compare Manager #1 and Manager #2.	Identify, in <i>each</i> case, which manager outperformed. (circle one)	Explain what caused the difference in performance between the two managers.
i. Reward per unit of systematic risk incurred	Treynor measure	<div>Manager #1</div> <div>Manager #2</div>	Manager #1 has achieved a higher Treynor measure than Manager #2 ($19.15 > 17.17$), for the same excess rate of return (21.13-2.75). Therefore, it must be the case that Manager #1's account has been exposed to a lower level of systematic risk (beta). In terms of the SML, Manager #1 has produced returns that have resulted in a slope greater than the slope of Manager #2's returns.
ii. Reward per unit of total risk incurred	Sharpe ratio or M2	<div>Manager #1</div> <div>Manager #2</div>	<p>Manager #2's Sharpe ratio is higher than Manager #1's ($1.21 > 1.17$), for the same excess return (21.13-2.75). Therefore, Manager #1 has taken on a larger amount of total risk as measured by standard deviation.</p> <p>Because Manager #1 has a higher Treynor measure (lower beta) and a lower Sharpe ratio, Manager #1 must have taken more unsystematic risk.</p>

LEVEL III

Question: 11

Topic: Performance Evaluation

Minutes: 18

iii. Reward per unit of risk earned by deviating from the benchmark's holdings	Information ratio	<div>Manager #1</div> Manager #2	The “reward per incremental unit of risk earned by deviating from the benchmark's holdings” is the Information ratio . Manager #1 has outperformed Manager #2 based on the IR ($0.52 > 0.27$). This is because Manager #1's active risk or tracking error risk is lower than Manager #2's.
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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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Government provides at no direct cost to citizens.
Tax-deferred accounts (TDAs)	<ul style="list-style-type: none">• 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
Minutes: 35

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)

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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 <i>most</i> tax-efficient allocation in <i>each</i> 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 <i>most</i> tax-efficient allocation in <i>each</i> account (tax-deferred and taxable).	
	Tax-deferred Account	Taxable Account
Bonds		
Equities		
iii. Justify, with <i>two</i> reasons, why this is the <i>most</i> 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

- 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

ii. Return Calculation

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. Factors that increase Lima's ability to take risk:

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. Factors that increase Rual's ability to take risk:

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

Rual has a greater willingness to take risk because:

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 <i>most</i> tax-efficient allocation in <i>each</i> 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 <i>most</i> tax-efficient allocation in <i>each</i> account (tax-deferred and taxable).	
	Tax-deferred Account	Taxable Account
Bonds	USD 500,000	0
Equities	0	USD 500,000
iii. Justify, with <i>two</i> reasons, why this is the <i>most</i> tax-efficient allocation.		
<p>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.</p> <p>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.</p>		

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 <i>each</i> of the following characteristics of the fixed-rate portfolio if Island Life's global interest rate forecast is correct. (circle one)	Justify <i>each</i> response with <i>one</i> 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 <i>each</i> of the following characteristics of the fixed-rate portfolio if Island Life's global interest rate forecast is correct. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. surplus	<div>Increase</div> <div>No change</div> <div>Decrease</div>	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	<div>Increase</div> <div>No change</div> <div>Decrease</div>	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	<div>Increase</div> <div>No change</div> <div>Decrease</div>	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

<u>Gambler's Fallacy</u>	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.
<u>Naïve Diversification</u>	Stewart's preference to equally weight government bonds from all G-7 countries reflects naïve diversification.
<u>Regret</u>	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:
- Apax Bakers (Trade A, B, C, or D)
 - CarbX Corp (Trade A, B, E, or F)
 - 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 <i>three</i> factors that affect Apax pension plan's ability to take risk.	Determine whether <i>each</i> factor increases or decreases the plan's ability to take risk. (circle one)	Justify <i>each</i> response with <i>one</i> 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 <i>most</i> appropriate to achieve Schlipp's recommendation for <i>each</i> company. (circle one)	Justify <i>each</i> response with <i>one</i> 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 <i>three</i> factors that affect Apax pension plan's ability to take risk.	Determine whether <i>each</i> factor increases or decreases the plan's ability to take risk. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
1. Pension surplus	<div>increases</div> <div>decreases</div>	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	<div>increases</div> <div>decreases</div>	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	<div>increases</div> <div>decreases</div>	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	<div>increases</div> <div>decreases</div>	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	<div>increases</div> <div>decreases</div>	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 <i>most</i> appropriate to achieve Schlipp's recommendation for <i>each</i> company. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. Apax Bakers	Trade A <input checked="" type="radio"/> 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 <input checked="" type="radio"/> 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	<input checked="" type="radio"/> 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
Minutes: 14

- 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
Topic: Economics
Minutes: 14

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 $D_1 = D_0 * (1+g)$:

$$\begin{aligned} D_1 &= (760 * .035) * (1 + .05) \\ &= 27.93 \end{aligned}$$

Calculate k-g:

$$\begin{aligned} k-g &= (.02 + .06) - (.05) \\ &= .03 \end{aligned}$$

DDM:

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

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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;**

LEVEL III

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:

$$w = 0.25 \text{ and } 1 - w = 0.75$$

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:

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

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 + $(2 \times \text{correlation between Foreign asset return and exchange rate movement} \times \text{standard deviation of foreign asset in local currency} \times \text{standard deviation of the exchange rate})$

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

Question: 6
Topic: Fixed Income
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.

$$(\text{USD } 69,640,000 \times 4 \times 0.01 = \text{USD } 2,785,600)$$

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:

$$\text{Dollar duration of Bond X} = 1.333 \times 15,268,200 \times 0.01 = 203,525.$$

$$\text{Dollar duration of Bond Y} = 2.154 \times 15,268,200 \times 0.01 = 328,877.$$

$$\text{Dollar duration of Bond Z} = 1.890 \times 15,268,200 \times 0.01 = 288,569.$$

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:

$$\text{Modified duration of Bond A} = 477,139 / 24,556,800 / 0.01 = 1.943$$

$$\text{Modified duration of Bond B} = 2,104,939 / 29,815,000 / 0.01 = 7.060$$

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 $\text{GBP } 8.80 \times 2 = \text{GBP } 17.60$, in which case the profit per share on the straddle is:

Call option's profit of $\text{GBP } 17.60 - \text{GBP } 9.00 = \text{GBP } 8.60$, less the cost of both options ($\text{GBP } 0.38 + \text{GBP } 0.57$) = $\text{GBP } 7.65$.

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

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 = $\text{GBP } 10 \times 4,667 = \text{GBP } 46,670$.

The number of futures contracts required is:

$$\begin{aligned} N_f &= [(\beta_T - \beta_S)/\beta_f] \times (S/f), \text{ where } S = \text{stock portfolio, } f = \text{futures contract.} \\ &= [(0 - 1.04)/0.98] \times (\text{GBP } 235,400,000/\text{GBP } 46,670) \\ &= -5,352.74 \end{aligned}$$

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 $\text{GBP } 235,400,000 \times 1.035 = \text{GBP } 243,639,000$ or a gain of $\text{GBP } 8,239,000$.

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

So, the overall profit is $\text{GBP } 8,239,000 - \text{GBP } 8,164,000 = \text{GBP } 75,000$ and the ending value of the overall portfolio is $\text{GBP } 235,475,000$.

This is an overall return of $\text{GBP } 75,000/\text{GBP } 235,400,000 = 0.0003$ 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 $\pm 10\%$ 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 <i>most</i> appropriate trade execution tactic (crossing system, implementation shortfall, or VWAP) for <i>each</i> order. (circle one)	Justify <i>each</i> recommendation with <i>one</i> 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 <i>most</i> appropriate trade execution tactic (crossing system, implementation shortfall, or VWAP) for <i>each</i> order. (circle one)	Justify <i>each</i> recommendation with <i>one</i> reason.
i. Buy 5,000 shares ABCD	<div style="text-align: center;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; display: inline-block;">Crossing system</div> Implementation shortfall VWAP </div>	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	<div style="text-align: center;"> Crossing system <div style="border: 1px solid black; border-radius: 50%; padding: 5px; display: inline-block;">Implementation shortfall</div> VWAP </div>	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: $\% \text{ unfilled} \times (\text{difference between new closing price and benchmark price} / \text{benchmark price}) =$

$$14,000/20,000 \times ((10.32 - 10.25)/10.25) = .70 \times .0068294 = .0047805\% \text{ or } 48 \text{ basis points}$$

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
Minutes: 12

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

Question: 9
Topic: Performance Evaluation
Minutes: 12

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%.

LEVEL III

Question: 1
Topic: Individual PM/Behavioral
Minutes: 15

Reading References:

2011 Level III, Volume 2, Study Session 3, Reading 7, pp. 5–12
“Heuristic-Driven Bias: The First Theme,” *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University School Press, 2002)

2011 Level III, Volume 2, Study Session 3, Reading 8, pp13–20
“Frame Dependence: The Second Theme,” *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, Hersh Shefrin (Oxford University School Press, 2002)

2011 Level III, Volume 2, Study Session 4, Reading 16, pp. 246–250
“Estate Planning in a Global Context,” Stephen M. Horan, CFA, and Thomas R. Robinson, CFA (CFA Institute, 2009).

LOS:

2011-III-3-7-a

7. “Heuristic-Driven Bias: The First Theme”

The candidate should be able to

- a) **evaluate the impact of heuristic-driven biases (including representativeness, overconfidence, anchoring-and-adjustment, aversion to ambiguity) on investment decision making.**

2011-III-3-8-a

8. “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 impacts that the emotional frames of self-control, regret minimization, and money illusion have on investor behavior.

2010-III-4-16-a, b, f, g

16. “Estate Planning in a Global Context”

The candidate should be able to:

- a) **discuss the purpose of estate planning and explain the basic concepts of domestic estate planning, including estates, wills, and probate;**
- b) **explain the two principal forms of wealth transfer taxes and discuss the impact of important non-tax issues, such as legal system, forced heirship, and marital property regime;**
- c) determine a family’s core capital and excess capital, based on mortality probabilities and Monte Carlo analysis;

LEVEL III

Question: 1
Topic: Individual PM/Behavioral
Minutes: 15

- d) evaluate the relative after-tax value of lifetime gifts and testamentary bequests;
- e) explain the estate planning benefit of making lifetime gifts when gift taxes are paid by the donor, rather than the recipient;
- f) evaluate the after-tax benefits of basic estate planning strategies, including generation skipping, spousal exemptions, valuation discounts, and charitable gifts;**
- g) explain the basic structure of a trust and discuss the differences between revocable and irrevocable trusts;**
- h) explain how life insurance can be a tax-efficient means of wealth transfer;
- i) discuss the two principal systems (source jurisdiction and residence jurisdiction) for establishing a country's tax jurisdiction;
- j) discuss the possible income and estate tax consequences of foreign situated assets and foreign-sourced income;
- k) evaluate a client's tax liability under each of three basic methods (credit, exemption, and deduction) that a country may use to provide relief from double taxation;
- l) describe the impact of increasing international transparency and information exchange on international estate planning.

LEVEL III

Question: 1
Topic: Individual PM/Behavioral
Minutes: 15

Guideline Answer:

PART A

Template for Question 1-A

Note: Consider *each* objective independently.

Objective	Determine which trust (irrevocable, revocable, or both equally) is more appropriate for <i>each</i> objective. (circle one)	Justify your response with <i>one</i> reason for <i>each</i> objective.
1. Sell USD 1.0 million of Buildco shares while minimizing total taxes.	irrevocable <div>revocable</div> both equally	Becker should sell the shares in the revocable trust. Current taxes on realized capital gains will be the same for either trust ($20\% \times \text{USD } 1.8 \text{ million}$). Assets in the irrevocable trust are not subject to estate tax. Assets in the revocable trust are subject to estate taxes upon Becker's death, at which time the cost basis will be increased to market value. Thus, total taxes are minimized by selling from the revocable trust.
2. Put additional assets into a trust to protect those assets from potential future legal claims against Becker.	<div>irrevocable</div> revocable both equally	Becker remains the owner of revocable trust assets. These would be at legal risk if a claim were made against him. Irrevocable trust assets are no longer owned by the settlor and hence are out of the reach of any claimants.

LEVEL III

Question: 1
Topic: Individual PM/Behavioral
Minutes: 15

PART B

Template for Question 1-B

Note: Consider *each* bias independently. Use each discussion only *once*.

Behavioral bias	Identify the discussion in which one of the participants <i>best</i> illustrates <i>each</i> of the following behavioral biases (circle the discussion number from Exhibit 1).	Justify <i>each</i> response with <i>one</i> reason.
i. representativeness	1 2 3 4	Representativeness refers to judgments based on stereotypes. Becker may be overly optimistic that Rolling Mix Cement shares will perform well because the CEO of Rolling Mix Cement performed well at Buildco.
ii. frame dependence	1 2 3 4	Frame dependence refers to investor behavior that depends on the way decisions are framed. Becker holds many positions valued below cost. This may be evidence of frame dependence (loss aversion). His investment decisions are framed to avoid losses rather than continuously reevaluate holdings.
iii. aversion to ambiguity	1 2 3 4	People prefer the familiar to the unfamiliar. Frost prefers the certainty of bond cash flows to the uncertainty of risky asset cash flows, even though investors might receive appropriately higher returns for assuming that risk.

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 23

Reading References:

2011 Level III, Volume 2, Study Session 4, Reading 14, pp. 97–167
“Managing Individual Investor Portfolios,” Ch. 2, James W. Bronson, Matthew H. Scanlan, and Jan R. Squires, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition (CFA Institute, 2007).

LOS: 2011-III-4-14-a, j, k, l, n

14. “Managing Individual Investor Portfolios”

The candidate should be able to:

- a) **discuss how source of wealth, measure of wealth, and stage of life affect an individual investors’ risk tolerance;**
- b) explain the role of situational and psychological profiling in understanding an individual investor;
- 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 among distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
- g) explain the potential benefits, for both clients and investment advisers, 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 investor portfolios and discuss the impact that ability and willingness to take risk have on risk 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;**
- 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.**

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 23

Guideline Answer:

PART A

The after-tax nominal rate of return required for the Beckers' first year of retirement is calculated by dividing the Year 1 Net Required Cash Flow by the Beginning of Year 1 Net Investable Assets, and then adjusting for expected inflation.

Cash Flows	Year 1 of Retirement
Michael's after-tax company pension	\$48,000
Living expenses ($250,000 \times 1.03$ inflation)	<u>-257,500</u>
Year 1 Net required cash flow	<u>-\$209,500</u>
Net Investable Assets	
Inheritance	\$8,000,000
Mortgage debt repayment	-3,500,000
Consumer debt repayment	<u>-150,000</u>
Investable asset base (beginning Year 1)	<u>\$4,350,000</u>
Return Objective	
Year 1 after-tax required cash flow	<u>\$209,500</u>
Divided by investable asset base	<u>\$4,350,000</u>
Equals after-tax real return	4.82%
Plus expected inflation	3.00%
Equals after-tax nominal rate of return	7.82%
or geometrically $\{ (1.0482)(1.03) - 1 \}$	7.96%

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 23

PART B

There are several factors that decrease the Becker's risk tolerance:

- The Beckers, being retired, are in the maintenance stage of life. They do not intend to work; no additional income flows are expected.
- Michael Becker has a small pension relative to living expenses. The Beckers must depend primarily on their investment portfolio.
- The Beckers have a high level of spending relative to investable assets, making them less able to tolerate volatility and negative short-term returns.
- The Beckers want their portfolio to be invested conservatively (low willingness to take risk).
- The Beckers inherited their wealth (passive source of wealth), which may result in a reduced willingness to take risk.

PART C

i. Liquidity:

The Beckers have USD 3,650,000 immediate cash needs for debt repayments plus USD 209,500 in net living expenses for the first year of retirement (USD 257,500 – USD 48,000 Michael's annual pension), or a total of USD 3,859,500. Ongoing liquidity needs will be USD 209,500 adjusted for inflation.

ii. Time horizon:

The Beckers are retiring at a young age, and do not expect expenses to change until one of them dies. Therefore, their time horizon is long-term, two-stage: (1) when they are both alive, and (2) after one of them dies.

The Beckers' time horizon may also be considered long-term, three-stage. In this case, their beginning liquidity needs are the first stage. The second and third stages would be the remainder of their lives as noted above.

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 23

PART D

i.

Portfolio A will better allow the Beckers to achieve their primary financial goal of maintaining their living standard until both have died. This is because the portfolio has a higher probability of achieving a positive terminal value.

ii.

1. Frost should incorporate expected capital market assumptions into her simulation. Historical data may not fully reflect the range of possible future investment returns. Historical data also may include unlikely outliers.
2. Frost should model the performance of the portfolio's specific assets rather than the performance of its asset classes. The portfolio's performance and risk may differ from asset class performance and risk. Asset class simulation could also exclude important aspects of asset-specific investment returns such as fees and tax efficiencies.

LEVEL III

Question: 3
Topic: Institutional Portfolio Management
Minutes: 26

Reading References:

2011 Level III, Volume 2, Study Session 5, Reading 20
“Managing Institutional Investor Portfolios,” Ch. 3, R. Charles Tschampion, Laurence B. Siegel, Dean J. Takahashi, and John L. Maginn, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition (CFA Institute, 2007).

LOS: 2011-III-5-20-h, i, j, l, m, n

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;**
- 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.**

LEVEL III

Question: 3
Topic: Institutional Portfolio Management
Minutes: 26

Guideline Answer:

PART A

- i. The return objective for the WU endowment is to earn a rate of return sufficient to maintain the real value of its assets and to support 25% of the university's annual operating expenses.
- ii. The required rate of return for the WU endowment combines the 5% spending rate, the higher education inflation rate of 4%, and annual management expense of 0.55%.

Calculated using a multiplicative formulation; the required return is:

$$[(1.05) \times (1.04) \times (1.0055)] - 1 = 0.09801 \text{ or } 9.80\%$$

OR by the arithmetic formulation:

$$(0.05) + (0.04) + (0.0055) = 0.0955 \text{ or } 9.55\%$$

LEVEL III

Question: 3
Topic: Institutional Portfolio Management
Minutes: 26

PART B

Template for Question 3-B

Note: Consider *each* factor independently.

Factor	Determine how a change in <i>each</i> of the factors, holding all else constant, affects the risk tolerance (increases, decreases, does not change) for the WU endowment. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. private donations	increases decreases does not change	Increases risk tolerance: External funding (including private donations) is a source of liquidity. As donations <u>increase</u> , a lower proportion of invested assets is required to meet current spending needs, and the endowment can assume greater risk. Decreases risk tolerance: As donations <u>decrease</u> , a higher proportion of invested assets is required to meet current spending needs, and the endowment must assume lower risk.
ii. expected inflation	increases decreases does not change	Increases risk tolerance: An increase in expected inflation may cause the endowment to demand a higher real return on investments to compensate for a perceived increase in risk. This can lead to an increase in expected long-term real returns for the portfolio. As expected real returns increase, with the nominal spending rule held constant, the risk tolerance of the endowment increases. Decreases risk tolerance: An increase in expected inflation may cause the endowment to use inflation hedges, or to hold more liquid assets in the portfolio to meet expected increased spending needs. This reduction in risk exposure may be considered a reduction in risk tolerance.

LEVEL III

Question: 3
Topic: Institutional Portfolio Management
Minutes: 26

PART C

- i. The liquidity constraint is defined by the endowment's current spending need. This is 5% of the beginning of period market value of the asset portfolio, or 25% of WU's operating expenses. For the current year, the endowment's liquidity needs are USD 37.5 million. (Management fees of 0.55% can also be considered liquidity needs, increasing required spending to 5.55% of beginning of period market value of the asset portfolio, or USD 41.625 million.)
- ii. The WU endowment fund has a long-term time horizon as its goal is to maintain the real value the endowment in perpetuity.

LEVEL III

Question: 3
Topic: Institutional Portfolio Management
Minutes: 26

PART D

Template for Question 3-D

Determine which <i>one</i> of Bergen's strategic actions is:	Bergen's strategic actions (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. <i>least likely</i> to assist the endowment in achieving its primary goal.	1 2 <u>3</u>	Revising the portfolio's asset allocation to decrease its risk reduces the expected return on the asset portfolio and the WU endowment will be less likely to maintain its real value over the long-term.
ii. <i>most likely</i> to reduce the volatility of the endowment's funding of WU's operating expenses.	1 <u>2</u> 3	Adopting a rolling three-year average spending rule, based on the endowment's beginning-of-year market value for the last three years, spreads or smooths the impact of a particular year, thereby reducing the volatility of the endowment's funding of WU's operating expenses.

LEVEL III

Question: 3
Topic: Institutional Portfolio Management
Minutes: 26

PART E

Factors that suggest SU may have a higher risk tolerance than WU:

1. SU's endowment has a lower relative commitment to SU's operating budget than WU's endowment to WU's operating budget (10% versus 25%). Hence, SU is less likely to face a spending obligation short-fall and, holding all else constant, suggests that SU's risk tolerance is higher than WU.
2. SU's endowment is committed to covering the SU operating deficit, but only up to its spending rule. If the operating deficit (in dollar terms) is smaller than its spending rule (in dollar terms), it will spend less. Therefore, in any period where it is required to spend less than 5%, it can accumulate real value. Given WU's secondary goal of funding 25% of the operating budget, it is less likely that WU's spending will be less than 5%.
3. SU's operating expenses are expected to grow at a slower rate than WU's, thus SU is less likely to face a spending obligation short-fall in the future and, holding all else constant, suggests that SU may have a higher risk tolerance than WU.
4. Donations have been increasing for SU and decreasing for WU. SU requires fewer liquid assets and relies less on portfolio returns to satisfy spending needs. Thus, SU's risk tolerance is higher than WU.
5. SU's investment manager is evaluated with a longer-term return metric. Hence, SU's manager has less short-term performance pressure, and is able to tolerate greater short-term volatility.
6. SU receives government funding whereas WU relies on a private funding. Therefore, SU has a more stable or reliable external funding source, resulting in a higher risk tolerance.
7. SU has a spending rule that is smoothed over a three year period versus WU's annual spending rule. A smoothed spending rule will decrease volatility in spending requirements, allowing SU to assume higher risk tolerance.

LEVEL III

Question: 4
Topic: Economics
Minutes: 23

Reading References:

2011-Level III: Volume 3; Study Session 7; Reading 24
“Equity Market Valuation,” Peter C. Stimes and Stephan E. Wilcox (CFA Institute, 2011)

LOS: 2011-III-7-24-c, d, f, g

24. “Equity Market Valuation”

The candidate should be able to:

- a. explain the terms of the Cobb-Douglas production function and demonstrate how the function can be used to model growth in real output under the assumption of constant returns to scale;
- b. evaluate the relative importance of growth in total factor productivity, in capital stock, and in labor input given relevant historical data;
- c. **demonstrate the use of the Cobb-Douglas production function in obtaining a discounted dividend model estimate of the intrinsic value of an equity market;**
- d. **evaluate the sensitivity of equity market value estimates to changes in assumptions;**
- e. contrast top-down and bottom-up forecasts of the earnings per share of an equity market index;
- f. **explain and critique models of relative equity market valuation based upon earnings and assets;**
- g. **judge whether an equity market is under-, fairly, or over-valued based on a relative equity valuation model.**

LEVEL III

Question: 4
Topic: Economics
Minutes: 23

Guideline Answer:

PART A

The Cobb-Douglas production function can be used to calculate the projected annual real GDP growth rate. The model is particularly useful in the case of developing markets where the structure of the underlying economy has experienced, and may continue to experience, fundamental changes. One assumption of the model is that the production function exhibits constant returns to scale (i.e., a given percentage increase in capital stock and labor input results in an equal percentage increase in output).

Projected annual real GDP growth rate = growth in Total Factor Productivity (TFP) + {(Output Elasticity of Capital) × (Growth in Capital Stock)} + {(1 – Output Elasticity of Capital) × (Growth in Labor Input)}

For the projected annual real GDP growth rate $= 2.8\% + (0.4 \times 3.6\%) + (0.6 \times 2.2\%)$
 $= 2.8\% + 1.44\% + 1.32\%$
 $= 5.56\% \text{ or } 5.6\%$

LEVEL III

Question: 4
Topic: Economics
Minutes: 23

PART B

Template for Question 4-B

Note: No calculations are required. Consider *each* action independently.

Action	Determine the <i>initial</i> effect (increase, decrease, or no change) <i>each</i> action would most likely have on the country's GDP growth trend. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
1. Issue new regulations to reduce environmental pollution by manufacturers.	increase <div>decrease</div> no change	Total Fixed Costs increase as a result of the new regulations. This will lead to lower levels of production and lower growth rates of GDP in the short- to medium-term. However, in the long run, there are no fixed costs. As retro-fitting is completed and obsolete plants and machinery are replaced, a new equilibrium will be established.
2. Decrease the minimum retirement age by three years for all workers.	increase <div>decrease</div> no change	Decreasing the minimum retirement age will initially decrease labor participation and therefore the growth in labor input. This directly decreases the GDP growth trend.

LEVEL III

Question: 4
Topic: Economics
Minutes: 23

PART C

In the H-Model, the dividend growth rate g_S , is expected to decline linearly over a finite horizon, towards a sustainable rate g_L . It incorporates a growth rate in dividends “ g_S ” that is expected to prevail in the initial period of years, N , and then decline linearly to a long-term dividend growth rate “ g_L ”. g_L is expected to prevail to perpetuity from the end of period N . Inputs also include the initial annual dividend at time zero, D_0 , and a discount rate to perpetuity of r .

$$\text{Implied Price Level } (V_0) = [D_0 / (r - g_L)] [(1 + g_L) + (N/2) (g_S - g_L)]$$

Where D_0 = initial annualized dividend rate at time zero

Where g_S = dividend growth rate in initial period, N

Where g_L = long-term dividend growth rate (in perpetuity) starting at the end of period N

Where r = discount rate in perpetuity

$$V_0 = [(10 / (0.055 - 0.03)) [(1 + 0.03) + (15 / 2) (0.06 - 0.03)]$$

$$V_0 = 400 [1.03 + 7.5 (0.03)]$$

$$V_0 = 400 (1.255) = 502$$

Based on the H-Model, the estimated intrinsic value of the country's broad equity index is 502.

PART D

Two factors not included in the Fed Model but included in the Yardeni Model are:

1. The equity risk premium.
2. Earnings growth.

The Yardeni Model attempts to address the equity risk premium by including the yield on risky debt (credit spread on A-rated bonds). While including a credit risk premium may improve upon the Fed Model, this approach does not accurately address the equity risk premium.

The Yardeni Model includes a long-term earnings growth forecast, which does accurately address the earnings growth.

LEVEL III

Question: 4
Topic: Economics
Minutes: 23

PART E

Template for Question 4-E

Model	Determine, using the data in Exhibit 2, if the broad equity market is overvalued, fairly valued, or undervalued according to the models indicated. (circle one)	Justify <i>each</i> response with <i>one</i> reason. Show your calculations.
i. Fed Model	<div>overvalued</div> <div>fairly valued</div> <div>undervalued</div>	<p>The Fed model assumes that a market is fairly valued when the yield on long-term government debt, Y_{govt} equals the forward equity-index earnings yield, Y_{eqty}. In this case, the forward equity-index earnings yield is lower than the long-term government bond yield; therefore the equity market is overvalued.</p> <p>In this case:</p> <ul style="list-style-type: none">• The long-term government bond yield (Y_{govt}) equals 4.05%• The forward equity index earnings yield (Y_{eqty}) equals 3.95% <p>$Y_{\text{eqty}} < Y_{\text{govt}}$ Therefore, based on the Fed model, the broad equity market is overvalued.</p>

LEVEL III

Question: 4
Topic: Economics
Minutes: 23

Template for Question 4-E (continued)

Model	Determine, using the data in Exhibit 2, if the broad equity market is overvalued, fairly valued, or undervalued according to the models indicated. (circle one)	Justify <i>each</i> response with <i>one</i> reason. Show your calculations.
ii. Yardeni Model	overvalued <div style="border: 1px solid black; border-radius: 50%; padding: 5px; display: inline-block;">fairly valued</div> undervalued	<p>The Yardeni model assumes that a market is fairly valued when the justified forward earnings yield, Y_{eqty} is equal to the forward equity index earnings yield value implied by current equity market index values (using consensus forward earnings estimates). The Yardeni model defines the justified forward earnings yield as the long-term corporate bond yield, Y_{corp}, minus the weighted long-term earnings growth rate, $d \times \text{LTEG}$ (the weighting, d, is based on the market).</p> <p>In this case:</p> <ul style="list-style-type: none">• The forward equity index earnings yield value implied by current equity market index values (Y_{eqty}) equals 3.95%.• The long-term corporate bond yield (Y_{corp}) minus the weighted long-term earnings growth rate ($d \times \text{LTEG}$) equals 3.95%, $4.70\% - (0.10 \times 7.5\%) = 3.95\%$. <p>Since $(Y_{\text{eqty}}) = (Y_{\text{corp}}) - (d \times \text{LTEG})$, the Yardeni model would conclude that the equity market is fairly valued.</p>

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 20

Reading References:

2011 Level III, Volume 3, Study Session 8, Reading 26.
“Asset Allocation,” Ch. 5, William F. Sharpe, Peng Chen, Jerald E. Pinto, and Dennis W. McLeavey, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition (CFA Institute, 2007).

LOS: 2010-III-8-26-d, l, and o.

26. “Asset Allocation”

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 and discuss the investor circumstances in which they are commonly used;**
- e) explain the advantage of dynamic over static asset allocation and discuss 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;
- 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: 20

Guideline Answer:

PART A

i. Advantages of using a resampled efficient frontier:

The resampled efficient frontier approach generates portfolios that are more stable through time than those derived using standard mean-variance optimization (MVO). Finnegan stated that she was dissatisfied with the high level of turnover and transaction costs she incurred in her portfolio using standard MVO. A portfolio that is more stable would reduce turnover and transaction costs, and be more appropriate for Finnegan.

The resampled efficient frontier approach generates portfolios that are more diversified than those derived using standard MVO. Finnegan stated that she has below-average risk tolerance until she finds a new job. A more diversified portfolio should be less volatile, meeting Finnegan's lower risk tolerance requirement.

ii. Advantages of using the Black-Litterman approach:

The Black-Litterman (BL) approach incorporates the investor's views. Finnegan has a positive view of the European retail clothing sector. The BL approach allows her to incorporate these views, while standard MVO does not.

The BL approach generates portfolios that are more diversified than those derived using standard MVO. Finnegan stated that she has below-average risk tolerance until she finds a new job. A more diversified portfolio should be less volatile, meeting Finnegan's lower risk tolerance requirement.

iii. Advantages of using a Monte-Carlo simulation:

Monte Carlo simulations allow for portfolio rebalancing under changing tax rates and in multi-period situations. Finnegan's effective tax rate will likely increase sharply when she starts a new job. MVO does not consider these factors.

Monte Carlo simulations can compute path-dependent terminal wealth. Finnegan hopes to make a deposit on a home for her sister within the year, provided she finds a new job. Cash flows in and out of a portfolio and the sequence of returns will have a material effect on terminal wealth – this is termed path-dependent. In Finnegan's case, the deposit would be a significant cash outflow, resulting in lower terminal wealth.

LEVEL III

Question: 5
Topic: Asset Allocation
Minutes: 20

PART B

The ALM approach focuses asset allocation on funding liabilities. Finnegan should adopt an ALM approach because:

- Finnegan faces a significant penalty for not meeting her liabilities. If she misses her mortgage payments for three or more months, she risks losing her home. She does not want to sell assets to pay the mortgage. Therefore, a portfolio structure designed to meet liabilities would be appropriate.
- Finnegan has below average risk tolerance while unemployed. Loss averse investors, or investors with below-average risk tolerance, are better suited to an ALM approach than to an AO approach.
- Finnegan's mortgage payments are interest-rate sensitive. Holding investment assets with similarly sensitive cash flows would hedge this risk. Therefore, an ALM approach is more appropriate than an AO approach for her.

PART C

Finnegan should have a lower allocation to equities because:

- Finnegan is young and has a large amount of human capital relative to her financial capital.
- The correlation between Finnegan's income and the equity market's performance is high. Thus, her overall allocation to "equity like" capital is extremely high. Investors whose human capital is highly correlated with equity returns should balance human capital risk through a lower allocation to equities in their investment portfolios.

Level III

Question: 6
Topic: Fixed Income
Minutes: 19

Reading References:

2011 Level III, Volume 4, Study Session 9, Reading 28

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

2011 Level III, Volume 4, Study Session 9, Reading 29

“Relative-Value Methodologies for Global Credit Bond Portfolio Management,” Ch. 5, Jack Malvey, *Fixed Income Readings for the Chartered Financial Analyst® Program*, 2nd edition (CFA Institute, 2005).

LOS:

2011-III-9-28-d, g

28. “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 techniques, such as duration matching and the use of 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 to 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) explain 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;

- 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.

2011-III-9-29-d, e

29. “Relative-Value Methodologies for Global Credit Bond Portfolio Management”

The candidate should be able to:

- a) explain classic relative-value analysis, based on top-down and bottom-up approaches to credit bond portfolio management;
- b) discuss the implications of cyclical supply and demand changes in the primary corporate bond market and the impact of secular changes in the market’s dominant product structures;
- c) summarize the influence of investors’ short- and long-term liquidity needs on portfolio management decisions;
- d) **discuss common rationales for secondary market trading, including yield-spread pickup trades, credit-upside trades, credit-defense trades, new-issue swaps, sector-rotation trades, yield curve–adjustment trades, structure trades, and cash flow reinvestment;**
- e) **discuss and evaluate corporate bond portfolio strategies that are based on relative value, including total return analysis, primary market analysis, liquidity and trading analysis, secondary trading rationales and trading constraints, spread analysis, structure analysis, credit curve analysis, credit analysis, and asset allocation/sector analysis.**

Level III

Question: 6
Topic: Fixed Income
Minutes: 19

Guideline Answer:

PART A

i.

The rebalancing ratio is the beginning of year dollar duration of the portfolio divided by the end of year dollar duration of the portfolio minus 1. It indicates the percentage amount that each bond position needs to be changed in order to rebalance the portfolio.

The beginning of year dollar duration of the government bond (\$D₀) portfolio equals \$166,230.

Beginning of Year Dollar Duration (\$D₀)

Portfolio:	Price	Duration	Market Value	Dollar Duration
Bond 1	94.50	4.9	\$ 945,000	\$ 46,305
Bond 2	90.00	7.0	\$900,000	\$ 63,000
Bond 3	103.50	5.5	\$1,035,000	\$ 56,925
			\$2,880,000	\$ 166,230

where:

Dollar duration = (Market value of bond) × (Bond duration) × (Par value of bond) × (0.01)

For example for Bond 1, the dollar duration = $0.9450 \times 4.9 \times \$1,000,000 \times 0.01 = \text{USD } 46,305$.

The end of year dollar duration of the government bond portfolio (\$D₁) equals \$150,010.

End of Year Dollar Duration (\$D₁)

Portfolio:	Price	Duration	Market Value	Dollar Duration
Bond 1	94	4.3	\$940,000	\$ 40,420
Bond 2	93	6.3	\$ 930,000	\$ 58,590
Bond 3	102	5.0	\$ 1,020,000	\$ 51,000
			\$ 2,890,000	\$ 150,010

The rebalancing ratio = $\$D_0 / \D_1
= $\$166,230 / \$150,010$
= $1.1081 - 1 = 10.81\%$.

This implies that Andrews must increase the portfolio's holdings of each bond by 10.81% to restore the dollar duration match with the pension fund's liability benchmark.

Level III

Question: 6
Topic: Fixed Income
Minutes: 19

ii.

The amount of cash required for rebalancing equals the end of year market value of the bond portfolio times the rebalancing ratio.

Cash required for rebalancing = $\$2,890,000 \times 0.1081 = \$312,409$

PART B

Wang's portfolio will most likely outperform its benchmark.

Wang's portfolio deviates from the benchmark in one parameter: sector weights. Relative to the benchmark index, his portfolio is overweight in Consumer Cyclical, underweight in Consumer Non-cyclicals and neutral in Utilities. Consumer Cyclical tends to outperform other sectors during a period of economic strength, as consumers go forward with delayed and non-essential purchases. Therefore, the returns on Wang's portfolio are expected to be higher than the benchmark portfolio returns during a period of increased economic activity, as forecast by SM Capital's economist.

The utilities sector will neither increase nor decrease portfolio returns compared to the benchmark index, because the portfolio weighting matches the index. Similarly, the other two parameters, duration and credit quality, are matched to the benchmark and thus would have no impact on relative performance.

Level III

Question: 6
Topic: Fixed Income
Minutes: 19

PART C

Template for Question 6-C

Note: Consider *each* strategy independently.

Trading strategy	Describe the trades that Wang could use (buy/sell bonds as appropriate) to implement <i>each</i> trading strategy.	Justify <i>each</i> trade, based on the economist's forecast.
1. sector rotation trades	Bonds to buy: Consumer Cyclical	<p>A sector rotation trade is used to move out of a sector that is expected to weaken and move into a sector that is expected to strengthen.</p> <p>When there is an increase in economic activity, the Consumer Cyclical sector tends to outperform other sectors. Consumers go forward with purchases that have been delayed and purchases of non-essential goods.</p> <p>Since the economist has forecast a significant economic improvement, an appropriate sector rotation trade for Wang would be to increase Consumer Cyclical holdings (Wang is already overweight this sector relative to the benchmark index). Either Consumer Non-cyclical or Utilities can be sold to fund the purchase. Given that Wang's portfolio is already underweight in Consumer Non-cyclical relative to the benchmark index, he is more likely to reduce his exposure to Utilities, which also behave in a non-cyclical fashion.</p>
	Bonds to sell: Consumer Non-Cyclical or Utilities	

Level III

Question: 6
Topic: Fixed Income
Minutes: 19

Template for Question 6-C (continued)

Note: Consider *each* strategy independently.

Trading strategy	Describe the trades that Wang could use (buy/sell bonds as appropriate) to implement <i>each</i> trading strategy.	Justify <i>each</i> trade, based on the economist's forecast.
2. credit adjustment trades	Bonds to buy: Low rated bonds: BBB	A credit adjustment trade is designed to increase or decrease the average credit quality of the bond portfolio. Given the economist's strong outlook for the economy and the prospect of fewer corporate defaults, Wang should decrease the average credit quality of the portfolio. Lower quality bonds tend to outperform higher quality bonds during periods of increased economic activity. Therefore, Wang should engage in trades that increase the proportion of lower-rated bonds such as BBB bonds, and decrease the proportion of higher-rated bonds such as AA and above.
	Bonds to sell: High rated bonds: AA and above	
3. yield curve adjustment trades	Bonds to buy: Shorter duration bonds	A yield curve adjustment trade is designed to capitalize on expected shifts in the yield curve. The economist is expecting no change in short-term interest rates and expecting long-term interest rates to rise by 200 basis points. This would decrease the value of the long duration bonds in Wang's portfolio, thereby negatively affecting total portfolio returns. The longer the maturity of a bond (other factors equal), the longer the duration of a bond. The longer the duration, the more price-sensitive a bond is to interest rate movements. Therefore, Wang should decrease the overall duration of the portfolio by decreasing the proportion of longer duration bonds.
	Bonds to sell: Longer duration bonds	

LEVEL III

Question: 7
Topic: Equity
Minutes: 22

Reading References:

2011 Level III, Volume 4, Study Session 12, Reading 33
“Corporate Governance,” Ch. 1, *The Theory of Corporate Finance*, Jean Tirole (Princeton University Press, 2006).

2011 Level III, Volume 4, Study Session 12, Reading 35, pp. 405-407.
“Emerging Markets Finance,” Geert Bekaert and Campbell R. Harvey, *Journal of Empirical Finance*, vol. 10, issue 5 (Elsevier, December 2003).

LOS:

2011-III-12-33-b, c, d, e

33. “Corporate Governance”

The candidate should be able to:

- a) explain the ways in which management may act that are not in the best interest of the firm’s owners (moral hazard) and illustrate how dysfunctional corporate governance can lead to moral hazard.
- b) evaluate explicit and implicit incentives that can align management’s interests with those of the firm’s shareholders;**
- c) explain the shortcomings of boards of directors as monitors of management and state and discuss prescriptions for improving board oversight;**
- d) discuss why active monitoring by investors requires control, the various mechanisms by which control is exercised, and the limitations of active monitoring;**
- e) critique the effectiveness of debt as a corporate governance mechanism;**
- f) explain the social responsibilities of the corporation in a “stakeholder society” and evaluate the advantages and disadvantages of a corporate governance structure based on stakeholder rather than shareholder interests;
- g) discuss the Cadbury Report recommendations for best practice in maintaining an effective board of directors whose interests are aligned with those of shareholders.

2011-III-12-35-c

35. “Emerging Markets Finance”

The candidate should be able to:

- a) discuss the process of financial liberalization and explain the expected impact on pricing and expected returns as a segmented market evolves into an integrated market;
- b) explain the benefits that may accrue to an emerging market economy as a result of financial liberalization;
- c) discuss the major issues confronting emerging market investors, including excess correlations during times of crisis (contagion), corporate governance, price discovery, and liquidity.**

LEVEL III

Question: 7
Topic: Equity
Minutes: 22

Guideline Answer:

PART A

The management incentive system at Orca would likely be improved by each of the following:

Recommended measures:

- Increase share-based incentives – Orca’s executive compensation system currently emphasizes cash bonuses based on one year earnings growth which encourages a short-term focus and possible manipulation of accounting data. By implementing greater share-based incentives, management will be encouraged to take a long-term perspective on shareholder value.
- Include share options as part of the compensation – Compensation in the form of share options provides a stronger incentive to increase the share price (compared with awarding straight shares), since there is a payoff only if the share price moves above the exercise price (which should be set above current market value).
- Increase implicit incentives, such as the threat of firing – These incentives appear to be weak at Orca, based on the long tenure of executive management, despite poor share price performance.
- Structure bonuses to reward Orca’s share price performance relative to the industry’s share price performance – Bonuses are currently based on earnings targets for Orca set at the beginning of the year. By indexing against the average industry share price performance, Orca managers would be rewarded for the relative performance of Orca’s share price compared to the industry and would not be penalized or rewarded for market-driven events or trends.

LEVEL III

Question: 7
Topic: Equity
Minutes: 22

PART B

The reasons that Orca's board of directors most likely does not represent the best interests of shareholders can be grouped into three main categories:

1. Lack of independence:
 - The Board Chair is also the CEO. The Chair exercises a disproportionate influence on board meetings. When the Chair is also the CEO, it could be difficult for other members of the board to effectively represent all stakeholders.
 - Manley Bank has two board seats and is a major creditor of Orca. These board members would likely be biased towards the interests of debt holders.
 - Five of the Board directors are classified as insiders. Therefore, only half the board is potentially free of conflicts of interest in representing all stakeholders. In addition, at least two of the independent directors have a vested interest in representing the interests of Manley Bank. Therefore, there are at most three truly independent directors.
2. Insufficient attention:
 - Three of Orca's independent directors are each CEOs of large publicly traded companies and directors of other boards. As such, they are likely to be unable to devote adequate attention to their Orca Board duties. In these situations, directors may be inclined to rely entirely on information provided by management.
3. Insufficient incentives:
 - Board compensation consists only of a fixed annual fee, which does not connect Board interests to shareholder interests.

PART C

Replacing debt with equity would:

- Increase Orca's liquidity by reducing the amount of regular contractual interest and principal payments. This is particularly important for Orca, since it appears to need to invest in new products and production technologies.
- Allow Orca to invest in projects that have a higher degree of risk and higher return potential since there will be less need to preserve cash for principal and interest payments.
- Improve Orca's ability to raise capital.
- Decrease the likelihood of cash shortages, defaults and bankruptcy.
- Lower the weighted average cost of capital if the company's debt is currently above the level indicated by its optimal capital structure.

LEVEL III

Question: 7
Topic: Equity
Minutes: 22

PART D

With only 4% ownership, it would be suboptimal for Horizon to acquire strategic information to challenge the firm's policies. Horizon would only receive a small portion (4%) of any increase in value for shareholders. There would be substantial free-riding on Horizon's monitoring efforts.

Since Orca's shares are highly liquid, Horizon can easily exit its investment by selling its position in the company. Investors are more likely to incur the costs of monitoring to protect their investment when a company's shares are illiquid, since investors cannot easily sell their positions.

The relatively high turnover in Horizon's funds suggests that the mutual fund company is generally not a long-term investor that might expend resources to create long-run value through monitoring.

PART E

Issuance of ADRs would likely have a positive effect on Acorn's corporate governance.

ADR issuance would:

- allow Acorn to 'opt-in' to a better external governance regime in the US.
- commit the firm to a higher level of disclosure, having to meet US disclosure rules.
- lead to increased coverage by research analysts and an increase in the quality of the research on the firm. Increased investor and media scrutiny also improves the information environment.

LEVEL III

Question: 8
Topic: Risk Management
Minutes: 16

Reading References:

2011 Level III, Volume 5, Study Session 14, Reading 39

“Risk Management,” Ch. 9, Don M. Chance, Kenneth Grant, and John Marsland, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition (CFA Institute, 2007).

2011 Level III, Volume 5, Study Session 14, Reading 40

“Currency Risk Management,” Ch. 11, *Global Investments*, 6th edition, Bruno Solnik and Dennis W. McLeavey (Addison Wesley, 2009).

LOS: 2010-III-14-39-c, d, e, f, g, h

39. “Risk Management”

The candidate should be able to:

- a) compare and contrast the main features of the risk management process, risk governance, risk reduction, and an enterprise risk management system;
- b) recommend and justify the risk exposures an analyst should report as part of an enterprise risk management system;
- c) evaluate the strengths and weaknesses of a company’s risk management processes and the possible responses to a risk management problem;**
- d) evaluate a company’s or a portfolio’s exposures to financial and nonfinancial risk factors;**
- e) interpret and compute value at risk (VAR) and explain its role in measuring overall and individual position market risk;**
- f) compare and contrast the analytical (variance–covariance), historical, and Monte Carlo methods for estimating VAR and discuss the advantages and disadvantages of each;**
- g) discuss the advantages and limitations of VAR and its extensions, including cash flow at risk, earnings at risk, and tail value at risk;**
- h) compare and contrast alternative types of stress testing and discuss the advantages and disadvantages of each;**
- i) evaluate the credit risk of an investment position, including forward contract, swap, and option positions;
- j) demonstrate the use of risk budgeting, position limits, and other methods for managing market risk;
- k) demonstrate the use of exposure limits, marking to market, collateral, netting arrangements, credit standards, and credit derivatives to manage credit risk;
- l) compare and contrast the Sharpe ratio, risk-adjusted return on capital, return over maximum drawdown, and the Sortino ratio as measures of risk-adjusted performance;
- m) demonstrate the use of VAR and stress testing in setting capital requirements.

LEVEL III

Question: 8
Topic: Risk Management
Minutes: 16

LOS: 2010-III-14-40-a

40. “Currency Risk Management”

The candidate should be able to

- a) **demonstrate and explain the use of foreign exchange futures to hedge the currency exposure associated with the principal value of a foreign investment;**
- b) justify the use of a minimum-variance hedge when covariance between local currency returns and exchange rate movements exists and interpret the components of the minimum-variance hedge ratio in terms of translation risk and economic risk;
- c) evaluate the effect of basis risk on the quality of a currency hedge;
- d) evaluate the choice of contract terms (short, matched, or long term) when establishing a currency hedge;
- e) explain the issues that arise when hedging multiple currencies;
- f) discuss the use of options rather than futures/forwards to insure and hedge currency risk;
- g) evaluate the effectiveness of a standard dynamic delta hedge strategy when hedging a foreign currency position;
- h) discuss and justify other methods for managing currency exposure, including the indirect currency hedge created when futures or options are used as a substitute for the underlying investment;
- i) compare and contrast the major types of currency management strategies specified in investment policy statements.

LEVEL III

Question: 8
Topic: Risk Management
Minutes: 16

Guideline Answer:

PART A

i. Historical VaR

Use of a historical VaR model is not appropriate as it will not take into account the recent increase in the volatility of Polish equities.

ii. Analytical VaR

Use of an analytical VaR model is not appropriate, as it will not take into account that the portfolio return distribution is most likely not normal. Both the equity index options that hedge the downside risk of the portfolio and the classification of Poland as an emerging market are likely to contribute to a non-normal distribution of returns.

PART B

To determine the 1% monthly VaR using annualized data, the expected annualized return and standard deviation must first be adjusted. The expected monthly return equals $0.06 / 12 = 0.005$ and the monthly standard deviation equals $0.07 / \sqrt{12} = 0.020207$.

The 1 percent monthly portfolio VAR is $\mu_p - 2.33\sigma = 0.005 - 2.33(0.020207) = -0.042083$. Then the VaR in PLN equals $1,400,000,000(0.042083) = \text{PLN } 58,916,080$.

PART C

The portfolio produced a profit of PLN 400,000, calculated by converting initial and ending LHS market values to PLN, and subtracting the initial values from the ending values.

	Initial LHS Value	Initial PLN Value (Initial LHS \times 0.87)	Ending LHS Value	Ending PLN Value(Ending LHS \times .80)	Profit/Loss (PLN)
Bonds	25,000,000	21,750,000	27,500,000	22,000,000	250,000
Equities	10,000,000	8,700,000	8,000,000	6,400,000	-2,300,000
- Fwd	-35,000,000	-30,450,000	-35,000,000	-28,000,000	2,450,000
				Total Profit/Loss	400,000

LEVEL III

Question: 9
Topic: Performance Evaluation
Minutes: 16

Reading References:

2011 Level III, Volume 6, Study Session 17, Reading 46

“Evaluating Portfolio Performance,” Ch. 12, Jeffery V. Bailey, Thomas M. Richards, and David E. Tierney, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition (CFA Institute, 2010)

LOS: 2011-III-17-46; LOS: k, l, and o

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;**
- 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
Minutes: 16

Guideline Answer:

PART A

- i. Chin should prepare a macro performance attribution report. This is required in order for the committee to understand the overall results of the Fund compared to its benchmark, and to analyze the effects of the committee's decisions (asset allocation, manager allocation, choice of benchmarks) on the Fund.
- ii. Macro attribution analysis requires two additional inputs: policy allocations and benchmark portfolio returns. Fund sponsors determine policy allocations, or "normal" weightings for each asset class and individual manager. Fund sponsors typically determine these weightings from a review of asset/liability analysis and risk tolerance. Benchmark portfolio returns are necessary to adequately evaluate the value added by the managers. Fund sponsors may use broad market indexes as benchmarks for asset categories and the entire portfolio, and may use more focused indexes to represent a manager's investment style and mandate.

PART B

- i. The pure sector allocation return for Consumer Durables equals $(w_{pj} - w_{Bj}) \times (r_{Bj} - r_B)$.

where:

w_{pj} = Portfolio weight of sector j
 w_{Bj} = Benchmark weight of sector j
 r_{Bj} = Benchmark return of sector j
 r_B = Overall benchmark return

$$= (26.3\% - 21.9\%) \times (4.90\% - 2.80\%) = 0.092\% \text{ or nine basis points.}$$

- ii. The within-sector allocation (security selection) return for Technology equals $w_{Bj} \times (r_{pj} - r_{Bj})$.

where:

r_{pj} = Portfolio return of sector j

$$= 22.4\% \times (1.30\% - (-0.20\%)) = 0.336\% \text{ or thirty-four basis points.}$$

LEVEL III

Question: 9
Topic: Performance Evaluation
Minutes: 16

PART C Template for Question 9-C

Statement	Conclude (yes, no, cannot determine with the information provided) whether <i>each</i> statement made by the managers is consistent with the data in Exhibit 2. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Manager A: “Our strategy is to add value by actively managing the duration of the fixed income securities in the portfolio.”	yes <input checked="" type="radio"/> no cannot determine with the information provided	The Interest Rate Management Effect indicates how well the manager predicts interest rate changes. It can be broken down into returns due to duration, convexity, and yield-curve shape changes. Manager A has generated a –0.08% return from Interest Rate Management Effect. This is inconsistent with their stated strategy. Skillful duration management suggests an ability to add value by actively managing the duration of the fixed income securities in the portfolio.
Manager B: “Our strategy is to add value by identifying undervalued securities and sectors to take advantage of bonds that are mispriced by the market.”	<input checked="" type="radio"/> yes no cannot determine with the information provided	Other Management Effects consists of sector/quality, bond selectivity, and transaction costs. The sector/quality effect measures the manager’s ability to identify undervalued/overvalued sector/quality groups and buying/selling accordingly. Manager B has generated a 0.32% return from Other Management Effects which is consistent with their stated strategy to add value by identifying undervalued securities and sectors.

Reading References:

Level III, Volume 2, Study Session 4, Reading 10

“Managing Individual Investor Portfolios,” Ch. 2, James W. Bronson, CFA, Matthew H. Scanlan, CFA, and Jan R. Squires, CFA, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 2, Study Session 4, Reading 14

“Lifetime Financial Advice: Human Capital, Asset Allocation, and Insurance,” Roger G. Ibbotson, Moshe A. Milevsky, Peng Chen, CFA, Kevin X. Zhu (The Research Foundation of CFA Institute, 2007).

LOS:

2012-III-2-10-a, 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 an individual investor’s risk tolerance;**
- b) explain the role of situational and psychological profiling in understanding an individual investor;
- c) compare 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 risk attitudes and decision-making styles among distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
- g) explain the potential benefits, for both clients and investment advisers, 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 investor portfolios and discuss the impact that ability and willingness to take risk have on risk tolerance;**
- k) **discuss 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;**
- m) determine the strategic asset allocation that is most appropriate for an individual investor’s specific investment objectives and constraints;

- n) compare Monte Carlo and traditional deterministic approaches to retirement planning and explain the advantages of a Monte Carlo approach.

2012-III-2-14-b, c, g

“Lifetime Financial Advice: Human Capital, Asset Allocation, and Insurance”

The candidate should be able to:

- a) explain the concept and discuss the characteristics of “human capital” as a component of an investor’s total wealth;
- b) discuss the earnings risk, mortality risk, and longevity risk associated with human capital and explain how these risks can be reduced by appropriate portfolio diversification, life insurance, and annuity products;**
- c) explain how asset allocation policy is influenced by the risk characteristics of human capital and the relative relationships of human capital, financial capital, and total wealth;**
- d) discuss how asset allocation and the appropriate level of life insurance are influenced by the joint consideration of human capital, financial capital, bequest preferences, risk tolerance, and financial wealth;
- e) discuss the financial market risk, longevity risk, and savings risk faced by investors in retirement and explain how these risks can be reduced by appropriate portfolio diversification, insurance products, and savings discipline;
- f) discuss the relative advantages of fixed and variable annuities as hedges against longevity risk;
- g) recommend basic strategies for asset allocation and risk reduction when given an investor profile of key inputs, including human capital, financial capital, stage of life cycle, bequest preferences, risk tolerance, and financial wealth.**

Guideline Answer:

Part A

To calculate the required return needed to reach the target annuity future value, use the following inputs:

Number of years to retirement	=	15
Annual savings	=	–25,000
Current portfolio value	=	–650,000 (900,000 – 250,000 trust contribution)
Target portfolio value	=	1,600,000

Then solve for i :

$i = 3.6467\%$ or, rounded to **3.65%**

Part B

Alonso's ability to take risk appears to be above average for the following reasons:

- He has the ability to consistently save part of his annual earnings.
- He has a relatively large asset base in comparison to his goal, and thus a low required return, allowing him to withstand short-term market volatility.
- Alonso makes a substantial gift every year to a children's sports program. If necessary, he could decrease or eliminate the gift, reducing his expenses.
- Alonso has a medium- to long-term investment horizon for saving the funds needed at retirement.
- Alonso does not plan to leave an estate.

Part C

Template for Question 1-C

i. Describe <i>one</i> change in Alonso's circumstances that has:	
<i>decreased his earnings risk.</i>	Alonso now has a longer term (guaranteed 10-year) contract, instead of a one-year contract. This reduces the risk of a substantial drop in his income. OR Alonso's increased savings can help to offset his earnings risk.
<i>increased his earnings risk.</i>	The guarantee on Alonso's employment contract is backed by corporate ownership, subjecting Alonso to the credit risk of the owners and the possibility of a substantial drop in his income in case of default.
ii. Describe <i>one</i> change in Alonso's circumstances that has:	
<i>decreased his financial market risk in retirement.</i>	Alonso's increased savings rate will allow him to accumulate a larger asset base at retirement. This would allow the portfolio to absorb greater losses from market fluctuations before affecting his ability to support himself. In addition, he will not be exposed to the credit risk of the issuer of the annuity.
<i>increased his financial market risk in retirement.</i>	Alonso no longer plans to purchase an annuity to fund his retirement spending needs. He now intends to rely on his investment portfolio to meet his spending needs. Funding for living expenses will now be subject to market fluctuations in retirement.

Part D

- i. Time horizon: At both age 40 and age 45, Alonso has a long-term time horizon.

Initially, Alonso faced a three-stage horizon consisting of: (1) 15 years until his planned retirement date; (2) the 25-year annuity period; and (3) his post-annuity retirement years (if he outlives the annuity).

Currently, Alonso faces a two-stage horizon consisting of: (1) the next 10 years until retirement; and (2) his remaining life expectancy during retirement. During his retirement, the investment portfolio will cover expenses.

- ii. Liquidity: In the previous time period, Alonso had a need to fund a trust for his children in the amount of USD 250,000.

Currently he has no known liquidity needs.

Part E

Template for Question 1-E

Determine which <i>one</i> asset class in Alonso's portfolio <i>most</i> closely resembles his current human capital. (circle one)	Justify your response with <i>two</i> reasons.
Treasury bills	Alonso's human capital is bond-like, not equity-like, because of the fixed payments provided in his contract. His contract extends over 10 years, much longer than Treasury bill maturities. His contract is subject to the creditworthiness of the team owner. Such credit risk is similar to corporate securities' credit risk, rather than to government credit risk.
<div>A-rated corporate amortizing ABS</div>	Alonso's human capital will gradually deplete (as he works toward age 55), similar to the principal of corporate ABS securities and unlike government bonds.
AAA-rated government bonds	Although amortizing ABS payments are not typically indexed for inflation (as Alonso's salary is), the structure and payment stream of corporate amortizing ABS <i>most</i> closely resemble his human capital, from among the choices given.
Small-cap domestic equities	
Large-cap international equities	

Reading References:

Level III, Volume 2, Study Session 4, Reading 11

“Taxes and Private Wealth Management in a Global Context,” Stephen M. Horan, CFA, and Thomas R. Robinson, CFA (CFA Institute, 2008).

LOS:

2012-III-2-11-c, d, e, f

“Taxes and Private Wealth Management in a Global Context”

The candidate should be able to:

- a) compare 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 returns;**
- 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 relation 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.

Guideline Answer:

Part A

Template for Question 2-A

Determine, based <i>only</i> on tax considerations, whether Alonso's advisor is correct or incorrect (circle one) with respect to Alonso's:		Justify <i>each</i> response with <i>one</i> reason.
i. after-tax return	<div><div>correct</div><div>incorrect</div></div>	Alonso's after-tax return would have been greater than or equal to his actual return, all else equal, if a greater proportion of his investments had been in taxable accounts. This is because he can use losses to offset other income or realized gains.
ii. investment risk	<div><div>correct</div><div>incorrect</div></div>	Tax exempt investors bear all of the risk associated with returns in their accounts. Taxable accounts have the effect of sharing investment risk between the investor and the taxing authority. In negative-return years, losses can offset taxes on other income or gains. In positive-return years, after-tax return is lower than pre-tax return. This smoothing effect of taxes on investment returns (lower returns in positive years and higher returns in negative years) reduces the overall volatility of the return stream and, all else equal, reduces investment risk.

Part B

The estimated accrual equivalent return is higher for the 15-year period than that of the 3-year period as a result of deferring taxes on realized gains over time. In the case of this portfolio, the difference occurs because only a maximum of half of the capital gains are realized and taxed each year, allowing for compound earnings on the reinvested balances.

Reading References:

Level III, Volume 6, Study Session 16, Reading 39

“Execution of Portfolio Decisions,” Ch. 10, Ananth Madhavan, Jack L. Treynor, and Wayne H. Wagner, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 6, Study Session 16, Reading 40

“Monitoring and Rebalancing,” Ch. 11, Robert D. Arnott, Terence E. Burns, Lisa Plaxco, CFA, and Philip Moore, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

LOS:

2012-III-6-39-c, e, h, k–m

“Execution of Portfolio Decisions”

The candidate should be able to:

- a) compare 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 alternative market structures and their relative advantages;**
- d) compare 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) explain the components of execution costs, including explicit and implicit costs, and evaluate a trade in terms of these costs;
- g) calculate and discuss 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;**
- m) **discuss 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.

LOS:

2012-III-6-40-h, i, j

“Monitoring and Rebalancing”

The candidate should be able to:

- a) discuss a fiduciary's responsibilities in monitoring an investment portfolio;
- b) discuss 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;
- 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.**

Guideline Answer:

Part A

Template for Question 3-A

Identify <i>three</i> market characteristics that support Kadar's conclusion that Betania has a higher quality market.	Justify <i>each</i> response with <i>one</i> reason.
Bid–ask spread	Because Betania has tighter spreads than Alphastan, the cost of trading small amounts of an asset is lower. As a result, investors can trade positions without excessive loss of value. If bid–ask spreads are wide, investors cannot profitably trade on information, except when the information is of great value. Narrower spreads, therefore, lead to higher market quality.
Market hours	The Betania market is open five days per week versus only three days per week for Alphastan. This gives Betania greater convenience and more opportunity to trade, leading to higher market quality.
Market depth	Based on the typical quotes given, the Betania market has a larger number of shares at each price level in the order book. Therefore, the cost of trading a large amount of shares in Betania is lower and market quality is higher.
Number of member firms	The presence of many buyers and sellers contributes to increased market liquidity. Betania has a larger number of member firms than Alphastan (32 vs. 5). Since both markets are quote driven, Betania has more potential buyers and sellers. The additional buyers and sellers create more competition and greater diversity of opinion, leading to higher market quality.

Note: Any three of the four answers to Question 3-A above are acceptable.

Part B

Template for Question 3-B

Determine which algorithmic participation strategy [volume-weighted average price (VWAP), time-weighted average price (TWAP), or implementation shortfall] is <i>most</i> appropriate for Kadar's trades. (circle one)	Justify your response with <i>two</i> reasons.
volume-weighted average price (VWAP)	Kadar should select an implementation shortfall strategy because it attempts to minimize the weighted average of market impact and the opportunity costs of missed or delayed trades.
time-weighted average price (TWAP)	As global equity markets are rising and this trend is expected to continue, Kadar should be more concerned with reducing opportunity costs. To minimize these opportunity costs, implementation shortfall will “front-load” trade execution to complete the trade more quickly than either TWAP or VWAP.
<div>implementation shortfall</div>	

The other strategies are less appropriate because:

A VWAP strategy is less appropriate because the strategy attempts to match the expected volume pattern in the stock, typically over a whole trading day. If Kadar is correct and markets rise during the course of the day, then trading over the whole day will lead to a higher average trade price, and higher opportunity cost relative to implementation shortfall.

A TWAP strategy is less appropriate because the strategy assumes trading volume is constant throughout the trading day. Trades are executed in equal proportion over the whole day. If Kadar is correct and markets rise during the course of the day, then trading over the whole day will lead to a higher average trade price, and higher opportunity cost relative to implementation shortfall.

Part C

Template for Question 3-C

Determine which of the available rebalancing strategies (buy-and-hold, constant-mix, or CPPI) is <i>most</i> appropriate for Marsden. (circle one)	Justify your response with <i>two</i> reasons.
<div>buy-and-hold</div> <div>constant-mix</div> <div><div>CPPI</div></div>	<p>CPPI is the most appropriate rebalancing strategy for Marsden for the following reasons:</p> <ul style="list-style-type: none">• CPPI provides a floor (minimum portfolio value), which the client requires;• CPPI will outperform both the buy-and-hold and constant-mix strategies in Kadar's scenario of rising markets;• CPPI is a convex strategy which increases investment in risky assets as the portfolio value increases. This is consistent with the client's willingness to accept additional risk as his portfolio value increases.

Reading References:

Level III, Volume 2, Study Session 3, Reading 8

“The Behavioral Biases of Individuals,” Michael M. Pompian, CFA (CFA Institute, 2011).

LOS:

2012-III-2-8-a–d

“The Behavioral Biases of Individuals”

The candidate should be able to:

- a. distinguish between cognitive errors and emotional biases;**
- b. discuss commonly recognized behavioral biases and their implications for financial decision making;**
- c. analyze an individual’s behavior for behavioral biases;**
- d. evaluate the impact of biases on investment policy and asset allocation discuss approaches to mitigate their effects.**

Guideline Answer:

Part A

Template for Question 4-A

Note: Each diagnostic question is designed to reveal a different bias.

Diagnostic Question	Identify the behavioral bias that <i>each</i> diagnostic question in Exhibit 1 is <i>most likely</i> to reveal. (circle one)
1. Would a prior investment decision that resulted in a loss stop you from making a similar decision, even if the new investment appears to be the best alternative?	anchoring hindsight <u>regret aversion</u> representativeness status quo
2. How frequently do you review your investment portfolio?	anchoring hindsight regret aversion representativeness <u>status quo</u>
3. Would you sell a recent equity investment following a management announcement of a significant decline in the expected growth rate of revenue?	<u>anchoring</u> hindsight regret aversion representativeness status quo

Regret aversion refers to the influence of past decisions (associated with poor investment performance) on similar choices in the present. Often, rational actions are not taken in order to avoid a recurrence of the regret experienced after the past decision(s).

Status quo bias is an emotional bias in which people do nothing (i.e., maintain the “status quo”) instead of making a change. People are generally more comfortable keeping things the same. This bias might prevent an investor from looking for opportunities where change may be beneficial.

Anchoring is the tendency to continue using information that had been used in past decisions despite the availability and relevance of new information. As a result, investment decisions become difficult to reverse when the new information indicates that a change is advisable.

Part B

Template for Question 4-B

Identify <i>two</i> cognitive biases exhibited by Stoffer. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
<p>First cognitive bias:</p> <p>endowment</p> <p>conservatism</p> <p><u>mental accounting</u></p> <p>illusion of control</p>	<p>Stoffer’s practice of separating investments by source of funds and following different strategies with each source indicates a desire for distinct “mental accounts.”</p>
<p>Second cognitive bias:</p> <p>endowment</p> <p>conservatism</p> <p>mental accounting</p> <p><u>illusion of control</u></p>	<p>Stoffer’s feeling of personal influence over her company’s stock price indicates an overestimation of the degree of control she can exercise over the success of her investments.</p>

Endowment bias is an emotional bias in which people value an asset more when they hold the rights to it than when they do not. There is no evidence that Stoffer suffers from this bias. In addition, this is not a cognitive bias.

Conservatism bias is a belief perseverance bias in which people maintain their prior views or forecasts by inadequately incorporating new information. There is no evidence that Stoffer suffers from this cognitive bias.

Part C

The advisor should attempt to moderate Stoffer's behavioral biases because her biases are cognitive (mental accounting and illusion of control), not emotional, biases, so she can be educated to avoid these biases. Also, because of her concentrated investments, the risk to Stoffer's ability to maintain her standard of living is high. Adapting to her biases could prevent Stoffer from achieving her investment goals.

Reading References:

Level III, Volume 3, Study Session 6, Reading 18

“Capital Market Expectations,” Ch. 4, John P. Calverley, Alan M. Meder, CFA, Brian D. Singer, CFA, and Renato Staub, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 3, Study Session 7, Reading 19

“Equity Market Valuation,” Peter C. Stimes, CFA, and Stephen E. Wilcox, CFA (CFA Institute, 2010).

LOS:

2012-III-3-18-b, c, n–q

“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) explain how exogenous shocks may affect economic growth trends;

- l) identify and interpret macroeconomic, interest rate, and exchange rate linkages between economies;
- m) discuss the risks faced by investors in emerging-market securities and the country risk analysis techniques used to evaluate emerging market economies;
- n) compare the major approaches to economic forecasting;**
- o) demonstrate the use of economic information in forecasting asset class returns;**
- p) evaluate how economic and competitive factors affect investment markets, sectors, and specific securities;**
- q) discuss the relative advantages and limitations of the major approaches to forecasting exchange rates;**
- r) recommend and justify changes in the component weights of a global investment portfolio based on trends and expected changes in macroeconomic factors.

LOS:

2012-III-3-19-d–g

“Equity Market Valuation”

The candidate should be able to:

- a) explain the terms of the Cobb-Douglas production function and demonstrate how the function can be used to model growth in real output under the assumption of constant returns to scale;
- b) evaluate the relative importance of growth in total factor productivity, in capital stock, and in labor input given relevant historical data;
- c) demonstrate the use of the Cobb-Douglas production function in obtaining a discounted dividend model estimate of the intrinsic value of an equity market;
- d) critique the use of discounted dividend models and macroeconomic forecasts to estimate the intrinsic value of an equity market;**
- e) contrast top-down and bottom-up approaches to forecasting the earnings per share of an equity market index;**
- f) discuss the strengths and limitations of relative valuation models;**
- g) judge whether an equity market is under-, fairly, or over-valued using a relative equity valuation model.**

Guideline Answer:

Part A

Template for Question 5-A

Note: Consider *each* source of error independently.

Source of error	Determine which of Cooke's analyses in Exhibit 1 is <i>most likely</i> to be affected by <i>each</i> of the following sources of error. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. survivorship bias	1 2 <input checked="" type="checkbox"/> 3 4 5	Cooke's data series for his regression analysis includes only those economies that achieved developed status. He has excluded all that failed to reach current developed country status. By only including the economies that survived to developed status, he is likely overly optimistic in his projection of Emergistan's real GDP growth.
ii. regime changes	<input checked="" type="checkbox"/> 1 2 3 4 5	Cooke's inflation model was created using the full 50-year history of Emergistan. However, the creation of a central bank 12 years ago appears to have resulted in high and volatile inflation. Therefore, data prior to 12 years ago is probably not relevant for current economic analysis.

iii. appraisal data	1	<p>By using interpolated data points to calculate bond prices where none were available, Cooke has probably created a smoother (or appraised) price series than would actually exist. As a result, he has most likely underestimated bond market volatility. He also has most likely overestimated risk-adjusted return.</p>
	2	
	3	
	4	
	5	

Part B

Template for Question 5-B

Note: Consider *each* methodology independently and use *only* the economic data in Exhibit 2.

Methodology	Determine whether the EMD is <i>most likely</i> to become stronger, weaker, or remain unchanged relative to the USD, based on <i>each</i> of the following methodologies. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. purchasing power parity	stronger <input checked="" type="checkbox"/> weaker remain unchanged	Emergistan has a higher inflation rate than the U.S., and this difference is forecast to grow. PPP asserts that movements in an exchange rate should offset any difference in the inflation rates between two countries.
ii. capital flows	stronger <input checked="" type="checkbox"/> weaker remain unchanged	Capital flows, measured by foreign direct investment, are forecast to decline as a percent of GDP (from 1.9% to 1.7%). This will decrease the demand for Emergistan's currency, all else being equal.*

*An alternative answer to Question 5-Bii is that EMD is most likely to become stronger because capital flows, measured by foreign direct investment, are forecast to increase. This is the result of forecast GDP increasing at a faster rate (4.3% to 4.6% per year) than foreign direct investment is decreasing. This will increase the demand for a country's currency, all else being equal.

Part C

The H-model is defined as follows:

$$V_0 = D_0 / (r - g_l) \times [(1 + g_l) + N/2 \times (g_s - g_l)]$$

Where:

V_0 = intrinsic value

D_0 = current dividend rate

g_s = initial expected growth rate of dividends

g_l = long-term expected growth rate of dividends

N = period of years for growth rate of dividends to decline from g_s to g_l

r = required rate of return for the stock market

so,

$$V_0 = 46 / (0.102 - 0.04) \times [(1 + 0.04) + 15/2 \times (0.12 - 0.04)]$$

$$V_0 = 1216.8$$

Part D

i.

Tobin's q is defined as:

$$q = (\text{Market value of equity} + \text{Market value of debt}) / \text{Replacement cost of assets}$$

so,

$$q = (224 \text{ billion EMD} + 116 \text{ billion EMD}) / 152 \text{ billion EMD}$$

$$q = 2.24$$

ii

According to economic theory, Tobin's q will be lower than 2.24 in the long run, all other factors held constant.

The market is valued higher than the replacement cost of assets. Either security prices will fall or companies will continue to invest in new assets until the ratio reverts to an equilibrium value of 1.0. However, it may take several years for this adjustment to occur.

Reading References:

Level III, Volume 2, Study Session 5, Reading 15

“Managing Institutional Investor Portfolios,” Ch. 3, R. Charles Tschampion, CFA, Laurence B. Siegel, Dean J. Takahashi, and John L. Maginn, CFA, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 2, Study Session 5, Reading 16

“Linking Pension Liabilities to Assets,” Aaron Meder and Renato Staub (UBS Global Asset Management, 2007).

Level III, Volume 2, Study Session 5, Reading 17

“Allocating Shareholder Capital to Pension Plans,” Robert C. Merton, *Journal of Applied Corporate Finance* (Blackwell Publishing, winter 2006).

LOS:

2012-III-2-15-a–e

“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) **prepare an investment policy statement for a defined-benefit plan;**
- e) **evaluate the risk management considerations in investing pension plan assets;**
- f) prepare 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 the investment objectives and constraints of foundations, endowments, insurance companies, and banks;
- j) prepare 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;
- m) compare the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;

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

LOS:

2012-III-2-16-a–c

“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.**

LOS:

2012-III-2-17-a

“Allocating Shareholder Capital to Pension Plans”

The candidate should be able to:

- a) **compare funding shortfall and asset/liability mismatch as sources of risk faced by pension plan sponsors;**
- b) explain how the weighted average cost of capital for a corporation can be adjusted to incorporate pension risk and discuss the potential consequences of not making this adjustment;
- c) explain, in an expanded balance sheet framework, the effects of different pension asset allocations on total asset betas, the equity capital needed to maintain equity beta at a desired level, and the debt-to-equity ratio.

Guideline Answer:

Part A

Aquiline has been experiencing declining profitability, and the company is concerned about the negative impact that future contributions to the Plan would have on the stock price. Although the funding surplus was eliminated because of the recent economic slowdown, the Plan is currently fully funded.

The company's return objective is to earn a return that will, at a minimum, "defeas" the Plan's liability (keep the value of the fund's assets equal to the present value of liabilities). Because the Plan is currently fully funded, the return objective is the discount rate used to calculate the present value of the Plan's liabilities.

Therefore, the minimum return requirement for the Plan is 5% because this is the rate that is used to calculate the present value of the liabilities. (Note that expected future liabilities already incorporate expected inflation-related adjustments to benefits for Plan participants.)

Aquiline may consider earning a return in excess of the 5% required minimum. Achieving a higher return would reduce the probability of a future funding deficit and the need to make additional contributions.

Part B

Factors that contribute to the Plan's low risk tolerance are:

- Aquiline has declining profitability. This limits the ability of the company to make contributions to the Plan.
- Aquiline's operating earnings are positively correlated with pension asset returns. Low or negative asset returns could occur when the firm is least capable of making contributions.
- The new provision for early retirement reduces the duration of Plan liabilities and increases the liquidity requirement.
- The relatively older workforce (average age of 54) results in a short duration of Plan liabilities.
- The diminished funding status for the Plan increases the probability of shortfall risk, which could require Aquiline to make additional contributions.
- There is a risk that actual inflation could exceed expected inflation. This would lead to a greater need to pay the inflation-indexed retirement benefits for current retirees and certain former employees.

Part C

The current asset allocation may lead to a funding shortfall because:

- The realized returns on the portfolio may not equal the expected return. While expected return is stable, realized returns can be volatile. As the Plan is fully funded (but no longer in a surplus situation), the Plan could experience shortfall between assets and the present value of liabilities if realized returns are less than the expected return.
- The company is partially funding debt-like liabilities with equities. While equities may have higher return potential than debt assets, equities exhibit higher market risk.

Part D

- i. Under Trout's asset-only approach, the primary characteristic of low-risk investments would be low correlation with the Plan's assets. Under this approach, the focus is on creating efficient frontier portfolios; therefore, low-risk investments are those that have low correlation with plan assets.
- ii. Under Rayburn's liability-relative approach (which seeks to match assets with economic liabilities), the primary characteristic of low-risk investments would be a high positive correlation with the Plan's liabilities. The investment portfolio's assets should mimic the liabilities in market-related exposures and expected cash flows. This approach should minimize shortfall risk now and in the future.

Part E

Template for Question 6-E

Weighting	Determine which asset class (equities, nominal bonds, or real-rate bonds) in Rayburn's recommended portfolio should have the: (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. highest weighting	<div>equities</div> <div>nominal bonds</div> <div><div>real-rate bonds</div></div>	Under the liability-relative approach, the asset allocation of the investment portfolio should be determined by the risk-return characteristics of liabilities. All liabilities subject to inflationary effects should be matched with real-rate bonds, i.e., bonds with yields that reflect risk premium and inflation. In Aquiline's case, this includes the inflation indexed payments for current retirees, deferred benefits, and future wage inflation.
ii. lowest weighting	<div><div>equities</div></div> <div>nominal bonds</div> <div>real-rate bonds</div>	Future real wage growth is correlated with the return on domestic equity securities through the relationship between productivity growth and stock market returns. Therefore, the allocation to equities is the lowest allocation, because future real wage growth is the smallest component of the Plan's benefit payments.

Part F

i. Advantages to Aquiline:

- In the Defined Contribution setting, Aquiline does not have the responsibility to set objectives and constraints; rather, the plan participants set their own risk and return objectives and constraints.
- Aquiline does not bear the risk of investment results; employees and beneficiaries bear the risk.
- Aquiline's future pension obligations are more stable and predictable.
- Aquiline does not need to recognize any additional pension liabilities on its balance sheet under the new plan.
- As long as Aquiline provides a wide range of investment choices and periodically evaluates them, it fulfills its fiduciary responsibilities as the plan sponsor.

ii. Advantages to Employees:

- The participant is able to choose a risk and return objective reflecting his or her own personal financial circumstances, goals, and attitudes toward risk.
- Defined contribution plan assets are more readily portable.
- Under Aquiline's defined contribution plan, employees are immediately vested.
- Defined contribution plans do not present early termination risk, i.e., the risk that the plan is terminated by the plan sponsor.
- Participants can rebalance and re-allocate investments.
- Defined contribution plans reduce participants' exposure to Aquiline's financial condition.
- Account balances legally belong to participants.

Reading References:

Level III, Volume 4, Study Session 10, Reading 25

“Fixed-Income Portfolio Management – Part II,” Ch. 6, H. Gifford Fong and Larry D. Guin, CFA, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 4, Study Session 10, Reading 26

“Hedging Mortgage Securities to Capture Relative Value,” Ch. 23, Kenneth B. Dunn, Roberto M. Sella, and Frank J. Fabozzi, CFA, *Fixed Income Readings for the Chartered Financial Analyst*[®] (CFA Institute, 2005).

LOS:

2012-III-4-25-a, b, d, f

“Fixed-Income Portfolio Management – Part II”

The candidate should be able to:

- a) **evaluate the effect of leverage on portfolio duration and investment returns;**
- b) **discuss the use of repurchase agreements (repos) to finance bond purchases and the factors that affect the repo rate;**
- c) critique the use of standard deviation, target semivariance, shortfall risk, and value at risk as measures of fixed-income portfolio risk;
- d) **demonstrate the advantages of using futures instead of cash market instruments to alter portfolio risk;**
- e) formulate and evaluate an immunization strategy based on interest rate futures;
- f) **explain the use of interest rate swaps and options to alter portfolio cash flows and exposure to interest rate risk;**
- g) compare default risk, credit spread risk, and downgrade risk and demonstrate the use of credit derivative instruments to address each risk in the context of a fixed-income portfolio;
- h) explain the potential sources of excess return for an international bond portfolio;
- i) evaluate 1) the change in value for a foreign bond when domestic interest rates change and 2) the bond’s contribution to duration in a domestic portfolio, given the duration of the foreign bond and the country beta;
- j) recommend and justify whether to hedge or not hedge currency risk in an international bond investment;
- k) describe how breakeven spread analysis can be used to evaluate the risk in seeking yield advantages across international bond markets;
- l) discuss the advantages and risks of investing in emerging market debt;
- m) discuss the criteria for selecting a fixed-income manager.

LOS:

2012-III-4-26-a, b

“Hedging Mortgage Securities to Capture Relative Value”

The candidate should be able to:

- a) **demonstrate how a mortgage security’s negative convexity will affect the performance of a hedge;**
- b) **explain the risks associated with investing in mortgage securities and discuss whether these risks can be effectively hedged;**
- c) contrast an individual mortgage security to a Treasury security with respect to the importance of yield-curve risk;
- d) compare duration-based and interest rate sensitivity approaches to hedging mortgage securities.

Guideline Answer:

Part A

i.

The return on the total funds invested (initial plus borrowed) equals the return on the borrowed funds less borrowing costs, plus the return on the initial funds, divided by the size of the fund.

$$R_P = [B \times (r_F - k) + E \times r_F] / E$$

Where:

r_F = return on invested funds = 3.20%

k = cost of borrowing = 2.40%

E = initial (or Equity) funds = 200,000,000

B = borrowed funds

R_P = Required return on initial (equity) funds, after leveraging = 4.40%

Solving the above equation for the B :

$$B = (R_P \times E - E \times r_F) / (r_F - k) = E (R_P - r_F) / (r_F - k)$$

$$= 200,000,000 \times (0.044 - 0.032) / (0.032 - 0.024)$$

$$= \text{USD } 300,000,000$$

ii.

Let D_E = duration of the initial (equity) funds

D_A = duration of the assets (the bond portfolio)

D_L = duration of the liabilities (borrowed funds)

A = value of bond portfolio (initial funds plus borrowed funds)

L = value of liabilities (borrowed funds)

$E = A - L$ = value of equity

Therefore:

$$D_E = (D_A A - D_L L) / E$$

$$= [8.50 \times (200,000,000 + 300,000,000) - 0.8 \times 300,000,000] / 200,000,000$$

$$= 20.05.$$

Part B

Factor	Determine, for <i>each</i> factor that Brown has identified, the characteristic that would lead to a lower repo rate. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
availability of the collateral	<div>easy to obtain</div> <div><div>difficult to obtain</div></div> <div>has no effect</div>	When the collateral security is difficult to obtain, the buyer (lender) in the repo transaction is willing to accept a lower repo rate in order to access the scarce collateral, for example, to cover a short sale. This “special” collateral is valuable to the lender of funds.
quality of the collateral	<div><div>high quality</div></div> <div>low quality</div> <div>has no effect</div>	Higher quality collateral reduces the risk (default, credit, liquidity, etc.) of the collateral and therefore, fund lenders are willing to accept a lower repo rate.

Part C

Let D_T = target portfolio duration = 11.00
 D_I = initial portfolio duration = 8.50
 P_I = initial market value of the portfolio = 211,000,000
 D_{CTD} = duration of the cheapest-to-deliver bond = 16.70
 P_{CTD} = price of the cheapest-to-deliver bond = 100,000

Conversion factor = 1.02

Therefore, the number of futures contracts required to increase the portfolio's duration to 11.0 equals:

$$\begin{aligned} &= [(D_T - D_I) \times P_I] / (D_{CTD} \times P_{CTD}) \times \text{Conversion factor} \\ &= [(11.00 - 8.50) \times 211,000,000] / (16.70 \times 100,000) \times 1.02 \\ &= 322.19. \end{aligned}$$

Brown should buy 322 futures contracts.

Part D

The duration of the 90-day call option equals:

$$\begin{aligned} &= (\text{delta of call option}) \times (\text{duration of underlying}) \times (\text{price of underlying}) / (\text{price of call option}) \\ &= 0.4 \times 16.93 \times 1,037,560 / 27,568 = 254.87 \text{ or approximately } 255. \end{aligned}$$

Part E

Since Brown believes that the actual future volatility will be higher than implied volatility, she should use options hedging. She is confident that volatility will increase, and if she is correct, the value of the options will increase as volatilities rise.

Dynamic hedging, buying futures after rates have declined, and selling futures after rates have risen, is not appropriate when volatility is expected to rise. This approach would not benefit from the rise in the option's value.

Reading References:

Level III, Volume 5, Study Session 15, Reading 36

“Risk Management Applications of Forward and Futures Strategies,” Don M. Chance, CFA, *Analysis of Derivatives for the Chartered Financial Analyst[®] Program* (AIMR, 2003).

LOS:

2012-III-5-36-a, d, e

“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) explain the use of stock index futures to convert a long stock position into synthetic cash;
- 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) explain exchange rate risk and demonstrate the use of forward contracts to reduce the risk associated with a future 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.

Guideline Answer:

Part A

i. Equity targets

Patheo effectively needs to sell \$28 million of stock by converting it to cash using stock index futures and buy \$28 million of bonds by using bond futures. This would effectively convert the stock into cash and then convert that cash into bonds. Of course, this entire series of transactions will be synthetic; the actual stock and bonds in the portfolio will stay in place.

In order to achieve the equity targets, Patheo must determine the number of equity futures necessary to:

1. Reduce the equity allocation by \$28 million and
2. Decrease the equity beta to 0.90

In both cases Patheo will rely on the following relationship:

$$N_{fe} = [(\beta_T - \beta_P) / (\beta_f)] \times (E / f_e)$$

Where:

N_{fe} = number of equity futures to be traded

β_T = the beta being targeted

β_P = the starting beta of the relevant portfolio or portfolio component

β_f = the beta of the relevant futures contract

E = the size of the relevant equity portfolio or portfolio component

f_e = the price of the relevant equity futures contract

To Reduce the Equity Allocation by \$28 million:

Patheo wants to reduce equities by USD 28,000,000, so the target beta is the beta of cash, which is assumed to be zero. The portfolio's current beta is 1.08 and the futures' beta is 0.97.

Therefore, $N_{fe} = [(0 - 1.08) / (0.97)] \times (28,000,000 / 129,000) = -241.67$.

Patheo should **sell 242** equity futures contracts.

To Decrease the Equity Beta to 0.90:

Next, Patheo needs to decrease the equity beta from 1.08 to 0.90 on what is now a USD 154,000,000 equity portfolio.

Therefore $N_{fe} = [(0.90 - 1.08) / (0.97)] \times (154,000,000 / 129,000) = -221.53$

Patheo should **sell 222** equity futures contracts.

To achieve the equity targets, Patheo should **sell** $242 + 222 = 464$ equity futures contracts.

ii. Bond targets

In order to achieve the bond targets, Patheo must determine the number of bond futures necessary to:

1. Increase the bond allocation by \$28 million and
2. Decrease the modified duration to 6.0

In both cases Patheo will rely on the following relationship:

$$N_{fb} = [(MDUR_T - MDUR_P) / MDUR_f] \times (B / f_b)$$

Where:

N_{fb} = number of bond futures to be traded

$MDUR_T$ = the modified duration being targeted

$MDUR_P$ = the modified duration of the relevant portfolio or portfolio component

$MDUR_f$ = the implied modified duration of the relevant bond futures contract

B = the size of the relevant bond portfolio or portfolio component

f_b = the price of the relevant bond futures contract

To Increase the Bond Allocation by \$28 Million:

Patheo wants to increase bond exposure by USD 28,000,000. The starting position for this is the synthetic cash which has been raised by the sale of equity futures, so the modified duration of this component is zero.

$$\text{Therefore } N_{fb} = [(7.20 - 0.00) / 7.70] \times (28,000,000 / 103,000) = 254.19$$

Patheo should **buy 254** bond futures contracts.

To Decrease the Modified Duration to 6.0:

Next, Patheo needs to change the modified duration from 7.20 to 6.00 on what is now a USD 126,000,000 bond portfolio.

$$N_{fb} = [(6.00 - 7.20) / 7.70] \times (126,000,000 / 103,000) = -190.64$$

Patheo should **sell 191** bond futures contracts.

To achieve the bond targets, Patheo should **buy** $254 - 191 = 63$ bond futures contracts.

Part B

The initial value of the Peterson portfolio equals:

- Equity securities position = USD 46,000,000
- Bond securities position = USD 32,000,000

The rebalancing transactions are as follows:

- Equity futures position (long) = $42 \times 160,000 = \text{USD } 6,720,000$
- Bond futures position (short) = $-35 \times 190,000 = -\text{USD } 6,650,000$

Profit/Loss Over the Past Three Months:

Profit/Loss on equity securities = $3\% \times \text{USD } 46,000,000 = +\text{USD } 1,380,000$

Profit/Loss on bond securities = $-2.40\% \times \text{USD } 32,000,000 = -\text{USD } 768,000$

Profit/Loss on equity futures = $42 \times (165,000 - 160,000) = +\text{USD } 210,000$

Profit/Loss on bond futures = $-35 \times (185,250 - 190,000) = +\text{USD } 166,250$

Total Net Profit/Loss = $1,380,000 - 768,000 + 210,000 + 166,250 = \text{USD } 988,250$
Or $988,250 / 78,000,000 = 1.27\%$

Reading References:

Level III, Volume 5, Study Session 15, Reading 37

“Risk Management Applications of Options Strategies,” Don M. Chance, CFA, *Analysis of Derivatives for the Chartered Financial Analyst® Program* (AIMR, 2003).

LOS:

2012-III-5-37-e, f

“Risk Management Applications of Option Strategies”

The candidate should be able to:

- a) compare the use of covered calls and protective puts to manage risk exposure to individual securities;
- b) calculate and interpret the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and general shape of the graph for the major option strategies (bull spread, bear spread, butterfly spread, collar, straddle, box spread);
- c) calculate 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) calculate 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.**

Guideline Answer:

Part A

i.

Delpont needs to *sell* shares in the underlying equity.

By selling put options to his client, Delpont is net long the underlying equity. Therefore, the hedge needs to be a short position. He must sell shares to hedge his exposure.

ii.

Delpont's current exposure from selling the put options = # contracts \times spot price \times option delta
 $= -2,000 \times \$1,340 \times -0.3088$
 $= \$827,584$ (long)

Therefore, the number of shares that must be sold equals $\$827,584 / \$1,340 = 617.60$ or 618 shares.

Part B

The change in the price of put options will be greater for an instantaneous *decrease* in the price of the underlying equity than for an instantaneous *increase* in the price of the underlying equity of equal size.

For put options, the delta will underestimate the price effect of decreases in the underlying equity and will overestimate the price effect of increases in the underlying equity. This is due to the convex relationship between put option prices and the price of the underlying equity. This can be addressed by adjusting the put option price for the effect of gamma, which is analogous to the convexity adjustment of a bond's price.

Part C

Delport's current hedged position consists of a long position in equities and a short position in call options. His net cash outlay equals:

$$\begin{aligned} &= (\# \text{ of shares bought} \times \text{price per share}) - (\# \text{ of call options sold} \times \text{option premium}) \\ &= 1,322 \times 800 - (3,000 \times 29.42) \\ &= \$969,340 \end{aligned}$$

The value of Delport's performance benchmark continuously compounded at 2.25%, for five days equals:

$$\begin{aligned} &= 969,340 \times e^{(0.0225 \times 5 / 365)} \\ &= \$969,638.82 \end{aligned}$$

The value of Delport's long equity position in five days equals:

$$= 1,322 \times 815 = \$1,077,430$$

The value of Delport's short call option position in five days equals:

$$= -3,000 \times 35.30 = -\$105,900$$

The value of Delport's hedged position equals:

$$= 1,077,430 - 105,900 = \$971,530.$$

Therefore, the percentage difference between the hedged position's value and Delport's performance benchmark equals:

$$(971,530 - 969,638.82) / 969,638.82 = 0.195\%$$

Reading References:

10. “Managing Individual Investor Portfolios,” Ch. 2, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, James W. Bronson, Matthew H. Scanlan, and Jan R. Squires (CFA Institute, 2007).

LOS: 2013-III-4-10-j-m

10. “Managing Individual Investor Portfolios”
The candidate should be able to:
 - a) discuss how source of wealth, measure of wealth, and stage of life affect an individual investor’s risk tolerance;
 - b) explain the role of situational and psychological profiling in understanding an individual investor;
 - c) compare 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 risk attitudes and decision-making styles among distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
 - g) explain the potential benefits, for both clients and investment advisers, 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 investor portfolios and discuss the impact that ability and willingness to take risk have on risk tolerance;**
 - k) discuss 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;**
 - m) determine the strategic asset allocation that is most appropriate for an individual investor’s specific investment objectives and constraints;**
 - n) compare Monte Carlo and traditional deterministic approaches to retirement planning and explain the advantages of a Monte Carlo approach.

Guideline Answer:

Part A

**Required After-tax Rate of Return
Calculation**

Cash Need Next Year	
Total expenses last year	300,000
x (1 + Inflation rate)	1.025
Total expenses next year	307,500
Less after-tax retirement income [125,000 x (1 – 0.30)]	87,500
Net cash need in coming year	220,000

Investable Assets

Net from Sale of Business	
Gross proceeds from sale	10,000,000
Tax rate due on sale	15%
Net from sale of business	8,500,000
Current Investment Portfolio	2,500,000
Total Investable Assets	11,000,000

Required After-tax Rate of Return

Cash Need	220,000
Investable Assets	11,000,000
Real Required After-tax Rate of Return	2.00%

Nominal Required After-tax Rate of Return (2.0% + Inflation of 2.5%) = 4.50%
Or, geometric return of 4.55% ($1.02 \times 1.025 - 1$)

ALTERNATE ANSWER

Remove the USD 250,000 cash reserve from the investable asset base, reducing the investable asset base to USD 10,750,000. This results in:

Real Required After-tax Rate of Return $(220,000 / 10,750,000) = 2.05\%$

Nominal Required After-tax Rate of Return $(2.05\% + \text{Inflation of } 2.5\%) = 4.55\%$

Or, geometric return of 4.60% $(1.0205 \times 1.025 - 1)$

Part B

Factors that indicate the Voorts' ability to assume risk is above average:

- They are relatively young and have a long time horizon, so they are likely to have time to recover from any unanticipated adverse financial event.
- They have a substantial asset base relative to their spending needs.
- The couple has relatively stable spending habits and does not expect any significant cash outflows in the future.
- They own a home and have no debt, so the home could be sold or borrowed against if cash is needed.
- They are relatively young and have the ability to seek employment if necessary.

Part C

The liquidity requirement for the Voorts in the coming year has two components: net cash needs for living expenses and an emergency reserve. Their annual expenses are estimated to increase by inflation of 2.5% (USD 300,000 last year $\times 1.025 =$ USD 307,500). Retirement income is reduced by taxes of 30% (USD 125,000 $\times (1 - 0.30) =$ USD 87,500). The net cash need for expenses is thus USD 220,000. In addition, the Voorts want to establish and maintain a cash reserve of USD 250,000. Therefore, the Voorts' total liquidity requirement for the next year is USD 470,000 (USD 220,000 + USD 250,000).

Part D

The *most* appropriate portfolio for the Voorts must meet the following requirements:

1. Real after-tax return of 3.5% or more $((\text{pre-tax return} \times (1 - \text{tax rate})) - \text{inflation rate})$
2. Shortfall risk of no lower than -10% in any one year (equal to nominal pre-tax expected return minus two times standard deviation)

The following analysis shows whether each portfolio meets (pass/fail) the specified return and risk requirements:

Portfolio X

Return Objective:

$$\text{Real after-tax return: } 9.3\% \times (1 - 30\%) - 2.5\% = 4.0\% > 3.5\%; \text{ pass}$$

Shortfall risk constraint:

$$\text{Shortfall risk: } 9.3\% - (2 \times 11.0\%) = -12.7\% < -10.0\%; \text{ fail}$$

Portfolio Y

Return Objective:

$$\text{Real after-tax return: } 8.4\% \times (1 - 30\%) - 2.5\% = 3.4\% < 3.5\%; \text{ fail}$$

Shortfall risk constraint:

$$\text{Shortfall risk: } 8.4\% - (2 \times 8.7\%) = -9.0\% < -10.0\%; \text{ pass}$$

Portfolio Z

Return Objective:

$$\text{Real after-tax return: } 8.8\% \times (1 - 30\%) - 2.5 = 3.7 > 3.5; \text{ pass}$$

Shortfall risk constraint:

$$\text{Shortfall risk: } 8.8\% - (2 \times 9.3\%) = -9.8\% > -10.0\%; \text{ pass}$$

Portfolio X does not meet the shortfall risk constraint and Portfolio Y does not meet the return objective. Portfolio Z is the only one of the three proposed portfolios that meets both the return objective and the shortfall risk constraint.

Reading References:

12. “Estate Planning in a Global Context,” Stephen M. Horan, CFA, and Thomas R. Robinson, CFA (CFA Institute, 2009).

LOS: 2013-III-4-12-a, b, d-g

12. “Estate Planning in a Global Context”

The candidate should be able to

- a) **discuss the purpose of estate planning and explain the basic concepts of domestic estate planning, including estates, wills and probate;**
- b) **explain the two principal forms of wealth transfer taxes and discuss the impact of important non-tax issues, such as legal system, forced heirship, and marital property regime;**
- c) determine a family’s core capital and excess capital, based on mortality probabilities and Monte Carlo analysis;
- d) **evaluate the relative after-tax value of lifetime gifts and testamentary bequests;**
- e) **explain the estate planning benefit of making lifetime gifts when gift taxes are paid by the donor, rather than the recipient;**
- f) **evaluate the after-tax benefits of basic estate planning strategies, including generation skipping, spousal exemptions, valuation discounts, and charitable gifts;**
- g) **explain the basic structure of a trust and discuss the differences between revocable and irrevocable trusts;**
- h) explain how life insurance can be a tax-efficient means of wealth transfer;
- i) discuss the two principal systems (source jurisdiction and residence jurisdiction) for establishing a country’s tax jurisdiction;
- j) discuss the possible income and estate tax consequences of foreign situated assets and foreign-sourced income;
- k) evaluate a client’s tax liability under each of three basic methods (credit, exemption, and deduction) that a country may use to provide relief from double taxation;
- l) discuss the impact of increasing international transparency and information exchange among tax authorities on international estate planning.

Guideline Answer:

Part A

Puente's total estate is USD 26 million.

His current wife is entitled to receive either:

- a minimum of 25 percent of the total estate under forced heirship:
 $\text{USD } 26 \text{ million} \times 0.25 = \text{USD } 6.5 \text{ million}$; or
- 50 percent of the increase in the value of the total estate during his current marriage under community property:
 $(\text{USD } 26 \text{ million} - \text{USD } 12 \text{ million}) \times 0.50 = \text{USD } 7.0 \text{ million}$

Therefore, the minimum amount that Puente's current wife would receive, before estate taxes are considered, if Puente were to die today, is the *greater* of her share under forced heirship or community property; that is, USD 7.0 million.

Part B

A trust is an arrangement created by a settlor or grantor (in this case, Puente), who transfers assets to a trustee. The trustee holds and manages the assets for the benefit of the beneficiaries (Puente's current wife and his four children - three sons from his current marriage and one daughter from his previous marriage).

A trust would provide Puente the following benefits:

- Transfer of assets to his wife and children without the potential publicity associated with probate. Puente has expressed a need for privacy.
- Protection of the assets within the trust from claims against him or his wife and children, both now and in the future. Puente wants to secure their financial future and worries about claims from outside of the family.
- Avoids disputes within the family (among his wife and four children).
- Responsible stewardship of assets while his children are minors, and afterwards if they are unable to manage the assets themselves.

Part C

Two reasons why tax considerations favor Puente making a current gift to his daughter rather than transferring wealth to her through a bequest upon his death:

- Because his daughter's income tax rate is lower than Puente's and their pre-tax returns are assumed to be the same, the future after-tax value of any gifted amount will be greater than if this amount stayed in Puente's estate.
- Because gift taxes are paid from Puente's estate, the size of his taxable estate is reduced. Because his daughter's estate will not be taxed, this lowers the ultimate estate tax that will be paid. The present value of this tax benefit is equal to the gift tax rate, multiplied by the estate tax rate, multiplied by the size of the gift.

Part D

Generation-skipping is a strategy for reducing taxes by transferring assets directly to the third generation (grandchild) from the first generation (Puente).

Transferring assets to the second generation (daughter) would incur transfer taxes. A second layer of taxes would be assessed when assets are transferred from his daughter to his grandchild. The generation-skipping strategy through a direct gift to his grandchild avoids this double layer of taxation, thereby reducing overall taxes.

Reading References:

7. “The Behavioral Finance Perspective,” Michael M. Pompian, CFA (CFA Institute, 2011)
9. “Behavioral Finance and Investment Processes,” Michael M. Pompian, CFA, Colin McLean, and Alistair Bryne, CFA (CFA Institute, 2011)

LOS: 2013-III-3-7-a, d

7. “The Behavioral Finance Perspective”

The candidate should be able to:

- a. **contrast traditional and behavioral finance perspectives on investor decision making;**
- b. contrast expected utility and prospect theories of investment decision making;
- c. discuss the effects of cognitive and knowledge capacity limitations on investment decision making;
- d. **compare traditional and behavioral finance perspectives on portfolio construction and the behavior of capital markets.**

LOS: 2013-III-3-9-c, d

9. “Behavioral Finance and Investment Processes”

The candidate should be able to:

- a. explain the uses and limitations of classifying investors into various types;
- b. discuss how behavioral factors affect adviser-client interactions;
- c. **discuss how behavioral factors influence portfolio construction;**
- d. **explain how behavioral finance can be applied to the process of portfolio construction;**
- e. discuss how behavioral factors affect analyst forecasts and recommend remedial actions for analyst biases;
- f. discuss how behavioral factors affect investment committee decision making and recommend techniques for mitigating their effects;
- g. describe how behavioral biases of investors can lead to market anomalies and observed market characteristics.

Guideline Answer:**Part A**

Siosan has a risk-seeking (convex) utility function for gains and a risk-averse (concave) utility function for losses. This is consistent with a Friedman-Savage utility function characterized by an inflection point where the function turns from concave to convex. This type of function explains why people may take low-probability, high-payoff risks (e.g., out-of-the-money options) while at the same time insuring against low-probability, low-payoff risks (e.g., earthquake insurance). The concave portion of the utility function explains purchasing low-payoff insurance against low-probability losses, while the convex portion of the function explains risk taking with options.

Traditional finance theory assumes risk aversion (concave utility function) at all levels of wealth, which would lead to rejection of all gambles having a non-positive expected return.

Part B

Template for Question 3-B

Behavioral bias	Discuss how Siosan's behavior reflects <i>each</i> bias.	Explain how a rational economic individual in traditional finance would behave differently with respect to <i>each</i> bias.
i. self-control	Siosan exhibits a self-control bias by spending all of her current salary income and half her bonus income on current consumption, pursuing short-term satisfaction to the detriment of long-term financial security.	A rational economic individual uses self-control to pursue long-term goals rather than short-term satisfaction, achieving an optimal consumption plan that maximizes expected utility over his or her lifetime.
ii. mental accounting	Siosan is engaging in mental accounting by classifying her sources of wealth into three accounts: current income, currently-owned assets, and the present value of future income. Her consumption and savings decisions are based on the source of her wealth. She spends her salary and one-half of her bonus income, does not spend currently-owned assets (retirement accounts), and does not consume based on expectations of future income (her only debt is a small mortgage on her home despite expectations of high future earnings). Siosan is also engaging in mental accounting by considering her investments separately based on their purposes. Her retirement account is for long-term financial security and her options trading account is for short-term gains when they are exercised in-the-money.	A rational economic individual: <ul style="list-style-type: none">• does not use mental accounts, but treats money and wealth as fungible;• optimizes spending and investment decisions regardless of the source of wealth; and• does not segregate investments based on their purposes, but views all assets in a portfolio context, considering correlations between assets to construct an optimal portfolio.

Part C

Murray is correct that Siosan's retirement portfolio allocation is consistent with Behavioral Portfolio Theory (BPT) and not consistent with a mean-variance framework (MVF). A BPT investor maximizes expected wealth subject to a safety constraint. As a result, the optimal portfolio of a BPT investor is a combination of bonds or riskless assets and highly speculative assets. Siosan's portfolio is consistent with BPT and is constructed in layers, which may be the result of mental accounting.

An MVF investor constructs portfolios in a comprehensive manner. MVF portfolios are mean-variance efficient and take into account the investor's risk tolerance, investment objectives and constraints, and circumstances. Siosan's portfolio is not mean-variance efficient because it appears that no consideration has been given to the covariance of returns between different assets, and there is no evidence that Siosan has considered her risk tolerance, investment objectives and constraints, or circumstances.

Reading References:

27. “Equity Portfolio Management,” Ch. 7, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Gary Gastineau, Andrew R. Olma, and Robert G. Zielinski (CFA Institute, 2007).
29. “International Equity Benchmarks,” Ch. 10, *Benchmarks and Investment Management*, Laurence B. Siegel (The Research Foundation of AIMR, 2003).

LOS: 2013-III-11-27-j

27. “Equity Portfolio Management”

The candidate should be able to:

- a) discuss the role of equities in the overall portfolio;
- b) discuss the rationales for passive, active, and semiactive (enhanced index) equity investment approaches and distinguish among those approaches with respect to expected active return and tracking risk;
- c) recommend an equity investment approach when given an investor’s investment policy statement and beliefs concerning market efficiency;
- d) distinguish among the predominant weighting schemes used in the construction of major equity share indices and evaluate the biases of each;
- e) compare alternative methods for establishing passive exposure to an equity market, including indexed separate or pooled accounts, index mutual funds, exchange-traded funds, equity index futures, and equity total return swaps;
- f) compare full replication, stratified sampling, and optimization as approaches to constructing an indexed portfolio and recommend an approach when given a description of the investment vehicle and the index to be tracked;
- g) explain and justify the use of equity investment–style classifications and discuss the difficulties in applying style definitions consistently;
- h) explain the rationales and primary concerns of value investors and growth investors and discuss the key risks of each investment style;
- i) compare techniques for identifying investment styles and characterize the style of an investor when given a description of the investor’s security selection method, details on the investor’s security holdings, or the results of a returns-based style analysis;
- j) compare the methodologies used to construct equity style indices;**
- k) interpret the results of an equity style box analysis and discuss the consequences of style drift;
- l) distinguish between positive and negative screens involving socially responsible investing criteria and discuss their potential effects on a portfolio’s style characteristics;
- m) compare long–short and long-only investment strategies, including their risks and potential alphas, and explain why greater pricing inefficiency may exist on the short side of the market;
- n) explain how a market-neutral portfolio can be “equitized” to gain equity market exposure and compare equitized market-neutral and short-extension portfolios;

- o) compare the sell disciplines of active investors;
- p) contrast derivatives-based and stock-based enhanced indexing strategies and justify enhanced indexing on the basis of risk control and the information ratio;
- q) recommend and justify, in a risk–return framework, the optimal portfolio allocations to a group of investment managers;
- r) explain the core-satellite approach to portfolio construction and discuss the advantages and disadvantages of adding a completeness fund to control overall risk exposures;
- s) distinguish among the components of total active return (“true” active return and “misfit” active return) and their associated risk measures and explain their relevance for evaluating a portfolio of managers;
- t) explain alpha and beta separation as an approach to active management and demonstrate the use of portable alpha;
- u) describe the process of identifying, selecting, and contracting with equity managers;
- v) contrast the top-down and bottom-up approaches to equity research.

LOS: 2013-III-12-29-b,c

29. “International Equity Benchmarks”

The candidate should be able to:

- a) discuss the need for float adjustment in the construction of international equity benchmarks;
- b) discuss trade-offs involved in constructing international indices, including (1) breadth versus investability, (2) liquidity and crossing opportunities versus index reconstitution effects, (3) precise float adjustment versus transactions costs from rebalancing, and (4) objectivity and transparency versus judgment;**
- c) discuss the effect that a country’s classification as either a developed or an emerging market can have on market indices and on investment in the country’s capital markets.**

Guideline Answer:

Part A

Template for Question 4-A

Index construction criterion	Determine if <i>each</i> of Kimi Capital's index construction criteria in Exhibit 1 will <i>most likely</i> result in lower, no difference in, or higher transaction costs relative to <i>each</i> of the criteria of its main competitor. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Index breadth as percent of total market capitalization	lower no difference <u>higher</u>	Greater index breadth would mean including less-liquid equities in the index, which would increase transaction costs.
Float adjustment	<u>lower</u> no difference higher	Use of float bands reduces the number of rebalancing transactions compared with single-point float adjustments, and thus lowers transaction costs.
Selection of index constituents	<u>lower</u> no difference higher	Use of objective, clearly stated rules enables index funds to predict which firms will be in the benchmark, and as a result to trade more efficiently in anticipation of changes in benchmark constituents. This lowers transaction costs.

Part B

Badaar's Equity Market

Inclusion in the larger Developed Market Index should provide benefits to Badaar's national equity market. All else equal, it would likely promote capital inflows into Badaar's capital markets because more assets are committed internationally to developed market investments than emerging market investments. As a result, it is generally preferable for a country to have a small weighting in a developed market index rather than a large weighting in an emerging market index.

Index Funds Tracking the Emerging Market Index

While Badaar is a good fit for the Emerging Market Index in some ways, its total market capitalization is large compared to that of the entire Emerging Market Index. It would become 35% of the total Emerging Market Index, considerably changing the overall index and requiring significant turnover (resulting in higher transaction costs) upon its inclusion for index funds tracking the Emerging Market Index.

Part C

Aspects of Kimi Capital's Style Index Construction Likely to Increase Turnover:

- No overlap between categories – stocks are assigned to one or the other category with no overlap or splitting between categories. This tends to create more reassignments of a stock from one category to the other, which increases the number of rebalancing transactions.
- No buffering – buffering would help avoid frequent changes of classification on stocks that have some characteristics of each style.
- Exclusion of holding companies – because holding companies' classifications are more stable over time, excluding holding companies would result in higher turnover.

Note:

- The use of multiple variables to define each category is more likely to reduce turnover, as styles defined by multiple characteristics should be more stable than those defined by a single characteristic.

Reading References:

19. Equity Market Valuation,” Peter C. Stimes, CFA and Stephen E. Wilcox, CFA (CFA Institute, 2010)
20. “Dreaming With BRICs: The Path to 2050,” Dominic Wilson and Roopa Purushothaman, Global Economics Paper No. 99 (Goldman Sachs, 2003).

LOS: 2013-III-7-19-a,f,g

19. “Equity Market Valuation”

The candidate should be able to:

- a) **explain the terms of the Cobb-Douglas production function and demonstrate how the function can be used to model growth in real output under the assumption of constant returns to scale;**
- b) evaluate the relative importance of growth in total factor productivity, in capital stock, and in labor input given relevant historical data;
- c) demonstrate the use of the Cobb-Douglas production function in obtaining a discounted dividend model estimate of the intrinsic value of an equity market;
- d) critique the use of discounted dividend models and macroeconomic forecasts to estimate the intrinsic value of an equity market;
- e) contrast top-down and bottom-up approaches to forecasting the earnings per share of an equity market index;
- f) **discuss the strengths and limitations of relative valuation models;**
- g) **judge whether an equity market is under-, fairly, or over-valued using a relative equity valuation model.**

LOS: 2013-III-7-20-c

20. “Dreaming With BRICs: The Path to 2050”

Note: This reading is presented as an example of how economic analysis can serve as the basis for building an emerging markets investment strategy; the inclusion of this reading does not represent an endorsement of the authors’ specific conclusions.

The candidate should be able to:

- a) compare the economic potential of emerging markets such as Brazil, Russia, India, and China (BRICs) to that of developed markets, in terms of economic size and growth, demographics and per capita income, growth in global spending, and trends in real exchange rates;
- b) explain why certain developing economies may have high returns on capital, rising productivity, and appreciating currencies;
- c) **explain the importance of technological progress, employment growth, and growth in capital stock in estimating the economic potential of an emerging market;**
- d) discuss the conditions necessary for sustained economic growth, including the core factors of macroeconomic stability, institutional efficiency, open trade, and worker education;

- e) evaluate the investment rationale for allocating part of a well-diversified portfolio to emerging markets in countries with above average economic potential.

Guideline Answers:

Part A

The basic form of the Cobb-Douglas production function is set forth as:

$$Y = AK^{\alpha}L^{\beta}$$

Where

Y = total real economic output

A = total factor productivity (TFP)

K = capital stock

α = output elasticity of capital (K)

L = labor input

β = output elasticity of labor (L)

Under the assumption of constant returns to scale, the output elasticity of labor = (1 – output elasticity of capital) or $\beta = (1 - \alpha)$.

An approximation of the percentage change in real economic output (GDP) is:

$$\frac{\Delta Y}{Y} \approx \frac{\Delta A}{A} + \alpha \frac{\Delta K}{K} + (1 - \alpha) \frac{\Delta L}{L}$$

Or:

Estimated percentage change in real GDP = % growth in total factor productivity
+ (output elasticity of capital) x (% growth in capital stock)
+ (output elasticity of labor) x (% growth in labor input)

The estimated change in real GDP is 5.9%, calculated as:

$$\frac{\Delta Y}{Y} \approx \frac{\Delta A}{A} + \alpha \frac{\Delta K}{K} + (1 - \alpha) \frac{\Delta L}{L} = 1.3\% + [0.7 \times 5.5\%] + [0.3 \times 2.5\%] = 5.9\%$$

Part B

Template for Question 5-B

Policy	Determine whether <i>each</i> proposed policy will <i>most likely</i> decrease, have no effect on, or increase the long-run Cobb-Douglas growth projection for Westria. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
<p>Policy 1:</p> <p>Offer incentives to limit the average number of children per family.</p>	<p><input checked="" type="checkbox"/> decrease</p> <p><input type="checkbox"/> no effect</p> <p><input type="checkbox"/> increase</p>	<p>Incentives to limit the average number of children per family will most likely limit population growth, and therefore reduce the growth rate of the labor input ($\Delta L/L$) in the long run. Reducing the growth rate of the labor input, holding all else constant, will decrease the long-run growth projection.</p>
<p>Policy 2:</p> <p>Increase the maximum allowable annual contribution to tax-free retirement accounts.</p>	<p><input type="checkbox"/> decrease</p> <p><input type="checkbox"/> no effect</p> <p><input checked="" type="checkbox"/> increase</p>	<p>Increasing the maximum allowable annual contribution to tax-free retirement accounts:</p> <ul style="list-style-type: none"> will most likely increase the rate of savings and investment, and therefore increase the growth rate of the capital stock ($\Delta K/K$). Increasing the growth rate of capital stock, holding all else constant, will increase the long-run growth projection. could increase the total factor productivity (TFP) due to a) an improvement in the level of technology, or b) a reduction in taxes. Increasing the growth rate of TFP, holding all else constant, will increase the long-run growth projection.

Part C

Template for Question 5-C

Model	Determine whether Westria's stock market (using the broad equity index as a proxy) is undervalued, fairly valued, or overvalued using <i>each</i> model. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
i. Fed model	<div>undervalued</div> <div>fairly valued</div> <div>overvalued</div>	<p>The Fed model hypothesizes that, in equilibrium, the yield on long-term government bonds should be equal to the forward earnings yield on a broad equity index (defined as forward operating earnings divided by index level). Differences in these yields identify an overpriced or underpriced equity market.</p> <p>Based on the data in Exhibit 2, the forward earnings yield = $(35.00 \times 1.07) / 800 = 4.68\%$. Therefore, Westria's stock market is overvalued because the forward earnings yield is lower than the 10-year government bond yield, i.e., $4.68\% < 5.10\%$.</p>
ii. Yardeni model	<div>undervalued</div> <div>fairly valued</div> <div>overvalued</div>	<p>The Yardeni model is similar to the Fed model, but addresses some of the criticisms of the Fed model. The Yardeni model uses the yield on risky debt (thus incorporating a risk premium) and a projected long-term earnings growth rate to calculate a justified forward earnings yield. Differences between that yield and the forward earnings yield on a broad equity index identify an overpriced or underpriced equity market.</p> <p>Based on the data in Exhibit 2, the forward earnings yield = $(35.00 \times 1.07) / 800 = 4.68\%$ and the Yardeni justified forward earnings yield = $[10\text{-year A-rated corporate bond yield} - (\text{Yardeni weighting factor} \times \text{Projected long-term earnings growth rate})] = [0.059 - (0.2 \times 0.07)] = 4.50\%$. Therefore, Westria's stock market is undervalued because the forward earnings yield is higher than the Yardeni justified forward earnings yield, i.e., $4.68\% > 4.50\%$.</p>

Part D

- i. The Fed model uses only the yield on long-term government bonds to estimate equity valuations. Consequently, substituting the yield on BB-rated corporate bonds for A-rated corporate bonds would have no effect on the fair value estimate of Westria's stock market as implied by the Fed model.
- ii. One of the improvements of the Yardeni model over the Fed model is that it includes a risk premium by using the yield on risky debt. Therefore, substituting the yield on BB-rated corporate bonds for A-rated corporate bonds would further increase the Yardeni justified earnings yield and thus reduce the fair value estimate, making the stock market of Westria appear less undervalued, or possibly overvalued.

Reading References:

15. “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).

LOS: 2013-III-5-15-j, 1

15. “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) prepare an investment policy statement for a defined-benefit plan;
- e) evaluate the risk management considerations in investing pension plan assets;
- f) prepare 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 the investment objectives and constraints of foundations, endowments, insurance companies, and banks;
- j) prepare 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;**
- m) compare the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;
- n) compare the investment objectives and constraints of institutional investors given relevant data, such as descriptions of their financial circumstances and attitudes toward risk.

Guideline Answer:

Part A

Factors that support Smith's conclusion that the Pearce Foundation's risk tolerance is above average:

- The Pearce Foundation has a perpetual time horizon, which allows it opportunities to make up for losses sustained by the portfolio.
- The Pearce Foundation expects to receive ongoing annual contributions.
- The Pearce Foundation does not have a contractually-defined liability stream. Its 6% annual spending requirement is not a contractual obligation.

Part B

The elements of the nominal return requirement from Year 2 onwards are:

- A 6% annual spending requirement.
- Cost of managing the fund is 0.40% per annum.
- An inflation rate for the college of 3.5%.

Therefore:

Nominal return requirement = $(1 + 0.06) \times (1 + 0.004) \times (1 + 0.035) - 1 = 10.15\%$
(multiplicative method)

OR

Nominal return requirement = $6.0\% + 0.4\% + 3.5\% = 9.9\%$ (additive method)

OR

Nominal return requirement = $(1 + 0.06 + 0.035) \times 1.004 - 1 = 9.94\%$ (calculation method, reflecting exact timing of cash flows)

Part C

At the beginning of Year 1, USD 3 million is withdrawn from the portfolio, leaving USD 97 million to be invested.

The portfolio value at the end of Year 1 is USD 105,730,000 ($\text{USD } 97,000,000 \times 1.09$).

In Year 2, the Pearce Foundation's liquidity requirement equals:

- 6% spending requirement = $\text{USD } 105,730,000 \times 0.06 = \text{USD } 6,343,800$
- Management fees = $\text{USD } 105,730,000 \times 0.004 = \text{USD } 422,920$
- Less: USD 2,000,000 contribution received at the beginning of Year 2.

Total liquidity requirement in Year 2 is $6,343,800 + 422,920 - 2,000,000 = \text{USD } 4,766,720$.

Part D

Template for Question 6-D

IPS component	Determine the effect (decrease, no change, increase) of these changed circumstances on the Foundation's return objective and liquidity requirement. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Return objective	decrease <input checked="" type="radio"/> no change increase	The Foundation still needs to preserve the real value of its investment portfolio and meet its spending requirement.
Liquidity requirement	decrease no change <input checked="" type="radio"/> increase	The Foundation will no longer receive ongoing contributions from Pearce.

Reading References:

16. “Linking Pension Liabilities to Assets,” Aaron Meder and Renato Staub (UBS Global Asset Management, 2006).
17. “Allocating Shareholder Capital to Pension Plans,” Robert C. Merton, *Journal of Applied Corporate Finance* (Morgan Stanley, vol. 18, Winter 2006).

LOS: 2013-III-5-16-a

16. “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.

LOS: 2013-III-5-17-a-c

17. “Allocating Shareholder Capital to Pension Plans”
The candidate should be able to:
 - a) **compare funding shortfall and asset/liability mismatch as sources of risk faced by pension plan sponsors;**
 - b) **explain how the weighted average cost of capital for a corporation can be adjusted to incorporate pension risk and discuss the potential consequences of not making this adjustment;**
 - c) **explain, in an expanded balance sheet framework, the effects of different pension asset allocations on total asset betas, the equity capital needed to maintain equity beta at a desired level, and the debt-to-equity ratio.**

Guideline Answer:

Part A

- i. Vermillion's smaller asset/liability risk mismatch contributes to a lower shortfall risk relative to Shire, all else equal.

Vermillion's defined benefit pension plan has a fixed income allocation of 70% of plan assets while Shire has an allocation of 40%. Given that both firms match the duration of fixed income investments with the duration of pension liabilities, the firm with the highest allocation to fixed income in the defined benefit plan rather than equities (which have a higher volatility of expected returns) would have the smallest asset/liability risk mismatch.

- ii. Vermillion's lower defined benefit plan surplus as a percentage of plan assets contributes to a higher shortfall risk relative to Shire, all else equal.

Vermillion has a lower relative funding surplus of EUR 50 million (10% of total plan assets) when compared to Shire's funding surplus of EUR 30 million (15% of plan assets).

Part B

Structured Product X should be chosen, as it has the highest correlation (0.92) with the pension plan liabilities.

If the company were to change from an asset-only approach to a liability-relative approach, the key aspect of any suitable investment product would be its expected performance relative to that of the liabilities of the pension plan. If the returns and volatilities of investment products are similar, a higher correlation between a product's return and a company's pension liabilities implies a lower shortfall risk, and thus a higher probability of a company meeting its pension obligations.

Part C

Using a full economic balance sheet rather than a standard balance sheet when making capital budgeting decisions would most likely lead to a higher future firm value for Shire.

When estimating the weighted average cost of capital (WACC), the inclusion of the pension assets and liabilities in the full economic balance sheet provides a better measure of operating or project risk. For purposes of project valuation and capital budgeting, the relevant risk measure to be used in the calculation of WACC is an operating asset beta of 0.42 (under the full economic balance sheet) versus 0.71 (under the standard balance sheet). Thus, the inclusion of the pension

plan assets and liabilities leads to a lower estimate of WACC relative to a standard balance sheet approach.

A lower WACC in capital allocation decisions leads to a lower hurdle rate applied during project evaluation (net present value approach) and the acceptance of more projects that would increase the value of the firm.

Part D

While using a full economic balance sheet, shifting 20% of the pension plan's portfolio from equity into fixed income would most likely lower Shire's cost of equity capital.

When a company alters the mix of its pension assets between fixed income and equities, it changes the risk of its pension plan and the equity of the overall firm.

If Shire were to lower its pension allocation of equities from 60% to 40%, the pension asset beta would decrease from 0.60 to 0.40, causing the firm's total asset beta to decrease, and thus the beta of the firm's equity would also decrease. Investors would require a lower return on Shire's equity based on this decrease in risk.

Reading References:

23. “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).

LOS: 2013-III-9-23-i, j, l, m

23. “Fixed-Income Portfolio Management-Part I”

The candidate should be able to:

- a) compare, with respect to investment objectives, the use of liabilities as a benchmark and the use of a bond index as a benchmark;
- b) compare pure bond indexing, enhanced indexing, and active investing with respect to the objectives, advantages, disadvantages, and management 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) describe and evaluate techniques, such as duration matching and the use of 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 demonstrate the use of total return analysis and scenario analysis to assess the risk and return characteristics of a proposed trade.
- f) formulate a bond immunization strategy to 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) **explain the risks associated with managing a portfolio against a liability structure, including interest rate risk, contingent claim risk, and cap risk;**
- k) compare immunization strategies for a single liability, multiple liabilities, and general cash flows;
- l) **compare risk minimization with return maximization in immunized portfolios;**
- m) **demonstrate the use of cash flow matching to fund a fixed set of future liabilities and compare the advantages and disadvantages of cash flow matching to those of immunization strategies.**

Guideline Answer:

Part A

A cash flow matching strategy is unlikely to be more effective than a classical immunization strategy because of the following factors:

- The more uncertain, indeterminate, or highly variable the liability stream, the less effective cash flow matching will be compared to classical immunization. In this case, the liability portfolio is a pool of insurance claims that is subject to significant and unexpected variations in amount and timing.
- Transaction costs from forced, unanticipated trading necessary to adjust asset cash flows to match the frequently changing liability schedule would make cash flow matching less effective than classical immunization.
- Classical immunization requires less capital to fund liabilities. This is because a) a cash flow matching strategy usually requires a conservative return assumption for short-term cash balances (and such balances may at times be significant) while an immunized portfolio is essentially fully invested at the remaining horizon duration; and b) funds from a cash flow-matched portfolio must be available on or before each liability due date, which tends to reduce the assumed rate of return. A classically immunized portfolio needs to meet the target value only on the date of each liability, because funding is achieved by a rebalancing of the portfolio.

Part B

Because the manager is starting with EUR 400,000,000 and the required return is 2.75%, the required terminal value must equal $P_1(1+s/2)^{2T}$, where:

P_1 = initial portfolio value

s = safety net rate of return

T = years in the investment horizon

$$(400,000,000) \times (1+0.0275/2)^{(3 \times 2)} = \text{EUR } 434,155,388$$

At time 0, the portfolio can be immunized at a 3.80% rate of return, so the required initial portfolio amount is equal to the present value of the required terminal value for the indicated time horizon, discounted at the immunized rate of return:

Required initial portfolio value = (Required terminal value) / $(1+i/2)^{2T}$ where i is the immunized rate of return

$$= 434,155,388 / (1 + 0.038/2)^{2 \times 3}$$

$$= \text{EUR } 387,793,112$$

The manager therefore has an initial safety margin of EUR 400,000,000 – EUR 387,793,112 = EUR 12,206,888.

Part C

Contingent immunization provides for a degree of flexibility in pursuing active management when a portfolio is in a surplus position due to the available immunized rate of return exceeding the required rate of return. Because Bergen is allocating 20% of the portfolio to corporate bonds – securities which are exposed to credit risk – a widening of credit spreads in this scenario would cause the market value of the portfolio to decline. If the drop in value were substantial enough to erase the surplus, then Bergen must immunize the portfolio immediately.

Part D

The portfolio's economic surplus is defined as the market value of assets less the present value of liabilities. Changes in the value of the assets and liabilities are a function of both duration and convexity. Because the duration of the assets equals the duration of the liabilities, changes in value due to duration will be equal. As a result of the yield curve shift, there is no change in economic surplus due to duration effects.

In this case, however, the convexity of the liabilities is less than the convexity of the assets. Therefore, the decline in value of the liabilities as a result of the yield curve shift will be greater than the decline in value of the assets, thus increasing economic surplus.

Reading References:

24. “Relative-Value Methodologies for Global Credit Bond Portfolio Management,” Ch. 5, Jack Malvey, *Fixed Income Readings for the Chartered Financial Analyst® Program*, 2nd edition, Frank J. Fabozzi, editor (CFA Institute, 2005).

LOS: 2013-III-9-24-a, d, e

24. “Relative-Value Methodologies for Global Credit Bond Portfolio Management”
The candidate should be able to:
- a) **explain classic relative-value analysis, based on top-down and bottom-up approaches to credit bond portfolio management;**
 - b) discuss the implications of cyclical supply and demand changes in the primary corporate bond market and the impact of secular changes in the market’s dominant product structures;
 - c) explain the influence of investors’ short- and long-term liquidity needs on portfolio management decisions;
 - d) **discuss common rationales for secondary market trading;**
 - e) **discuss corporate bond portfolio strategies that are based on relative value.**

Guideline Answer:**Part A**

The two basic approaches to global credit bond portfolio management are top-down and bottom-up. The top-down approach used by the portfolio manager makes high-level allocations among a broad range of credit opportunities by reviewing macroeconomic data and industry developments, without evaluating company-specific information.

The bottom-up approach used by the credit analysts focuses on company-specific fundamentals such as ratings, revenues, earnings, cash flows, and new product developments. The bottom-up approach searches for undervalued securities and is sector neutral.

Part B

The most significant risk associated with Trade 1 is that while spreads are tightening, long-term interest rates could increase (the yield curve could shift upwards). Thus, the price increase from spread tightening could be offset by the price decrease from the yield curve shift. This yield curve effect is magnified because the 30-year bond has a longer duration than the 3-year bond.

Part C

Trade 2 will decrease the liquidity of the portfolio because on-the-run issues (newly-issued) have greater liquidity than off-the-run issues.

Reading References:

34. “Risk Management,” Ch. 9, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Don M. Chance, Kenneth Grant, and John Marsland, (CFA Institute, 2007).

LOS: 2013-III-14-34-b, c, e-h

34. “Risk Management”

The candidate should be able to:

- a) discuss the main features of the risk management process, risk governance, risk reduction, and an enterprise risk management system;
- b) evaluate the strengths and weaknesses of a company’s risk management process;**
- c) describe the characteristics of an effective risk management system;**
- d) evaluate a company’s or a portfolio’s exposures to financial and nonfinancial risk factors;
- e) calculate and interpret value at risk (VAR) and explain its role in measuring overall and individual position market risk;**
- f) compare the analytical (variance–covariance), historical, and Monte Carlo methods for estimating VAR and discuss the advantages and disadvantages of each;**
- g) discuss the advantages and limitations of VAR and its extensions, including cash flow at risk, earnings at risk, and tail value at risk;**
- h) compare alternative types of stress testing and discuss the advantages and disadvantages of each;**
- i) evaluate the credit risk of an investment position, including forward contract, swap, and option positions;
- j) demonstrate the use of risk budgeting, position limits, and other methods for managing market risk;
- k) demonstrate the use of exposure limits, marking to market, collateral, netting arrangements, credit standards, and credit derivatives to manage credit risk;
- l) discuss the Sharpe ratio, risk-adjusted return on capital, return over maximum drawdown, and the Sortino ratio as measures of risk-adjusted performance;
- m) demonstrate the use of VAR and stress testing in setting capital requirements.

Guideline Answer:

Part A

Template for Question 10-A

Identify <i>three</i> weaknesses in Capital Cubed's enterprise risk management (ERM).	Describe, for <i>each</i> weakness, <i>one</i> method to improve Capital Cubed's ERM.
1. The head trader on each team is also in charge of monitoring risk.	Good ERM practice requires that an individual or group that is independent of the trading function monitor and independently value the positions taken by the traders. So, in order to improve the ERM, individuals who are independent of the trading function should be responsible for risk management. This function should be removed from the head traders.
2. Watson adds the three VAR estimates together to calculate Capital Cubed's VAR.	Simply adding the three VAR estimates together overlooks any diversification effects that may be present, unless the returns of the three teams are perfectly positively correlated. So, in order to improve the ERM, Watson needs to account for the effect of the covariances of returns between the three teams when calculating Capital Cubed's VAR.
3. The manager of each back office reports jointly to his head trader and to Watson.	Effective risk governance requires that the back office be fully independent from the front office, so as to provide a check on the accuracy of information and to prevent collusion. So, in order to improve the ERM, the managers of the three back offices should no longer report (jointly) to their head traders.

Note that the integration of the data warehouses is not a weakness. Effective ERM systems always feature centralized data warehouses and store all pertinent risk information in a technologically efficient manner. Further, the reporting lines of the heads of business development may or may not be ideal, but they are not an ERM issue.

Part B

Excerpt 1 is incorrect. The statement should be either:

There is a 1% probability that Capital 10 will lose *at least* GBP 1.2 million in a single week, or:
There is a 99% probability that the team will lose *at most* GBP 1.2 million in a single week.

Excerpt 4 is incorrect. The statement should be:

The client should expect losses greater than GBP 0.8 million as often as 8 weeks every three years [calculated as $0.05 \times 3 \text{ years} \times 52 \text{ weeks per year} = 7.8$].

Note:

- Excerpt 2 is correct. A VAR at 1% will give a higher value or “more conservative measure” than a VAR at 5% because it relates to losses than can be expected less frequently.
- Excerpt 3 is correct because the variance-covariance method of calculating VAR will *not* adequately capture Capital 30’s risk exposure. Capital 30 trades options on UK equities. Capital 30’s variance-covariance VAR assumes the distribution of returns is adequately described by the mean and variance/covariance of the assets. However, the return distributions of option portfolios are often not symmetrical. A symmetric distribution has similar upside and downside, but return distributions on call and put options are highly skewed.

Part C

Scenario 3 – “GBP moves relative to USD by $\pm 15\%$ ” – will most likely result in the largest loss to Capital 10.

Capital 10 does not hedge its currency exposure so an adverse move (USD weakens by 15% against GBP) would reduce GBP returns by 15%, all else equal.

Note:

- A $\pm 10\%$ move in US equities (Scenario 1) would likely lead to at most a 10% decrease in Capital 10’s holdings (i.e., a smaller loss than if USD weakens by 15% against GBP), as large-cap equities are likely to have a beta less than or close to 1.0.
- Implied volatility *falling* by 15% (Scenario 2) would primarily concern option holders rather than long-only equity holders, and is usually associated with increases in equity values.

Reading References:

41. “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).

LOS: 2013-III-17-41-e, p-t

41. “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 following 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 decomposition of portfolio returns into components attributable to the market, to style, and to active management;**
- f) discuss the properties of a valid benchmark and explain the advantages and disadvantages of alternative types of performance benchmarks;
- g) explain the steps involved in constructing a custom security-based benchmark;
- h) discuss 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) evaluate 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;
- 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.**

Guideline Answer:**Part A**

i. Style Return = 0.0%

Style Return (S) = Benchmark Return (B) – Market Index Return (M)

For Lux, B = M because its benchmark (“broad Scandinavian equity market index”) is the same as its relevant market index (“diversified portfolio of equities across the Scandinavian region”). Therefore, Style Return = $-6.5\% - (-6.5\%) = 0$.

ii. Active Return = 0.8%

Active Return (A) = Portfolio Return (P) – Benchmark Return (B)

For Lux, P = -5.7% and B = -6.5% , so Active Return = $-5.7\% - (-6.5\%) = 0.8\%$

Part B

i. Rigel is most appropriate for Client 1 on a risk-adjusted basis.

Total risk is most relevant for a portfolio which is not fully diversified. With all his assets invested in a stand-alone energy sector fund, Client 1 does not hold a fully diversified portfolio. Therefore, the Sharpe ratio is the most appropriate risk-adjusted performance measure for Client 1 because it compares a portfolio’s excess return to its total risk. Rigel has the highest Sharpe ratio of the three funds.

ii. Procyon is most appropriate for Client 2 on a risk-adjusted basis.

Beta risk is most relevant for a portfolio in which nonsystematic risk has been diversified away. Since Client 2 holds a well-diversified portfolio, the Treynor measure is the most appropriate risk-adjusted performance measure because it compares a portfolio’s excess return relative to its systematic risk, represented by beta. Procyon has the highest Treynor measure of the three funds.

Part C

Template for Question 11-C

Note: Consider each criterion independently.

Criterion	Determine the <i>most likely</i> effect on the risk of committing a Type I error (decrease, no effect, increase) for <i>each</i> criterion if the proposed guideline is implemented. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Statistical significance for zero-value-added return outcomes	decrease no effect increase	Changing the level of statistical significance from 15% to 5% reduces the probability of a zero- or negative-value-added manager being misclassified as a value-added manager (Type I error). Fewer unskilled managers will exceed the more demanding value-added threshold by chance.
Exceptions allowed for MCP guideline violations	decrease no effect <u>increase</u>	Allowing exceptions to the MCP guidelines increases the tolerance for guideline violations and therefore increases the probability of retaining underperforming managers who otherwise would have been fired; i.e., increases the risk of making a Type I error.

LEVEL III

Question: 1
Topic: Individual PM
Minutes: 20

Reading References:

Level III, Volume 2, Study Session 4, Reading 10

“Managing Individual Investor Portfolios,” Ch. 2, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, James W. Bronson, CFA, Matthew H. Scanlan, CFA, and Jan R. Squires, CFA (CFA Institute, 2007).

Level III, Volume 2, Study Session 4, Reading 11

“Taxes and Private Wealth Management in a Global Context,” Stephen M. Horan, CFA, and Thomas R. Robinson, CFA (CFA Institute, 2008).

LOS:

“Managing Individual Investor Portfolios”

The candidate should be able to

- a) **discuss how source of wealth, measure of wealth, and stage of life affect an individual investor’s risk tolerance;**
- b) explain the role of situational and psychological profiling in understanding an individual investor;
- c) compare 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 risk attitudes and decision-making styles among distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
- g) explain potential benefits, for both clients and investment advisers, 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 how these affect the individual investor’s investment policy;
- j) **explain how to set risk and return objectives for individual investor portfolios and discuss the impact that ability and willingness to take risk have on risk tolerance;**
- k) **discuss each of the major constraint categories included in an individual investor’s investment policy statement;**
- l) **prepare and justify an investment policy statement for an individual investor;**
- m) determine the strategic asset allocation that is most appropriate for an individual investor’s specific investment objectives and constraints;
- n) compare Monte Carlo and traditional deterministic approaches to retirement planning and explain the advantages of a Monte Carlo approach.

LEVEL III

Question: 1
Topic: Individual PM
Minutes: 20

LOS:

“Taxes and Private Wealth Management in a Global Context”

The candidate should be able to

- a) compare 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 effects of different types of taxes and tax regimes on future wealth accumulation;
- c) calculate accrual equivalent tax rates and after-tax returns;**
- 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 relation 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 PM
Minutes: 20

Guideline Answer:

Part A

The Crusoes have a below-average risk tolerance because:

- Their investment portfolio is heavily weighted towards fixed income, indicating a low willingness to take risk.
- They would like to retire in only four years, so they would not have a long time to recover from investment losses before retirement, indicating a low ability to take risk.
- Neither Louis nor Marie are eligible for a defined benefit pension and are thus totally reliant on their investments to fund their needs in retirement, indicating a low ability to take risk.
- To the extent that their wealth has been passively accumulated through savings, they might be less confident they can rebuild their wealth should it be lost, indicating a low willingness to take risk.

Part B

The Crusoes' liquidity requirement from their portfolio for the coming year is equal to USD 85,000:

- They will pay off their home mortgage of USD 25,000 within the next few weeks.
- They will establish a USD 60,000 university tuition fund in the next few weeks for their daughter.

Therefore, $\text{USD } 60,000 + \text{USD } 25,000 = \text{USD } 85,000$

Note: The Crusoes' ongoing expenses of USD 100,000 per year (USD 135,000 after-tax income less USD 35,000 annual savings) are not included as a component of the liquidity requirement. The Crusoes are net savers, and thus ongoing expenses do not create a liquidity need from the portfolio.

Part C

The Crusoes will not be able to retire in four years. Any of the following five alternatives is acceptable to demonstrate this conclusion.

Alternative #1:

The Crusoes will need to work eight more years in order to save the USD 2,200,000 that will sustain them in retirement.

LEVEL III

Question: 1
Topic: Individual PM
Minutes: 20

Present value (<i>PV</i>)	:	(USD 1,330,000)
Annual savings (<i>PMT</i>)	:	(USD 35,000)
Future value (<i>FV</i>)	:	USD 2,200,000
After-tax expected rate of return (<i>i</i>)	:	4.5%
Solve for number of years (<i>n</i>)	:	7.85 years (or 8 years)

Alternative #2:

In four years the Crusoes will accumulate USD 1,735,786, an amount lower than the USD 2,200,000 that will sustain them in retirement.

Present value (<i>PV</i>)	:	(USD 1,330,000)
Annual savings (<i>PMT</i>)	:	(USD 35,000)
After-tax expected rate of return (<i>i</i>)	:	4.5%
Number of years (<i>n</i>)	:	4 years
Solve for future value (<i>FV</i>)	:	USD 1,735,786

Alternative #3:

The Crusoes would need a starting portfolio of USD 1,719,272, which is more than the USD 1,330,000 that they actually have.

Future value (<i>FV</i>)	:	USD 2,200,000
Annual savings (<i>PMT</i>)	:	(USD 35,000)
After-tax expected rate of return (<i>i</i>)	:	4.5%
Number of years (<i>n</i>)	:	4 years
Solve for present value (<i>PV</i>)	:	(USD 1,719,272)

Alternative #4:

The Crusoes would need to achieve an investment return of 11.21% per year, which is more than the 4.5% per year they can expect to earn based on their current risk tolerance.

Present value (<i>PV</i>)	:	(USD 1,330,000)
Annual savings (<i>PMT</i>)	:	(USD 35,000)
Future value (<i>FV</i>)	:	USD 2,200,000
Number of years (<i>n</i>)	:	4 years
Solve for after-tax expected rate of return (<i>i</i>)	:	11.21%

LEVEL III

Question: 1
Topic: Individual PM
Minutes: 20

Alternative #5:

The Crusoes would need to save USD 143,507 per year, which would not be possible because it is more than their after-tax income of USD 135,000 per year.

Present value (<i>PV</i>)	:	(USD 1,330,000)
After-tax expected rate of return (<i>i</i>)	:	4.5%
Future value (<i>FV</i>)	:	USD 2,200,000
Number of years (<i>n</i>)	:	4 years
Solve for annual savings (<i>PMT</i>)	:	(USD 143,507)

Part D

In order for the Crusoes to be able to retire in four years, they would need to:

- Increase their willingness to take risk by changing their asset allocation to investments with a higher expected return. An after-tax return of 11.21% per year would allow them to accumulate USD 2,200,000 in four years. This much higher return would be far from certain, even at a significantly higher level of risk.
- Reduce the size of their investment portfolio needed when they retire by accepting a lower standard of living, or spending less, during retirement. They are currently on track to accumulate USD 1,735,786 in their investment portfolio in four years.

Part E

The percentage return after taxes for the Crusoes' investment portfolio was 4.9% and calculated as follows:

- The total dollar return based on the 6% before-tax annual return:
 $\text{USD } 1,330,000 \times 6\% = \text{USD } 79,800$
- The taxes due on each component of return:
Interest: $\text{USD } 40,698 \times 0.25 = \text{USD } 10,175$
Dividends: $\text{USD } 10,374 \times 0.15 = \text{USD } 1,556$
Realized capital gains: $\text{USD } 21,546 \times 0.15 = \text{USD } 3,232$
- The total dollar return net of taxes due is:
 $\text{USD } 79,800 - (\text{USD } 10,175 + \text{USD } 1,556 + \text{USD } 3,232) = \text{USD } 64,837$

LEVEL III

Question: 1
Topic: Individual PM
Minutes: 20

- The percentage return after taxes is equal to the total dollar return net of taxes due, divided by the beginning value of the investment portfolio:
$$\text{USD } 64,837 / \text{USD } 1,330,000 = 0.049 \text{ or } 4.9\%$$

Alternatively:

- The total dollar return based on the 6 percent before-tax annual return:
$$\text{USD } 1,330,000 \times 6\% = \text{USD } 79,800$$
- The percentage of total dollar return in the form of:
Interest: $\text{USD } 40,698 / \text{USD } 79,800 = 0.51 \text{ or } 51\%$
Dividends: $\text{USD } 10,374 / \text{USD } 79,800 = 0.13 \text{ or } 13\%$
Realized capital gains: $\text{USD } 21,546 / \text{USD } 79,800 = 0.27 \text{ or } \underline{27\%}$
91%
The remaining 9% of portfolio return was earned in the form of unrealized capital gains.
- The percentage return after taxes is equal to the before-tax annual return adjusted by the tax rates applied to each percentage of total dollar return in the form of interest, dividends, and realized capital gains:
$$6\% \times [1 - (51\%) (0.25) - (13\%) (0.15) - (27\%) (0.15)] = 0.049 \text{ or } 4.9\%$$

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 19

Reading References:

Level III, Volume 2, Study Session 4, Reading 13

“Concentrated Single Asset Positions,” Thomas J. Boczar, CFA and Nischal R. Pai, CFA (CFA Institute, 2013)

LOS:

“Concentrated Single Asset Positions”

The candidate should be able to:

- a) explain investment risks associated with a concentrated position in a single asset and discuss the appropriateness of reducing such risks;
- b) describe typical objectives in managing concentrated positions;**
- c) discuss tax consequences and illiquidity as considerations affecting the management of concentrated positions in publicly traded common shares, privately held businesses, and real estate;**
- d) discuss capital market and institutional constraints on an investor’s ability to reduce a concentrated position;
- e) discuss psychological considerations that may make an investor reluctant to reduce his or her exposure to a concentrated position;
- f) describe advisers’ use of goal-based planning in managing concentrated positions;
- g) explain uses of asset location and wealth transfers in managing concentrated positions;
- h) describe strategies for managing concentrated positions in publicly traded common shares;**
- i) discuss tax considerations in the choice of hedging strategy;**
- j) describe strategies for managing concentrated positions in privately held businesses;
- k) describe strategies for managing concentrated positions in real estate;
- l) evaluate and recommend techniques for tax efficiently managing the risks of concentrated positions in publicly traded common stock, privately held businesses, and real estate.**

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 19

Guideline Answer:

Part A

The put option strategy achieves Greene's objectives as follows:

1. Reduce the risk of her wealth concentration

The strategy establishes an effective floor price for the Panther shares, thereby reducing both the risk of price declines and the risk of her wealth concentration. The floor is equal to the strike price of the put minus the cost of the put, or $\text{USD } 20.00 - \text{USD } 1.95 = \text{USD } 18.05$.

2. Defer capital gains taxes

The strategy allows Greene to defer capital gains taxes, as she is able to protect against declines in the stock price without having to sell the stock outright, which would cause her to realize a taxable gain.

3. Retain upside return potential

The strategy allows Greene to retain upside potential – in this case, unlimited upside potential, as long as she does not exercise the put options during the next year. She will not exercise the puts if the stock price is above the strike price. The upside return potential is equal to the stock price (S) minus the cost of the put.

Part B

Other strategies, using *only* Panther put options, to lower Greene's cost of hedging:

- Greene could use puts that have a lower strike price.
A disadvantage of this strategy is that it provides less downside protection than the strategy proposed by Reynaldo.
- Greene could combine her purchase of put options with the sale of put options that have a lower strike price and the same maturity as the long puts (put spread).
A disadvantage of this strategy is that Greene would lose downside protection if the stock price moves below the strike price of the short put.
- Greene could use a 'knock-out' put option. This is less expensive than a 'plain vanilla' option because the option expires before its stated expiration if the stock price increases to a certain level. A disadvantage of this strategy is that the stock price could rise to the level that causes the expiration of the knock-out option (resulting in the loss of downside protection), and then decline, resulting in unprotected losses.

LEVEL III

Question: 2
Topic: Individual PM
Minutes: 19

Part C

Pair F is most likely to create a cashless collar for Greene.

A cashless collar involves simultaneously buying a put and selling a call and is typically used to hedge the value of a stock portfolio. The investor typically buys puts with a strike price either at or slightly below the current price of the stock. The investor sells calls with the same maturity as the puts with a strike price that is above the current stock price. The put and call prices must be equal to achieve the cashless feature.

Justification: Pair F is the only option pair in which the put strike price is below the current stock price and the call strike price is above the current stock price. Option Pairs G and H are not collars.

Part D

A forward conversion with options strategy for Greene would consist of the following:

- A purchase of put options on Panther shares.

- A sale of call options on the same number of Panther shares.

- The put and call options would have the same expiration date and exercise price.

Note: This is a synthetic short position.

This strategy will allow her to generate liquidity in her Panther shares.

Because this position is perfectly hedged and thus riskless, she would be able to borrow against the value of her stock position (monetization) with a very high loan-to-value ratio.

LEVEL III

Question: 3
Topic: Equity
Minutes: 17

Reading References:

Level III, Volume 4, Study Session 11, Reading 23

“Equity Portfolio Management,” Ch. 7, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Gary Gastineau, Andrew R. Olma, CFA, and Robert G. Zielinski, CFA (CFA Institute, 2007).

LOS:

“Equity Portfolio Management”

The candidate should be able to:

- a) discuss the role of equities in the overall portfolio;
- b) discuss the rationales for passive, active, and semiactive (enhanced index) equity investment approaches and distinguish among those approaches with respect to expected active return and tracking risk;
- c) recommend an equity investment approach when given an investor’s investment policy statement and beliefs concerning market efficiency;
- d) distinguish among the predominant weighting schemes used in the construction of major equity share indices and evaluate the biases of each;
- e) compare alternative methods for establishing passive exposure to an equity market, including indexed separate or pooled accounts, index mutual funds, exchange-traded funds, equity index futures, and equity total return swaps;
- f) compare full replication, stratified sampling, and optimization as approaches to constructing an indexed portfolio and recommend an approach when given a description of the investment vehicle and the index to be tracked;
- g) explain and justify the use of equity investment–style classifications and discuss the difficulties in applying style definitions consistently;
- h) explain the rationales and primary concerns of value investors and growth investors and discuss the key risks of each investment style;
- i) compare techniques for identifying investment styles and characterize the style of an investor when given a description of the investor’s security selection method, details on the investor’s security holdings, or the results of a returns-based style analysis;**
- j) compare the methodologies used to construct equity style indices;**
- k) interpret the results of an equity style box analysis and discuss the consequences of style drift;
- l) distinguish between positive and negative screens involving socially responsible investing criteria and discuss their potential effects on a portfolio’s style characteristics;
- m) compare long–short and long-only investment strategies, including their risks and potential alphas, and explain why greater pricing inefficiency may exist on the short side of the market;**
- n) explain how a market-neutral portfolio can be “equitized” to gain equity market exposure and compare equitized market-neutral and short-extension portfolios;
- o) compare the sell disciplines of active investors;

LEVEL III

Question: 3
Topic: Equity
Minutes: 17

- p) contrast derivatives-based and stock-based enhanced indexing strategies and justify enhanced indexing on the basis of risk control and the information ratio;
- q) recommend and justify, in a risk–return framework, the optimal portfolio allocations to a group of investment managers;
- r) explain the core-satellite approach to portfolio construction and discuss the advantages and disadvantages of adding a completeness fund to control overall risk exposures;
- s) distinguish among the components of total active return (“true” active return and “misfit” active return) and their associated risk measures and explain their relevance for evaluating a portfolio of managers;
- t) explain alpha and beta separation as an approach to active management and demonstrate the use of portable alpha;
- u) describe the process of identifying, selecting, and contracting with equity managers;
- v) contrast the top-down and bottom-up approaches to equity research.

LEVEL III

Question: 3
Topic: Equity
Minutes: 17

Guideline Answer:

Part A

Ideal indices for returns-based style analysis should be (1) mutually exclusive with respect to the indices/asset classes, (2) exhaustive with respect to the manager's investment universe, and (3) represent distinct sources of risk.

Wang's choice of the 6 indices meets these criteria. The indices are mutually exclusive with respect to asset classes. The 6 indices do not overlap in capitalization or style. Together, the indices exhaust the U.S. equity markets of Fund A's investment universe. Each index represents a distinct source of risk. Style (growth & value) and size (large, mid and small capitalization) are widely accepted sources of risk.

Part B

The given description of Fund A as "a U.S. actively managed value fund" is not accurate. Using a returns-based style analysis, Fund A's description is not accurate because it has a 55% style weight of growth stocks and a 45% style weight of value stocks. Fund A's present investment style would be better characterized as core or market-oriented with a growth bias, but not as value.

Part C

The appropriate benchmark for Fund B is the risk-free rate, 2%. A market-neutral portfolio carries no systematic risk, therefore has a zero beta and should be measured against the risk-free rate.

Part D

The following are potential reasons for more price inefficiencies on the short side of the market than on the long side:

- Because of impediments to short selling (e.g., the need to borrow the stock before selling it), relatively few investors search for overvalued stocks. This results in investor pessimism not being fully reflected in stock prices and creates opportunities on the short side of the market.
- Since insiders are less likely to divulge negative information (i.e., drop in profits, fraud, etc.) than positive information, stock prices might not fully reflect negative information.
- Sell-side analysts predominantly issue "buy" recommendations. One explanation for this phenomenon is related to commissions that a recommendation may generate. Although most customers may be potential buyers of a stock, only those who already

LEVEL III

Question: 3
Topic: Equity
Minutes: 17

own shares or who are short sellers – usually a smaller group – can sell it. Analysts may also be reluctant to issue “sell” recommendations as market reaction may cause losses for customers who own the stock.

Part E

Fund C has the ability to short, which allows the fund manager to further exploit positive information on the long side. In a long-short portfolio, the position weights can be outside the 0% to 100% range because shorting releases money which can be used to take on larger long positions than otherwise possible. In a long-only portfolio (e.g. Fund D), the weight of each stock in the portfolio is limited to the 0% to 100% range.

LEVEL III

Question: 4
Topic: Economics
Minutes: 15

Reading References:

Level III, Volume 3, Study Session 6, Reading 17

“Capital Market Expectations,” Ch. 4, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, John P. Calverley, Alan M. Meder, CFA, Brian D. Singer, CFA, and Renato Staub (CFA Institute, 2007).

LOS:

“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 challenges in developing capital market forecasts;
- 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) explain how exogenous shocks may affect economic growth trends;
- l) identify and interpret macroeconomic, interest rate, and exchange rate linkages between economies;
- m) **discuss the risks faced by investors in emerging-market securities and the country risk analysis techniques used to evaluate emerging market economies;**
- n) compare the major approaches to economic forecasting;
- o) demonstrate the use of economic information in forecasting asset class returns;
- p) evaluate how economic and competitive factors affect investment markets, sectors, and specific securities;
- q) discuss the relative advantages and limitations of the major approaches to forecasting exchange rates;
- r) recommend and justify changes in the component weights of a global investment portfolio based on trends and expected changes in macroeconomic factors.

LEVEL III

Question: 4
Topic: Economics
Minutes: 15

Guideline Answer:

Part A

Using the Singer-Terhaar approach, the expected return for an investment in Asia-Pacific real estate is equal to 5.24%.

Most markets lie between the extremes of perfect market integration and complete market segmentation.

- For perfect integration, the expected risk premium of an asset is expressed as:
$$[(\sigma_i) \times (\rho_{i, M}) \times (\text{Sharpe ratio}_{GIM})] + \text{Illiquidity premium}$$
 - For complete segmentation, the expected risk premium of an asset is expressed as:
$$[(\sigma_i) \times \text{Sharpe ratio}_{GIM}] + \text{Illiquidity premium}$$
- where:
 σ_i is the standard deviation or volatility of the asset's returns
 $\rho_{i, M}$ is the correlation of the asset's returns with the Global Investable Market's (GIM) returns

The answer calculated as follows:

1. Determine the Sharpe ratio of the GIM:
$$RP_M / \sigma_M = (6\% - 2\%) / 12.5\% = 0.32$$

where:
 RP_M is the risk premium of the GIM
 σ_M is the standard deviation or volatility of the GIM's returns
2. Calculate the Asia-Pacific real estate risk premium under the assumption of perfect integration (see formula above):
$$[13\% \times 0.47 \times 0.32] + 0.4\% = 2.36\%$$
3. Calculate the Asia-Pacific real estate risk premium under the assumption of complete segmentation (see formula above):
$$[13\% \times 0.32] + 0.4\% = 4.56\%$$
4. Calculate the weighted average of the risk premiums based on a 60% degree of market integration:
$$[2.36\% \times 0.60] + [4.56\% \times 0.40] = 3.24\%$$

LEVEL III

Question: 4
Topic: Economics
Minutes: 15

5. The expected return on an investment in Asia-Pacific real estate equals the risk-free interest rate plus the weighted average of the risk premiums = $2.0\% + 3.24\% = 5.24\%$.

Part B

Using the Taylor rule, the target or optimal short-term interest rate can be calculated as follows:

$$R_{\text{optimal}} = R_{\text{neutral}} + [0.5 \times (\text{GDPg}_{\text{forecast}} - \text{GDPg}_{\text{trend}}) + 0.5 \times (I_{\text{forecast}} - I_{\text{target}})]$$

Where:

R_{optimal} = the target for the short-term interest rate

R_{neutral} = the short-term interest rate that would be targeted if GDP growth were on trend and inflation on target

$\text{GDPg}_{\text{forecast}}$ = the GDP forecast growth rate

$\text{GDPg}_{\text{trend}}$ = the observed GDP trend growth rate

I_{forecast} = the forecast inflation rate

I_{target} = the target inflation rate

The previous and updated target interest rates are:

$$\begin{aligned} R_{\text{optimal previous}} &= R_{\text{neutral}} + [0.5 \times (1.4\% - 3.5\%) + 0.5 \times (0.8\% - 2.0\%)] \\ &= R_{\text{neutral}} - 1.65\% \end{aligned}$$

$$\begin{aligned} R_{\text{optimal updated}} &= R_{\text{neutral}} + [0.5 \times (1.3\% - 3.5\%) + 0.5 \times (0.7\% - 2.0\%)] \\ &= R_{\text{neutral}} - 1.75\% \end{aligned}$$

The change in the target short-term interest rate is:

$$\text{Change in } R_{\text{optimal}} = R_{\text{optimal updated}} - R_{\text{optimal previous}} = -1.75\% - (-1.65\%) = -0.10\%$$

Therefore, the target or optimal short-term interest rate is expected to decrease by 0.10%.

LEVEL III

Question: 4
Topic: Economics
Minutes: 15

Part C

The case provides three key pieces of information regarding the factors that could strengthen or weaken Workia's ability to service its debt:

Relevant information provided in the vignette	Previous Year	Current Year	Effect on Workia's ability to service its debt
Economy's dependence on iron ore	20%	18%	Strengthen
External debt/GDP (calculated)	41.3%	50.3%	Weaken
Foreign exchange reserves/Short-term debt (calculated)	150%	150%	No change

i.
External debt/GDP measures the external debt burden of a country. Workia's ability to service its debt weakened because this ratio increased.

ii.
Workia's economy depends heavily on production of a single commodity, iron ore, making the economy vulnerable to adverse demand shocks. During the past year, Workia's dependence on iron ore production declined, implying a lower reduced impact of an economic shock and an improved ability to service debt.

Note: Foreign exchange reserves/short-term debt measures the availability of liquidity. This ratio has not changed during the past year, thus having no impact on Workia's ability to service its debt.

LEVEL III

Question: 5
Topic: Institutional PM
Minutes: 15

Reading References:

Level III, Volume 2, Study Session 5, Reading 15

“Managing Institutional Investor Portfolios,” Ch. 3, *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).

Level III, Volume 2, Study Session 5, Reading 16

“Linking Pension Liabilities to Assets,” Aaron Meder, CFA, and Renato Staub (UBS Global Asset Management, 2006).

LOS:

“Managing Institutional Investor Portfolios”

The candidate should be able to:

- a) contrast a defined-benefit plan to a defined-contribution plan and discuss the advantages and disadvantages of each from the perspectives of the employee and the employer;
- 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) **prepare an investment policy statement for a defined-benefit plan;**
- e) **evaluate the risk management considerations in investing pension plan assets;**
- f) prepare 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 the investment objectives and constraints of foundations, endowments, insurance companies, and banks;
- j) prepare 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;
- m) compare the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;
- n) compare the investment objectives and constraints of institutional investors given relevant data, such as descriptions of their financial circumstances and attitudes toward risk.

LEVEL III

Question: 5
Topic: Institutional PM
Minutes: 15

LOS:

“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: 5
Topic: Institutional PM
Minutes: 15

Guideline Answer:

Part A

Note: Consider *each* category independently.

Category	Determine, for <i>each</i> category, which company's pension plan <i>most likely</i> has the lowest risk tolerance. (circle <i>one</i>)	Justify <i>each</i> response with <i>one</i> reason.
i. Sponsor financial status/profitability	<div>GHPL</div> <div>MWOL</div> <div>QYDL</div>	<p>Financial status/profitability can affect the sponsor's ability and willingness to make payments to the pension plan and thus directly impact the plan's risk tolerance. All else equal, the pension plan of a company with lower profitability and higher debt ratios has a lower risk tolerance.</p> <ul style="list-style-type: none">QYDL has the lowest net income margin (15%) and has the highest debt to equity ratio (1.4) therefore its pension plan most likely has the lowest risk tolerance. <p>The absolute level of the projected benefit obligation is not sufficient to support conclusions about the sponsor's financial status/profitability.</p> <p>The funded status of the plan is not in the "Sponsor financial status/profitability" category.</p>
ii. Workforce characteristics	<div>GHPL</div> <div>MWOL</div> <div>QYDL</div>	<p>All else equal, the greater the proportion of retired lives (lowest proportion of active lives), the shorter the duration of plan liabilities and the lower the risk tolerance.</p> <ul style="list-style-type: none">MWOL's DB Plan has the greatest proportion of retired lives (lowest proportion of active lives 57%) and therefore most likely has the lowest risk tolerance. <p>Provisions for lump-sum payments and early retirements are plan features and not workforce characteristics.</p> <p>The funded status of the plan is also not a workforce characteristic.</p>

LEVEL III

Question: 5
Topic: Institutional PM
Minutes: 15

Part B

Note: Consider *each* factor independently.

Factor	Determine, for <i>each</i> factor, whether the DB plan's liquidity requirement in two years will be lower, the same, or higher relative to its liquidity requirement today, holding all else constant. (circle <i>one</i>)	Justify <i>each</i> response with <i>one</i> reason.
i. Change in proportion of active lives	<div><div>lower</div><div>the same</div><div>higher</div></div>	The net cash outflow (benefit payments minus pension contributions) constitutes a pension plan's liquidity requirement. Although distributions from the plan will remain unchanged (as the number of retirees is unaffected by the increase in the proportion of active lives), the higher proportion of active lives lowers the plan's liquidity requirement because contributions to the plan by GHPL would be higher.
ii. Change in provision allowing lump-sum distributions	<div><div>lower</div><div>the same</div><div>higher</div></div>	Abolishing lump-sum distributions will lower the plan's liquidity requirement in two years. Large withdrawals related to the exercise of this provision will no longer be possible.

LEVEL III

Question: 5
Topic: Institutional PM
Minutes: 15

Part C

i.

Liability mimicking *could not* achieve GHPL's objective. When the cash flows of the assets mimic the cash flows of the liability stream, the liabilities are essentially immunized.

Immunization should prevent the pension shortfall from worsening. However, immunization also means that the return on the assets will not exceed the implicit return on the liabilities, and will thus be insufficient to eliminate the underfunding of the pension plan. Assuming liabilities remain the same, either additional company contributions or investment returns in excess of liability mimicking returns will be necessary to correct the plan's shortfall.

ii.

An asset-only investment approach *could* achieve GHPL's objective because it allows for the possibility of making up for the shortfall without needing to make additional contributions. This approach targets an overall required return for the portfolio's assets rather than attempting to match the liability stream. Assuming an appropriate level of risk tolerance and a realistic distribution of returns, the required return could be set high enough to eventually make up the funding shortfall. The burden falls upon the pension fund's investment manager to generate that required return.

LEVEL III

Question: 6
Topic: Institutional PM
Minutes: 16

Reading References:

Level III, Volume 2, Study Session 5, Reading 15

“Managing Institutional Investor Portfolios,” Ch. 3, *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).

LOS:

“Managing Institutional Investor Portfolios”

The candidate should be able to:

- a) contrast a defined-benefit plan to a defined-contribution plan and discuss the advantages and disadvantages of each from the perspectives of the employee and the employer;
- 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) prepare an investment policy statement for a defined-benefit plan;
- e) evaluate the risk management considerations in investing pension plan assets;
- f) prepare 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 the investment objectives and constraints of foundations, endowments, insurance companies, and banks;**
- j) **prepare 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;
- m) **compare the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;**
- o) compare the investment objectives and constraints of institutional investors given relevant data, such as descriptions of their financial circumstances and attitudes toward risk.

LEVEL III

Question: 6
Topic: Institutional PM
Minutes: 16

Guideline Answer:

Part A

The Munoz endowment has an above-average risk tolerance based on the following:

- Munoz's board is confident that it could raise funds through donor contributions, if necessary.
- The recent investment returns of the endowment have been above the return objective, providing a cushion for lower future returns.
- The long time horizon of the Munoz endowment allows for short-term fluctuations of returns and time to make up for shortfalls in any given year.
- The endowment's low spending rate of 2% helps ensure preservation of fund value.

Part B

Elmar's return objective calculation is deficient because it ignores two factors that the endowment faces over time:

- The organization's spending needs incur a higher rate of inflation than the overall economy. The applicable inflation factor should be 4.5% (3.0% general inflation rate plus 1.5% additional annual inflation in Munoz's operating expenses) rather than the 3.0% general inflation rate.
- The 0.5% management fee should be included in the required return.

The resulting nominal required return would be 7.0% (2% distribution rate + 4.5% inflation rate for Munoz + 0.5% management fee). Calculated geometrically this required return would be $7.12\% = ((1.02 * 1.045 * 1.005) - 1)$.

LEVEL III

Question: 6
Topic: Institutional PM
Minutes: 16

Part C

IPS Component	Determine whether <i>each</i> component of Logano's IPS is lower than, the same as, or higher than that of the Munoz endowment. (circle one)	Justify <i>each</i> response with <i>one</i> reason.
Risk tolerance	<div><div>lower</div><div>the same</div><div>higher</div></div>	Logano has a lower risk tolerance than Munoz due to: <ul style="list-style-type: none">• its shorter time horizon• less certain cash flow/liquidity needs compared to Munoz• greater volatility in required return as compared to Munoz
Liquidity requirement	<div><div>lower</div><div>the same</div><div>higher</div></div>	Logano has a higher liquidity requirement (5% currently, approximately equal to the real required rate of return) than Munoz (2% spending + 0.5% management fee). Logano also has a more volatile liquidity requirement, due to the uncertainty of claims compared to Munoz's more predictable annual need. This requires Logano to hold a higher level of cash reserves.

LEVEL III

Question: 7
Topic: Fixed Income
Minutes: 11

Reading References:

Level III, Volume 4, Study Session 10, Reading 22

“Fixed-Income Portfolio Management-Part II,” Ch. 6, sections 5-7 (pp. 41–76) *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, H. Gifford Fong, Larry D. Guin (CFA Institute, 2007).

LOS:

“Fixed-Income Portfolio Management-Part II”

The candidate should be able to:

- a) evaluate the effect of leverage on portfolio duration and investment returns;
- b) discuss the use of repurchase agreements (repos) to finance bond purchases and the factors that affect the repo rate;
- c) critique the use of standard deviation, target semi-variance, shortfall risk, and value at risk as measures of fixed-income portfolio risk;
- d) demonstrate the advantages of using futures instead of cash market instruments to alter portfolio risk;
- e) formulate and evaluate an immunization strategy based on interest rate futures;
- f) explain the use of interest rate swaps and options to alter portfolio cash flows and exposure to interest rate risk;
- g) compare default risk, credit spread risk, and downgrade risk and demonstrate the use of credit derivative instruments to address each risk in the context of a fixed-income portfolio;
- h) explain the potential sources of excess return for an international bond portfolio;
- i) evaluate (1) the change in value for a foreign bond when domestic interest rates change and (2) the bond’s contribution to duration in a domestic portfolio, given the duration of the foreign bond and the country beta;**
- j) recommend and justify whether to hedge or not hedge currency risk in an international bond investment;**
- k) describe how breakeven spread analysis can be used to evaluate the risk in seeking yield advantages across international bond markets;**
- l) discuss the advantages and risks of investing in emerging market debt;
- m) discuss the criteria for selecting a fixed-income manager.

LEVEL III

Question: 7
Topic: Fixed Income
Minutes: 11

Guideline Answer:

Part A

The minimum spread widening that would eliminate Alphastan's yield advantage is calculated as the additional yield income (in basis points) from investing in Alphastan bonds divided by the duration of either the existing UK bond portfolio or the targeted Alphastan bonds, whichever is greater.

= (Average yield of targeted Alphastan bonds – Average yield of the existing UK bond portfolio) / Duration of either the existing UK bond portfolio or the targeted Alphastan bonds

= $(620 - 300) / 5$ – in this case the existing UK bond portfolio and the targeted Alphastan bonds each have a duration of 5.

= 64 basis points (bps)

Based only on breakeven spread analysis only, Gupta *should not* invest in Alphastan bonds because the predicted spread widening of 90–100 bps is greater than the minimum spread widening (64 bps) that would eliminate Alphastan's yield advantage.

Part B

The new duration of the UK bonds in the overall portfolio that is required to maintain the overall portfolio's sensitivity to UK interest rates following the addition of Alphastan bonds is 5.24.

There are two steps involved in calculating the new duration of the UK bonds in the overall portfolio after adding Alphastan bonds:

Step 1

Calculate the duration contribution to the rebalanced bond portfolio after adding the Alphastan bonds – this duration contribution is called the adjusted Alphastan bond duration:

The adjusted Alphastan bond duration = (the Alphastan bonds duration) x (the Alphastan Country Beta Relative to UK)
= 5×0.35
= 1.75

Step 2

Calculate the new duration of the UK component of the rebalanced portfolio, i.e., 93% allocated to UK bonds and 7% allocated to Alphastan bonds.

LEVEL III

Question: 7
Topic: Fixed Income
Minutes: 11

The rebalanced portfolio's sensitivity to UK interest rates (DUR_p) is a weighted average of the adjusted Alphastan bond duration and the new UK bond duration or:

$$DUR_p = (\text{Weight of Alphastan bonds} \times \text{Adjusted Alphastan bond duration}) + (\text{Weight of UK bonds} \times \text{new UK bond duration})$$

Given the requirement that the overall portfolio's sensitivity to UK interest rates remains unchanged implies that the rebalanced portfolio's overall duration will equal 5.

Therefore,
 $5 = (0.07 \times 1.75) + (0.93 \times \text{New UK Bond Duration})$
The new UK Bond Duration = 5.24

Part C

Assuming the economist's currency forecast is correct, Gupta *should not* hedge the currency risk in Alphastan bonds.

According to Interest Rate Parity (IRP), the expected depreciation of the ACU over the next six months would be 1.25%, calculated as follows:

$$(\text{Alphastan risk-free rate} - \text{UK risk-free rate}) / 2 = (5.0\% - 2.5\%) / 2 = 1.25\%$$

If IRP holds, the ACU should depreciate against the GBP by approximately 1.25% over the next six months. However, the economist forecasts that the ACU will depreciate by 1.0% over the same time period. Therefore, Gupta *should not* use a forward hedge to lock in a currency loss of 1.25%. If he were to leave the ACU exposure unhedged, the expected currency loss would be lower, i.e. 1.0%.

LEVEL III

Question: 8
Topic: Asset Allocation
Minutes: 15

Reading References:

Level III, Volume 3, Study Session 8, Reading 19
“Asset Allocation,” Ch. 5, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, William F. Sharpe, Peng Chen, CFA, Jerald E. Pinto, CFA, and Dennis W. McLeavey, CFA (CFA Institute, 2013).

LOS:

“Asset Allocation”

The candidate should be able to:

- a) explain 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 strategic and tactical asset allocation;
- c) discuss the importance of asset allocation for portfolio performance;
- d) contrast the asset-only and asset/liability management (ALM) approaches to asset allocation and discuss the investor circumstances in which they are commonly used;
- e) explain the advantage of dynamic over static asset allocation and discuss 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) demonstrate the application of mean-variance analysis to decide whether to include an additional asset class in an existing portfolio;**
- l) describe risk, cost, and opportunities associated with nondomestic equities and bonds;
- m) explain the importance of conditional return correlations in evaluating the diversification benefits of nondomestic investments;**
- n) explain expected effects on share prices, expected returns, and return volatility as a segmented market becomes integrated with global markets;
- o) explain the major steps involved in establishing an appropriate asset allocation;
- p) 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;
- q) discuss the structure of the minimum-variance frontier with a constraint against short sales;
- r) formulate and justify a strategic asset allocation, given an investment policy statement and capital market expectations;

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Minutes: 15

- s) compare the considerations that affect asset allocation for individual investors versus institutional investors and critique a proposed asset allocation in light of those considerations;
- t) formulate and justify tactical asset allocation (TAA) adjustments to strategic asset class weights, given a TAA strategy and expectational data.

LEVEL III

Question: 8
Topic: Asset Allocation
Minutes: 15

Guideline Answer:

Part A

Based only on expected utility, the Board should select Jade because its risk-adjusted expected return is higher than Ruby's. Expected utility is calculated as follows:

$$U_P = E(R_P) - 0.005 \times R_B \times \sigma_P^2$$

where U_P = expected utility for the portfolio
 $E(R_P)$ = expected return of the portfolio
 R_B = the Board's risk aversion level
 σ_P^2 = variance of return for the portfolio

The expected utility for Jade is:
 $= 6.50\% - 0.005 \times 6 \times (10.0\%)^2$
 $= 3.50\%$

The expected utility for Ruby is:
 $= 7.50\% - 0.005 \times 6 \times (13.5\%)^2$
 $= 2.03\%$

Part B

Based only on Roy's safety-first criterion, the Board should select Ruby because it maximizes the safety-first ratio. The Ruby portfolio has a lower probability of falling below the minimum threshold level of 5%. The safety-first ratio is calculated as follows:

$$SFRatio = \frac{E(R_P) - R_L}{\sigma_P}$$

where $SFRatio$ = safety-first ratio
 $E(R_P)$ = expected return of the portfolio
 R_L = the Board's return threshold level
 σ_P = standard deviation of return for the portfolio

The safety-first ratio for Jade is:
 $= (6.50\% - 5.00\%) / 10.0\%$
 $= 0.150$

The safety-first ratio for Ruby is:
 $= (7.50\% - 5.00\%) / 13.5\%$
 $= 0.185$

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Question: 8
Topic: Asset Allocation
Minutes: 15

Part C

A mean-variance improvement *would* be achieved by adding non-domestic developed market equity to the current endowment portfolio.

A mean-variance improvement would be achieved if the Sharpe ratio for non-domestic developed market equity is greater than the product of the Sharpe ratio of the current endowment portfolio and its correlation to non-domestic developed market equity.

The calculation to determine the appropriateness of adding non-domestic developed market equity is as follows:

$$\frac{E(R_{ND}) - R_f}{\sigma_{ND}} > \frac{[E(R_P) - R_f]}{\sigma_P} \times \text{corr}(R_{ND}, R_P)$$

where

$E(R_{ND})$	=	expected return of non-domestic developed market equity
$E(R_P)$	=	expected return of the existing portfolio
R_f	=	risk-free rate
σ_{ND}	=	standard deviation of return of non-domestic developed market equity
σ_P	=	standard deviation of return of the existing portfolio
$\text{corr}(R_{ND}, R_P)$	=	correlation between the return of non-domestic developed market equity and the return of the existing portfolio

Substituting with the appropriate values:

$$\left(\frac{8.00\% - 2.0\%}{14.0\%} \right) > \left[\left(\frac{6.25\% - 2.0\%}{9.5\%} \right) \right] \times 0.70$$
$$0.429 > 0.313$$

Because 0.429 is greater than 0.313, a mean-variance improvement would be achieved.

Part D

The use of conditional return correlations is valuable in stress testing because:

- Correlations tend to increase during periods of market volatility.
- Traditional mean-variance analysis assumes that the correlation statistic is constant over time, when in fact it is not.
- Correlations often change with the absolute level of the market and/or the magnitude of returns.
- Conditional return correlations provide the ability to more accurately evaluate mean-variance improvement under varying market environments.

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 15

Reading References:

Level III, Volume 5, Study Session 15, Reading 29

“Risk Management Applications of Forward and Futures Strategies,” Ch. 6 (pp. 356–391) *Analysis of Derivatives for the CFA® Program*, Don M. Chance, CFA (CFA Institute, 2003).

Level III, Volume 5, Study Session 15, Reading 31

“Risk Management Applications of Swap Strategies,” Ch. 8, *Analysis of Derivatives for the CFA® Program*, Don M. Chance, CFA (CFA Institute, 2003).

LOS:

“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) explain the use of stock index futures to convert a long stock position into synthetic cash;
- 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) explain exchange rate risk and demonstrate the use of forward contracts to reduce the risk associated with a future receipt or payment in a foreign currency;
- g) explain the limitations to hedging the exchange rate risk of a foreign market portfolio and discuss feasible strategies for managing such risk.

LOS:

“Risk Management Applications of Swap Strategies”

The candidate should be able to:

- a) demonstrate how an interest rate swap can be used to convert a floating-rate (fixed-rate) loan to a fixed-rate (floating-rate) loan;
- b) **calculate and interpret the duration of an interest rate swap;**
- c) explain the effect of an interest rate swap on an entity’s cash flow risk;
- d) **determine the notional principal value needed on an interest rate swap to achieve a desired level of duration in a fixed-income portfolio;**
- e) explain how a company can generate savings by issuing a loan or bond in its own currency and using a currency swap to convert the obligation into another currency;
- f) demonstrate how a firm can use a currency swap to convert a series of foreign cash receipts into domestic cash receipts;

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 15

- g) explain how equity swaps can be used to diversify a concentrated equity portfolio, provide international diversification to a domestic portfolio, and alter portfolio allocations to stocks and bonds;
- h) demonstrate the use of an interest rate swaption (1) to change the payment pattern of an anticipated future loan and (2) to terminate a swap.

LEVEL III

Question: 9
Topic: Risk Management
Minutes: 15

Guideline Answer:

Part A

Hood needs to:

- i. sell 971 Taurus contracts and
- ii. buy 1,283 Aries contracts.

Hood wants to shift 15 percentage points of his USD 700 million portfolio, or USD 105 million, from fixed income to equity. Therefore, he effectively needs to sell USD 105 million of bonds by converting them to cash using bond futures and buy USD 105 million of stocks using equity index futures. This would effectively convert the bonds into cash and then convert that cash into equity.

i.

To reduce the fixed-income allocation to 20% from 35%, the number of Taurus futures Hood needs to sell is:

$$N_{bf} = [(MDUR_T - MDUR_B)/MDUR_f] \times (B/f_b)$$

N_{bf} = number of bond futures contracts

$MDUR_T$ = target modified duration

$MDUR_B$ = modified duration of existing position

$MDUR_f$ = implied modified duration of futures

B = market value of portfolio to be reallocated

f_b = bond futures price

$MDUR_T$ is zero in this case, as Hood is effectively converting USD 105 million of the fixed-income portfolio into synthetic cash rather than actual cash. Also, the Taurus contract has a yield beta of 1.00, which indicates that its sensitivity to interest rate changes is identical to that of the bonds. Therefore:

$$N_{bf} = [(0.00 - 6.55)/7.15] \times (105,000,000/99,100) = -970.62 \text{ contracts, or sell 971 contracts}$$

ii.

To increase the equity allocation to 80% from 65%, Hood needs to use that synthetic cash to buy Aries futures as follows:

$$N_{sf} = [(B_T - B_S)/B_f] \times (S/f_S)$$

N_{sf} = number of equity futures contracts

B_T = target beta

B_S = beta of existing position

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Question: 9
Topic: Risk Management
Minutes: 15

B_f = futures beta

S = market value of portfolio to be reallocated

f_s = equity index futures price

In this case, B_T is 1.12 and B_S is zero, as Hood needs to take the existing synthetic cash position generated above (beta equal to zero) and effectively convert it to an equity position that will match the beta of the current equity portfolio. Therefore:

$$N_{sf} = [(1.12 - 0)/0.97] \times (105,000,000/94,505) = +1,282.86 \text{ contracts, or buy 1,283 contracts}$$

Part B

The Canis swap contract will best achieve Hood's objective because it is the alternative with the smallest required notional principal. The duration of a pay-fixed, receive-floating interest rate swap is equal to the duration of a floating-rate bond minus the duration of a fixed-rate bond, where the bonds have cash flows equivalent to the corresponding cash flows of the swap. The duration of the fixed leg is 75% of its maturity and the duration of the floating leg is 50% of its payment frequency period.

The swap duration for each swap in Exhibit 2 is calculated below:

Swap duration = Duration of floating leg – Duration of fixed leg

Duration of Orion contract (three-year maturity with quarterly payments)
 $= 0.125 - 2.25 = -2.125$

Duration of Ursa contract (three-year maturity with semiannual payments)
 $= 0.25 - 2.25 = -2.00$

Duration of Canis contract (five-year maturity with quarterly payments)
 $= 0.125 - 3.75 = -3.625$

Duration of Lupus contract (five-year maturity with semiannual payments)
 $= 0.25 - 3.75 = -3.50$

In this case, because the Canis contract has the longest maturity and the highest payment frequency, its duration is the most negative of the four alternatives.

The notional principal of a swap (with duration $MDUR_S$) needed to change the duration of a bond portfolio, with a market value of B , from its current duration of $MDUR_B$ to a target duration of $MDUR_T$ is calculated as :

$$NP = B \times [(MDUR_T - MDUR_B)/MDUR_S]$$

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Question: 9
Topic: Risk Management
Minutes: 15

Therefore using a swap with a higher (negative) duration requires a lower notional principal (NP) for the same-sized adjustment to portfolio duration.

Part C

The reasons Hood's return using the futures overlay strategy was not the same as that of the cash-market strategy are as follows:

- Futures hedge only the relationship between the portfolio and the index/security underlying the futures contract, so an equity portfolio could contain non-systematic risk, which would cause the portfolio to behave differently than the futures contract. Small-cap and mid-cap equity index futures contracts were used as proxies for equity portfolios. Portfolio holdings and weights may not match those of the indices underlying the futures contracts.
- Equities do not always respond in the precise manner predicted by their betas.
- Betas are difficult to measure precisely and are often unstable.

LEVEL III

Question: 10
Topic: Trading, Monitoring & Rebalancing
Minutes: 19

Reading References:

Level III, Volume 6, Study Session 16, Reading 32

“Execution of Portfolio Decisions,” Ch. 10, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Ananth Madhavan, Jack L. Treynor, and Wayne H. Wagner (CFA Institute, 2007).

Level III, Volume 6, Study Session 16, Reading 33

“Monitoring and Rebalancing,” Ch. 11, *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Robert D. Arnott, Terence E. Burns, CFA, Lisa Plaxco, CFA, and Philip Moore (CFA Institute, 2007).

LOS:

“Execution of Portfolio Decisions”

The candidate should be able to:

- a) compare 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 alternative market structures and their relative advantages;
- d) compare 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) explain the components of execution costs, including explicit and implicit costs, and evaluate a trade in terms of these costs;
- g) calculate and discuss 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;
- m) discuss 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;

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Question: 10
Topic: Trading, Monitoring & Rebalancing
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- 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.

LOS:

“Monitoring and Rebalancing”

The candidate should be able to:

- a) discuss a fiduciary's responsibilities in monitoring an investment portfolio;
- b) discuss 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;**
- g) compare 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.

LEVEL III

Question: 10
Topic: Trading, Monitoring & Rebalancing
Minutes: 19

Guideline Answer:

Part A

i.

The fixed-income allocation on 1 July using the calendar rebalancing method would be 73%.

Titanium Re uses calendar rebalancing on a semiannual basis and will thus have to rebalance the portfolio back to the target weights on 1 July.

ii.

The fixed-income allocation on 1 July using the percentage-of-portfolio rebalancing method would be 73%.

While the fixed income and large-cap equity allocations are within the stated tolerance bands on 30 June, the 24% cash allocation is outside its allowed tolerance band of $21\% \pm 2\%$. Whenever a tolerance band is exceeded, all asset classes in the portfolio must be rebalanced back to their target weights.

Part B

Raffo's statement is correct because two factors indicate a narrower corridor width and one factor indicates a wider corridor width. Hence, the expected changes in market conditions are inconclusive as to whether the corridor width should be narrowed or widened.

- Decreasing transaction costs for fixed income implies a *narrower* corridor width because the cost of rebalancing is reduced.
- Increasing volatility of fixed income implies a *narrower* corridor width because it makes divergence from the strategic asset allocation more costly because a further large move is more likely.
- Increasing the correlation of fixed income with other asset classes implies a *wider* corridor width because it makes divergence from the strategic asset allocation less likely. Asset class returns are expected to move more closely together.

LEVEL III

Question: 10
Topic: Trading, Monitoring & Rebalancing
Minutes: 19

Part C

Note: Consider *each* trade execution tactic independently.

Trade execution tactic	Determine the security for which <i>each</i> trade execution tactic is <i>most</i> appropriate. (circle <i>one</i>)	Justify <i>each</i> response with <i>three</i> features of the selected trade.
i. Volume-weighted average price (VWAP) algorithm	UWOE <div>STPR</div> TORN ZEHP	VWAP is preferable under the following conditions: low order volume relative to average daily volume traded, narrow bid-ask spread, and low urgency to complete the trade. STPR meets all of these conditions. 1. Low order volume relative to average daily volume traded ($48,000 / 972,000 = 4.9\%$) 2. Narrow bid-ask spread 3. Low urgency to complete trade
ii. Implementation shortfall algorithm	UWOE STPR <div>TORN</div> ZEHP	The implementation shortfall algorithm is preferable under the following conditions: low order volume relative to average daily volume traded, narrow bid-ask spread, and high urgency to complete the trade. TORN meets all of these conditions. 1. Low order volume relative to average daily volume traded ($3,000 / 77,000 = 3.9\%$) 2. Narrow bid-ask spread 3. High urgency to complete trade

LEVEL III

Question: 10
Topic: Trading, Monitoring & Rebalancing
Minutes: 19

Part D

The implementation shortfall component attributable to realized profit/loss equals a 19 basis point loss. The realized profit/loss represents the difference between the execution price and the decision price for the portion of the trade executed on the day it was placed.

Realized profit/loss = $\left(\frac{P_{\text{execution}} - P_{\text{decision}}}{P_{\text{decision}}} \right) \frac{N_{\text{purchased}}}{N_{\text{ordered}}}$ where:

$P_{\text{execution}} = \text{GBP } 12.51$

$P_{\text{decision}} = \text{GBP } 12.45$

$N_{\text{purchased}} = \text{Total shares purchased} = 6,000$

$N_{\text{ordered}} = \text{Total shares in order} = 15,000$

Note: The value for P_{decision} is the same in both the numerator and denominator because the decision price is given as the price at the time Raffo chooses to execute the trade on Tuesday afternoon. The purchase of 6,000 shares is executed on Tuesday and since the balance of the trade is cancelled on Wednesday, no shares are carried over to the next day (which would have resulted in a change in the decision price for any trades on Wednesday).

Realized loss = $\left(\frac{12.51 - 12.45}{12.45} \right) \frac{6,000}{15,000} = 0.001928 = 0.19\% \text{ or } 19 \text{ bps}$

LEVEL III

Question: 11
Topic: Individual PM Behavioral
Minutes: 17

Reading References:

Level III, Volume 2, Study Session 3, Reading 8
“The Behavioral Biases of Individuals,” Michael M. Pompian, CFA (CFA Institute, 2011)

LOS: 2014-III-3-8-a, c, d

“The Behavioral Biases of Individuals”

The candidate should be able to:

- a. distinguish between cognitive errors and emotional biases;**
- b. discuss commonly recognized behavioral biases and their implications for financial decision making;
- c. identify and evaluate an individual’s behavioral biases;**
- d. evaluate how behavioral biases affect investment policy and asset allocation decisions and recommend approaches to mitigate their effects.**

LEVEL III

Question: 11
Topic: Individual PM Behavioral
Minutes: 17

Guideline Answer:

Part A

i. Identify <i>two</i> of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by Lam.	Justify <i>each</i> identified bias with <i>one</i> example from the information provided.
1. Availability	Availability is a bias in which people take a heuristic approach to estimating the probability of an outcome based on how easily the outcome comes to mind. Lam gets some investment ideas from advertisements by industry trade groups and from blogs sponsored by the companies he is researching, rather than considering additional independent resources. These are sources he sees regularly, demonstrating availability bias. Lam also demonstrates availability bias by investing in companies that remind him of his most successful corporate clients since “they know what works.”
2. Representativeness	Representativeness is a belief perseverance bias in which people tend to classify new information based on past experiences and classifications. Lam demonstrates representativeness bias by investing in companies that remind him of his most successful corporate clients since “they know what works.”
ii. Identify <i>two</i> of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by Ashland.	Justify <i>each</i> identified bias with <i>one</i> example from the information provided.
1. Endowment	Endowment is a bias in which people value an asset more when they hold rights to it than when they do not. Ashland demonstrates endowment bias by considering his shares in his father’s company “a source of family pride and worth every cent” and refusing to consider selling or diversifying.
2. Regret-aversion	Regret-aversion is a bias in which people tend to avoid making decisions that will result in action, out of fear that the decision will turn out poorly. Ashland demonstrates regret-aversion bias when he tells Taylor he would be upset to sell an investment, only to then see it appreciate further in value.

LEVEL III

Question: 11
Topic: Individual PM Behavioral
Minutes: 17

Part B

Taylor's educational approach is more appropriate for Lam.

Lam's behavior shows evidence of primarily cognitive biases (availability, representativeness). Cognitive biases result from errors in processing and retaining information, so modification through education can have an effect. Emotional biases (such as those demonstrated by Ashland) result from feelings and instincts, and are much harder (if not impossible) to modify.

Lam also has a higher standard of living risk than Ashland. A mortgage, a young child who will require resources for upbringing, and the low level of retirement savings are indicative of a lower implied level of wealth, and a higher probability that his current lifestyle may not be sustainable (standard of living risk). The higher the client's standard of living risk, the more an advisor should moderate, rather than adapt to, a client's biases.