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
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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.

  2014 Level III Guideline Answers

LEVEL III

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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, USD 60,000 + USD 25,000 = 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.

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Present value (*PV*)	:	(USD 1,330,000)
Annual savings (*PMT*)	:	(USD 35,000)
Future value (*FV*)	:	USD 2,200,000
After-tax expected rate of return (*i*)	:	4.5%
Solve for number of years (*n*)	:	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 (*PV*)	:	(USD 1,330,000)
Annual savings (*PMT*)	:	(USD 35,000)
After-tax expected rate of return (*i*)	:	4.5%
Number of years (*n*)	:	4 years
Solve for future value (*FV*)	:	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 (*FV*)	:	USD 2,200,000
Annual savings (*PMT*)	:	(USD 35,000)
After-tax expected rate of return (*i*)	:	4.5%
Number of years (*n*)	:	4 years
Solve for present value (*PV*)	:	(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 (*PV*)	:	(USD 1,330,000)
Annual savings (*PMT*)	:	(USD 35,000)
Future value (*FV*)	:	USD 2,200,000
Number of years (*n*)	:	4 years
Solve for after-tax expected rate of return (*i*)	:	11.21%

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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 (*PV*)	:	(USD 1,330,000)
After-tax expected rate of return (*i*)	:	4.5%
Future value (*FV*)	:	USD 2,200,000
Number of years (*n*)	:	4 years
Solve for annual savings (*PMT*)	:	(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:
  USD 1,330,000 x 6% = USD 79,800

- The taxes due on each component of return:
Interest:	USD 40,698 x 0.25 = USD 10,175
Dividends:	USD 10,374 x 0.15 = USD 1,556
Realized capital gains:	USD 21,546 x 0.15 = USD 3,232

- The total dollar return net of taxes due is:
  USD 79,800 – (USD 10,175 + USD 1,556 + USD 3,232) = USD 64,837

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- 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:
  USD 64,837 / USD 1,330,000 =
  0.049 or 4.9%

Alternatively:

- The total dollar return based on the 6 percent before-tax annual return:
  USD 1,330,000 x 6% = USD 79,800

- The percentage of total dollar return in the form of:
  Interest: USD 40,698 / USD 79,800 = 0.51 or 51%
  Dividends: USD 10,374 / USD 79,800 = 0.13 or 13%
  Realized capital gains: USD 21,546 / USD 79,800 = 0.27 or <u>27%</u>
                                                                                              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% x [1 – (51%) (0.25) – (13%) (0.15) – (27%) (0.15)] = 0.049 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 USD 20.00 – USD 1.95 = 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
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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;

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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

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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.

2014 Level III Guideline Answers

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:
    $[2.36\% \times 0.60] + [4.56\% \times 0.40] = 3.24\%$

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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:

$$R_{optimal} = R_{neutral} + [\ 0.5 \times (GDPg_{forecast} - GDPg_{trend}) + 0.5 \times (I_{forecast} - I_{target})]$$

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
$GDPg_{forecast}$ = the GDP forecast growth rate
$GDPg_{trend}$ = 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:

$$R_{optimal}\ previous = R_{neutral} + [\ 0.5 \times (1.4\% - 3.5\%) + 0.5 \times (0.8\% - 2.0\%)]$$
$$= R_{neutral} - 1.65\%$$

$$R_{optimal}\ updated = R_{neutral} + [\ 0.5 \times (1.3\% - 3.5\%) + 0.5 \times (0.7\% - 2.0\%)]$$
$$= R_{neutral} - 1.75\%$$

The change in the target short-term interest rate is:

$$\text{Change in } R_{optimal} = R_{optimal}\ updated - R_{optimal}\ previous = -1.75\% - (-1.65\%) = -0.10\%$$

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.

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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 *each* category, which company's pension plan *most likely* has the lowest risk tolerance. (circle *one*)	Justify *each* response with *one* reason.
i. Sponsor financial status/profitability	GHPL MWOL QYDL (boxed)	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. • 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. The absolute level of the projected benefit obligation is not sufficient to support conclusions about the sponsor's financial status/profitability. The funded status of the plan is not in the "Sponsor financial status/profitability" category.
ii. Workforce characteristics	GHPL MWOL (boxed) QYDL	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. • 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. Provisions for lump-sum payments and early retirements are plan features and not workforce characteristics. The funded status of the plan is also not a workforce characteristic.

2014 Level III Guideline Answers

LEVEL III

Question: 5
Topic: Institutional PM
Minutes: 15

Part B
Note: Consider *each* factor independently.

Factor	Determine, for *each* 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 *one*)	Justify *each* response with *one* reason.
i. Change in proportion of active lives	~~lower~~ the same higher	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	~~lower~~ the same higher	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 *each* component of Logano's IPS is lower than, the same as, or higher than that of the Munoz endowment. (circle one)	Justify *each* response with *one* reason.
Risk tolerance	<u>lower</u> the same higher	Logano has a lower risk tolerance than Munoz due to: • its shorter time horizon • less certain cash flow/liquidity needs compared to Munoz • greater volatility in required return as compared to Munoz
Liquidity requirement	lower the same <u>higher</u>	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.

2014 Level III Guideline Answers

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.

2014 Level III Guideline Answers

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 x 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.

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 = (Weight of Alphastan bonds x Adjusted Alphastan bond duration) + (Weight of UK bonds x 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 x 1.75) + (0.93 x 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:

(Alphastan risk-free rate – 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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LEVEL III

Question: 8
Topic: Asset Allocation
Minutes: 15

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    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:

$$U_P = E(R_P) - 0.005 \ x \ R_B \ x \ \sigma^2_P$$

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^2_P	=	variance of return for the portfolio

The expected utility for Jade is:
$$= 6.50\% - 0.005 \ x \ 6 \ x \ (10.0\%)^2$$
$$= 3.50\%$$

The expected utility for Ruby is:
$$= 7.50\% - 0.005 \ x \ 6 \ x \ (13.5\%)^2$$
$$= 2.03\%$$

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:
$$= (7.50\% - 5.00\%) \ / \ 13.5\%$$
$$= 0.185$$

LEVEL III

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:

$$\frac{E(R_{ND}) - R_f}{\sigma_{ND}} \quad > \quad \frac{[E(R_P) - R_f]}{\sigma_P} \quad \text{x corr } (R_{ND,} R_P)$$

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
        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:

$$(\underline{8.00\% - 2.0\%}) \quad > \quad [(\underline{6.25\% - 2.0\%})] \quad \text{x} \quad 0.70$$
$$14.0\% 9.5\%$$

$$0.429 \quad > \quad 0.313$$

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;

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Question: 9
Topic: Risk Management
Minutes: 15

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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.

2014 Level III Guideline Answers

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] x (105,000,000/94,505) = +1,282.86 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 x [($MDUR_T$ – $MDUR_B$)/$MDUR_S$)

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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.

2014 Level III Guideline Answers

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
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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% ± 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.

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Question: 10
Topic: Trading, Monitoring & Rebalancing
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Part C
Note: Consider *each* trade execution tactic independently.

Trade execution tactic	Determine the security for which *each* trade execution tactic is *most* appropriate. (circle *one*)	Justify *each* response with *three* features of the selected trade.
i. Volume-weighted average price (VWAP) algorithm	UWOE (STPR) 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 (TORN) 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

2014 Level III Guideline Answers

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.

$$\text{Realized profit/loss} = \left(\frac{P_{execution} - P_{decision}}{P_{decision}}\right)\frac{N_{purchased}}{N_{ordered}} \text{ where:}$$

$P_{execution}$ = GBP 12.51
$P_{decision}$ = GBP 12.45
$N_{purchased}$ = Total shares purchased = 6,000
$N_{ordered}$ = 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).

$$\text{Realized loss} = \left(\frac{12.51 - 12.45}{12.45}\right)\frac{6,000}{15,000} = 0.001928 = 0.19\% \text{ or 19 bps}$$

2014 Level III Guideline Answers

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 *two* of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by Lam.	Justify *each* identified bias with *one* 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 *two* of the following behavioral biases (availability, endowment, framing, regret-aversion, representativeness, self-control) exhibited by Ashland.	Justify *each* identified bias with *one* 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.

2014 Level III Guideline Answers

LEVEL III

Question:	11
Topic:	Individual PM Behavioral
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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.