# Schweser Review Workshop Questions: 2017 Level III CFA®

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How to Use This Workbook

This workbook is intended for use during the review course and not for self-study. It is not a replacement for basic preparation and practice. Level III material can be subtle. If you apply the taught principals to the case facts you will do well. If you try to learn the principals from individual answers you will lower your score. Ideally you have completed the readings in the SchweserNotes™ and/or CFA text. The OnDemand videos can supplement this. You have also taken classes, worked the Class Discussion Questions, used the QBank and, perhaps, some CFA end-of-chapter questions.

Because it is a preparation tool, not every question in this workbook is in precise exam form. Not every multiple choice question has 6 parts. Constructed response (CR) questions do not include the lined paper that will be in the exam book. While we do include a variety of question types, we put more emphasis on CR questions.

The basic process to answer a CR question is:

• First, check the minutes; these are the maximum total score that can be earned and are part of the question instructions. A reasonable guideline is a well done answer can be written in less than half the allotted time. Writing too much will lower your score.
• Then, read the specific question. Failure to directly answer all parts of the question will lower your score.
• Read the case facts and consider how they may apply to the specific question asked and how they fit into the taught material. Questions rarely test obscure trivia or exceptions but regularly focus on well-taught material. Making up facts, ignoring facts, and using reasoning not based on the taught material will lower your score.
• Now, read the question again to be sure you are answering what was asked. Under stress, it is easy to answer the wrong question and lower your score.
• Check the case facts again and decide how you will approach writing an answer.
• Begin writing. Writing should take less than half the allotted time. Writing without thinking clearly will lower your score.
• On the job, the same kinds of mistakes will limit your career prospects.

Answering item set questions is similar except you know every set has six questions that are worth three minutes/points each. Plus, you only have to look at and select the best of three answer choices for each question.

CR questions include template and lined paper questions. The lined paper is included in the exam question book on exam day, and you must turn to those pages to write your answer. We do not include that space in this workbook, so bring your own paper to the review course. Template questions often seem a little easier because the template partially guides your answer. Template questions have typically been less than 20% of the CR question point value.
More Typical Mistakes

**Inadequate preparation.** Level III candidates rightfully feel a sense of accomplishment. Unfortunately, when you combine this with the open response style of CR questions and stress, it can lead candidates to argue why their answer is better or acceptable. If you directly answer the question using the relevant case facts and the most relevant taught material, you have an acceptable answer. However, if you are arguing the inherent logic of “my way is better,” you are contributing to the 50% failure rate. **Only answers based on the taught material are accepted on this style of test. Please do not shoot the messenger.**

**Studying from the past questions and answers.** Every year candidates complain “they did not ask that before.” More subtly (and worse) every question depends on the specifics given. Small changes in details can substantially change the answer. **Learn the material first and then use questions to practice.** Do not try to reverse the process. A leads to B does not mean B will lead to A.

**Expecting to be perfect.** You will get questions wrong and find some things you cannot grasp by exam day. So what? Focus on a passing score. **The CFA Institute has said candidates lower their score by trying to answer every question.** A professional level exam assumes you know how to set rational priorities.

For the review, bring a spiral notebook (wide rule), blue or black ball point pens, and your calculator. The calculator is the lowest priority on this list. A 100-page notebook should be plenty, but if you are worried, bring two.

*David Hetherington*

David Hetherington, CFA  
Vice President of CFA Education  
CFA Level III Manager and Instructor

P.S. After the review course, your most relevant study materials are the Schweser Practice Exams and Mock Exams plus the last three years of actual morning exams.
LEVEL III REVIEW WORKSHOP QUESTIONS: ETHICS

1. Ethics

Jennifer Juniper, CFA, works for Zygotic Fund Managers (ZFM). She is currently thinking about setting up her own firm.

For many years, Juniper has been advising the trustees of a pension fund set up by a friend of hers, Samantha. Juniper has never charged for this advice (which she gives in her spare time), but Samantha has promised her a substantial bonus in the future if the fund performs well.

Juniper has not informed ZFM of Samantha's pension fund, as it never interferes with her paid work and she has never received any compensation for her advice.

ZFM is no longer interested in small clients, and these days only accepts clients who are looking to place more than US$10 million under management.

Juniper receives a call one day from a client of ZFM, Rupert Robbins. During the conversation, Rupert tells Juniper that his mother is looking for a new investment manager for her $4 million of assets, as Mrs. Robbins is unhappy with her current adviser. Juniper informs Rupert of ZFM's size limit. In the course of conversation, however, she mentions that she expects to be running her own firm within a year and that Rupert should ask his mother to give her a call once the new firm is operational.

In the months leading up to her resignation from ZFM, Juniper memorizes the names, addresses, and direct telephone numbers of a few of ZFM's clients each day. As soon as she gets home, she writes the information down. She also took home some client-specific marketing presentations.

When performing company research, ZFM analysts use the “dividend valuation model” to assess the value of equity shares. When Juniper's new firm was established, she modified this model to adapt it to her own approach. She did not credit ZFM with the original model.

Based on this information, answer the following questions:

1. Which of the following statements best describes the requirements of the CFA Institute Standards related to Juniper soliciting new clients?
   A. New clients may only be solicited after Juniper has tendered her resignation.
   B. New clients may only be solicited after the cessation of Juniper’s employment at ZFM.
   C. New clients may only be solicited after Juniper has ceased employment at ZFM and after ZFM has given permission for her to solicit new clients.
2. Which of the following is most likely to be a violation of CFA Institute’s Standards of Professional Conduct?
   A. Before terminating her employment with ZFM, Juniper tells Rupert to ask his mother to call her when Juniper’s new firm is operational.
   B. Before terminating her employment with ZFM, Juniper plans to take with her computer spreadsheets, which she developed for making investment recommendation to ZFM’s clients.
   C. Before terminating her employment with ZFM, Juniper rents office space and purchases furniture for her new business. Three weeks before terminating her employment with ZFM, Juniper applies for a business license with the local government, which will enable her to begin her business on the day she announces her resignation.

3. In advising Samantha’s pension fund, is Juniper in breach of CFA Institute’s Standards of Professional Conduct?
   A. No, because she has not received any compensation for the advice.
   B. Yes, since she has been promised a substantial bonus.
   C. Yes, since the advice is in conflict with her employment even without the bonus.

4. Has Juniper breached CFA Institute’s Standards of Professional Conduct by (i) memorizing the client lists, (ii) taking the marketing presentations, and (iii) using the dividend valuation model without attribution?
   A. No Yes No
   B. Yes Yes No
   C. Yes Yes Yes

5. If Juniper wants to provide investment advice and other services to clients in several countries, which of the following statements is the best description of the requirements under the CFA Institute’s Standards of Professional Conduct?
   A. Juniper must know the details of the laws and regulations that govern her activities in any country in which she trades securities or provides investment advice.
   B. In countries with no applicable securities laws or regulations, Juniper must comply with the CFA Institute Code and Standards.
   C. In each country where she trades securities or provides investment advice, Juniper must comply with either the local laws or the CFA Code and Standards, whichever is stricter.
6. When Juniper’s new firm is running, she hires an assistant, Geoffrey, and puts in place a comprehensive set of rules to ensure that he adheres to CFA Institute’s Standards of Professional Conduct. Geoffrey is not a CFA charterholder or candidate, but he has worked for other firms previously and has high-quality references and academic credentials. Despite the rules that Juniper has put in place, Geoffrey produces a recommendation based on research that he has not properly conducted. Juniper reviews all of Geoffrey’s work and did not discover this lapse. Is Juniper in breach of the Standards of Professional Conduct as a result of this action?

A. No, since Juniper is not responsible for work performed by a non-CFA candidate.

B. No, since Juniper has put in place rules that enable her to make reasonable efforts to detect all violations.

C. Yes, since Juniper is automatically responsible for all work produced by her subordinates.
LEVEL III REVIEW WORKSHOP QUESTIONS: ETHICS: ANSWERS

1. Ethics

1. B According to Standard IV(A): Duties to Employers – Loyalty, an employee may not solicit clients prior to cessation of employment.

   If Juniper were to receive permission from her employer, then she would be permitted to engage in independent practice. Given that she is planning to resign, this scenario is highly unlikely.

2. B Except with the consent of the ZFM, Juniper should not take any records from her employer, even if these were prepared by Juniper.

   Juniper has not breached Standard IV(A): Duties to Employers – Loyalty by soliciting business from Rupert's mother because her asset size does not reach ZFM's minimum client size. Therefore, we can safely assume that ZFM has already rejected this client. The key point here is that so long as the contacts are not in competition with her employer, and Juniper's solicitation efforts do not interfere with her responsibilities at ZFM, no violation has occurred. However, to service this client in her own time while still being employed by ZFM, Juniper will need to get written permission from both her employer at ZFM and the prospective client according to Standard IV(B): Duties to Employers – Additional Compensation Arrangements.

   Juniper has not violated Standard IV(A): Duties to Employers – Loyalty. The Standard allows Juniper to make preliminary arrangements to start her new business as long as those arrangements are not in competition with her current employer and does not deprive that employer of any business opportunities. Juniper's efforts do not interfere with her responsibilities at ZFM. Renting office space, purchasing office furniture for her new business, or a simple registration for her new business is generally not considered to be a competitive activity against her employer ZFM.


4. B The client lists have been misappropriated, even though they were memorized rather than simply copied. This is in breach of Standard IV(A): Duties to Employers – Loyalty. The marketing presentations are client specific and are a breach of the same standard. The dividend valuation model is a standard model and not a proprietary tool of ZFM. Hence Juniper using this model does not breach Standard IV(A) or Standard I(C): Professionalism – Misrepresentation.

5. C According to Standard I(A): Professionalism – Knowledge of the Law, if the applicable law is stricter than the requirements of the Standards, then the applicable laws must be adhered to. Otherwise, members should follow the Standards.

6. B According to Standard IV(C): Duties to Employers – Responsibilities of Supervisors, Juniper is entitled to rely on reasonable procedures designed to detect and prevent violations. In this situation, the rules were designed to prevent such violations, and Juniper is allowed to rely on them.

   Despite this, the fact that a violation did occur may indicate that the compliance procedures are in fact inadequate. However, in this situation, answer B is the best option.
LEVEL III REVIEW WORKSHOP
QUESTIONS: BEHAVIORAL FINANCE

2. Behavioral Finance

In his recent continuing professional education, Jose Mesa, an investment advisor, has become aware of behavioral finance concepts. He believes this could be useful in his work with his clients, Bob and Judy Smith. Mesa has had trouble relating to the Smiths and believes that their desires are producing an inefficient portfolio. He feels he must get them to change and adopt a more traditionally efficient approach in order to maximize return to risk.

1. Mesa’s concerns are most appropriate if the Smiths have:
   A. a very large portfolio because they may later be disappointed and damage his reputation.
   B. shown an interest in continuing investment education.
   C. fairly significant investment needs.

2. In further interviews with the Smiths, Mesa realized their tendency toward regret aversion. Which one of the following statements is the least accurate description of regret aversion?
   A. Investors might invest out of fear of committing an error of omission.
   B. Investors are sometimes hesitant to act based on the amount and quality of data they have.
   C. Investors might be hesitant to invest out of fear of committing an error of commission.

3. Which of the following statements, taken from information relating to the Smiths, best represents an example of the behavioral finance phenomena of mental accounting?
   A. “We will not sell a security for less than we paid for it.”
   B. “The focus of the Smith family’s college portfolio is preservation of capital. It is entirely invested in government treasuries because we can’t accept even a modest likelihood of losses in that portfolio.”
   C. “Extensive use of short-term, investment grade investments is entirely justified by the expectation that a low inflation environment will exist indefinitely into the future.”

4. Based on the way they have allocated their portfolio and process information, Mesa is convinced that the Smiths exhibit conservatism bias. Which of the following best describes conservatism bias? The Smiths:
   A. sell securities that are above but retain securities that are below the previous year-end closing price.
   B. buy more of any security they already own when they see favorable recommendations on the security.
   C. ignore unfavorable information on any security they own.
5. In explaining utility theory to the Smiths, Mesa makes the following statements. Which of the statements is most accurate?
A. The four axioms of utility include completeness, continuity, transitivity, and codification.
B. According to the transitivity axiom of utility, rankings must be consistent. If X is preferred to Y and Y is preferred to Z, X must be preferred to Z.
C. According to the codification axiom of utility, indifference curves must be smooth and continuous.

6. The Smiths tend to look for patterns in stock prices. The existence of price patterns and the ability to use them to generate excess returns would most likely invalidate which of the following forms of market efficiency?
A. Weak form efficiency.
B. Semi-strong form efficiency.
C. Both weak and semi-strong form efficiency.
3. Behavioral Finance

THIS QUESTION HAS ONE PART FOR A TOTAL OF 12 MINUTES.

Gerald Head is a U.S.-based pension fund advisor whose clients include General Stores, Inc., (GS) a well known U.S.-based retailer. GS has a defined contribution plan that was established 10 years ago. Head has been asked to assist the board of GS with several issues relating to each of the pension schemes.

In the defined contribution (DC) plan, GS matches employee contributions (with cash) to up to 3% of salary and encourages employees to make additional contributions. All DC contributions are tax deductible (deducted from income before calculating taxes due) under the relevant U.S. tax code. The board is considering making changes to the menu of funds offered to plan participants, the default asset allocation, and the information provided to employees to help them decide which funds to select.

During the meeting, the following comments were made by various GS directors:

- Many DC plan participants have not reallocated their portfolios since they joined the plan.
- For each fund in the plan, we need to provide plan participants with 20- to 30-year compound return data as well as annual data. When they see only recent annual performance, they tend to avoid equity funds.
- Plan participants tend to purchase and then hold the maximum allowed in GS stock.
- New plan participants tend to allocate evenly across all mutual funds in the plan.

Determine the behavioral characteristic exhibited by plan participants in each statement and explain the potential impact on the risk or return characteristics of the participant's portfolio.

Answer Question 3 in the template provided.
## Template for Question 3

<table>
<thead>
<tr>
<th>Statement</th>
<th>Characteristic (circle one)</th>
<th>Explain the potential impact on the risk or return characteristics of the participant’s portfolio.</th>
</tr>
</thead>
</table>
| Many DC plan participants have not reallocated their portfolios since they joined the plan. | Endowment bias  
Status quo bias  
1/n diversification  
Myopic loss aversion  
Familiarity  
Overconfidence |                                                                                       |
| For each fund in the plan, we need to provide plan participants with 20- to 30-year compound return data as well as annual data. When they see only recent annual performance, they tend to avoid equity funds. | Endowment bias  
Status quo bias  
1/n diversification  
Myopic loss aversion  
Familiarity  
Overconfidence |                                                                                       |
Plan participants tend to purchase and then hold the maximum allowed in GS stock.

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LEVEL III REVIEW WORKSHOP
QUESTIONS: BEHAVIORAL FINANCE:
ANSWERS

2. Behavioral Finance

1. C High standard of living risk (SLR) and mostly cognitive biases are when the client
should and can be educated to adopt a more efficient portfolio. Answer C indicates high
SLR (large investment needs in relation to available assets) and a need to get the Smiths
to adopt a more efficient portfolio. Answer B indicates it should be easier to get the
Smiths to change but not necessarily important to do so. Answer A indicates they can be
accommodated because they may have ample assets.

2. B Regret aversion refers to individuals’ fear of making a bad decision. It can be based on
an act of omission, where the investor failed to act, or an act of commission, where the
investor made the wrong decision. Fear of not acting and, hence, not capitalizing along
with everyone else, investors might feel compelled to invest. Likewise, fear of making
a bad decision might make the investor hesitant to invest. Answer B is a description of
logical, informed investing and is thus least related to regret aversion.

3. B Mental accounting is looking at your assets in isolation to meet specific goals. For
example, looking at the college funding objective in isolation is an example of mental
accounting. Mental accounting is inconsistent with the tenets of modern portfolio
theory. Answer A is best described as anchoring. Answer C could describe over-
confidence or representativeness.

4. C Answer A shows both reference dependence in using the closing price to determine their
opinion and framing in selling winners and holding losers. Answer B shows confirmation
bias in reacting to information that confirms an existing belief in the investment, while
Answer C shows conservatism (keeping the initial opinion) in rejecting information that
does not support that existing belief.

5. B The four axioms of utility are completeness, transitivity, independence, and continuity.
Codification is part of the editing phase of prospect theory; individuals clarify outcomes
by coding them as gains or losses or in some other way. Answer B is the correct
definition of the transitivity axiom.

6. C Each successive level of market efficiency implies the previous. In order for a market to
be considered semi-strong form efficient, for example, it must be weak form efficient.
Technical trading rules explicitly test for weak form efficiency. If technical trading rules
consistently generate excess returns, the market must not be weakly efficient and thus
cannot be semi-strong form efficient.
3. Behavioral Finance

Template for Question 3

<table>
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| Many DC plan participants have not reallocated their portfolios since they joined the plan. | Endowment bias  
Status quo bias  
1/n diversification  
Myopic loss aversion  
Familiarity  
Overconfidence | Portfolio risk and return may become inconsistent with participant’s changing circumstances. |
| For each fund in the plan, we need to provide plan participants with 20- to 30-year compound return data as well as annual data. When they see only recent annual performance, they tend to avoid equity funds. | Endowment bias  
Status quo bias  
1/n diversification  
Myopic loss aversion  
Familiarity  
Overconfidence | Annual data may lead to a focus on reducing standard deviation, resulting in an inadequate long-run return and increasing longevity risk. |
| Plan participants tend to purchase and then hold the maximum allowed in GS stock. | Endowment bias  
Status quo bias  
1/n diversification  
Myopic loss aversion  
Familiarity  
Overconfidence | Leading to over-concentration and excessive diversifiable risk. |
| New plan participants tend to allocate evenly across all mutual funds in the plan. | Endowment bias  
Status quo bias  
1/n diversification  
Myopic loss aversion  
Familiarity  
Overconfidence | Ignores correlation among assets and diversification, leading to excessive diversifiable risk. Total risk and return can be too high or low.  
**Candidate note:** Ignoring correlation makes it likely the portfolio will plot to the right of the efficient frontier, and such portfolios have unnecessary nonsystematic risk. |
Jeremy Phelp is 48 years old, and his wife, Alice, is 45. They have three children, ages 12, 15, and 18. Jeremy and Alice both work, and their combined salaries average $120,000 per year. They currently pay an average tax rate of 28% on income and capital gains. This rate is expected to continue, and they take advantage of no tax shelters.

The Phelps’ brokerage account totals $1,550,000, including a recent inheritance of over $1.2 million. When questioned, Jeremy states that they have average to above-average risk tolerance, and they wish to avoid high-risk investments such as derivatives, international securities, and commodities. In addition, they want their portfolio to do no worse than break even in any year.

The Phelps plan to retire in 10 years when their youngest child graduates from college. In retirement, they plan to travel and enjoy their free time. Their financial advisor, Tom Steele, has determined that when the Phelps retire, they will need $2,000,000 (in real terms) to meet their goals.

Considering their salaries, college costs, living expenses, taxes, and any deductions over the next 10 years, Steele has calculated that the Phelps will require $21,600 in real terms annually from the portfolio. Jeremy and Alice have also committed to giving $50,000 to Alice’s favorite charity in six months. Inflation is expected to average 3% annually for the foreseeable future.

The Phelps want to leave significant amounts to each of their children upon the death of the surviving spouse, estimated to be when Alice would be 85. When pressed, they agree that $500,000 for each child in current dollars would be significant. They also wish to leave their home to a local charity upon the death of the surviving spouse.

Their current brokerage account includes money market assets of $78,625, high-grade corporate bonds valued at $185,000, and diversified U.S. equities, primarily large cap. Regarding his current asset allocation, Jeremy states the following: “The money market assets supply the foundation for our portfolio by providing enough cash for our donation and emergency needs. The corporate bonds are set aside for our children’s college expenses. The equity portfolio gives me a little upside potential. I am willing to take a little more risk with the equities than I am with the other assets.”
A. **Formulate** the Phelps’ risk and return objectives. **Calculate** their required nominal, after-tax return for the 10 years until they retire. **Show** your work.

(10 minutes)

B. **Formulate** the five constraints for the Phelps’ and **justify each** constraint with reference to their situation.

(10 minutes)

C. A year has passed, and the charitable contribution has been made. The Phelps’ situation is similar to what it was, though they have refined their required return objective. **Recommend** from the selections below and **justify** with three reasons the most appropriate asset allocation for the Phelps’ brokerage portfolio. Assume all the portfolios provide sufficient return.

(6 minutes)

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Alternative Portfolios</th>
<th>Asset Allocation Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current A B C D</td>
<td></td>
</tr>
<tr>
<td>Cash equivalents</td>
<td>17 5 5 10 15</td>
<td></td>
</tr>
<tr>
<td>U.S. corporate bonds</td>
<td>40 30 30 30 15</td>
<td></td>
</tr>
<tr>
<td>International bonds</td>
<td>0 10 0 5 10</td>
<td></td>
</tr>
<tr>
<td>U.S. equities</td>
<td>43 25 60 50 45</td>
<td></td>
</tr>
<tr>
<td>International equities</td>
<td>0 25 0 5 0</td>
<td></td>
</tr>
<tr>
<td>Real estate (land)</td>
<td>0 5 5 0 15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Alternative Portfolios</th>
<th>Current A B C D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected return</td>
<td>8.1% 13.4% 11.2% 10.9% 12.9%</td>
<td></td>
</tr>
<tr>
<td>Current yield</td>
<td>6.1% 3.1% 3.6% 4.2% 5.8%</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td>6.2% 7.1% 5.6% 7.8% 6.5%</td>
<td></td>
</tr>
</tbody>
</table>
Ten years have passed, and Jeremy and Alice have reached their desired retirement date. Returns and inflation have been about as expected. The Phelps' plans and capital markets expectations have not changed. Discuss how retirement will change the Phelps' objectives. In particular, discuss any conflict in the new objectives.

Answer this question in the template provided.

(4 minutes)
Answer Questions 5 and 6 in the order presented.

5. Private Wealth Management

THIS QUESTION HAS 4 PARTS (A, B, C, D) FOR A TOTAL OF 18 MINUTES.

James Rawls has just retired from his job at World Electronics (WE), a large manufacturing company. Rawls has worked at WE for 30 years and has accumulated NE stock worth $7.5 million with a tax basis of $1.1 million. While he was working, he was not able to sell any of the stock because such actions were generally regarded as disloyal to the company. Rawls owns a home valued at $1.2 million with no mortgage. His after-tax salary and expenditures for the year just ended were $200,000. In retirement, he plans to take up a number of new hobbies and travel with his wife, Sarah. They are both 55 years old. Taking all of this into account, he will require 10% more for real living expenses than in the past. Upon retirement, he received a bonus of $1.5 million after taxes.

Rawls plans to sell the WE stock, with tax due immediately at a 15% rate. He reasons that if he is no longer working at the company, he can no longer affect the company results. He will then add the proceeds to his investment portfolio. That portfolio is worth $2.5 million and invested in small-cap stocks.

James’ investment philosophy has been aggressive. He has always taken concentrated risk in more aggressive investments, reasoning that he can replace it by working harder. Sarah is more conservative and has not worked since their second child was born when she was 25. Both children are grown, gainfully employed, and independent. The Rawls now agree their objective is to maintain the real value of the portfolio. Their financial advisor has projected inflation to remain at the current 2% rate for the indefinite future. They also agree they should maintain an emergency reserve of $150,000.

A. State the Rawlses’ return objectives and calculate their required nominal after-tax return for the first year of retirement. Show your calculations.

(7 minutes)

B. State three reasons the Rawlses’ ability to take risk is above average.

(6 minutes)

C. Determine the Rawlses’ time horizon.

(2 minutes)

D. Determine their liquidity needs for the coming year; show your calculations.

(3 minutes)
6. Private Wealth Management

THIS QUESTION HAS 4 PARTS (A, B, C, D) FOR A TOTAL OF 22 MINUTES.

Both Sarah and James Rawls, along with one of their grown children, were tragically killed in a car crash. Their estate of $15 million less a charitable gift of $5 million to Hostein University will go to their daughter, Sally Christo, at the end of this year. Sally and her husband, Juan, are 45 years old.

Upon receipt of the inheritance, they plan to work for one more year at a combined pre-tax salary of $380,000. For planning purposes, a zero return on the estate assets is assumed prior to retirement. Expected after-tax living expenses are estimated as $300,000. Immediately before they retire, they will make a tax deductible one-time charitable gift of $250,000 in memory of the Rawlses, and pay off the mortgage on their home. The home is worth $750,000 with an expected mortgage balance due of $200,000. Their effective tax rate is 22%.

Upon retirement, Juan will receive an annual pension of $45,000 after-tax in his first year of retirement and growing with inflation. The pension continues until the death of both Juan and Sally. Sally will receive a one-time payoff of $550,000 after tax at retirement. They have no other savings.

They estimate they will need $220,000 after-tax to live on in that first year of retirement. They assume their remaining life expectancy is 40 years with inflation of 2.5%. At the death of the first spouse, the living expenses of the surviving spouse are expected to be 20% less than their combined expenses.

They consider themselves well off and plan to leave any assets remaining in their estate to charity at their death. They have also stated they want to minimize the probability of earning less than 1% in any one year.

A. Calculate the nominal after-tax required return from the investment portfolio in their first year of retirement. Show your calculations.

(6 minutes)

B. Discuss two factors specific to their situation that decrease their risk tolerance.

(4 minutes)

C. Formulate their liquidity and time horizon constraints after retirement.

(4 minutes)
Several years later, the Christos have retained an investment advisor, Bill Kennedy, to advise them. Returns have been as expected and their situation has not changed significantly. Kennedy proposes four possible portfolio allocations for their investment portfolio. All of the portfolios have an acceptable expected return.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>2%</td>
<td>2%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Domestic equity</td>
<td>5%</td>
<td>38%</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td>International equity</td>
<td>15%</td>
<td>20%</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>Distressed debt</td>
<td>20%</td>
<td>5%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Domestic bonds</td>
<td>48%</td>
<td>35%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Real estate</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>Expected return</td>
<td>4.5%</td>
<td>5.2%</td>
<td>5.8%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>7.9%</td>
<td>8.0%</td>
<td>9.2%</td>
<td>9.3%</td>
</tr>
</tbody>
</table>

D. **Recommend** the most appropriate portfolio for the Christos from the list and **support** your recommendation with **three** reasons.

*(8 minutes)*
7. **Private Wealth Management**

$8,000 is invested for 20 years and earns a pre-tax return of 5.8%.

1. Assume that the entire return was in the form of income and that the investor pays income tax at a rate of 35%.
   A. What will the investment be worth in 20 years?
   B. What is the tax drag in this case (as a percentage of the pre-tax gain)?
   C. Compute the accrual-equivalent, after-tax return and the accrual-equivalent tax rate.

   *(6 minutes)*

2. Assume that the entire return was in the form of capital gains and that the investor pays capital gains tax at a rate of 40% at the end of the investment horizon.
   A. What will the investment be worth in 20 years assuming a cost basis of $8,000?
   B. What will the investment be worth in 20 years assuming a cost basis of $3,600?
   C. What is the tax drag in both cases?
   D. Compute the accrual-equivalent, after-tax return and the accrual-equivalent tax rate for case A.

   *(8 minutes)*

3. Assume that the investor pays only wealth taxes at 2%.
   A. What will the investment be worth after 20 years?
   B. What is the tax drag?
   C. Compute the accrual-equivalent, after-tax return and the accrual-equivalent tax rate.

   *(6 minutes)*
8. Private Wealth Management

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

Germaine Asset Management sponsored an estate planning conference for its high net worth U.S. clients. A guest speaker at the conference made the following statements during his presentation. For each statement, indicate in the template whether the statement is correct or incorrect by circling the appropriate answer. If the statement is incorrect, restate the portion(s) that is (are) incorrect in a way that would be correct.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Correct or Incorrect? (circle one)</th>
<th>Restate the portion(s) that is (are) incorrect in a way that would be correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clawback provisions allow certain beneficiaries to reclaim all the assets of an estate if they wish to revoke actions to which they previously consented.</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td>Deemed disposition allows counties to tax assets if an individual changes country of residence.</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td>Monetization strategies for concentrated positions typically involve hedging the risk of the asset and then borrowing. The more perfect the hedge, the lower the loan rate, and the better for the client.</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>Correct or Incorrect? (circle one)</td>
<td>Restate the portion(s) that is (are) incorrect in a way that would be correct.</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>All individuals need life insurance to hedge longevity risk.</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td></td>
</tr>
<tr>
<td>Variable annuities for the joint life of a couple are likely to offer a</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td>higher lifetime payout than a fixed annuity for one member of the couple.</td>
<td>Incorrect</td>
<td></td>
</tr>
<tr>
<td>Assume the initial cost of both were the same.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. Private Wealth Management

THIS QUESTION HAS FOUR PARTS (A,B,C,D) FOR A TOTAL OF 13 MINUTES.

Carl Anderson, age 70, and his wife Carol, age 69, have just retired after long careers as college professors. They have amassed an investment portfolio that is currently valued at $1.05 million. They want to maintain their current lifestyle, which requires annual real spending of $100,000. During the next five to ten years, the Andersons expect their spending to increase in line with inflation, which is forecasted to be 3% per year. The nominal risk-free rate is forecasted to be 5% (real risk-free rate = 1.94% for the same period). The following table lists the Andersons' survival probabilities for the next four years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Carl</th>
<th>Carol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age</td>
<td>P(Survival)</td>
</tr>
<tr>
<td>1</td>
<td>71</td>
<td>0.9500</td>
</tr>
<tr>
<td>2</td>
<td>72</td>
<td>0.9432</td>
</tr>
<tr>
<td>3</td>
<td>73</td>
<td>0.9400</td>
</tr>
<tr>
<td>4</td>
<td>74</td>
<td>0.9321</td>
</tr>
</tbody>
</table>

A. **Calculate** the probability that either Carl or Carol or both will survive to each of the next four years.

(4 minutes)

B. **Calculate** the capitalized value of the Andersons' core capital spending over the next four years.

(4 minutes)

C. Assuming that the capitalized value of the Andersons' core capital spending beyond the next four years is $581,243, **calculate** the value of their excess capital.

(2 minutes)

D. **Explain** two reasons the Andersons should not gift the excess capital to charity now.

(3 minutes)
10. Private Wealth Management

THIS QUESTION HAS FIVE PARTS FOR A TOTAL OF 22 MINUTES.

Millard and Eleanor (M & E) Fillmore, both age 75, have a balanced stock-bond portfolio with a current market value of $15 million. The portfolio produces an average annual pretax return of 12%. The Fillmores are in poor health and decide to investigate estate planning strategies with their financial planner, Robert E. Jackson, CFA, CFP.

To aid M & E in making their decision, Jackson calculates the relative value of several different gifting scenarios. The following information may be relevant for Jackson’s relative value analyses:

- M & E’s life expectancy: 5 years.
- M & E’s tax rate on investment returns: 25%.
- James M. Fillmore’s (son of Millard and Eleanor Fillmore) tax rate on investment returns: 35%.
- Earl Fillmore’s (son of James M. Fillmore) tax rate on investment returns: 30%.
- Estate tax rate: 33%.
- Gift tax rate: 45%.

A. Scenario 1

Alternatives:

1. M & E gift their portfolio to James today.
2. M & E leave the portfolio to James as a bequest in their will.

Assume no gift tax.

Calculate the relative value of the gift compared to the bequest.

Which decision is best based on relative value analysis?

(5 minutes)

B. Scenario 2

Alternatives:

1. M & E gift their portfolio to James today.
2. M & E leave the portfolio to James as a bequest in their will.

Assume the son, James M. Fillmore, pays the gift tax.

Calculate the relative value of the gift compared to the bequest.

Which decision is best based on relative value analysis?

(4 minutes)
C. Scenario 3

Alternatives:
1. M & E gift their portfolio to James today.
2. M & E leave the portfolio to James as a bequest in their will.

Assume Millard and Eleanor Fillmore pay the gift tax.

**Calculate** the relative value of the gift compared to the bequest.

Which decision is best based on relative value analysis?

*(4 minutes)*

D. Scenario 4

Jackson decides to calculate the relative value of a generation-skipping strategy. For this scenario, he assumes the following:

- The portfolio will go to James in five years upon the deaths of M & E.
- Earl inherits the portfolio as part of James’ estate 35 years after the deaths of M & E.
- The after-tax rate of return of the portfolio will be 10%.
- The estate tax rate has just been increased to 45%. All other rates are unchanged.

**Calculate** the relative value of generation-skipping (assuming the portfolio goes directly to Earl on the deaths of M & E) versus transferring the portfolio from generation to generation.

Which decision is best based on relative value analysis?

*(5 minutes)*

E. Scenario 5

M & E have a bitter argument with their son and grandson regarding being placed in a nursing home. They decide to give their portfolio to charity. The charity does not pay taxes. M & E will receive a tax deduction for their gift. The portfolio’s pretax rate of return is still assumed to be 12% for M & E, but the charity earns a tax-exempt return of 15% on its investments. While M & E’s tax on investment returns remains at 25%, their ordinary income tax rate is 36% and the estate tax is 33%.

**Calculate** the relative value of making the charitable gift now versus making it as a bequest in five years.

Which decision is best based on relative value analysis?

*(4 minutes)*
11. Private Wealth Management

Mr. Phillip Marlowe, age 55, has decided to take the early retirement package offered by his company. To maximize his monthly pension payment, Marlowe has decided to defer receiving it until he turns 62. He believes the interest and dividends he receives from his investment portfolio will provide sufficient income to maintain his current lifestyle. As part of his early retirement strategy, Marlowe decides to leave the country of his birth, Gladstonia, where the tax on investment income is 33%, and moves to Disraelia, where the tax on investment income is a significantly lower 16%. Marlowe will keep his Gladstonian citizenship while living in Disraelia.

1. Just before Marlowe moved to Disraelia, the country’s high court handed down a decision in which it stated that its citizens must pay Disraelia income tax on all income regardless of whether it was earned in Disraelia or in a foreign country. In the decision, the high court was applying:
   A. source jurisdiction.
   B. global-source, country-residence jurisdiction.
   C. residence jurisdiction.

2. Which tax provisions effectively eliminate the residence-source conflict of double taxation?
   A. Credit method and the deduction method.
   B. Deduction method and the exemption method.
   C. Exemption method and credit method.

3. Determine Marlowe’s tax rate liabilities to Gladstonia and Disraelia on income from investments in Gladstonia, assuming the credit method applies and Gladstonia claims source jurisdiction while Disraelia claims residence jurisdiction.
<table>
<thead>
<tr>
<th>Gladstonia</th>
<th>Disraelia</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 33%</td>
<td>0%</td>
</tr>
<tr>
<td>B. 33%</td>
<td>16%</td>
</tr>
<tr>
<td>C. 0%</td>
<td>16%</td>
</tr>
</tbody>
</table>

4. Determine Marlowe’s tax rate liabilities on income as in Question 3, assuming the exemption method applies and Gladstonia claims source jurisdiction while Disraelia claims residence jurisdiction.
<table>
<thead>
<tr>
<th>Gladstonia</th>
<th>Disraelia</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 33%</td>
<td>0%</td>
</tr>
<tr>
<td>B. 17%</td>
<td>16%</td>
</tr>
<tr>
<td>C. 0%</td>
<td>16%</td>
</tr>
</tbody>
</table>

5. Determine Marlowe’s tax rate liabilities on income as in Question 3, assuming the deduction method applies and Gladstonia claims source jurisdiction while Disraelia claims residence jurisdiction.
<table>
<thead>
<tr>
<th>Gladstonia</th>
<th>Disraelia</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 33.0%</td>
<td>10.7%</td>
</tr>
<tr>
<td>B. 17.0%</td>
<td>16.0%</td>
</tr>
<tr>
<td>C. 27.7%</td>
<td>16.0%</td>
</tr>
</tbody>
</table>
6. Assume Marlowe renounces his Gladstonian citizenship and becomes a citizen of Disraelia. Marlowe also decides to move his investment portfolio to Disraelia. The tax Gladstonia could levy on this transfer is called:

A. transfer tax.
B. exit tax.
C. expatriation tax.
12. Private Wealth Management

THIS QUESTION HAS TWO PARTS FOR A TOTAL OF 14 MINUTES

Michael Green is 63 years old and is the CEO of Hi-Fi Wizards (HFW). He founded the business, which specializes in the sale and installation of high-end home entertainment systems, in 1992. His effective cost basis in the company is zero. He and his wife are childless, and Green has been alienated from his siblings and their children since the death of their mother led to an acrimonious dispute over the distribution of her estate. Green recently had a health scare and, although it turned out to be a false alarm, it has prompted him to focus his attention on issues around retirement.

Green has engaged Daniel Corbin as his financial advisor. Corbin has summarized Green’s current wealth in Exhibit 14-1. Corbin suggests to Green that a goal-based approach to planning would provide an appropriate framework within which to begin analysing the Greens’ needs. Based on their current and forecast future cash flows, using a planning horizon of 30 years, Corbin estimates that $22.5 million in primary capital would be adequate to securely support the couple’s lifestyle.

<table>
<thead>
<tr>
<th>Asset</th>
<th>Estimated Market Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home (owned outright)</td>
<td>$750,000</td>
</tr>
<tr>
<td>Cash and treasury bills</td>
<td>$300,000</td>
</tr>
<tr>
<td>Medium and long-term bonds (Treasury and high-quality corporate)</td>
<td>$500,000</td>
</tr>
<tr>
<td>Equities (U.S., mainly S&amp;P 500 companies)</td>
<td>$2,700,000</td>
</tr>
<tr>
<td>Hi-Fi Wizards (wholly owned by Green)</td>
<td>$28,000,000</td>
</tr>
</tbody>
</table>

The capital gains tax rate is currently 20%, although shares held at the time of an investor’s death are subject to a step-up in basis (to the fair market value at death).

A. Based on the information in Exhibit 12-1:

i. **Estimate** the current value in each of Green’s “risk buckets” (personal, market, and aspirational); hence, the value of Green’s primary capital.

ii. **Evaluate** whether the current distribution of Green’s assets is appropriate.

**Show** your calculations.

(6 minutes)
After discussing the results of Corbin’s preliminary analysis with his wife, Green requests that Corbin investigate options for the sale or monetization of his interest in HFW. Green makes it clear that he is optimistic about the future prospects for the business (a view that is shared by a group of key employees who have indicated that they would be very interested in purchasing the business). Green would be sad to move to the sidelines, but he acknowledges that business-related stress was a contributory factor to his recent health scare. The idea of being able to spend more quality time with his wife while they are both able to lead active lives is attractive.

B.  
   i. Comparing recapitalization and sale of the business, explain one factor that would favor a recapitalization and one factor that would favor sale of the business.
   
   ii. Comparing sale of the business to a strategic buyer and sale to the key employees, explain two factors that would likely favor sale to a strategic buyer.

   (8 minutes)
13. **Private Wealth Management**

**THIS QUESTION HAS TWO PARTS FOR A TOTAL OF 10 MINUTES.**

Cathy Jupiter, one of the heirs to the Jupiter Candy Company fortune, has just approached you for advice on what she can do with the company’s Class A shares she inherited many years ago from her father.

The Jupiter Candy Company was founded in 1926 by two brothers, Adam and Ben Jupiter, in Newark, New Jersey. Originally the company was organized as a partnership, but for legal and tax reasons, it became incorporated in 1934. Class A common stock valued at $3 per share was distributed to family members. The Class A stock was never listed on a stock exchange and was restricted by deed of gift to be sold only to Jupiter family members. It pays no dividend since most of the holders of the stock work for the company. To finance the expansion of the company’s international operations, Jupiter issued Class B common stock in 1957. The Class B common stock is listed on the NYSE. Although Class B shareholders receive a generous dividend each year, they have limited voting rights.

Cathy Jupiter is the only child of Adam Jupiter, and she inherited 200,000 Class A shares from him when he passed away in 1972. Cathy was educated at the Sorbonne in the early-1960s where she adopted a bohemian lifestyle, which caused her to become estranged from her parents and the other members of her family. After graduation from the Sorbonne she opened a gallery in Paris, which became famous (and financially successful) for identifying up-and-coming performance artists. Cathy never married and has no direct heirs. Upon her death, her Class A shares will revert to her cousins, the children of Ben Jupiter.

Cathy is financially independent and has accumulated substantial, highly diversified investment and retirement portfolios. She is now tired of having her Jupiter shares just sitting around and would like to have some financial benefit now. Several family members have indicated that they are willing to purchase her Class A shares. Both federal and New Jersey law state that the tax basis of the securities is their original cost basis of $3 per share. The Class A shares are not publicly traded. Cathy’s combined federal and New Jersey long-term capital gains tax rate is 15%. Cathy has heard of equity collars, exchange funds, and completion portfolios but does not know if any of them would be applicable to her situation.

A. **Select the most appropriate strategy for Cathy from the following list. Justify your selection.**
   - Sale to another family member.
   - Equity collar.
   - Exchange fund.
   - Completion portfolio.

   *(4 minutes)*
B. For two of the strategies not selected for Cathy, explain how they would be constructed and how they can provide financial benefits for a different individual for whom they are appropriate.

(6 minutes)
4. Private Wealth Management

A. Objectives:
Pay $21,600 per year after tax and accumulate $2,000,000 at retirement in 10 years. Both are in real terms.

Current asset base $1,500,000 ($1,550,000 – $50,000 charitable donation).

Real, after-tax required return:
PV = –1,500,000; PMT = 21,600; N = 10; FV = 2,000,000;
CPT I/Y = 4.19%

Nominal, after-tax return:
Adjust for 3% inflation
4.19 + 3.00 = 7.19%, or
(1.0419)(1.03) – 1 = 7.32%

Willingness: Below average
Jeremy states that they have average to above-average risk tolerance, but they also want to avoid “risky” investments; they do not want to lose money in any one year. Despite their general assertion, their more specific statements show they have below-average willingness to take risk. The fact that they inherited most of their wealth is also associated with lower willingness.

Ability: Below average
Their income is insufficient, and portfolio return is needed to meet living expenses.

Overall: Below average

B. Time horizon
The time horizon is long term and consists of two stages, pre-retirement and retirement. The first stage is ten years, and the second stage is 30 years.

Taxes
They are taxed at a 28% rate on income and capital gains. No tax sheltering is available.

Liquidity
Plan to donate $50,000 to charity in six months. They also want a small emergency reserve, approximately $28,000. Annual distributions for living of $21,600 real each year for the next 10 years.

Legal/regulatory
There are no unusual legal or regulatory considerations.

Unique circumstances
The Phelps will benefit from client education. Their low willingness to bear risk and desire to avoid losing money is inconsistent with their long remaining life expectancy and need to cover inflation. They also should be counseled about the diversification benefits from international securities, derivatives, and commodities.
C.  Select B

- It provides sufficient, but not excessive, cash at 5%.
- It avoids prohibited international assets.
- The other portfolios are unacceptable: Current, C, and D have excessive cash, while A, C, and D have prohibited international exposure.

**Candidate note:** B also has the best Safety First Ratio, but that only works as a reason if you were selecting among otherwise acceptable portfolios. Also note that while B does have a modest 5% allocation to land and the couple already has RE exposure in the home, there is no blanket prohibition to adding some additional RE exposure. Plus, the home and land are different RE exposures. B is still the best choice.

Roy’s Safety First criterion:

- Current: 8.1 / 6.2 = 1.31
- A: 13.4 / 7.1 = 1.89
- B: 11.2 / 5.6 = 2.00
- C: 10.9 / 7.8 = 1.40
- D: 12.9 / 6.5 = 1.98

D.

<table>
<thead>
<tr>
<th>Return</th>
<th>The required portfolio return has risen as the Phelps no longer have income from working.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>There is no indication willingness has changed. Ability has declined given that they are older and no longer working. The key issue and conflict is that the need for portfolio return has risen while the overall risk objective has declined.</td>
</tr>
</tbody>
</table>
5. **Private Wealth Management**

A. The objectives are to fund their retirement expenses and maintain the real value of the portfolio.

The investable asset base is:
- 2,500,000 in small cap stocks
- 7,500,000 from WE stock

Less tax due at 15%
- 960,000 = (7.5 – 1.1)(0.15)

Plus AT bonus of
- 1,500,000

=10,540,000

Real need for the next year is 10% greater than the last AT salary and increased for one past year of 2% inflation:

\[200,000 \times 1.10 \times 1.02 = 224,400\]

AT Real Return \(= 224,400/10,540,000 = 2.1\%\)

AT Nominal Return including future inflation \(= 2.1 + 2.0\% = 4.1\%\)

B. • The Rawlises are reasonably young at age 55, giving the portfolio time to recover from market downturns.
• They have a substantial asset base in relation to needs.
• Their liquidity needs are minimal.
• They are debt free and own a home worth 1.2 million.

C. The time horizon is long term and could be 30+ years.

D. They desire an emergency reserve of 150,000 and to fund expenses of 224,400 for a total of $374,400.
6. Private Wealth Management

A. Retire in one year:

Investable base: Inheritance 15 – 5 = $10,000,000
After tax salary: 380,000 (1 – 0.22) = 296,400
Less AT living expenses: –300,000
Less tax deductible gift: 250,000 (1 – 0.22)= –195,000
Less mortgage payoff –200,000
Plus after-tax retirement receipt +550,000
= $10,151,400

After-tax need in first year of: 220,000 less 45,000 pension = 175,000
After-tax required real return: 175,000 / 10,151,400= 1.7%

Plus 2.5% future inflation = after-tax required nominal return = 1.7 + 2.5 = 4.2%

B. Other than the pension of $45,000, the portfolio is their sole source of support.

They indicate they are concerned with risk by stating they want to minimize the chance of earning less than 1% in any one year.

Candidate note: Don’t confuse answering the question asked (factors that reduce risk tolerance) with general conclusion (all other and the preponderance of factors indicate average risk tolerance). General conclusion is needed in a later part of the question.

C. Liquidity: Meet their annual distribution needs—$175,000 in the first year and increasing with inflation.

Time horizon: Two stage. Stage 1 while both are alive which could be 40 plus years. Stage 2 is after the death of the first spouse when expenses decline 20%.

Candidate note: The question specifically asks for after retirement. Discussing liquidity needs or a stage before retirement is therefore inappropriate. It may seem harmless, and at times, past answers have included unneeded comments, but it is a bad habit to get into. Focus on answering the question that was asked.

D. • The other portfolios are unacceptable, so select B. Portfolio A has excess real estate when the home is already owned, minimal domestic equity, and a large position in high risk alternative investments (distressed debt). Portfolios C and D have excess cash allocations. Portfolio D is inefficient with higher risk and less return than Portfolio C.

• Portfolio B has an acceptable 2% cash allocation given the minimal liquidity needs.

• Counting distressed debt as equity, Portfolio B has 63% equity, in line with a moderate risk tolerance of 60/40.

Portfolio B is recommended.
7. Private Wealth Management (Tax exercises)

1. A. \( FV_{AT} = PV \left[ 1 + R(1-T) \right]^N = 8,000 \times [1 + 0.058(1 - 0.35)]^{20} = 16,770. \)

   B. The future value with no tax would have been \( 8,000 \times (1 + 0.058)^{20} = 24,706 \), so whereas the pretax gain would have been \( 24,706 - 8,000 = 16,706 \), the post-tax gain was \( 8,770 \), meaning that tax reduced the gain by \( 16,706 - 8,770 = 7,936 \), or 47.5% of \( 16,706 \), which is thus the tax drag.

   C. The accrual-equivalent, after-tax return \( (R_{AE}) \) is the annualized rate of return that links the initial investment and the post-tax future value.
   \[ R_{AE} = \left( \frac{16,770}{8,000} \right)^{1/20} - 1 = 3.77\% . \]
   The accrual-equivalent tax rate \( (T_{AE}) \) is the effective accrual tax rate that relates the pre-tax return and \( R_{AE} \).
   \[ T_{AE} = 1 - \left( \frac{3.77}{5.8} \right) = 35\% . \]
   Note: It is always the case with accrual taxes (by definition) that \( T_{AE} \) equals the tax rate, and \( R_{AE} = \text{Pretax return} \times (1 - \text{tax rate}) \)
   \[ [3.77\% = 5.8\% \times (1 - 0.35)]. \]

2. A. \( FV_{AT} = PV \left[ (1 + R)^N \times (1 - T_{CG}) + T_{CG} \times B \right] = 8,000 \times [(1.058^{20} \times (1 - 0.4)) + (0.4 \times 1)] = 18,023. \)

   B. In this case, \( B \) (the cost basis %) = 3.600/8.000 = 0.45, so
   \( FV_{AT} = 8,000 \times [(1.058^{20} \times (1 - 0.4)) + (0.4 \times 0.45)] = 16,264. \)

   C. As per part A, the pretax gain would have been \( 16,706 \), so
   With cost basis = 100%: tax drag = \( \frac{16,706 - 10,023}{16,706} = 40\% . \)
   With cost basis = 45%: tax drag = \( \frac{16,706 - 8,264}{16,706} = 50.54\% . \)
   Note: With deferred CGT and a cost basis of 100%, the tax drag will always equal the CGT rate.

   D. For the 100% cost basis case:
   \[ R_{AE} = \left( \frac{18,023}{8,000} \right)^{1/20} - 1 = 4.145\% . \]
   \[ T_{AE} = 1 - \left( \frac{4.145}{5.8} \right) = 28.54\% . \]

3. A. \( FV_{AT} = PV \left[ (1 + R)(1 - T_{W}) \right]^N = 8,000 \times [1.058 \times (1 - 0.02)^{20} = 16,494. \)

   B. The gain in this case is \( 16,494 - 8,000 = 8,494 \), so
   tax drag = \( \frac{16,494 - 8,494}{16,494} = 49.16\% . \)

   C. \( R_{AE} = \left( \frac{16,494}{8,000} \right)^{1/20} - 1 = 3.684\% . \)
   \[ T_{AE} = 1 - \left( \frac{3.684}{5.8} \right) = 36.48\% . \]
## 8. Private Wealth Management

<table>
<thead>
<tr>
<th>Statement</th>
<th>Correct or Incorrect? circle one)</th>
<th>Restate the portion(s) that is (are) incorrect in a way that would be correct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clawback provisions allow certain beneficiaries to reclaim all the assets of an estate if they wish to revoke actions to which they previously consented.</td>
<td>Correct</td>
<td>Clawback applies to designated portions, not all. And it does not apply to actions that were previously agreed to.</td>
</tr>
<tr>
<td>Deemed disposition allows counties to tax assets if an individual changes country of residence.</td>
<td>Correct</td>
<td>Perfect hedges may be treated as the equivalent of a sale, triggering the gains tax and hurting the client.</td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imperfect hedges are typically needed to avoid the hedge being treated as a sale.</td>
</tr>
<tr>
<td>Monetization strategies for concentrated positions typically involve hedging the risk of the asset and then borrowing. The more perfect the hedge, the lower the loan rate, and the better for the client.</td>
<td>Correct</td>
<td>Life insurance is needed for the individuals with needs that would have been met in the absence of premature death (not for longevity risk).</td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>Candidate note: No rewrite is required and the statement is true because the variable annuity shifts more risk to the annuitant and generally leads to higher risk and return investments.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Discussing the difference between joint life and life of only one member of the couple is not relevant because the insurance company would take that into account in setting the relationship between initial premium cost and periodic payout amount. By itself, it should not produce a difference in lifetime cost to the insurance company and benefit to the annuitant.</td>
</tr>
<tr>
<td>All individuals need life insurance to hedge longevity risk.</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td></td>
</tr>
<tr>
<td>Variable annuities for the joint life of a couple are likely to offer a higher lifetime payout than a fixed annuity for one member of the couple. Assume the initial cost of both were the same.</td>
<td>Correct</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td></td>
</tr>
</tbody>
</table>
9. **Private Wealth Management**

A. The Andersons' joint probability of survival is:

- Year 1: $0.9500 + 0.9642 - (0.9500 \times 0.9642) = 0.9982$
- Year 2: $0.9432 + 0.9600 - (0.9432 \times 0.9600) = 0.9977$
- Year 3: $0.9400 + 0.9500 - (0.9400 \times 0.9500) = 0.9970$
- Year 4: $0.9321 + 0.9432 - (0.9321 \times 0.9432) = 0.9961$

B. Core capital calculation

There are two approaches to the determination of the Andersons' core capital, either working in real or nominal terms:

\[
\text{discounted value} = \frac{\text{real spending} \times \text{joint probability}}{(1 + \text{real risk-free rate})^i}
\]

\[
\text{discounted value} = \frac{\text{real spending} \times (1 + \text{inflation}) \times \text{(joint probability)}}{(1 + \text{nominal risk-free rate})^i}
\]

The first formula is used in the following to calculate the Andersons' core capital:

<table>
<thead>
<tr>
<th>Year</th>
<th>Real spending</th>
<th>Probability-adjusted real spending</th>
<th>Present value, discounted at real RFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$100,000</td>
<td>$99,820</td>
<td>$97,920</td>
</tr>
<tr>
<td>2</td>
<td>$100,000</td>
<td>$99,770</td>
<td>$96,009</td>
</tr>
<tr>
<td>3</td>
<td>$100,000</td>
<td>$99,700</td>
<td>$94,116</td>
</tr>
<tr>
<td>4</td>
<td>$100,000</td>
<td>$99,610</td>
<td>$92,241</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$380,286</td>
</tr>
</tbody>
</table>

C. We have computed that the core capital required to support the Andersons in the first four years of retirement is $380,286, plus we have been told that the additional core capital required for the remaining years of their retirement is $581,243. Overall, they require core capital of $380,286 + $581,243 = $961,529.

Given the current portfolio value is $1,050,000, we can work out that the excess capital is $1,050,000 – $961,529 = $88,471.

D. • They could live longer than the average life expectancy in a mortality table.
• Their spending needs could be higher than they assumed.
• The rate of return earned could be less than the discount rate used.
• Once the money is gifted, they cannot get it back.

Note: Only two reasons are required.
10. **Private Wealth Management**

A. **Scenario 1**

FV of bequest:
After-tax return to Millard and Eleanor = 0.12(1 – 0.25) = 0.09
(1.09)^5 × (1 – 0.33) = 1.0309 per dollar of present value

FV of gift:
After-tax return to James = 0.12(1 – 0.35) = 0.078
(1.078)^5 = 1.4558 per dollar of present value

RV = 1.4558 / 1.0309 = 1.4122

Decision based on relative value analysis: The value of the gift is 1.4122 times the value of the bequest, so choose gift.

B. **Scenario 2**

FV of bequest: 1.0309

FV of gift:
After-tax return to James = 0.12(1 – 0.35) = 0.078
(1.078)^5 × (1 – 0.45) = 0.8007 per dollar of present value

RV = 0.8007 / 1.0309 = 0.7767

Decision based on relative value analysis: The value of the gift is only 0.7767 times the value of the bequest, thus bequest is preferable.

C. **Scenario 3**

FV of the bequest: 1.0309 per dollar of present value.

FV of gift:
After-tax return to James = 0.12(1 – 0.35) = 0.078
(1.078)^5 × [1 – 0.45 + (0.45 × 0.33)] = 1.0169 per dollar of present value

RV = 1.0169 / 1.0309 = 0.9864

Decision based on relative value analysis: The value of the gift is only 0.9864 times the value of the bequest, thus bequest is once again preferable.
D. Scenario 4

Because the estate tax rate is equal to the gift tax rate, the relative value of the generation-skipping strategy, versus passing the portfolio down through the generations, is:

\[
\frac{1}{1 - 0.45} = 1.8182 \text{ per dollar of present value}
\]

This is confirmed by the following calculations:

FV of generation-skipping:
\[
(1.10)^{40} \times (1 - 0.45) = 24.8926
\]

FV of not generation-skipping:
\[
\left( (1.10)^5 \times (1 - 0.45) \right) \times \left( (1.10)^{35} \times (1 - 0.45) \right) = 13.6909
\]

\[
RV = \frac{24.8926}{13.6909} = 1.8182
\]

Decision based on relative value analysis: The value of the generation-skipping strategy is 1.8182 times the value of passing the portfolio down through each generation, thus the generation-skipping strategy is preferable.

E. Scenario 5

FV of the bequest: 1.0309 per dollar of present value (calculated in part A, scenario 1).

FV of the donation to charity:
\[
(1.15)^5 + \left( 0.36 \times \left( 1 + 0.12(1 - 0.25) \right)^5 \times (1 - 0.33) \right) = 2.3825
\]

\[
RV = \frac{2.3825}{1.0309} = 2.311
\]

Decision based on relative value analysis: The value of the donation to charity now is 2.31 times the value of the bequest to charity. Donation is much more efficient.
11. Private Wealth Management

1. C In source jurisdiction, also known as territorial jurisdiction, a country taxes all income earned within its borders whether it is earned by residents or foreigner residing in the country. Global-source, country-residence jurisdiction does not exist.

2. C In the exemption method, the residence country does not levy a tax on income earned in a foreign country. The resident pays the taxes due in the country where the income is earned. In the credit method, the residence country allows its taxpayers to reduce their domestic tax bill by the amount of taxes paid to a country that imposes source jurisdiction. The credit is limited to the amount of taxes paid to the foreign country, which effectively eliminates double taxation.

3. A In the credit method, Disraelia reduces Marlowe's tax liability for the taxes he pays to Gladstonia. The credit is limited to Disraelia's investment income tax rate of 16%. Marlowe pays the 33% tax to Gladstonia and no taxes to Disraelia.

4. A Disraelia does not levy a tax on foreign-earned income. Marlowe only pays taxes to Gladstonia.

5. A Disraelia allows Marlowe to reduce his taxable foreign-source income by the amount of taxes he pays to Gladstonia. Marlowe's total taxes paid are less than the sum of the tax rates of the two countries: $0.33 + 0.16 + [0.16 \times (0.33 \times 0.16)] = 43.7\%$. Marlowe pays the 33% tax rate in Gladstonia and has an effective tax rate of only 10.7% on his foreign income in Disraelia.

6. B An exit tax is imposed by some residence jurisdictions and is usually based on the gains on assets leaving the country as if the individual sold the assets and realized the gains. A deemed disposition refers to treating assets as if they were sold.
12. Private Wealth Management

A. i. The three risk buckets used in the goal-based methodology are:

- The **personal risk bucket**, whose goal is protection from dramatic decrease in lifestyle. Into this bucket would go the investor's home and holdings of cash and near cash (such as CDs and T-bills).

In this case, the personal risk bucket contains:

<table>
<thead>
<tr>
<th>Asset</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>$750,000</td>
</tr>
<tr>
<td>Cash and T-bills</td>
<td>$300,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,050,000</strong></td>
</tr>
</tbody>
</table>

- The **market risk bucket**, whose goal is maintenance of the current standard of living. Into this bucket would go the investor's stock and bond portfolio.

In this case, the market risk bucket contains:

<table>
<thead>
<tr>
<th>Asset</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonds</td>
<td>$500,000</td>
</tr>
<tr>
<td>Equities</td>
<td>$2,700,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$3,200,000</strong></td>
</tr>
</tbody>
</table>

- The **aspirational risk bucket**, whose goal is the opportunity to substantially increase wealth. Into this bucket would go the investor's concentrated positions, including investment real estate and stock options.

This risk bucket solely contains the privately owned business, worth £28 million.

Primary capital, under the goal-based methodology, is defined as the sum of the personal and market risk buckets (or total wealth minus the aspirational risk bucket).

For Green, this is $1,050,000 + $3,200,000 = $4,250,000.

ii. Given the Greens' need for primary capital of $22.5 million to ensure that their future lifestyle is supported, the large proportion of total wealth that is currently tied up in the concentrated holding of HFW (with only $4.25 million in primary capital) represents a risk exposure that is much too high.

B. i. Factors that would favor a recapitalization (only one required):

- It is likely that Green could stay on as CEO, avoiding a move to the side lines. (If Green is seen as a major factor behind the success of the business, the private equity firm might make this a condition of the recapitalization.)

- If the prospects for the business are indeed good, the recapitalization could raise capital, which could be used to expand the business.

Factors that would favor a sale of the business (only one required):

- Selling the business would allow Green to retire and remove the work-related stress that might be having an adverse effect on his health

- Retirement would allow Green and his wife to spend much more time together.
ii. Factors that would favor a sale to a strategic buyer over a sale to key employees (two required):
   • A sale to a strategic buyer is likely to produce higher current proceeds, with greater certainty of the amount realized overall. With a management buyout, a substantial proportion of the purchase price is likely to be financed by the owner via a promissory note, with the amount ultimately repaid being contingent on the (uncertain) future performance of the company.
   • If the owner enters into negotiations with key workers regarding an MBO and those negotiations fail, this may sour their relationship and harm the business.
13. Private Wealth Management

A. Sale to family members.

The sale will provide (after paying the gains tax) funds and meet her goal of receiving a financial benefit.

Or, alternative reason:

The shares are restricted to family members, so placing them in an exchange fund or allowing them to be called or put are all prohibited. Cathy already has a completeness portfolio in that Jupiter is part of a highly diversified portfolio. But retaining the shares provides her no dividend or financial benefit.

B. Equity collar

Sell a call and buy a put on the underlying stock.

This hedged stock position can be used as collateral on a loan at favorable loan terms, and loan proceeds can be used to meet client objectives.

Exchange fund

Contribute the shares into a portfolio and retain the original cost basis to avoid any tax now.

Other fund participants contribute different assets, and each participant now shares in a diversified fund’s return (i.e., diversification is gained).

Completion portfolio

Retain the concentrated position but invest all other portfolio assets so that the total fund better reflects the overall desired market exposures.

This creates desired exposures without realizing any taxes now.

Candidate note: Part A illustrates there may be no perfect solution. The sale will trigger a gains tax, but it is the only allowable strategy that provides funds for some benefit now. The size of the tax is unknown because no sale price was provided. Part B indicates how the strategies that don’t work for Cathy have benefits that could work in other situations.
LEVEL III REVIEW WORKSHOP QUESTIONS: INSTITUTIONAL INVESTORS

14. Institutional Investors

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

Instinv, Inc. is a Lancaster, PA-based fund management company. The client base mainly consists of small- to medium-sized institutions, particularly endowments, foundations, and university defined benefit pension plans. Two new accounts have recently been won by Instinv, Inc.: the Whyter Museum (WM) Endowment, and the Perlstein Trust.

The WM Endowment was established 25 years ago under the terms of a bequest from Edward Whyter, the distinguished figurative artist and graphic designer who, although based in San Diego in the latter stages of his career, had been raised and attended art school in Lancaster and thus determined that a museum of 20th century American art should be established in that city. The fund currently is worth close to $15 million and is a major source of funds to the Whyter Museum. Approximately 85% of the museum’s running costs are funded by the endowment, which is also generous in supporting the museum’s active acquisitions policy.

The Perlstein Trust is an independent foundation that was set up 16 years ago by the concert violinist Joshua Perlstein. It exists to help promising young string players with the funding of their postgraduate studies. All of the major conservatoires on the East coast are encouraged to submit applications for grants to the trust on behalf of deserving students, and the successful applicants are awarded funding for a one-year period, paid directly to the conservatories on a monthly basis. This period may be extended, a year at a time, at the discretion of the trust’s board of management. The trust’s portfolio was recently valued at $1.14 million. Perlstein played the solos on the score for the wildly successful romantic movie *Love Triangle*, having struck a deal based on a percentage of gross receipts. He has signed over to the trust the substantial flow of post-tax royalties that this produces, on average amounting to 0.9% of the trust’s value.

The corporate tax rate is 40%. Average fees for postgraduate courses at music conservatories are forecast to rise at an average of 3.3% per year, while the inflation rate in the United States, as measured by the CPI, is expected to be 3.1% per year (both rates are for the foreseeable future). The Perlstein Trust has incurred investment management expenses of 0.72% (of asset value) per annum. The WM Endowment currently has in place a spending rule of 4.8% of the market value of its investment portfolio as of the previous year-end.
A. **Formulate** the return requirement for the Perlstein Trust’s IPS. **Show** your calculations. You should assume that the trust will follow a similar spending rule to the WM Endowment, setting the spending rate at the 5% minimum level sufficient for the trust to retain all the tax advantages associated with its foundation status.

(5 minutes)

B. **Judge** for each IPS element below the relationship between the values for the Perlstein Trust and the WM Endowment with respect to:

i. Ability to take risk.
ii. Time horizon.
iii. Liquidity requirement.

**Justify each** of your responses with **one reason**.

**This question should be answered in the template provided.**

(9 minutes)

The WM Endowment’s spending rule has, in recent years, produced an annual amount that has been sufficient to fund the endowment’s share of the museum’s operating costs. Fluctuations in the financial markets have meant, however, that the residual that is available to support acquisitions and other ad hoc expenditures has been highly volatile. The museum’s management team has found this to be a problem in their own planning process and have asked whether a change in the spending rule from the current approach might allow for greater consistency of support.

C. It has been suggested that a geometric spending rule would result in a less volatile level of annual spending. **Describe** the methodology of the geometric spending rule, and **explain** how it would address the concerns of the museum’s management team.

(6 minutes)
# Template for question 14-B

<table>
<thead>
<tr>
<th>IPS element</th>
<th>Judge (circle one)</th>
<th>Justify each of your responses with one reason.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to take risk</td>
<td>WM Higher, Perlstein Higher, Similar</td>
<td></td>
</tr>
<tr>
<td>Time horizon</td>
<td>WM Longer, Perlstein Longer, Similar</td>
<td></td>
</tr>
<tr>
<td>Liquidity needs</td>
<td>WM Higher, Perlstein Higher, Similar</td>
<td></td>
</tr>
</tbody>
</table>
15. Institutional Investors

THIS QUESTION HAS TWO PARTS (A, B) FOR A TOTAL OF 12 MINUTES.

Bigbucks Bank is a U.S.-based commercial bank that also underwrites a small amount of life insurance products.

The Treasury department of Bigbucks Bank is responsible for investing the bank's portfolio of investment securities (the securities portfolio) under the overall supervision of the bank's asset/liability risk management committee (ALCO).

Bigbucks Bank values its securities portfolio at market value for financial statement purposes. The recent upturn in the economy has led to an increase in stock prices, to a narrowing of corporate bond spreads, to a fall in the default rate on loans, and an increase in the level of interest rates. The management of Bigbucks Bank does not expect interest rates to increase further in the near term.

Demand for new loans has been low over the past year due to the higher interest rate environment. The management of Bigbucks expects this trend to reverse over the next few months. Management intends to continue with their existing interest rate policy on customer advances, although this is different from most of its competitors.

Bigbucks Bank is domiciled in a state that:
• Limits banks' holdings of common shares and below-investment-grade risk, fixed-income securities.
• Requires banks to meet legal reserve requirements.
• Requires banks to comply with risk-based capital regulations in line with the Basel Accord.

A. **Formulate** the return objective for Bigbucks Bank's securities portfolio. State the purposes of the securities portfolio in relation to the other assets of the bank and prioritize the objectives of the securities portfolio.

   (6 minutes)

B. Historically, Bigbucks Bank has had a leverage-adjusted duration gap (LADG) of –1.5 to +1.6. However, some years ago, the bank received a government-funded bail out to avoid bankruptcy. New bank management was brought in, has repaid the bailout funds, and increased the bank's capital to meet rising capitalization requirements. The new management has held LADG in the –0.5 to +0.5 range. **Identify and explain** two reasons the bank's interest rate risk has changed under the new management. **Identify for each** reason whether interest rate risk has increased or decreased. Treat each reason independently of the other.

Answer Question 15-B in the template provided.

(6 minutes)
Template for question 15-B

Identify and explain two reasons the bank’s interest rate risk has changed under the new management. Identify for each reason whether interest rate risk has increased or decreased. Treat each reason independently of the other.

1. 

2. 
16. Institutional Investors

Based in London, Coggins Technology, Inc. is an established company. It has operations in North America, Japan, and several European countries. The firm has GBP14.4 billion in total assets, and its employees are covered by a defined benefit pension plan.

The pension plan currently has assets of GBP5.436 billion and liabilities of GBP8.865 billion. The goals of the plan include achieving a minimum expected return of 8.4%, with expected standard deviation of return no greater than 16%. Next month, the retirement age for full benefits under the plan will be lowered from age 60 to age 55. The median age of Coggins Technology's workforce is 49 years.

James Spence, CFA, is responsible for the pension plan's investment policy and strategic asset allocation decisions. He has had an ongoing debate within Coggins Technology about the pension plan's investment policy statement (IPS). Two IPSs under consideration are shown in Exhibit 16-1. To assist Spence, Coggins Technology has hired two pension consultants, Jim Sprint and Pam Platy, each of whom has recommended a different asset allocation (Exhibit 16-2).

## Exhibit 16-1
Investment Policy Statements

<table>
<thead>
<tr>
<th>IPS X</th>
<th>IPS Y</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return requirement</strong></td>
<td>Plan's objective is to outperform the relevant benchmark by a substantial margin.</td>
</tr>
<tr>
<td><strong>Risk tolerance</strong></td>
<td>Plan has a high risk tolerance because of the long-term nature of the plan and its liabilities.</td>
</tr>
<tr>
<td><strong>Liquidity</strong></td>
<td>Plan needs moderate level of liquidity to fund monthly benefit payments.</td>
</tr>
</tbody>
</table>

## Exhibit 16-2
Coggins Technology's Asset Allocation

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Current</th>
<th>Sprint</th>
<th>Platy</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.K. small-capitalization equities</td>
<td>13%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>U.K. large-capitalization equities</td>
<td>30</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>International equities (MSCI World ex-U.K.)</td>
<td>10</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>U.K. bonds</td>
<td>42</td>
<td>52</td>
<td>17</td>
</tr>
<tr>
<td>Cash</td>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td>Expected portfolio return (%)</td>
<td>9.1%</td>
<td>8.2%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Expected portfolio volatility (standard deviation)</td>
<td>15.8%</td>
<td>12.8%</td>
<td>21.1%</td>
</tr>
</tbody>
</table>
Spence later asks for and receives a projected breakdown of Coggins pension plan liabilities:

- Retire lives: 30%
- Active lives accrued benefits: 50%
- Active lives future wage inflation: 10%
- Active lives future real wage growth: 10%

The breakdown is after any expected changes in plan provisions. Spence determines that benefits for retired workers are fully indexed to inflation but that accrued benefits for current workers are not inflation indexed. He estimates that 60% of wage inflation is related to the inflation index and 70% of real wage growth is related to productivity growth and the stock market.

Spence decides to use this new information to minimize the volatility of plan surplus. He instructs one of his assistants to prepare talking points on the benefits of this new approach. The assistant proposes for the new approach:

1. While not zero, it will reduce the volatility of surplus to near zero.
2. Allow Coggins to reduce pension contributions.
3. Increase the equity allocation for the current allocation.
1. Which investment policy statement, X or Y, has the appropriate language for the return requirement of Coggins Technology’s pension plan?
   A. IPS X because the plan is currently underfunded and unless substantial returns are generated, Coggins Technology will need to increase its level of contributions.
   B. IPS Y because the plan is currently underfunded, and the primary objective should be to make the pension fund financially stronger.
   C. IPS Y because Coggins Technology is a large firm that can afford to make further contributions if required to alleviate the pension fund deficit.

2. Which investment policy statement, X or Y, has the appropriate language for the risk tolerance of Coggins Technology’s pension plan?
   A. IPS X because the plan has an infinite life.
   B. IPS X because of the willingness of Coggins Technology to take risk in the hope of minimizing the future contributions that are needed for the plan.
   C. IPS Y because of the fund’s underfunded status; should the fund have a substantial loss, payments to beneficiaries could be jeopardized.

3. Which investment policy statement, X or Y, has the appropriate language for the liquidity needs of Coggins Technology’s pension plan?
   A. IPS X because of the early retirement feature starting next month and the increasing number of retirees in the near future.
   B. IPS X because the focus of the asset allocation will be on price appreciation not income generation.
   C. IPS Y because the income generated on the portfolio should easily cover the monthly benefit payments.

4. Which of the following statements is correct relating to the asset allocation that is most appropriate for Coggins Technology’s pension plan?
   A. The current asset allocation is best because the expected return exceeds the required return, the risk is consistent with the plan’s target, and the level of liquidity should be sufficient for future needs.
   B. The asset allocation suggested by Sprint is best because the expected return is not far off the required return, the risk is consistent with the plan’s target, and the level of liquidity at 10% is the only one that is likely to be sufficient for future needs.
   C. The asset allocation suggested by Platy is best because the expected return is substantially above the required return, the risk is consistent with the risk tolerance that the plan must adopt to alleviate the deficit, and the level of liquidity should be sufficient for future needs.

5. Based on the breakdown of plan liabilities plus Spence’s determinations and estimates, what percentage of plan assets would be allocated to real rate bonds if the objective is to minimize the volatility of plan surplus?
   A. 30%.
   B. 36%.
   C. 39%.

6. Which of the talking points prepared by the assistant is most likely correct?
   A. 1.
   B. 2.
   C. None of the talking points are correct.
17. Institutional Investors

Dora Dirg, treasurer for U.S.-based Bright Life Insurance, has just joined the board of a charitable organization that has a large endowment portfolio. She is researching how the investment policy for an endowment differs from that of life insurance companies and thus far has reached the following conclusions:

I. Both endowments and life insurance companies have aggressive return requirements.

II. Endowments are less willing to assume risk than life insurance companies because of donor concerns about volatility and loss of principal.

III. Endowments are less able to assume risk than life insurance companies because of expectations that endowments should provide stable funding for charitable operations.

IV. Endowments have lower liquidity requirements than life insurance companies because endowment spending needs are met through a combination of current income and capital appreciation.

V. Both endowments and life insurance companies are subject to stringent legal and regulatory oversight.

VI. Investing in a tax-aware manner is critical for both endowments and life insurance companies.

1. Which of the following statements is most correct regarding comment I?

A. The comment is accurate because life insurance companies operate in a highly competitive market and must earn high returns to maintain their premiums at a competitive level. Endowments have a long time horizon, are often infinite, and can take an aggressive stance to portfolio investing.

B. The comment is inaccurate because the return requirements of life insurance companies are first and foremost liability driven and must be consistent with their conservative stance toward risk. In contrast, some endowments may take a more aggressive stance depending on the required spending rate and the reliance of the endowed organization on the funding provided by the endowment.

C. The comment is inaccurate because the return requirements of life insurance companies are first and foremost liability driven and must be consistent with their conservative stance toward risk. In addition, most endowments invest very conservatively so as to preserve the long-term value of the fund.
2. Which of the following statements is most correct regarding comment II?
A. The comment is accurate because an endowment would have trouble attracting future donations if they lost a significant part of previous donated funds.
B. The comment is inaccurate because although an endowment has a low willingness to take risk, it is not as low as for life insurance companies, which must ensure that at all times they are able to pay the promised benefits to policyholders.
C. The comment is inaccurate since life insurance companies have a lower willingness to take risk because confidence in their ability to pay their obligations as they fall due is a crucial element in the industry's financial viability. Endowments, by contrast, have a greater willingness to take risk because short-term portfolio volatility is unlikely to impact their ability to support the endowed institution on a long-term basis.

3. Which of the following statements is most correct regarding comment III?
A. The comment is inaccurate because life insurance companies are generally constrained from taking high risk by regulation. In contrast, the very long time horizons faced by endowments enable them to accept higher volatility in the short term in order to maximize long-term total returns.
B. The comment is accurate because many endowed institutions rely on their endowment to provide them with a major segment of their operating budgets.
C. The comment is inaccurate since both life insurance companies and endowments have a low ability to assume risk because they need to ensure the funding of their liabilities to policyholders and charitable institutions respectively.

4. Which of the following statements is most correct regarding comment IV?
A. The comment is inaccurate since both life insurance companies and endowments have fairly high liquidity requirements because they need to make regular distributions to policyholders and charitable institutions respectively.
B. The comment is accurate because the distributions made by endowments are foreseeable and usually constitute a small percentage of the portfolio's total assets. In contrast, life insurance products are promises to pay money on certain expected or unexpected events.
C. The comment is inaccurate since life insurance companies also have low liquidity requirements because they can use new premium income together with current portfolio income to meet claims as they fall due.

5. Are comments V and VI correct or incorrect?
<table>
<thead>
<tr>
<th>Comment V</th>
<th>Comment VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Correct</td>
<td>Incorrect</td>
</tr>
<tr>
<td>B. Incorrect</td>
<td>Correct</td>
</tr>
<tr>
<td>C. Incorrect</td>
<td>Incorrect</td>
</tr>
</tbody>
</table>
18. Institutional Investors

THIS QUESTION HAS THREE PARTS (A, B, C) FOR A TOTAL OF 25 MINUTES.

De Freville Insurance plc. is a U.K. life insurance company whose core business is the writing of term life and endowment policies. (The endowment policies pay out a fixed interest rate). The company's board have engaged Pathway Advisors, an investment consultancy, to advise them on the appropriateness of the company's current asset allocation.

Pathway is forecasting a period of strongly rising interest rates, together with a moderate narrowing in credit spreads, and wishes to assess the likely effect of such an environment on the following risks in De Freville's investment portfolio: credit risk, interest rate risk, reinvestment risk, and cash flow volatility risk.

De Freville's board has provided Pathway with the following information:

<table>
<thead>
<tr>
<th>Sector</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>4%</td>
</tr>
<tr>
<td>Non-callable fixed income –investment grade</td>
<td>35%</td>
</tr>
<tr>
<td>Non-callable fixed income –high yield</td>
<td>22%</td>
</tr>
<tr>
<td>Mortgage-backed securities</td>
<td>14%</td>
</tr>
<tr>
<td>Equities</td>
<td>12%</td>
</tr>
<tr>
<td>Real estate</td>
<td>9%</td>
</tr>
<tr>
<td>Private equity</td>
<td>4%</td>
</tr>
<tr>
<td>Portfolio return</td>
<td>4.9%</td>
</tr>
<tr>
<td>Duration of assets</td>
<td>9.3</td>
</tr>
<tr>
<td>Duration of liabilities</td>
<td>10.5</td>
</tr>
</tbody>
</table>

A. Identify one source of each risk contained in De Freville's investment portfolio based on the information provided. Indicate the likely impact on De Freville's surplus (positive, no effect, or negative) of Pathway's forecast being correct for each of the four risk areas. Justify your response regarding the likely impact on the surplus with one reason.

Answer question 18-A in the template provided.

(16 minutes)
Template for question 18-A

<table>
<thead>
<tr>
<th>Risk</th>
<th>Identify one source of each risk contained in De Freville's investment portfolio based on the information provided.</th>
<th>Indicate the likely impact on De Freville's surplus of Pathway's forecast being correct.</th>
<th>Justify your response regarding the likely impact on the surplus with one reason.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit risk</td>
<td>Positive</td>
<td>No effect</td>
<td>Negative</td>
</tr>
<tr>
<td>Interest rate risk</td>
<td>Positive</td>
<td>No effect</td>
<td>Negative</td>
</tr>
</tbody>
</table>
### Institutional Investors

<table>
<thead>
<tr>
<th>Risk Type</th>
<th>Positive</th>
<th>No Effect</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinvestment risk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash flow volatility risk</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Within De Freville's product portfolio are fixed-rate annuity contracts. These contracts are sold with an initial 12-year term to maturity and include surrender clauses that permit the owner to terminate the contract, receiving the original investment plus accrued earnings at the three-year anniversary of the contract. Beyond this three-year period, the contracts may not be surrendered for the remainder of the original term.

B. **Determine** the effect (increase, no change, decrease) on the expected surrender rate of Pathway's forecast proving correct. **Justify** your response with one reason. 

**Answer question 18-B in the template provided.**

(3 minutes)

**Template for question 18-B**

<table>
<thead>
<tr>
<th>Determine the effect (increase, no change, decrease) on the expected surrender rate of Pathway's forecast proving correct</th>
<th>Justify your response with one reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td></td>
</tr>
<tr>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td></td>
</tr>
</tbody>
</table>
C. **Identify** two of De Freville’s investment policy constraints that are affected by the surrender clause. **Explain** how each constraint is affected.

Answer question 18-C in the template provided.

(6 minutes)

**Template for question 18-C**

<table>
<thead>
<tr>
<th>Identify two of De Freville’s investment policy constraints that are affected by the surrender clause</th>
<th>Explain how each constraint is affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
14. Institutional Investors

A. Maintain the real value of the portfolio as well as meet the distribution requirements (including distributions sufficient to maintain the tax exempt status) and expenses.

\[
[(1.05) \times (1.0072) \times (1.033)] - 1 = 9.25\%
\]

However, this is reduced by annual royalties of 0.9% of the fund, making the required investment return: 9.25% – 0.9% = 8.35%.

Candidate note: The CFAI preference has been to compound the return components to reach 9.25%, as done here. There is no inherent reason why the royalty receipts could not be treated that way as well, making the final calculation \([1.0925 \times (1 - 0.009)] - 1 = 8.27\%\).

B.

<table>
<thead>
<tr>
<th>IPS element</th>
<th>Judge (circle one)</th>
<th>Justify each of your responses with one reason.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to take risk</td>
<td>WM Higher</td>
<td>Perlstein has the ability to adjust grants from year to year. The museum is more dependent on WM as WM funds 85% of operating costs.</td>
</tr>
<tr>
<td></td>
<td>Perlstein Higher</td>
<td>Similar</td>
</tr>
<tr>
<td>Time horizon</td>
<td>WM Longer</td>
<td>Both are perpetual entities.</td>
</tr>
<tr>
<td></td>
<td>Perlstein Longer</td>
<td>Similar</td>
</tr>
<tr>
<td>Similar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquidity needs</td>
<td>WM Higher</td>
<td>WM funds 85% of operating expenses plus active acquisitions while Perlstein can adjust grants annually.</td>
</tr>
<tr>
<td></td>
<td>Perlstein Higher</td>
<td>Similar</td>
</tr>
<tr>
<td>Similar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. A geometric smoothing rule determines distribution partly as beginning market value times distribution percentage and partly as previous distribution increased for inflation.

The team's concern is the volatility of distributions.

Because inflation rate changes are more stable than market value changes from year to year, the smoothing rule distributions will be less volatile than distributions based only on market value; smoothing will lower volatility of distributions.
15. **Institutional Investors**

A. The return objective is to assist the bank in earning a positive spread between interest earned on assets (which include the securities portfolio) and interest paid on liabilities.

The securities portfolio is a residual use of funds after meeting loan demand. The objectives are:

- To manage the overall interest rate risk of the balance sheet (i.e., the duration of assets in relation to liabilities).
- To manage liquidity by holding liquid assets that offset the generally illiquid loans made.
- To produce income.
- To manage credit risk by holding lower risk securities to offset the generally riskier loans.

B. **Identify and explain** two reasons the bank’s interest rate risk has changed under the new management. **Identify for each reason whether** interest rate risk has increased or decreased. **Treat each reason independently of the other.**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The smaller LADG range means less mismatch of asset and liability duration, which means less interest rate risk.</td>
</tr>
<tr>
<td>2.</td>
<td>Management has increased the amount of capital. This increases the ability of the bank to absorb losses and, in that sense, lowers interest rate risk.</td>
</tr>
</tbody>
</table>

**Candidate note:** The expectation that interest rates will be stable is not an acceptable answer. The expectation does not lower risk; it only says management has an opinion rates are not going to change very much.
16. **Institutional Investors**

1. **B** The risk inherent in attempting to maximize total returns would be inappropriate given the pension fund’s limited ability to take risk.

2. **C** The plan is severely underfunded and cannot afford to take the chance of significant losses arising.

3. **A** The company is established and could easily already have retirees. The median age of the workforce is 49, and there is likely to be a significant number of staff who maybe be tempted to retire in the near future at the age of 55. As a result, benefit payments could be substantial.

4. **A** The higher expected return in relation to the return requirement of 8.4% will help the plan’s underfunded status somewhat, and the expected standard deviation of return is consistent with the plan’s risk tolerance. The portfolio has significant allocations to U.K. bonds and large-cap equities in addition to cash. The availability of these highly liquid assets should be sufficient, particularly in view of the stable income flows from these investments, to fund monthly benefit payments when the early retirement feature takes effect next month.

5. **B** Both the data provided and the goal of minimizing volatility of plan surplus indicate a liability mimicking portfolio. Spence’s determinations and estimates to the plan breakdown are used to calculate the allocation of assets between nominal and real rate bonds as well as equity.

   • Retire lives: 30%—all inflation indexed so 100% real rate
   • Active lives accrued benefits: 50%—no indexing so 100% nominal
   • Active lives future wage inflation: 10%—60% real rate for the indexed portion, leaving 40% nominal for the non-indexed
   • Active lives future real wage growth: 10%—70% equity, leaving 30% nominal

Nominal: 1.00 of 50% + 0.4 of 10% + 0.3 of 10% = 57%

Real rate: 1.0 of 30% + 0.6 of 10% = 36%

Equity: 0.7 of 10% = 7%

= 100% in total

6. **C** All the points are false. Some risk for liability noise remains in liability mimicking, but near zero is the typical objective. However, this plan remains seriously underfunded, so there will remain substantial volatility of surplus (initial $S = 5.436 – 8.865 billion). The return typically declines with mimicking, which will increase the need for contributions. The equity allocation is generally lower with mimicking, which is confirmed by the calculations shown in answering part 5, compared to the current allocation of 53%.
17. Institutional Investors

1. B
2. C
3. A
4. B
5. C Only life insurance companies are subject to stringent legal and regulatory oversight. Endowments are tax exempt and do not need to invest in a tax-aware manner.
18. Institutional Investors

A. Identify one source of each risk contained in De Freville's investment portfolio based on the information provided.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Source of Risk</th>
<th>Indicate the likely impact on De Freville's surplus of Pathway's forecast being correct</th>
<th>Justify your response regarding the likely impact on the surplus with one reason</th>
</tr>
</thead>
</table>
| Credit risk        | Any of the fixed income segments: - investment grade - high yield - MBS                  | Positive  
                       No effect  
                       Negative  | Narrowing credit spreads will lead to out-performance of comparable credit risk free fixed income assets |
| Interest rate risk | Asset and liability durations do not match                                             | Positive  
                       No effect  
                       Negative  | Liability duration is higher than asset duration, with increasing rates liabilities will have the greater decline in value. Candidate note: There is a potential issue with the mortgage-backed bonds whereby the higher interest rates cause prepayment rates to fall, thus increasing the duration of these assets. But remember, convexity is a second order effect so it should not be assumed (with no other information) to overwhelm the duration impact. |
| Reinvestment risk  | Any of the fixed income segments: - investment grade - high yield - MBS                  | Positive  
                       No effect  
                       Negative  | Higher interest rates mean that there will be a higher return on reinvested funds, which will have a beneficial effect on the surplus over time. Candidate note: Negative is also an acceptable answer, in which case, the reasoning must be the rise in rates will reduce mortgage prepayments available for reinvestment and that this effect exceeds the benefit of reinvesting all cash flow at higher rates. |
| Cash flow volatility risk | The mortgage-backed securities                                           | Positive  
                       No effect  
                       Negative  | Prepayment rates are likely to slow (due to the higher interest rates), which means there will be less cash flow to reinvest. |
### B.

<table>
<thead>
<tr>
<th></th>
<th>Justify your response with one reason</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Determine the effect (increase, no change, decrease) on the expected surrender rate of Pathway's forecast proving correct</strong></td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>Higher interest rates will mean that, all other factors being equal, the return on existing fixed-rate contracts will be lower than is available on new policies. The owners who have the ability to surrender should do so—cashing in and reinvesting at the new higher rates.</td>
</tr>
<tr>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td></td>
</tr>
</tbody>
</table>

### C.

<table>
<thead>
<tr>
<th>Identify two of De Freville’s investment policy constraints that are affected by the surrender clause</th>
<th>Explain how each constraint is affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time horizon</td>
<td>The potential for surrenders at the three-year point will shorten the average expected time horizon, which is the investment time horizon.</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Surrenders will require the company to have liquidity to pay back the owners, thus increasing the level of liquidity needed in the portfolio.</td>
</tr>
</tbody>
</table>
Joan Bonetti, CFA, is evaluating stock returns for two economies, the country of Devdale and the country of Emdale.

Devdale is a developed country with very few restrictions on cross-border capital flows and liquid capital markets. Emdale is an emerging market that has restrictions on investments from overseas. Bonetti has collected the following data (shown in Exhibit 1) on the two countries and is considering whether either of them should be included into one of her managed portfolios. She uses the MSCI World Index as a proxy for the global portfolio and uses a financial equilibrium model approach for market evaluation.

Using the data in Exhibit 1, she calculates for Devdale:

Required equity return = 7.77%
Beta = 1.00

Using these calculations and the other necessary data from Exhibit 1, calculate the following:

i. The required equity return for Emdale.
ii. The global beta for Emdale.
iii. The covariance between the markets of Devdale and Emdale.

(7 minutes)
20. **Capital Market Expectations: Forecasting Market Expectations**

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

Jake Preedy, CFA, is looking to formulate capital market expectations for the country of Germania. He has focused on interest rate expectations, market return, and risk.

Jake analyzed inflation and economic growth with a view to predicting what action the Central Bank will take with interest rates. The equilibrium rate that the Central Bank is striving to achieve to balance inflation with growth is 5%. The target inflation rate is 2%, but Jake expects inflation to be 3.8%. The GDP long-term trend is 3%, but Jake expects GDP growth to be only 2.7%.

Jake is looking to estimate the expected return from the stock market. He has estimated the dividend yield to be 2.8%. Inflation is estimated at 3.8% and real earnings growth at 2.7%. The stock repurchase yield (aggregate stock buy back) is expected to be 0.8%, and the P/E is expected to increase 0.4%.

Jake is also attempting to estimate stock market volatility using time series analysis. He believes that the stock market exhibits volatility clustering, and current volatility is a weighted average of the previous period volatility and a random error. He has estimated the rate of decay in volatility from one period to the next to be 0.82. The standard deviation of returns in the previous period was 0.13, and he assumes a random error of 0.03.

Using the above information, answer the following questions:

A. **Estimate** the short-term target interest rate given Jake’s predictions of inflation and economic growth. Explain why the target interest rate is higher/lower than the equilibrium neutral rate.

   (4 minutes)

B. **Calculate** the expected return on the stock market using the Grinold-Kronor model, given Jake’s estimates.

   (2 minutes)

C. **Calculate** the expected stock market volatility based on Jake’s estimate of theta, the coefficient of rate of decay in market volatility, and the market’s standard deviation in the previous period.

   (2 minutes)
21. **Capital Market Expectations**

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

A client of Sam Morgan is considering altering his allocation to a number of markets and has asked Morgan to provide an estimate of the nominal return expected for each of those markets, including Ruritania. Morgan decides to apply two models: the Grinold-Kroner model and the International CAPM (ICAPM).

To implement these models, Morgan collects the data given in Exhibits 21-1 and 21-2:

**Exhibit 21-1**

2015 Market Expectations

<table>
<thead>
<tr>
<th>Data for Ruritanian Stock Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard deviation of equities</td>
</tr>
<tr>
<td>Dividend yield</td>
</tr>
<tr>
<td>Real long-term growth rate</td>
</tr>
<tr>
<td>Share repurchase yield</td>
</tr>
<tr>
<td>Illiquidity premium</td>
</tr>
<tr>
<td>Per period decline in P/E ratio</td>
</tr>
<tr>
<td>Ruritanian equities market integration factor</td>
</tr>
</tbody>
</table>

**Global Data**

- Correlation coefficient between Global market and Ruritanian equities: 0.42
- Sharpe ratio for global investment market: 0.367

**Exhibit 21-2**

Ruritanian Economic Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>2014</th>
<th>2015 Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation rate (%)</td>
<td>2.7%</td>
<td>2.85%</td>
</tr>
<tr>
<td>Corporate tax rate (%)</td>
<td>42%</td>
<td>40%</td>
</tr>
<tr>
<td>Three-month government bill rate (%)</td>
<td>3.4%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

**A. Calculate** the expected return on Ruritanian equities using the Grinold-Kroner model and the data given in Exhibits 21-1 and 21-2. **Show** your calculations.

(3 minutes)

**B. Calculate** the expected return on Ruritanian equities using ICAPM and the data given in Exhibits 21-1 and 21-2. **Show** your calculations.

(5 minutes)

**C. Briefly comment** on the two approaches that were used. Why do the two answers differ?

(4 minutes)
Benny Carter, CFA, has been analyzing the valuation level of the Bordurian stock market. He started by using historical data to estimate the parameters of the Cobb-Douglas Production function. Based on the following data for the years 1989 to 2012, he has estimated the production function to be:

\[ Y = 1.007 \times L^{0.744} \times K^{0.256} \]

Where \( Y = \) real GDP, \( L = \) labor input, \( K = \) capital stock

(each variable has been scaled to 100 for 1989):

<table>
<thead>
<tr>
<th>Year</th>
<th>( Y )</th>
<th>( L )</th>
<th>( K )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1990</td>
<td>104.6</td>
<td>108.7</td>
<td>110.8</td>
</tr>
<tr>
<td>1991</td>
<td>106.8</td>
<td>104.9</td>
<td>108.7</td>
</tr>
<tr>
<td>1992</td>
<td>108.3</td>
<td>103.9</td>
<td>108.3</td>
</tr>
<tr>
<td>1993</td>
<td>107.9</td>
<td>106.2</td>
<td>114.0</td>
</tr>
<tr>
<td>1994</td>
<td>108.4</td>
<td>107.5</td>
<td>122.6</td>
</tr>
<tr>
<td>1995</td>
<td>111.7</td>
<td>97.6</td>
<td>116.4</td>
</tr>
<tr>
<td>1996</td>
<td>116.9</td>
<td>103.1</td>
<td>125.4</td>
</tr>
<tr>
<td>1997</td>
<td>120.9</td>
<td>112.1</td>
<td>140.9</td>
</tr>
<tr>
<td>1998</td>
<td>125.3</td>
<td>122.3</td>
<td>184.0</td>
</tr>
<tr>
<td>1999</td>
<td>130.6</td>
<td>120.5</td>
<td>166.8</td>
</tr>
<tr>
<td>2000</td>
<td>137.2</td>
<td>126.8</td>
<td>179.5</td>
</tr>
<tr>
<td>2001</td>
<td>143.7</td>
<td>139.0</td>
<td>202.9</td>
</tr>
<tr>
<td>2002</td>
<td>150.5</td>
<td>131.8</td>
<td>192.2</td>
</tr>
<tr>
<td>2003</td>
<td>155.8</td>
<td>132.1</td>
<td>199.8</td>
</tr>
<tr>
<td>2004</td>
<td>159.6</td>
<td>143.5</td>
<td>230.4</td>
</tr>
<tr>
<td>2005</td>
<td>165.3</td>
<td>136.4</td>
<td>232.6</td>
</tr>
<tr>
<td>2006</td>
<td>171.0</td>
<td>139.1</td>
<td>226.5</td>
</tr>
<tr>
<td>2007</td>
<td>176.3</td>
<td>153.8</td>
<td>260.2</td>
</tr>
<tr>
<td>2008</td>
<td>183.5</td>
<td>165.4</td>
<td>301.2</td>
</tr>
<tr>
<td>2009</td>
<td>189.9</td>
<td>170.7</td>
<td>337.1</td>
</tr>
<tr>
<td>2010</td>
<td>190.8</td>
<td>160.2</td>
<td>336.2</td>
</tr>
<tr>
<td>2011</td>
<td>184.8</td>
<td>150.7</td>
<td>430.5</td>
</tr>
<tr>
<td>2012</td>
<td>240.0</td>
<td>161.0</td>
<td>431.0</td>
</tr>
</tbody>
</table>

A. If labor and capital both increased by the same percentage amount, using the Cobb-Douglas production function, determine whether labor or capital has the greater impact on GDP and explain why.

Answer this question in the following template.

(3 minutes)

<table>
<thead>
<tr>
<th>Circle the impact factor whose changes will have the greater impact on GDP</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td></td>
</tr>
</tbody>
</table>

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Level III Review Workshop Questions
Applied Economics

B. If Carter believes that the percentage changes in the factor inputs for 2013 are best approximated by those that occurred for the five years ending in 2012, and he is prepared to assume that total factor productivity will increase by 2%, then what percentage change in real GDP will he predict for 2013 using Cobb-Douglas?

(4 minutes)

C. The figure of 1.007 in the above production function represents total factor productivity (TFP), and growth in TFP is known as the Solow residual. For each of the following circumstances (viewed in isolation), identify the most likely long-term effect on TFP.

i. The Bordurian government votes to abolish controls on foreign investment in Bordurian industries.

ii. The Bordurian government announces an amnesty for illegal immigrants: “We will allow people who have been in Borduria without the correct papers for ten years, who speak Bordurian, who have a clean record, and who want to live here long-term to earn their citizenship. This route to citizenship will not apply to people arriving after 2013.”

iii. The Bordurian government abolishes tax breaks on research and development expenditure.

Answer this question in the following template.

(6 minutes)
### Circumstance

<table>
<thead>
<tr>
<th>Circumstance</th>
<th>Most likely long-term effect on total factor productivity (circle answer)</th>
</tr>
</thead>
</table>
| i. The Bordurian government votes to abolish controls on foreign investment in Bordurian industries. | TFP decreases  
TFP stays the same  
TFP increases |
| ii. The Bordurian government announces an amnesty for illegal immigrants: “We will allow people who have been in Borduria without the correct papers for ten years, who speak Bordurian, who have a clean record, and who want to live here long-term to earn their citizenship. This route to citizenship will not apply to people arriving after 2013.” | TFP decreases  
TFP stays the same  
TFP increases |
| iii. The Bordurian government abandons tax breaks on research and development expenditure. | TFP decreases  
TFP stays the same  
TFP increases |

**D.** Aggregate dividends paid in 2012 have been $47.2 billion. Carter has revised some of his estimates and expects growth in aggregate dividends and earnings of 7.0% for 2013. He estimates annual growth will then decline linearly over the following ten years, stabilizing at 3.0%.

Carter notes that investors in Bordurian government long-term bonds currently earn a yield of 5.2% and believes that an average risk premium of 2.6% would be reasonable for Bordurian stocks.

What fair value for the Bordurian stock market would be estimated by the H-model from the above data?

*(3 minutes)*
23. **Economics**

Lillian Hardin, CFA, has gathered the following data on the Syldavian stock market:

<table>
<thead>
<tr>
<th><strong>GRI Market Index (market cap of Syldavian equities)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As of December 31, 2011</td>
<td>2514</td>
</tr>
<tr>
<td>As of December 31, 2012</td>
<td>2597</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Aggregate earnings for the GRI</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>172</td>
</tr>
<tr>
<td>2012</td>
<td>182</td>
</tr>
<tr>
<td>2013 (consensus poll of leading analysts)</td>
<td>215</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Average for 2003 to 2012</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(in December 2009 monetary terms)</td>
<td>136</td>
</tr>
<tr>
<td>(in December 2012 money terms)</td>
<td>154</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Expected GRI earnings growth, per annum</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2013–2014</td>
<td>9.30%</td>
</tr>
<tr>
<td>2013–2018</td>
<td>3.50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Syldavian long-term government bond yield (SBY)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As of December 31, 2011</td>
<td>7.10%</td>
</tr>
<tr>
<td>As of December 31, 2012</td>
<td>7.24%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Syldavian A-rated corporate bonds—spread vs SBY</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As of December 31, 2011</td>
<td>0.71%</td>
</tr>
<tr>
<td>As of December 31, 2012</td>
<td>0.76%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Syldavian B-rated corporate bonds—spread vs SBY</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As of December 31, 2011</td>
<td>3.01%</td>
</tr>
<tr>
<td>As of December 31, 2012</td>
<td>3.25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Total value of Syldavian corporate debt</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As of December 31, 2011</td>
<td>1,764</td>
</tr>
<tr>
<td>As of December 31, 2012</td>
<td>2,580</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Estimated market value of Syldavian corporate assets</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As of December 31, 2011</td>
<td>4,595</td>
</tr>
<tr>
<td>As of December 31, 2012</td>
<td>4,746</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>d for Yardeni model (regression slope)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.06</td>
</tr>
</tbody>
</table>

Use this data to answer the following questions, as of December 31, 2012. Other than percentages and d, all figures are per 100 million S$. 

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1. Which of the following would be an accurate statement regarding the application of the basic Fed model to the above data?
   A. The Fed model ratio currently stands at 1.14, which indicates that the Syldavian market is currently underpriced.
   B. The Fed model ratio currently stands at 0.968, which indicates that the Syldavian market is currently marginally underpriced.
   C. The Fed model ratio currently stands at 0.968, which indicates that the Syldavian market is currently marginally overpriced.

2. Which of the following statements in respect of the Yardeni model is accurate in relation to the above data?
   A. Since 7.65% > 7.01%, we can conclude from the Yardeni model that the Syldavian market is currently overpriced.
   B. Using the Yardeni model to arrive at a fair value for the Syldavian market leads to an estimated value of 2812.
   C. Since 8.28% > 7.79%, the Yardeni model indicates that the Syldavian market is currently underpriced.

3. Which of the following statements regarding the Yardeni and Fed models is least accurate?
   A. The Fed model ignores earnings growth, whereas the Yardeni model explicitly factors it in.
   B. Both the Fed and Yardeni models are based on comparisons between real and nominal values.
   C. Neither the Fed nor the Yardeni models explicitly factor in an equity risk premium.

4. Which of the following is most accurate regarding the P/10-year MA(E) given that the ratio's historical average has been 17.83 for the Syldavian market?
   A. The fact that 16.86 < 17.83 is indicative that the market should fall.
   B. The fact that 19.1 > 17.83 is indicative that the market should fall.
   C. Abnormal values for the ratio can persist, making it less useful.

5. Which of the following statements regarding the Tobin's q is accurate in relation to the above data?
   A. The fact that Tobin's q is currently standing at 0.547 is indicative that the Syldavian market is significantly undervalued.
   B. Tobin's q is currently 1.09, which indicates that the Syldavian market is currently overvalued.
   C. Tobin's q is currently 1.20, which indicates that the Syldavian market is currently overvalued.

6. Which of the following statements regarding top-down and bottom-up methods for forecasting earnings per share of an equity market index is the most accurate?
   A. A manager who utilizes a long-short, market-neutral strategy is most likely to use the top-down approach.
   B. The models used in top-down forecasting are usually quite slow to capture the effects of structural changes in the economy and/or market.
   C. The biases of each security analyst are a systemic problem in the application of the top-down methodologies.

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

Josh Hart, CFA, is attempting to estimate the covariance between the markets of two countries: Anastasia and Narnia. He can then consider the impact on his portfolio of making investments in these two countries. Rather than trying to calculate a correlation coefficient between the two countries, he has decided to use a multifactor model and infer the relationship via two global factors: global economic growth influencing global equity markets and global interest rates influencing global bond markets. Using historic data, he has generated the following factor covariance matrix:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Global Economic Growth</th>
<th>Global Interest Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Economic Growth</td>
<td>0.0198</td>
<td>0.0014</td>
</tr>
<tr>
<td>Global Interest Rates</td>
<td>0.0014</td>
<td>0.0021</td>
</tr>
</tbody>
</table>

The factor sensitivity to global economic growth for Anastasia is 0.88 and 0.75 for Narnia.

The factor sensitivity to global interest rates for Anastasia is 2.26 and 2.44 for Narnia.

Using the above data, calculate the following:

1. The overall market variance of Anastasia.
2. The overall market variance of Narnia.
3. The covariance between countries Anastasia and Narnia.

(9 minutes)
LEVEL III REVIEW WORKSHOP
QUESTIONS: APPLIED ECONOMICS: ANSWERS


Note that the calculations for Devdale (D) are not required and should not be shown on the exam. They are included only to verify the data explicitly given in the case.

i. To calculate the assets’ expected returns

1. Calculate the ERP assuming full integration and factoring in any illiquidity premium.

\[
\text{ERP}_i = \rho_{i,M} \sigma_i \left( \frac{\text{ERP}_M}{\sigma_M} \right)
\]

\[
\text{ERP}_D = 0.73 \times 0.11 \times 0.30 = 0.0241 = 2.41\%
\]

\[
\text{ERP}_E = (0.59 \times 0.18 \times 0.30) + 0.024 = 0.0559 = 5.59\%
\]

2. Calculate the ERP assuming full segmentation
(Note: the relevant global portfolio will be the individual market. Therefore, \(\rho_{i,M} = 1.0\))

\[
\text{ERP}_i = 1 \times \sigma_i \left( \frac{\text{ERP}_M}{\sigma_M} \right)
\]

\[
\text{ERP}_D = 1 \times 0.11 \times 0.30 = 0.033 = 3.30\%
\]

\[
\text{ERP}_E = (1 \times 0.18 \times 0.30) + 0.024 = 0.078 = 7.8\%
\]

3. Weight the integrated and segmented risk premiums.

\[
\text{ERP}_D = (0.88 \times 2.41\%) + (0.12 \times 3.30\%) = 2.52\%
\]

\[
\text{ERP}_E = (0.62 \times 5.59\%) + (0.38 \times 7.8\%) = 6.43\%
\]

4. \(\hat{R}_i = R_F + \text{ERP}_i\)

\[
\hat{R}_D = 5.25\% + 2.52\% = 7.77\%
\]

\[
\hat{R}_E = 5.25\% + 6.43\% = 11.68\%
\]

ii. To calculate the betas in each market:

\[
\beta_i = \frac{\rho_{i,M} \sigma_i}{\sigma_M}
\]

\[
\beta_D = \frac{0.73 \times 0.11}{0.08} = 1.00
\]

\[
\beta_E = \frac{0.59 \times 0.18}{0.08} = 1.33
\]

iii. To calculate the covariance:

\[
\text{Cov}(i, j) = \beta_i \beta_j \sigma_i^2 \sigma_j^2
\]

\[
\text{Cov}(D, E) = 1.00 \times 1.33 \times 0.08^2 = 0.008512
\]

(or 85.12 if applying SD as a percentage)
20. Capital Market Expectations

A. Using the Taylor Rule:

\[ r_{\text{target}} = r_{\text{neutral}} + 0.5(GDP_{\text{expected}} - GDP_{\text{trend}}) + 0.5(i_{\text{expected}} - i_{\text{target}}) \]

\[ r_{\text{target}} = 5\% + [0.5(2.7\% - 3\%) + 0.5(3.8\% - 2\%)] \]

\[ r_{\text{target}} = 5.75\% \]

Although the weak projected economic growth calls for a cut in interest rates, this is more than outweighed by the higher projected inflation.

The target interest rate is higher than the neutral rate as the concern of high inflation more than outweighs the weak growth concern.

B. Using the Grinold-Kronor model:

\[ \hat{R}_i = \frac{\text{Div}_1}{P_0} + i + g - \Delta S + \Delta \left( \frac{P}{E} \right) \]

\[ \hat{R}_i = 2.8\% + 3.8\% + 2.7\% - (0.8\%) + 0.4\% \]

\[ \hat{R}_i = 10.5\% \]

C. To calculate stock market volatility:

\[ \sigma_i^2 = \theta \sigma_{i-1}^2 + (1- \theta) \epsilon_i^2 \]

\[ \sigma_i^2 = 0.82 \times 0.13^2 + 0.18 \times 0.03^2 \]

\[ \sigma_i^2 = 0.01402 \]

\[ \sigma_i = \sqrt{0.01402} = 0.1184 \]
21. **Capital Market Expectations**

A. According to the Grinold-Kroner model:

\[ \hat{R}_i = \frac{\text{Div}_1}{P_0} + i + g - \Delta S + \Delta \left( \frac{P}{E} \right) \]

Expected market return = Dividend yield + inflation rate + real growth + share repurchase yield + % change in P/E ratio [all figures based on expectations]

(Share repurchase yield is added because repurchases imply $\Delta S$ is negative.)

In the case of Ruritania for 2015 (note P/E ratio falls and is subtracted):

Expected market return = 3.1% + 2.85% + 2.3% + 1.9% – 0.3% = 9.85%

B. Per ICAPM:

\[ \text{ERP}_i = \rho_{i,M} \times \sigma_i \times \text{Global Sharpe Ratio} \]

For Ruritania, assuming full integration, and incorporating the illiquidity premium:

\[ \text{ERP}_{\text{integrated}} = (0.42 \times 22\% \times 0.367) + 1.6\% = 3.39\% + 1.6\% = 4.99\% \]

For Ruritania, assuming zero integration, and incorporating the illiquidity premium:

\[ \text{ERP}_{\text{segmented}} = (1 \times 22\% \times 0.367) + 1.6\% = 8.07\% + 1.6\% = 9.67\% \]

Given that Ruritania is 55% integrated into the global market, we take a weighted average of the two ERPs calculated above:

\[ \text{ERP}_{\text{actual}} = (0.55 \times 4.99\%) + (0.45 \times 9.67\%) = 7.10\% \]

Adding the risk-free rate (assumed to be the government bill rate) gives use the expected return from the Ruritanian market:

Expected return = 3.6% + 7.1% = 10.7%

C. The approaches are fundamentally different.

Grinold-Kroner is a discounted cash flow approach derived from the Gordon Growth DDM that $E(R) = \text{yield} + \text{growth}$. It also incorporates stock repurchase as yield and a repricing effect if PEs are expected to change.

ICAPM, in this case Singer Terhaar, is a macroeconomic approach that determines $E(R)$ from risk factors. Using sigmas and correlation is equivalent to pricing based on beta and an illiquidity premium can then be added.

This can be considered a micro versus macro approach to valuation.
22. Economics

A.

<table>
<thead>
<tr>
<th>Factor whose changes will have the greater impact on GDP</th>
<th>Reason for choice of factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>Of the two factors, labor has the higher exponent (elasticity). (0.744 compared to 0.256 for capital)</td>
</tr>
<tr>
<td></td>
<td>This indicates that a 1% increase/decrease in the labor factor will lead to a 0.744% increase/decrease in real GDP, which is greater than the 0.256% impact of a similar change in capital.</td>
</tr>
<tr>
<td>Capital</td>
<td>(Note: The exponents represent the elasticity of GDP with respect to labor and capital. In other words, the exponents are multipliers that relate change in GDP for change in labor or capital.)</td>
</tr>
</tbody>
</table>

B. % change in labor for the 5 years ending 2012 = \((161 / 153.8)^{1/5} - 1\) = 0.92%
% change in capital for the 5 years ending 2012 = \((431 / 260.2)^{1/5} - 1\) = 10.62%

Using the formula: \(\%\Delta Y = \%\Delta A + (0.256 \times \%\Delta K) + (0.744 \times \%\Delta L)\)
(where \(\Delta A\) stands for the increase in total factor productivity)

Estimated % change in GDP \(\%\Delta Y\) = 2% + (0.256 \times 10.62%) + (0.744 \times 0.92%) = 5.40%
C. This question is concerned with the effect of various structural changes on total factor productivity (TFP):

<table>
<thead>
<tr>
<th>Circumstance</th>
<th>Most likely long-term effect on the Solow Residual</th>
<th>Reason (not required, but provided for information)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. The Bordurian government votes to abolish controls on foreign investment in Bordurian industries.</td>
<td>TFP decreases TFP stays the same TFP increases</td>
<td>Labor and capital productivity are both likely to increase as foreign funds flow into the Bordurian economy, resulting in long-term improvements in technology and the quality of capital and management (as overseas investors demand better corporate governance).</td>
</tr>
<tr>
<td>ii. The Bordurian government announces an amnesty for illegal immigrants: “We will allow people who have been in Borduria without the correct papers for ten years, who speak Bordurian, who have a clean record, and who want to live here long-term to earn their citizenship. This route to citizenship will not apply to people arriving after 2013.”</td>
<td>TFP decreases TFP stays the same TFP increases</td>
<td>The amnesty is only short-term, thus any impact on TFP will only be short-term. (The question asks about the long-term effect.)</td>
</tr>
<tr>
<td>iii. The Bordurian government abolishes tax breaks on research and development expenditure.</td>
<td>TFP decreases TFP stays the same TFP increases</td>
<td>The loss of tax breaks provides a disincentive for companies to innovate. This is likely to have an adverse effect on TFP on an ongoing basis.</td>
</tr>
</tbody>
</table>

D. According to the H-model:

\[
P_0 = \frac{D_0}{r - g_L} \left[ (1 + g_s) + \frac{N}{2} (g_s - g_L) \right]
\]

where:

- \( P_0 \) = current value
- \( D_0 \) = current dividend (B$47.2 billion)
- \( r \) = equity discount rate (5.2% + 2.6% = 7.8%)
- \( g_s \) = short-term rate of growth (7.0%), expected to decline linearly over \( N \) (10) years to the real long-term sustainable rate \( g_L \) (3.0%).

Putting the figures into the H-model gives:

\[
P_0 = \frac{B$47.2 billion}{0.078 - 0.03} \left[ (1.03) + \frac{10}{2} (0.07 - 0.03) \right]
\]

\[
P_0 = \frac{B$47.2 billion}{0.048} \left( 1.03 + 0.20 \right)
\]

Thus, \( P_0 = B$1,209.50 billion. \)
23. Economics

1. A

Fed model ratio = \[
\frac{\text{GRI Current Earnings Yield (CEY)}}{\text{Long-Term Government Bond Yield}}
\]

where \( CEY = \frac{\text{Aggregate 12-month fwd earnings}}{\text{current GRI level}} \)


So, \( CEY = \frac{215}{2597} = 8.28\% \).

Thus ratio = \( \frac{8.28\%}{7.24\%} = 1.14 \).

The fact that this is > 1 indicates that CEY > T-bond yield which, if the basic Fed model assumption that these two yields should be equal is true, implies that CEY is too high. If we accept the consensus earnings estimate, then we conclude that the current index level is too low. The Syldavian market is underpriced.

2. C

The Yardeni model compares the actual CEY (8.28% as above) with the Yardeni CEY

\( \text{[Yield on (A-rated) corporate bonds – (d \times LTEG), where LTEG = long-term expected earnings growth beyond next 12 months (typically the 5-year consensus forecast))}. \]

In this case, the yield on A-rated corporate bonds as of December 31, 2012 = 7.24% + 0.76% = 8%, while LTEG = 3.5%, so Yardeni CEY = 8% – (0.06 \times 3.5\%) = 7.79%.

If we assume that the two CEYs should be equal, then since actual > theoretical (8.28% > 7.79%), we can conclude that the actual CEY is too high. This leads to the same conclusion that the Syldavian market is underpriced as in Part 1.

3. C

Least accurate means you must identify the false (or least true statement). C is false because the Yardeni model, unlike the Fed model, does explicitly factor in a risk premium (through using the corporate bond yield rather than the pure government bond yield). The other two statements are true. Both models compare earnings yield (a real variable) with bond yield (a nominal variable). The Yardeni model includes earnings growth, and the Fed model does not.

4. C

\( \text{P/10-year MA(E) ratio} = \text{current S&P/average of previous ten years’ reported earnings, where the numerator and denominator are inflation-adjusted so as to be expressed in terms of the same money value.} \)

In this case, \( \text{P/10-year MA(E) ratio} = \frac{2597}{154} = 16.86 \) (both numerator and denominator are in terms of prices on December 31, 2012).

Compared to the long-term historical average value of 17.83, this looks low, indicating that the current price looks too low.

Answer A makes the correct calculation but draws the wrong conclusion that the market is overpriced.

Answer B is an incorrect calculation.

Answer C is acceptable, all of the relative value ratios are less than perfect but still useful.
5. B Tobin's q = (MV of debt + equity) / [Asset replacement cost (market value)].

\[ \frac{2580 + 2597}{4746} = 1.09 \]

Since this is > 1 we conclude that the MV of the corporate equity is too high (i.e., the market is overvalued).

6. B In both A and C, “top-down” should read “bottom-up”.
24. **Capital Market Expectations**

\[
\sigma_i^2 = \beta_{i,1}^2 \sigma_{F_1}^2 + \beta_{i,2}^2 \sigma_{F_2}^2 + 2 \beta_{i,1} \beta_{i,2} \text{Cov}(F_1, F_2)
\]

Variance for Anastasia:

\[
\sigma_A^2 = 0.88^2 \times 0.0198 + 2.26^2 \times 0.0021 + 2 \times 0.88 \times 2.26 \times 0.0014
\]
\[
\sigma_A^2 = 0.0153 + 0.0107 + 0.0056 = 0.0316
\]

Variance for Narnia:

\[
\sigma_N^2 = 0.75^2 \times 0.0198 + 2.44^2 \times 0.0021 + 2 \times 0.75 \times 2.44 \times 0.0014
\]
\[
\sigma_N^2 = 0.0111 + 0.0125 + 0.0051 = 0.0287
\]

Covariance between Anastasia and Narnia:

\[
\text{Cov}(i,j) = \beta_{i,1} \beta_{j,1} \sigma_{F_1}^2 + \beta_{i,2} \beta_{j,2} \sigma_{F_2}^2 + (\beta_{i,1} \beta_{j,1} \sigma_{F_1}^2 + \beta_{i,2} \beta_{j,2} \sigma_{F_2}^2) \text{Cov}(F_1, F_2)
\]

\[
\text{Cov}(\text{Anastasia, Narnia}) = 0.88 \times 0.75 \times 0.0198 + 2.26 \times 2.44 \times 0.0021 + (0.88 \times 2.44 + 0.75 \times 2.26) \times 0.0014
\]
\[
\text{Cov}(i,j) = 0.0131 + 0.0116 + 0.0054 = 0.0301
\]

Sample scoring key:
6 points for calculations of variances for Anastasia and Narnia (3 pts. each)
3 points for the covariance between Anastasia and Narnia
25. Asset Allocation

Roger Rosemount is the head of investment for the Australian Alzheimers Foundation (AAF), an Australian charity supporting research into the disease and providing assistance with care costs for those affected. The foundation has A$119 million of assets and is currently undertaking its triennial asset allocation review.

Rosemount is working on the basis of his firm’s capital market expectations and has produced the following table of corner portfolios:

<table>
<thead>
<tr>
<th>Corner portfolio</th>
<th>Exp Rtn</th>
<th>Std devn</th>
<th>Australian equity</th>
<th>International equity</th>
<th>Australian fixed-income</th>
<th>International fixed-income</th>
<th>Global property</th>
<th>Alternative investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24.20%</td>
<td>38.20%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>21.67%</td>
<td>11.93%</td>
<td>65.19%</td>
<td>25.11%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>9.71%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>20.89%</td>
<td>11.28%</td>
<td>68.62%</td>
<td>14.42%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>9.52%</td>
<td>7.44%</td>
</tr>
<tr>
<td>4</td>
<td>17.79%</td>
<td>9.53%</td>
<td>56.21%</td>
<td>9.26%</td>
<td>0.00%</td>
<td>20.32%</td>
<td>7.86%</td>
<td>6.35%</td>
</tr>
<tr>
<td>5</td>
<td>9.40%</td>
<td>6.66%</td>
<td>17.93%</td>
<td>44.42%</td>
<td>0.00%</td>
<td>29.52%</td>
<td>4.67%</td>
<td>3.46%</td>
</tr>
<tr>
<td>6</td>
<td>7.98%</td>
<td>6.59%</td>
<td>9.73%</td>
<td>0.00%</td>
<td>52.25%</td>
<td>31.03%</td>
<td>4.02%</td>
<td>2.97%</td>
</tr>
</tbody>
</table>

AAF has a multiplicative return requirement of 11.5%.

Rosemount intends to use the corner portfolio data to examine various approaches to strategic asset allocation. He also plans to consider tactical asset allocation (TAA) strategies and gathers the following TAA data for equity and bonds in a country he has not used before.

<table>
<thead>
<tr>
<th>Equity:</th>
<th>Current</th>
<th>Historical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend yield</td>
<td>1.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Real dividend growth</td>
<td>3.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Change in P/D</td>
<td>1.1%</td>
<td>-1.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bonds:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Real yield</td>
<td>0.7%</td>
</tr>
<tr>
<td>Price change</td>
<td>1.4%</td>
</tr>
</tbody>
</table>
Level III Review Workshop Questions
Asset Allocation

1. To meet its return requirement of 11.5%, which of the following is closest
to the correct weighting for the international equity asset class in the corner
portfolio or combination of two corner portfolios that best satisfies that return
requirement?
   A. 0%.
   B. 2.32%.
   C. 6.95%.

2. By using corner portfolio theory to approximate an efficient frontier portfolio
between two corner portfolios, it is most accurate to say that the approximated
portfolio’s:
   A. standard deviation is overstated.
   B. return is understated.
   C. asset allocation is approximated.

3. If a 4% true risk-free rate exists for borrowing and lending, which corner
portfolio will approximate the tangent portfolio used to construct the most
efficient capital allocation line?
   A. Corner portfolio 2.
   B. Corner portfolio 3.
   C. Corner portfolio 4.

4. Assuming AAF is a typical foundation with a perpetual time horizon, its
portfolio would most likely be constructed using:
   A. Strategy 1: two corner portfolios.
   B. Strategy 2: one corner portfolio and borrowing or lending a risk-free asset.
   C. a comparison of Strategy 1 and 2 to then select the strategy with the higher
expected return.

5. Suppose that AAF instead made the asset allocation decision on the basis
of maximization of utility and that Roger had assessed the foundation’s
risk tolerance level to be 5 (given a utility function of the form \( U = E(R) - 0.005\sigma^2 \)). Which of the following corner portfolios would be chosen if the
only consideration were utility maximization (assume that there is no possibility
of lending or borrowing at the risk-free rate)?
   A. Corner portfolio 2.
   B. Corner portfolio 3.
   C. Corner portfolio 4.

6. Using the current market prices approach and the TAA data Rosemount
collected, at this time he would be most likely to add:
   A. the new equity sector.
   B. the new bond sector.
   C. both.
26. **Asset Allocation**

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

Roger Smith at ALM Asset Management is discussing MVO with his boss, Helen Jones. Smith says:

“The problem with MVO analysis is the instability of the efficient frontier. Every time I rerun the model, the curve shifts.”

A. **Explain** what the instability in MVO Smith is referring to means and **discuss** two approaches used to address the instability problem. **State** which approach has better theoretical justification.

(5 minutes)

After listening to Smith, Jones says:

“The problem with asset allocations generated by these two other methods is they produce inferior return to risk when plotted versus the efficient frontier produced with basic MVO. The basic MVO allocations are superior.”

B. **Explain** how Jones’s comment is correct and how it is incorrect.

(3 minutes)
27. Asset Allocation

THIS QUESTION HAS ONE PART FOR A TOTAL OF 18 MINUTES.

You are preparing a briefing paper for a general staff meeting on asset allocation policies. As part of this, you are anxious to address a number of statements you have heard from staff recently concerning the approach to asset allocation.

For each of the following statements, state whether they are correct or incorrect using the table provided. For any incorrect statements, include a brief explanation of why the statement is incorrect.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Correct/Incorrect</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. While reviewing current market conditions, you believe the equity market may be heading for a temporary decline, and a strategic reallocation to bonds may be wise.</td>
<td>Correct Incorrect</td>
<td></td>
</tr>
<tr>
<td>2. The risk to the portfolio of an overseas equity will always be higher than the risk born on the same security by an investor residing in that overseas country.</td>
<td>Correct Incorrect</td>
<td></td>
</tr>
<tr>
<td>3. The higher volatility of equity markets means that currency effects are a more critical consideration for equity funds than they are for bond funds.</td>
<td>Correct Incorrect</td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>Correct/Incorrect</td>
<td>Explanation</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>4. The evidence on emerging markets seems to be that, as they become better integrated with global markets, their equities move to being priced based on covariance rather than variance, which has an upward impact on prices.</td>
<td>Correct, Incorrect</td>
<td></td>
</tr>
<tr>
<td>5. The resampled efficient frontier will typically plot to the left of the classic mean-variance efficient frontier.</td>
<td>Correct, Incorrect</td>
<td></td>
</tr>
<tr>
<td>6. The constrained Black-Litterman approach to the problem of estimation error takes a global benchmark's weightings, and the investor adjusts weights up or down based on whether the investor thinks the asset will have a high or low return. This approach results in only small/moderate tilts from benchmark weightings and produces only positive weightings.</td>
<td>Correct, Incorrect</td>
<td></td>
</tr>
</tbody>
</table>
28. Asset Allocation

John Laukler is an assistant portfolio manager for the International Institutional Investor fund, a hedge fund that invests in global equity markets. The fund is based in the United States and reports its NAV in USD.

Laukler notices that the managers of the fund currently employ no hedging strategies for holdings that are denominated in foreign currencies. When questioned about the rationale for this, management points out to Laukler that their expertise lies in identifying profitable investment opportunities rather than in managing currency exposure.

Laukler analyzes the currency exposure of the fund and finds that the fund currently has €10,000,000 of exposure to European assets. The spot exchange rate is currently $1.35/€. The current price of a three-month forward contract on the euro is $1.39/€. Laukler decides to demonstrate to his managers how a simple hedge of principal using a forward contract would work for the European holdings assuming that, in one month, the value of European stocks is €9,560,000, the spot exchange rate is $1.31/€, and the forward exchange rate is $1.36/€.

Laukler presents another scenario where the risk of the foreign asset (measured in the foreign currency) is fully hedged and earns the foreign risk-free rate of 3%. The investor's initial domestic risk-free rate is 2%, and he assumes the foreign currency will appreciate 0.5%.

When Laukler approaches management with his figures demonstrating the hedge, management once again reiterates its position on not hedging overseas holdings and makes the following statements:

Statement 1: We are unconcerned with the lack of currency hedging because our view is that the USD is currently overvalued. Remaining unhedged means the fund will benefit from the weakening that we expect in the USD in the future. Unhedged currency return must be superior to hedged currency return if our forecast is correct.

Statement 2: Assuming the correlation between the USD and corporate profits of the European companies we invest in is positive, the appropriate minimum variance hedge ratio would be less than one.

Laukler decides to investigate other methods that could be used to hedge the foreign exchange exposure of the fund. Turning to the currency option markets, Laukler finds the following information regarding at-the-money options.
Table 1

<table>
<thead>
<tr>
<th></th>
<th>Premium</th>
<th>Delta</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro puts</td>
<td>$0.05</td>
<td>–0.49</td>
<td>€62,500</td>
</tr>
<tr>
<td>Euro calls</td>
<td>$0.065</td>
<td>0.51</td>
<td>€62,500</td>
</tr>
</tbody>
</table>

1. Given management’s initial comments on their approach to managing foreign currency exposure, their area of expertise, and assuming a desire to add some value through currency management, which of the following strategies would be most appropriate for the International Institutional Investor fund?
   A. Passive hedging.
   B. Currency overlay.
   C. Active management.

2. In the demonstration of a simple principal hedge of the exposure to European assets, what is the hedged return, and will this return be higher or lower than the unhedged return for the European holdings?
   A. –0.61%, which is lower than the unhedged return.
   B. 2.22%, which is higher than the unhedged return.
   C. –5.01%, which is higher than the unhedged return.

3. In Laukler’s scenario where the risky foreign asset is hedged to earn the foreign risk-free rate, what are the currency hedged and unhedged returns to Laukler’s portfolio?
<table>
<thead>
<tr>
<th>Currency Hedged</th>
<th>Unhedged</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 2%</td>
<td>3.5%</td>
</tr>
<tr>
<td>B. 2%</td>
<td>2.5%</td>
</tr>
<tr>
<td>C. 3%</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

4. Regarding management’s response to Laukler’s analysis, which of the following is most correct?
   A. Statement 1 is correct; Statement 2 is correct.
   B. Statement 1 is correct; Statement 2 is incorrect.
   C. Statement 1 is incorrect; Statement 2 is correct.

5. Using the data in Table 1 and assuming that Laukler feels the USD could either appreciate or depreciate, he wants to protect against downside risk while retaining upside. He also wants to minimize the initial investment cost of hedging the foreign currency risk of the EUR. He should:
   A. buy 160 puts.
   B. sell 160 calls and buy 160 puts.
   C. buy 327 puts.

6. The USD-based fund also has a long exposure to the JPY, and the JPY is expected to depreciate. Management would like to protect against large downside risk, still participate if the JPY strengthens, and also reduce the initial cost of the protection. Which of the following strategies is most appropriate?
   A. Buy a 50 delta put and sell a 50 delta call on the JPY.
   B. Buy a 60 delta put on the JPY.
   C. Buy a 40 delta call on the USD.
29. Asset Allocation

One of your subordinates recently attended a meeting with a potential client who is based in the United States but is considering overseas investments. During the meeting, the client made several comments as noted in the following. Before your subordinate gets back to the client, he asked you to help him identify whether each of the following comments is correct or incorrect.

Complete the template below giving one reason for your conclusion on each comment.

(10 minutes)

<table>
<thead>
<tr>
<th>Comment made by client</th>
<th>Circle as appropriate</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The risk to me of an overseas equity will always be higher than the risk borne on the same security by an investor residing in that overseas country.</td>
<td>Correct Incorrect</td>
<td></td>
</tr>
<tr>
<td>2. Significant diversification can be achieved with an asset that has high volatility and negative correlation with my existing portfolio.</td>
<td>Correct Incorrect</td>
<td></td>
</tr>
</tbody>
</table>
3. Risk in developed financial markets is typically measured by the standard deviation of returns. However, I believe that it is not a sufficient measure of risk in emerging markets.

4. Using the minimum-variance hedge ratio will always result in the optimal currency hedging strategy.

5. The risk in emerging market currency can be hedged with standard futures or forward contracts.
30. **Asset Allocation**

The Tavistock International Growth Fund (TIGF) is U.K.-based and reports in sterling (GBP). It has extensive holdings of nonsterling assets, including exposures to JPY, INR, and EUR assets. The fund is managed by Anthony Bradstock.

To hedge 1.00 billion of JPY assets, Bradstock enters a GBP 6.5 million forward contract for September expiration at 153.85 JPY/GBP. A month later, the forward quote is 160.90 and the assets are worth 1.13 billion JPY. Bradstock is considering whether he should treat the hedge as dynamic or static.

Bradstock is using long forward contract positions on the INR as part of an active management strategy to profit from his predicted moves in the value of the INR. Interest rates are currently much higher in India than they are in the U.K. Bradstock is highly confident that the Bank of India is about to ease monetary policy, leading to some decline in short-term Indian interest rates. He wonders how this will affect the roll return component of hedging the INR.

The EUR-denominated assets are currently unhedged, but Bradstock is considering the use of GBP/EUR options to manage the currency exposure. He wants the strategy to have minimal cost, and is prepared to face some downside risk, but wants protection against an extreme adverse rate move. At the same time, he is prepared to forgo the benefit of moderate favorable moves while benefitting from extreme moves in that direction.

Bradstock’s friend Chloe Dunbar is of the opinion that the MXN/GBP rate is about to enter a period of at least a month during which its volatility will decrease. She is confident that the rate will neither increase nor decrease dramatically from its current level. Instead, it will be range-bound within the strikes of one month 25-delta calls and 75-delta calls. Such a view is not currently priced into MXN/GBP options.

1. Assuming that Bradstock has decided to maximize the effectiveness of the JPY hedge and use a dynamic hedge, how will he adjust the hedge for the new market value of the assets?
   A. Do nothing in order to minimize transaction costs.
   B. Buy JPY 130,000 forward to September 30.
   C. Sell JPY 130,000 forward to September 30.

2. Several weeks later, Bradstock has another portfolio in which he is speculating on the value of the JPY. He sells JPY 900,000,000 forward when the spot exchange quote is GBP/JPY 0.006354 and the forward points are 15. If the spot exchange rate is 0.006210 at contract expiration, the gain or loss on the contracts is closest to a:
   A. loss of GBP 145,000.
   B. gain of GBP 145,000.
   C. gain of GBP 130,000.
3. Bradstock questions whether an option-based hedge would be preferable to the existing futures-based hedge for the JPY assets. Which of the following would be the best response to Bradstock in relation to hedge methods?
   A. An option-based hedge will tend to have lower initial costs but higher opportunity costs.
   B. Option-based hedging has the disadvantage that there is always a net initial cost when such an approach is used.
   C. An option-based hedge can give the portfolio positive convexity.

4. Assume Bradstock is correct in his views for Indian monetary policy and short-term interest rates. How will the roll return of contracts held to expiration and purchased before the change in policy compare to roll for contracts purchased after the change?
   A. Shift from highly positive to highly negative.
   B. Shift from highly positive to less positive.
   C. Shift from highly negative to less negative.

5. The most suitable strategy with GBP/EUR options, given Bradstock’s requirements, would be to:
   A. buy a 25-delta call and write a 25-delta put.
   B. write a 25-delta put, buy an ATM put, and write a 25-delta call.
   C. buy a 25-delta put, write an ATM call, and buy a 25-delta call.

6. If Dunbar were to undertake an option trade now to profit from her view on the MXN/GBP rate, it would most likely involve being:
   A. long 25-delta calls and short 75-delta calls.
   B. short ATM calls and short ATM puts.
   C. long 25-delta calls and long 25-delta puts.
31. Asset Allocation

Blomdahl Asset Management AB (BAMAB) runs a number of Swedish-domiciled (SEK) funds. Dag Larsson is the lead manager of BAMAB’s Southern Opportunities Fund, which invests in Brazilian and South African assets. The total value of the fund is currently approximately SEK 100 million.

At present, the fund is 70% exposed to Brazilian equities and bonds, with the remaining 30% in South African treasury bills, which can be assumed risk free for the purpose of this question.

The following data has been estimated by Larsson:

<table>
<thead>
<tr>
<th></th>
<th>Brazil</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected return in foreign currency asset ($R_{FC}$)</td>
<td>16%</td>
<td>5%</td>
</tr>
<tr>
<td>Expected foreign currency return ($R_{FX}$)</td>
<td>-6%</td>
<td>3%</td>
</tr>
<tr>
<td>Expected asset risk ($\sigma(R_{FC})$)</td>
<td>22%</td>
<td>0%</td>
</tr>
<tr>
<td>Expected currency risk ($\sigma(R_{FX})$)</td>
<td>14%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Expected correlation ($R_{FC};R_{FX}$)</td>
<td>-0.35</td>
<td>0</td>
</tr>
<tr>
<td>Current spot rate (SEK/FC)</td>
<td>2.8642</td>
<td>0.6551</td>
</tr>
<tr>
<td>Expected correlation (SEK/BRL;SEK/ZAR)</td>
<td>+0.72</td>
<td></td>
</tr>
</tbody>
</table>

Traditionally, Larsson has used naïve hedges of currency exposure. He is now considering the use of more complex minimum variance hedge ratios and uses 5 years of monthly historical data to compile the following statistical analysis:

- Standard deviation of % change in the SEK/BRL: 22%
- Standard deviation of return for BRL assets (in BRL): 20%
- Standard deviation of SEK return for BRL assets (unhedged): 27%
- Correlation of SEK return for BRL assets (unhedged) with changes in SEK/BRL: 0.36
- Regression beta of SEK return for BRL assets (unhedged) for changes in SEK/BRL: 0.44

For the ZAR exposure, Larsson is prepared for the fund to be exposed to fluctuations in the SEK/ZAR rate of about +/- 4% from the current spot rate of 0.655, but wants to be hedged against more extreme movements (in both directions).
Level III Review Workshop Questions
Asset Allocation

1. Which of the following is closest to the expected SEK-denominated return from the fund's Brazilian assets (assuming no hedging of currency risk)?
   A. 8%.
   B. 9%.
   C. 10%.

2. Which of the following is closest to the expected SEK-denominated risk from the fund's Brazilian assets (assuming no hedging of currency risk)?
   A. 22%.
   B. 24%.
   C. 30%.

3. Which of the following is closest to the expected SEK-denominated risk from the fund's South African assets (assuming no hedging of currency risk)?
   A. 12.5%.
   B. 12.8%.
   C. 13.1%.

4. The SEK-denominated risks are 25% for Brazil and 15% for South Africa. The correlation between the two risks is zero. Which of the following is closest to the return and risk that Larsson should expect for the fund as a whole (assuming no hedging of currency risk)?
   A. 8% return and 22% risk.
   B. 9% return and 18% risk.
   C. There is insufficient information to calculate both figures.

5. Using Larsson's statistical analysis and assuming a naïve hedge would be to sell 1 million BRL forward, the MVHR sale would be closest to:
   A. 360,000 BRL.
   B. 440,000 BRL.
   C. 490,000 BRL.

6. For the ZAR-denominated assets, which of the following options on the ZAR would Larsson most likely choose in order to implement his hedge strategy?
   A. Long a 0.681 call and short a 0.629 put.
   B. Long a 0.629 put and short a 0.681 call.
   C. Long a 0.629 put and short a 0.681 put.
Asset Allocation

1. B 11.5% lies between the returns from corner portfolios 4 (17.79%) and 5 (9.4%), so the minimum-variance portfolio providing that return can, from the corner portfolio theorem, be constructed as a linear combination of those two portfolios. If we let $w$ = the weighting for corner portfolio 4 [so $(1 - w)$ is the weighting for corner portfolio 5], we solve:

\[
17.79w + 9.4(1 - w) = 11.5 \\
17.79w + 9.4 - 9.4w = 11.5 \\
8.39w = 2.1 \\
\text{thus, } w = 2.1/8.39 = 0.25
\]

So, we need a 25% weighting to 4 and a 75% weighting to 5, implying a weighting for the international equity asset class of:

\[
(0.25 \times 9.26\%) + (0.75 \times 0\%) = 2.315\%
\]

In this case, logic alone is sufficient to select the answer. The return is closer to CP 5’s return, so the weight in the AC must be closer to 5’s weight in the AC.

2. A The characteristics of the portfolios between the corner portfolios (CPs) are “estimated” based on straight linear interpolation (i.e., weighted average of the bracketing CPs). The return and asset allocation of these portfolios are in fact simple weighted averages of the bracketing CPs, so the “estimates” are fully accurate. However, portfolio variance and standard deviation are not simple averages but include the effect of correlation. CP theory is the equivalent of treating correlation as +1.00 and ignores all diversification benefit between the CPs. By using this straight line estimation, portfolio standard deviation is (slightly) overstated because the true EF bulges to the left.

3. B The corner portfolio is the efficient portfolio with the highest Sharpe ratio. Given the risk-free rate of 4%, we can calculate the Sharpe ratios as follows:

<table>
<thead>
<tr>
<th>Corner portfolio</th>
<th>Expected return</th>
<th>Standard deviation</th>
<th>Sharpe ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24.20%</td>
<td>38.20%</td>
<td>0.529</td>
</tr>
<tr>
<td>2</td>
<td>21.67%</td>
<td>11.93%</td>
<td>1.482</td>
</tr>
<tr>
<td>3</td>
<td>20.89%</td>
<td>11.28%</td>
<td>1.497</td>
</tr>
<tr>
<td>4</td>
<td>17.79%</td>
<td>9.53%</td>
<td>1.447</td>
</tr>
<tr>
<td>5</td>
<td>9.40%</td>
<td>6.66%</td>
<td>0.811</td>
</tr>
<tr>
<td>6</td>
<td>7.98%</td>
<td>6.59%</td>
<td>0.605</td>
</tr>
</tbody>
</table>

Remember that the expected Sharpe ratio = \( \frac{E(R) - \text{Risk-free rate}}{\sigma_p} \)
4. **A** In a perpetual situation, no risk-free asset with a known return, 0 standard deviation, and 0 correlation exists. Portfolios are instead constructed using the efficient frontier of risky assets (which include the concept of CPs). The idea of picking the strategy with highest return is superficially appealing until you realize one of the strategies does not exist in practice.

5. **A** We have to compute the utility of each of the listed corner portfolios:

   For example, \( U_{cp2} = 21.67 - (0.005 \times 5 \times 11.93^2) = 18.11 \)

   \( U_{cp3} = 17.71; U_{cp4} = 15.52; U_{cp5} = 8.29 \)

   Thus, 2 gives the highest utility.

6. **A** The current market prices approach adds dividend yield, real growth, and change in P/D to estimate real equity return. It estimates real bond return as real yield and price change. Then, check the real return difference to determine the more favorable sector.

```
<table>
<thead>
<tr>
<th>Equity:</th>
<th>Current</th>
<th>Historical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend yield</td>
<td>1.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Real dividend growth</td>
<td>3.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Change in P/D</td>
<td>1.1%</td>
<td>–1.0%</td>
</tr>
<tr>
<td>Real return</td>
<td>5.4%</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bonds:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Real yield</td>
<td>0.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Price change</td>
<td>1.4%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Real return</td>
<td>2.1%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Difference in real returns</td>
<td>3.3%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>
```

The current real return advantage for equity of 3.3% is higher than the 1% “normal” advantage. This indicates it is tactically a more favorable time to add the equity rather than bonds.
26. Asset Allocation

A. Instability refers to the fact that small changes in inputs, particularly E(R), can produce substantial changes in asset class weights for portfolios on the efficient frontier.

- Resampling: Small random variations around the initial inputs generate several different frontiers. For any given risk, the best portfolio becomes the average of the portfolio asset mixes from the possible efficient frontiers. The average mix tends to be more stable and have a larger number of asset classes.

- Black-Litterman (BL): Market asset weights are used in a mean variance optimizer to back solve for market expectations of E(R) by asset class. The manager can then view adjust these expected returns making the process less dependent on the manager’s initial opinions of E(R).

BL has better theoretical justification.

B. Jones is technically correct. Based on the initial assumptions used in MVO analysis, only the asset mixes on that EF are efficient. All other asset mixes plot to the right with more risk for the return offered.

But Jones misses the main point. The initial asset allocations are based on assumptions that are just best guesses of unknowable future returns.

Actual future events can lead the resampled or BL allocation to turn out to be more efficient.

Both alternative approaches are less dependent on initial assumptions and generally produce more diversified (number of asset classes) portfolios.

Plus the allocations do not change as frequently, which reduces rebalancing costs.
## Asset Allocation

<table>
<thead>
<tr>
<th>Statement</th>
<th>Correct/Incorrect</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. While reviewing current market conditions, you believe the equity market may be heading for a temporary decline, and a strategic reallocation to bonds may be wise.</td>
<td>Correct</td>
<td>A temporary (short-term) decline is relevant to tactical re-allocation decisions, not strategic ones. Strategic allocations refer to long-term allocations of weights.</td>
</tr>
<tr>
<td>2. The risk to the portfolio of an overseas equity will always be higher than the risk born on the same security by an investor residing in that overseas country.</td>
<td>Correct</td>
<td>If the correlation between the stock's return and the currency movement is sufficiently low or negative, the standard deviation of return in domestic terms may be lower than the standard deviation of return in the asset's local currency.</td>
</tr>
<tr>
<td>3. The higher volatility of equity markets means that currency effects are a more critical consideration for equity funds than they are for bond funds.</td>
<td>Correct</td>
<td>The fact that currency volatility is proportionately larger than bond market volatility (roughly twice as large), whereas it is roughly half as large as equity market volatility, means that it is a more critical factor for bond portfolios than it is for equity portfolios.</td>
</tr>
<tr>
<td>Statement</td>
<td>Correct/Incorrect</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4. The evidence on emerging markets seems to be that, as they become better integrated with global markets, their equities move to being priced based on covariance rather than variance, which has an upward impact on prices.</td>
<td>Correct</td>
<td>When we resample to construct an efficient frontier, we sacrifice efficiency but gain robustness of the asset allocations. (The percent allocations change much less abruptly as we move along the resampled efficient frontier.) The resampled efficient frontier will, thus, lie to the right of the classic frontier (more risk for the same return).</td>
</tr>
<tr>
<td>5. The resampled efficient frontier will typically plot to the left of the classic mean-variance efficient frontier.</td>
<td>Correct</td>
<td>With constrained BL, the benchmark is used to infer benchmark-implied returns. These are tweaked to reflect the investor's views, and then an optimization process is used to calculate the required weights. The weights are not directly adjusted as described here (which is, in fact, the unconstrained BL approach).</td>
</tr>
<tr>
<td>6. The constrained Black-Litterman approach to the problem of estimation error takes a global benchmark's weightings, and the investor adjusts weights up or down based on whether the investor thinks the asset will have a high or low return. This approach results in only small/moderate tilts from benchmark weightings and produces only positive weightings.</td>
<td>Correct</td>
<td></td>
</tr>
</tbody>
</table>
28. Asset Allocation

1. B It would appear from management’s initial comments that they do not have the appropriate expertise to manage their foreign currency exposure; therefore, it should be delegated to a separate overlay manager to add value. Active assumes they have the ability for active currency management, and passive seeks to avoid currency risk (thereby achieving zero value added).

2. C The return of the unhedged portfolio in dollars = (€9,560,000 × $1.31/€) – (€10,000,000 × $1.35/€) = $12,523,600 – $13,500,000 = –$976,400, which is a –7.23% return on the initial $13.5m value.

In a simple hedge of the principal, the manager would hedge €10,000,000. The manager shorts euro forward contracts to hedge the long euro position in the fund. The gain from the contract in dollars = €10,000,000 × ($1.39/€ – $1.36/€) = $300,000.

Therefore, the hedged portfolio will return (–$976,400 + $300,000) / $13,500,000 = –5.01%

The hedged position will give a higher (less negative) return than the unhedged position because the euro has weakened during the period, leading to a gain on the short euro forward contract.

3. A In a situation where the foreign asset earns the foreign risk-free return, the ending currency value can be fully hedged. The foreign interest rate is 1% higher than the domestic rate, and the forward sale of the foreign currency will be at a 1% discount to the spot currency exchange rate, locking in a 1% negative roll yield and hedged currency return. On a currency hedged basis, the \( R_{FC} \) and \( R_{FX} \) are 3% and –1% for a hedged \( R_{DC} \) of 2% (all risk was hedged, and the return is the investor’s domestic rate). With currency unhedged, the \( R_{FC} \) is still 3% and \( R_{FX} \) is the expected change in the foreign currency of +0.5% for an unhedged \( R_{DC} \) of 3.5%.

4. C Statement 1 is incorrect. If the USD weakens (euro strengthens), the unhedged foreign currency return will be positive. However, the hedged currency return depends on the initial differential in short-term rates. If the foreign interest rates are low enough, the positive roll yield earned selling the foreign currency forward could be the superior choice.

Statement 2 is correct. This is a U.S. based fund. Positive correlation of the foreign company profits to the USD means negative correlation to the foreign currency, the EUR. This strongly suggests \( R_{FC} \) and \( R_{FX} \) are negatively correlated, reducing the volatility of \( R_{DC} \) and making currency hedging less necessary. The two sources of risk tend to cancel, making the MVHR less than 1.0.

5. A All of the strategies meet the objective of protection from downside risk but only Answer A retains upside exposure. It is a protective put. Answer B is equivalent to a forward sale, no upside exposure. Note that a collar of long an ATM put on the EUR and sell an OTM call on the EUR is a potential strategy but not possible with the available options. Answer C is a dynamic hedge which is equivalent to a forward sale and requires more options which increases initial cost. Nothing can be done to meet his desire for lower initial cost with the answers available. An OTM put on the EUR would be ideal.

A simple protective put strategy requires a hedge ratio of 1.00 and could be executed by buying 160 at the money puts on the euro, EUR10,000,000 / EUR62,500.

6. C The question describes an OTM put on the JPY. This is equivalent to an OTM call on the USD. 40 delta is OTM.
29. **Asset Allocation**

<table>
<thead>
<tr>
<th>Comment made by client</th>
<th>Circle as appropriate</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The risk to me of an overseas equity will always be higher than the risk borne on the same security by an investor residing in that overseas country.</td>
<td>Correct Incorrect</td>
<td>If the correlation between the stock's return and its currency movement is negative, the standard deviation of the stock's return in dollar terms will be lower than its standard deviation in the local currency.</td>
</tr>
<tr>
<td>2. Significant diversification can be achieved with an asset that has high volatility and negative correlation with my existing portfolio.</td>
<td>Correct Incorrect</td>
<td>Negative correlation can create a significant diversification benefit, and if the asset is also highly volatile, a smaller position will be needed to create the diversification.</td>
</tr>
<tr>
<td>3. Risk in developed financial markets is typically measured by the standard deviation of returns. However, I believe that it is not a sufficient measure of risk in emerging markets.</td>
<td>Correct Incorrect</td>
<td>Emerging market returns often show negative skew and experience extreme returns more frequently than consistent with standard deviation. Contagion is also a problem as correlations tend to rise during periods of crisis.</td>
</tr>
<tr>
<td>4. Using the minimum-variance hedge ratio will always result in the optimal currency hedging strategy.</td>
<td>Correct Incorrect</td>
<td>MVHRs are generally based on historical data, and there is no assurance they will work the same in the future as in the past. In addition, they focus on risk reduction. A manager who has expectations about future currency movement may be more interested in strategies to add value.</td>
</tr>
<tr>
<td>5. The risk in emerging market currency can be hedged with standard futures or forward contracts.</td>
<td>Correct Incorrect</td>
<td>Futures are typically unavailable and emerging market governments often prohibit the currency movement required to settle standard forward contracts.</td>
</tr>
</tbody>
</table>
30. Asset Allocation

1. C To be more effective, a dynamic hedge requires rebalancing to match the changing value of the assets. (The comment about minimizing transaction costs is a distractor; that is not a dynamic hedge. Plus, transaction costs for developed market currency forwards are minimal.) The fund is GBP based and the initial foreign asset position is JPY 1 billion, making the initial currency hedge a sale of JPY 1 billion. The asset is now worth JPY 1.13 billion, requiring the forward sale of another JPY 130 million.

Beyond knowing the difference in a dynamic versus static hedge, plus what to buy or sell, there is another distractor in the question. The initial hedge is stated as buy GBP forward. This is correct, though oddly phrased and irrelevant to the solution. Selling JPY forward at 153.85 JPY/GBP to hedge 1.00 billion of JPY assets also means buying GBP forward: JPY 1.00 billion / 153.85 JPY/GBP = GBP 6,499,838.

2. B Forward points are an adjustment to the right most digits in the spot quote. Thus, GBP/JPY 0.006354 + 15 becomes GBP/JPY 0.006369. At contract expiration, the spot and forward converge to GBP/JPY 0.006210 as given in the question. This decline in F is a gain to the short 0.9 billion JPY position of (GBP/JPY 0.006369 – 0.006210) × JPY 900,000,000 = GBP 143,100.

3. C A common option-based hedge for this situation is a protective put to limit downside and retain upside. While convexity is normally used to describe bonds, positive convexity means more upside than downside, so it does describe a protective put strategy.

A is incorrect because the strategy has an initial cost.

B is incorrect because it is possible to remove the cost by selling options, though this will reduce the benefits of the strategy.

4. B With Indian interest rates much higher than in the U.K., the INR will trade at a significant forward discount to the GBP. This creates significant positive roll return (a certainty for contracts held to expiration) for long contact positions in the INR. You are buying forward at a significant discount. As the differential in interest rates shrinks, the forward discount and positive roll return will also shrink. For it to switch from positive to negative roll, Indian interest rate will have to decline below U.K. rates. Such a drastic change in rates is less likely and not consistent with Bradstock's expectation of from “much higher” to “some decline”. There is no indication of a complete reversal in which country has the higher rates.

5. C Bradstock has several requests regarding options to hedge his long exposure to the EUR. He wants to minimize cost, which would be consistent with buying OTM puts on the EUR. He will accept some downside risk but wants protection from large declines, which is also consistent with buying OTM puts on the EUR (delta < 50). He will forgo moderately favorable up moves in the EUR currency, consistent with selling ATM calls on the EUR (delta \approx 50) to generate premium income. But he still wants to benefit from extreme upward moves in the EUR, consistent with buying OTM calls on the EUR (delta < 50). In other words, he has described a seagull spread. Answer A will not work. Buying an OTM call potentially doubles his upside exposure to the EUR, and selling an OTM put potentially doubles his downside exposure. Answer B will not work either. Buying the ATM put is expensive and provides immediate downside protection, which is not what he asked for. Answer B has other problems as well.
6. **B** Dunbar believes volatility will decrease, which will cause both call and put values to fall.

   Strategy A is a directional trade (bullish) on the MXN/GBP rate and not primarily a volatility trade.

   Strategy C (a strangle) has positive vega, which is completely wrong.

   Strategy B (a short straddle) will benefit from declining volatility as both options that are sold subsequently decline in value.
31. **Asset Allocation**

1. **B** We use the formula for the return from a foreign asset in domestic currency terms, with DC = SEK and FC = BRL:

\[ R_{DC} = (1 + R_{FC}) \times (1 + R_{FX}) - 1 \]

\[ R_{SEK} = (1 + 0.16) \times (1 + -0.06) - 1 = (1.16 \times 0.94) - 1 = 9.04\% \]

Answer C uses the approximate formula of \( R_{FC} + R_{FX} \), but B is more accurate.

2. **A** We use the formula for the domestic currency risk of a foreign asset (currencies as in question 1):

\[ \sigma^2(R_{DC}) = \sigma^2(R_{FC}) + \sigma^2(R_{FX}) + 2 \sigma(R_{FC}) \sigma(R_{FX}) \rho(R_{FC}, R_{FX}) \]

\[ \sigma^2(R_{SEK}) = 0.22^2 + 0.14^2 + (2 \times 0.22 \times 0.14 \times -0.35) = 0.0484 + 0.0196 - 0.02156 = 0.04644 \]

Thus, \( \sigma(R_{SEK}) = (0.04644)^{0.5} = 21.55\% \).

3. **C** Since the ZAR asset is (assumed) risk free, we use the special case formula:

\[ \sigma(R_{DC}) = \sigma(R_{FX}) \times (1 + R_{FC}) \] (since the risk comes solely from the currency side)

Therefore, \( \sigma(R_{SEK}) = 12.5\% \times 1.05 = 13.125\% \)

4. **B** The expected fund return is: \[ [0.7 \times (1.16 \times 0.94)] + [0.3 \times (1.05 \times 1.03)] - 1 = 8.77\% \].

The formula for the risk of a two-foreign asset portfolio is:

\[ \sigma^2(DC,P) \approx \omega_1^2 \sigma^2(R_{DC,1}) + \omega_2^2 \sigma^2(R_{DC,2}) + 2 \omega_1 \omega_2 \sigma(R_{DC,1}) \sigma(R_{DC,2}) \rho(R_{DC,1}, R_{DC,2}) \]

With a zero correlation, this is \( [(0.7^2)(25^2)) + ((0.3^2)(15^2))]^{0.5} = 18\% \).

5. **B** The MVHR is the regression beta of 0.44 that Larson derived. This can also be calculated as \( (27 / 22)(0.36) = 0.44 \). The naïve hedge is a 1 for 1 hedge ratio, so his 1 million BRL hedge is for BRL 1 million of exposure. This makes the MVHR amount BRL 1 million exposure \times 0.44 = sell BRL 440,000 forward.

6. **B** We have a long exposure to the ZAR and wish to limit downside risk while being willing to reduce upside potential within the range of +/- 4% of the current spot exchange rate of 0.655 SEK/ZAR. This is a range of 0.681 to 0.629 SEK/ZAR. To limit upside sell calls on the ZAR at 0.681 and to limit downside buy puts on the ZAR at 0.629.
LEVEL III REVIEW WORKSHOP QUESTIONS: FIXED INCOME

32. Fixed Income

Fixed Income Asset Management, Incorporated (FIAM) has traditionally managed fixed income portfolios for pension and endowment funds employing immunization and cash flow matching strategies. Recently, however, FIAM has accepted the responsibility for managing funds for which indexed and enhanced indexed strategies are appropriate. Ms. Debra C. Truxell, CFA, a senior manager at FIAM, has been promoted to Vice President for Index Bond Fund Management to lead the company in this new direction. To staff this effort, Truxell had to recruit several new employees. Since most of the newly hired employees had little experience with indexing strategies, Truxell thought it prudent to conduct a series of in-house training seminars.

1. Truxell opened the first session with a discussion of why many clients were now requesting that their fixed income portfolios be indexed (pure or enhanced) rather than actively managed. Which of the following is least likely to be a reason given for this trend?
   A. The lower overall costs involved.
   B. The problems associated with reinvesting coupons and maturity proceeds.
   C. The inevitable diversification that indexing provides.

2. A former equity fund manager asked Truxell if there existed a strategy that involved simply creating a portfolio that replicated the Lehman Brothers Aggregate Bond Index or some other such index. Truxell accurately replied:
   A. yes, this is referred to as the enhanced indexing approach.
   B. yes, this is referred to as the full replication approach.
   C. no, and one must be careful in this area because it is illegal to replicate a registered benchmark portfolio.

3. Another employee asked Truxell: “Is it sufficient to match the duration of the indexed portfolio to the duration of the bond index to control for the primary risks of the bond index?” Truxell most likely replied:
   A. yes, as a matter of fact, this type of matching is the best way to assure that the tracking error attributable to yield shift is minimized.
   B. no, duration is only a “first order” risk factor; convexity would also need to be matched.
   C. no, it is not sufficient. Stratified sampling is one recommended strategy to control for primary risk factors.

4. Mr. Jackson, a recent college graduate and CFA candidate, asked Truxell if she felt that return enhancements could be realized through sector exposure. Truxell accurately replied: “Yes, as a matter of fact, it is possible to increase the yield of the portfolio without a commensurate increase in risk by:
   A. overweighting 1–5 year Treasuries and underweighting 1–5 year corporates.”
   B. underweighting 1–5 year Treasuries and overweighting 1–5 year corporates.”
   C. underweighting long-term Treasuries and overweighting long-term corporates.”
5. Truxell wanted to demonstrate the use of total return analysis and gave the following as an example:

Brenda Rogers has a one-year time horizon and buys a 12-year, 5% semiannual coupon corporate bond. The bond is trading at $899.47 to yield 6.2%. This represents a 110 bp spread over equivalent Treasuries. Over the next year, Treasury yields fall by 60 bp (with a parallel yield curve shift), and yield spreads remain constant. Rogers can reinvest at 4.5%. What is the annual realized return?
A. 10.74%.
B. 11.07%.
C. 11.37%.

6. One of the new employees asked: “I’ve heard that debt portfolios are often leveraged through repo agreements. What factors will help to reduce the repo rate?” Truxell’s response could be any of the following except:
A. the rate will be lower if the collateral is considered “special” and in high demand.
B. the rate will be lower if the collateral is in the form of a bond that is easy to obtain.
C. the rate will be lower if the collateral is delivered to the lender.
Jonathan Stanton, CFA, is a bond portfolio manager at CWT Investments Corporation. He is currently working on analyzing the bond portfolios for two new clients. The first client, Bill Overly, would like Stanton to at least match the average return of a bond index fund. In the past, this portfolio was passively managed. However, he would like to have the portfolio actively managed to try and generate higher returns.

1. Overly is increasing his exposure to:
   A. interest rate risk, because individual firms in actively managed portfolios will be more sensitive to changes in market interest rates.
   B. call risk, because in actively managed portfolios, the likelihood of bonds being called prematurely is increased as the portfolio deviates in characteristics from the benchmark.
   C. tracking error risk, because the risk of under-performing the specified benchmark is greater for an actively managed portfolio than a passive portfolio.

2. Stanton is considering which type of risk measure is most appropriate in practice when analyzing the bond portfolios. Which of the following is the most accurate statement?
   A. Duration is more useful than variance because it considers only interest rate risk.
   B. Duration is a more practical measure of portfolio risk because the calculation of variance can require a very large amount of computation.
   C. Variance is easier to compute than duration in practice because correlations and covariances are readily available.

3. Stanton has a ten-year corporate bond in an actively managed portfolio. The bond's duration is 4.9 years, and its market value is $450,000. The bond portfolio has a total value of $30,000,000. The contribution to portfolio duration for this corporate bond is:
   A. 0.7350.
   B. 0.3675.
   C. 0.0735.

4. Stanton has been asked by Eli Simpson, a second client, about duration measures. In particular, Simpson would like to know how portfolio duration and dollar duration are likely to change if a new bond is bought with additional cash not previously in the portfolio. Which of the following best summarizes the calculations that would be necessary?
   A. Both portfolio duration and dollar duration are average calculations, and their movements would depend on the magnitude of the new bond's duration and dollar duration relative to the existing portfolio.
   B. Portfolio duration is a weighted average calculation; the weightings of all existing bonds would be reduced. Dollar duration would be increased by adding the new bond's dollar duration.
   C. Both portfolio duration and dollar duration would increase by the duration and dollar duration (respectively) of the new bond.
5. Simpson has a $600,000 corporate bond with a duration of 4.2. The dollar duration for this bond is closest to:
   A. $2,520.
   B. $25,200.
   C. $252,000.

6. Stanton is implementing mean-reversion analysis for Simpson’s bond portfolio. Which of the following statements regarding mean-reversion analysis is most correct?
   A. The bond sector or issue should be bought when the current spread is significantly greater than the historic mean.
   B. If the yield is low on relative basis, then the issue or bond should be bought.
   C. Mean reversion analysis is becoming less useful as the U.S. corporate and global markets move towards the European corporate bond market’s homogenous bullet structure.
34. Fixed Income

A portfolio manager holds a domestic bond portfolio that consists of five sectors. The following table provides the weightings of both the portfolio and the bond index used as his benchmark.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Effective duration</th>
<th>Spread duration (based on OAS)</th>
<th>Portfolio weight (%)</th>
<th>Bond index weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treasury</td>
<td>5</td>
<td>–</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>Agencies</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Mortgages</td>
<td>6</td>
<td>6</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Corporates</td>
<td>5</td>
<td>5</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>ABS</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

The portfolio has an effective duration of 5.2 and a spread duration of 4.6.

1. What is the effective duration and spread duration for the bond index?
   - Effective duration
     - A. 4.60
     - B. 5.15
     - C. 5.15
   - Spread duration
     - A. 3.3
     - B. 3.3
     - C. 5.5

2. Which of the following statements correctly reflects the portfolio’s risk exposure compared to the exposure of the bond index?
   - A. Similar exposure to a small parallel shift in interest rates.
   - B. The portfolio has a smaller exposure to changes in spread.
   - C. Similar exposure to any change in interest rates.

3. Assuming no other value effects, a 50 basis point widening of the option-adjusted spread on the corporate sector would cause:
   - A. the portfolio to fall 0.50% in value relative to the benchmark.
   - B. the portfolio to fall 1.25% in value relative to the benchmark.
   - C. the portfolio to increase 0.75% in value relative to the benchmark.

Another portfolio manager is responsible for a portfolio currently worth $10 million. His client’s investment horizon is four years and over this period, the client’s minimum required return (safety net return) is 5%.

4. Assuming semiannual compounding, the required terminal value is closest to:
   - A. $12,155,063.
   - B. $12,184,029.
   - C. $12,800,845.

5. If the manager could presently lock into an immunized rate of return of 7%, the cushion spread is closest to:
   - A. 2%.
   - B. 5%.
   - C. 7%.
6. If the manager could presently lock into an immunized rate of return of 7%, the initial dollar safety margin is closest to:
   A. $200,000.
   B. $726,961.
   C. $747,308.
35. Fixed Income

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

Nicola is the manager of the Gallifray Corporate Bond Fund. Her long-term aim is for the fund to have a dollar duration of $8,500,000. The fund's current market value is $105.133 million, and its duration is 8.25. (Both figures ignore the cash balance, which can be assumed to have a zero duration.) She wishes to return the fund to its long-term target dollar duration.

Among the fund's holdings is a Cronos Corporation bond. This is currently 8% of the fund by market value, and it has a duration of 12.33.

Nicola is aware that two main methods exist for the rebalancing of a fund's dollar duration: the rebalancing ratio method, wherein the holdings of all bonds in a fund are adjusted in identical proportions, and the controlling position method, where just one bond is bought or sold.

A. Using the rebalancing ratio method, calculate what value of bonds needs to be purchased to adjust the dollar duration (or how much cash is released through the sale of bonds).

(4 minutes)

B. Using the Cronos Corporation bond as a controlling position approach, determine how much should be moved between cash and the Cronos bond in order to accomplish the rebalancing.

(4 minutes)
36. Fixed Income

This question has four parts (A, B, C, D) for a total of 12 minutes.

The Centauri Bond Fund holds bonds having a total market value of $175 million and a duration of 8.3. They have been financed by borrowing $125 million at an annual interest rate of 5.45%. Gavin Gordonson, the fund’s manager, is concerned that the high level of leverage might have an adverse effect on the returns and risk of the fund and has asked you to perform some illustrative calculations.

In relation to return, Gordonson asks for you to calculate the likely net return (after borrowing costs) if the overall return from the bonds in the fund over the next year is 7.1%.

A. Calculate the percentage net return for the investors.

(3 minutes)

Regarding risk, Gordonson asks you to estimate the duration of the equity of the investors in the fund. For the purposes of this calculation, you are to assume that the debt has a duration of 1.

B. Calculate the duration of the investors’ equity in the fund.

(3 minutes)

C. If the bond return is 5.2% rather than 7.1%, state whether the fund investors return will be higher or lower than 5.2%. Explain why.

(3 minutes)

D. Gordonson manages another portfolio and now anticipates a fall in bond yields. He wants to increase the duration of its $260 million bond portfolio from the current level of 3.8 to 5.5.

The underlying for the T-Bond future is $100,000 par value of a hypothetical 30-year 6% coupon bond. The cheapest-to-deliver bond for the selected contract is priced at 105.35 (per 100 nominal), its duration is 15.36, and it has a conversion factor of 0.9727.

Gordonson estimates that the yield on the bond portfolio is roughly 8% less volatile than the yield on futures.

Calculate the futures position necessary to achieve the desired duration alteration. Show your work.

(3 minutes)
37. Fixed Income

Dorene Wellstone, CFA, is a bond portfolio manager for the Ryder Investment Company. Part of Wellstone’s job is to analyze economic data. Ryder is interested in evaluating the prospects of establishing an international bond portfolio fund. There are two bonds under consideration. Bond X is denominated in Country X currency units and Bond Y is denominated in Country Y currency units. Ryder is based in the domestic economy, which is neither Country X nor Y.

<table>
<thead>
<tr>
<th>Bond X</th>
<th>Bond Y</th>
<th>Domestic Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>( r_x = 6.15% )</td>
<td>( r_y = 7.05% )</td>
<td></td>
</tr>
<tr>
<td>( i_x = 4.30% )</td>
<td>( i_y = 5.65% )</td>
<td>( i_d = 4.55% )</td>
</tr>
<tr>
<td>( e_x = 0.15% )</td>
<td>( e_y = 0.25% )</td>
<td></td>
</tr>
</tbody>
</table>

Where \( r \) refers to bond yield, \( i \) refers to cash return, \( e \) refers to expected exchange rate movement, relative to the domestic currency (all over the forecast period of one year).

1. What are the expected unhedged and forward-hedged returns, measured in the domestic currency from Bond Y?

<table>
<thead>
<tr>
<th>Unhedged return</th>
<th>Forward-hedged return</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 7.05%</td>
<td>7.05%</td>
</tr>
<tr>
<td>B. 7.05%</td>
<td>5.95%</td>
</tr>
<tr>
<td>C. 7.30%</td>
<td>5.95%</td>
</tr>
</tbody>
</table>

2. Suppose that Dorene constructs a fund where 40% of the value is placed in domestic bonds, 25% into Bond X, and 35% into Bond Y. Suppose that the domestic bond holding has a duration of 9.3, Bond X has a duration of 5.4, and Bond Y has a duration of 6.4. The yield betas for countries X and Y are 1 and 0.58, respectively. Which of the following is closest to the contribution to this fund’s duration of Bond Y?

A. 1.30.
B. 2.24.
C. 3.86.

3. Dorene has revised her projections. She now projects the annualized currency hedged return of Bond X to be 6.6%. Without currency hedging and with a projected change in the currency she expects a 6.4% return. Bond X has a duration of 5.4 and initial YTM of 6.15%. She believes that the purchase of a domestic Bond D with a duration of 3.8 and YTM of 7.0% will be superior. For a 6-month holding period, the breakeven spread widening for Bond D that will wipe out its expected return advantage for Dorene is closest to:

A. 11bp.
B. 7bp.
C. 4bp.
38. Fixed Income

THIS QUESTION HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 13 MINUTES.

The Holby Endowment provides funding to a major regional hospital, supporting both ongoing revenue expenditures and capital expenditures. The hospital is in the process of relocating and upgrading its radiography department (including installing CT and MRI scanners) thus the endowment is planning for some major associated scheduled outflows. It is budgeted that GBP 35 million will be needed in three years’ time. Keith Kildare, who manages the endowment’s portfolio, has decided to immunize this liability using U.K. government bonds (gilts). The immunization rate is 4.25%.

Kildare has been advised that contingent immunization might be a more attractive approach to use in such a situation than classical immunization.

A. **State** the main advantage to the Holby Endowment of using contingent immunization as opposed to classical immunization. **Discuss** the effect on portfolio return if contingent immunization is successful and also if it is unsuccessful. You must discuss both situations. **No calculations are required.**

(4 minutes)

B. Assuming that Kildare initiates contingent immunization of the liability by purchasing GBP 30 million par value of a 5.5% coupon (semiannual pay) bond with 15 years to maturity and a yield to maturity of 4.96%, **calculate** the initial dollar safety margin (in GBP). **Show** your calculations.

(3 minutes)

C. **Identify** the direction of change in yields to which this contingent immunization strategy is vulnerable. **Justify** your answer.

(3 minutes)

D. One year after the initial GBP 35 million liability is immunized at 4.25%, the market value of the portfolio is GBP 32,100,000 million. New 2-year and 3-year immunization rates are 5.04% and 5.25% respectively. **Calculate** the new safety margin in GBP. **Show** your calculations.

(3 minutes)
LEVEL III REVIEW WORKSHOP QUESTIONS: FIXED INCOME: ANSWERS

32. Fixed Income

1. B Reinvesting coupons and maturity proceeds is a problem that indexers face, and this can lead to tracking errors. It is not an argument in favor of indexing but rather an implementation problem with this strategy. The index return is calculated without regard to how coupons are reinvested. If the manager cannot reinvest coupons at the index rate, he may underperform the index.

2. B Full replication, or pure bond index matching, is a strategy that attempts to fully replicate a bond index. It has very low tracking error but is difficult to accomplish and costly to implement due to potential illiquidity of many of the index bonds.

3. C The process of stratified sampling or cell matching divides the index into strata for each risk factor then buys bonds from each cell so that the cell represents the same percentage in both the portfolio and the index. Matching the convexities of the portfolio and benchmarks would be useful but is a less complete answer than C.

4. B Short-term (less than five years) corporate bonds typically have the most favorable yield spread per unit of duration risk. Overweighting these issues and underweighting short duration Treasuries is known as the ongoing yield tilt enhancement, or corporate substitution.

5. C FV of coupons = 25 × (1 + 1.0225) (one coupon reinvested at 4.5% for 6 months) = 50.5625
   Horizon price: N = 22, I/Y = 2.8 (5.6% / 2), PMT = 25, FV = 1000, cpt PV = –951.2171
   Total FV = 1001.78
   Hence EAY = 1001.78 / 899.47 – 1 = 11.374%.

6. B Answers A and C are factors that will reduce the repo rate because they make the collateral more attractive to the lender (of the funds). In particular, if collateral is harder to obtain, then this will reduce the repo rate. Such collateral is called hot or special collateral.
33. Fixed Income

1. C Tracking error risk is the variability in the difference between the returns on the portfolio and the benchmark. This risk is usually very small for passively managed funds. Tracking error risk increases as actively managed funds deviate from the characteristics of the benchmark portfolio.

2. B The calculation of portfolio variance involves computation of correlations/covariances, the number of which increases rapidly for larger portfolios.

3. C The contribution to portfolio duration of the corporate bond is calculated as the bond’s weight in the portfolio multiplied by its duration: ($450,000/$30,000,000) × 4.9 = 0.0735.

4. B Portfolio duration is a weighted average calculation. The weightings of all existing bonds would be reduced as the proportion of the portfolio in each existing bond would drop. Dollar duration is additive and would be increased by adding the new bond’s dollar duration.

5. B The dollar duration (DD) of the bond is calculated as $P_B \times D_B \times 0.01$: $600,000 \times 4.2 \times (0.01) = $25,200.

6. A If the current spread is significantly greater than its historical mean, then the issue should be bought. If the yield is low on a relative basis, then the price will be high and the issue should be sold. Choice C relates to structural, not mean-reversion, analysis.
Level III Review Workshop Questions
Fixed Income: Answers

34. Fixed Income

1. B Effective duration = (0.4 × 5) + (0.05 × 4) + (0.3 × 6) + (0.2 × 5) + (0.05 × 3) = 5.15
   Spread duration = (0.4 × 0) + (0.05 × 4) + (0.3 × 6) + (0.2 × 5) + (0.05 × 6) = 3.3

2. A The previous question determined the effective durations of the index and portfolio are similar at 5.15 and 5.2, making their exposure to parallel shifts similar. The spread durations are quite different at 3.3 and 4.6, so exposure to spread change differs. Thus, they will respond differently depending on why interest rates change.

3. A Spread duration contribution of Corporates for portfolio = 0.4 × 5 = 2.0
   Spread duration contribution of Corporates for index = 0.2 × 5 = 1.0
   Impact of 50bp increase in spread = –1 × (2.0 – 1.0) × 50bp = –50bp
   Portfolio: %Δ = –1 × 2 × 0.50 = –1.00%
   Index: %Δ = –1 × 1 × 0.50 = –0.50%
   Portfolio will fall 0.50% more than the index.

4. B Required terminal value = $10m × (1.025)^8 = $12,184,029
   [PV = 10, I/Y = 2.5, N = 8, Compute FV]

5. A Cushion spread = immunized rate – safety net return = 7% – 5% = 2%

6. C Required assets at current immunized rate = $12,184,029/(1.035)^8 = $9,252,692
   [FV = 12,184,029, I/Y = 3.5, N = 8, Compute PV]
   Initial dollar safety margin = portfolio value – assets required at immunized rate = $10m – $9,252,692 = $747,308
35. Fixed Income

A. The current dollar duration of the fund is $8.25 \times 105.133 \times 0.01 = 8,673,500. Nicola requires $8,500,000, which implies a rebalancing ratio of $8,500,000 / 8,673,500 = 0.98.

Nicola needs to reduce the holding of each bond by 2%, which implies a release of cash of $105.133 \times 0.02 = 2,102,660.

B. We know from part A that the dollar duration of the fund needs to be reduced by $8,673,500 – $8,500,000 = 173,500. Dollar duration is additive (which is to say that the DD of a portfolio is simply the sum of the component bonds’ individual DDs), so Nicola will need to reduce the DD of the Cronos bond by $173,500.

The Cronos bond is currently 8% of the fund, so it has a market value of $8,410,640. It has a duration of 12.33, thus its DD is $12.33 \times 8,410,640 \times 0.01 = 1,037,032.

Nicola wants to reduce the DD of the Cronos bond holding by 173,500 / 1,037,032 = 16.73%.

This can be accomplished by selling off 16.73% of the Cronos position, which will release 16.73% \times 8,410,640 = 1,407,137.

(Note that all transaction costs have been ignored.)
36. Fixed Income

A. If the bonds earn a return of 7.1% then the increase in value of the bonds over the year will be $175 million \times 0.071 = $12.425 million.

The lenders will require a payment of $125 million \times 0.0545 = $6.8125 million.

The net profit to the equity investors will be $12.425 million – $6.8125 million = $5.6125 million.

As a percentage of the initial equity stake of $175 million – $125 million = $50 million, this represents a return of $5.6125 / 50 = 11.225%.

Alternatively, \( R_p = R_i + \frac{B}{E} (R_i - C) \), which in this case gives \( R_p = 7.1\% + \left[ \frac{(125 / 50) \times (7.1\% - 5.45\%)}{11.225\%} \right] = 7.1\% + (2.5 \times 1.65\%) = 11.225\% \).

B. The duration of the equity in a leveraged portfolio is worked out most easily by treating the borrowing (the liability) as a negative asset:

<table>
<thead>
<tr>
<th></th>
<th>MV</th>
<th>( w )</th>
<th>( D )</th>
<th>( wD )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonds</td>
<td>175</td>
<td>350.0%</td>
<td>8.3</td>
<td>29.05</td>
</tr>
<tr>
<td>Borrowed</td>
<td>–125</td>
<td>–250.0%</td>
<td>1</td>
<td>–2.5</td>
</tr>
<tr>
<td>Equity</td>
<td>50</td>
<td>100.0%</td>
<td></td>
<td>26.55</td>
</tr>
</tbody>
</table>

The duration of the investors’ equity in the fund is thus 26.55.

C. The investor’s return will be less than the bond return of 5.2% because the cost of leverage (5.45%) is above the bond return. Leverage is beneficial if the asset return exceeds the cost of leverage and detrimental in this, the reverse case.

Note: The question did not request and calculations are not required to know what will happen and why. Calculations could be shown to answer part of the question but then you must still explain why the return is lower.

If bond return = 5.2%, using the formula:

\[
R_p = 5.2\% + \left[ \frac{(125 / 50) \times (5.2\% - 5.45\%)}{11.225\%} \right] = 5.2\% - (2.5 \times 0.25\%) = 4.575\%
\]

D. Number of contracts to adjust duration = \( \frac{(D_{\text{target}} - D_{\text{initial}})}{D_{\text{CTD}} \times \text{CF}_{\text{CTD}} \times \text{yield beta}} \times P_{\text{initial}} \times \beta \)

Thus:

\[
\text{number of contracts} = \frac{(5.5 - 3.8) \times 260,000,000}{15.36 \times \frac{105.35}{100} \times 0.9727 \times (1 - 0.08)} \times 100,000
\]

Buy 244 contracts at 105,350.
37. Fixed Income

1. C  
   Unhedged return = \( r + e = 7.05\% + 0.25\% = 7.3\% \)

   Hedged return = \( r + f \)

   \( f \) is approximately equal to the domestic interest rate minus the foreign \((Y)\) interest rate
   \( = 4.55\% - 5.65\% = -1.1\% \), so hedged return = \( 7.05\% - 1.1\% = 5.95\% \).

   If the expected currency appreciation of 25 bp is realistic, then hedging sacrifices 1.35% of potential return.

2. A  
   The contribution to this fund's duration of Bond Y is equal to Y's duration, multiplied by the country beta (allowing for the fact that Bond Y's yield will not move one-for-one with the domestic yield) multiplied by the bond's weight in the portfolio.

   Duration contribution of bond Y = \( 6.4 \times 0.58 \times 0.35 = 1.2992 \)

3. C  
   Bond X is a foreign bond that exposes Dorene to currency risk and return. She needs to compare domestic Bond D to Bond X's return after the effects of currency change. Given that she expects the currency hedged return of X to exceed the unhedged currency return she will use the currency hedged projection as her alternative to D. This makes the 6-month projected return advantage of D:

   \( (7.0 - 6.6\%) / 2 = 20\text{bp} \)

   She can absorb a 20bp relative price decline in Bond D, before her return advantage is eliminated. This is a spread widening of:

   \(-20\text{bp} = -5.4(\text{delta } s), \text{ delta } s = 3.7\text{bp}\)

   **Candidate note:** The convention is to use the larger of the two durations to be conservative in calculating BE in a yield pick up trade when it is not known which bond's price will shift.
38. Fixed Income

A. Potentially higher return with a minimum floor return.
   • If successful, the return will exceed the initial immunization rate of 4.25%.
   • If unsuccessful, the return will be lower than 4.25% but with a specified minimum. The higher the initial surplus, the lower that floor return.

B. Surplus is PVA – PVL. PVL is
\[
\left[ \frac{35,000,000}{1 + \left( \frac{0.0425}{2} \right)^{25}} \right] = 30,851,453
\]

The PVA is the market value of the bond just purchased.

\[
\begin{align*}
N &= 15 \times 2 = 30; \\
I/Y &= 4.96 ÷ 2 = 2.48; \\
PMT &= 30,000,000 \times 0.055 ÷ 2 = 825,000; \\
FV &= 30,000,000
\end{align*}
\]

\[
\text{CPT PV} = £31,699,884
\]

Therefore, dollar safety margin = £31,699,884 – £30,851,453 = £848,431

C. A 15-year bond will have a duration close to 15 years and certainly more than the 3-year liability duration. If rates increase, the assets will decline in value more than the liabilities will decline and surplus will deteriorate. The strategy is at risk of rising rates.

D. PVL = 35,000,000 / [1 + (.0504 / 2)]^4 = 31,683,537

\[
S = \text{PVA} – \text{PVL} = 32,100,000 – 31,683,537 = \text{GBP}416,463
\]

Candidate note: The FVL is set at initiation and does not change. Because it is due in 2 years, its PVL depends on the new 2-year immunization rate. CFAI follows the semiannual compounding convention in immunization questions.
LEVEL III REVIEW WORKSHOP QUESTIONS: EQUITY PORTFOLIO MANAGEMENT

39. Equity Portfolio Management

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

Drew Saunders is evaluating several alternatives for the U.S. large-cap equity portfolio of her company’s pension plan. The pension plan is currently following an enhanced indexing strategy utilizing the services of the managers detailed in the following table:

Table 1:

<table>
<thead>
<tr>
<th>Manager</th>
<th>True Active Return</th>
<th>True Active Risk (with respect to normal benchmark)</th>
<th>Normal benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>0%</td>
<td>0%</td>
<td>S&amp;P 500</td>
</tr>
<tr>
<td>Enhanced index</td>
<td>1%</td>
<td>1.5%</td>
<td>S&amp;P 500</td>
</tr>
<tr>
<td>Active A (Value)</td>
<td>3%</td>
<td>5%</td>
<td>S&amp;P 500 Value</td>
</tr>
<tr>
<td>Active B (Growth)</td>
<td>4%</td>
<td>6%</td>
<td>S&amp;P 500 Growth</td>
</tr>
<tr>
<td>Long-short</td>
<td>6%</td>
<td>6.5%</td>
<td>Cash with S&amp;P 500 futures overlay</td>
</tr>
</tbody>
</table>

The overall equity portfolio benchmark is the S&P 500. Saunders has decided to assume that the active returns are uncorrelated.

Saunders has utilized the information regarding the managers’ performance to create an efficient frontier using a mean variance optimizer. The efficient frontier shows the true active return and true active risk of the overall equity portfolio of allocations between the five managers. He notices that the highest risk point on this efficient frontier is a 100% allocation to the long-short manager with a 100% S&P 500 overlay and that the active risk of this portfolio is 6.6%.

A. **Explain** why the 6.6% active risk of the highest point on the efficient frontier is greater than the 6.5% given in Table 1.

(3 minutes)

B. Saunders has calculated that the misfit risk for Active A’s portfolio is 7.13%. **Calculate** the total active risk for Active A.

(3 minutes)
C. Now suppose the current equity manager allocation is 30% index and 70% enhanced index. Calculate this portfolio’s current expected:
   i. active return
   ii. active risk
   iii. information ratio

(4 minutes)

D. After determining the desired level of active risk, Saunders selected the appropriate portfolio from the efficient frontier. This portfolio has the following allocation between the five managers:

Table 2:

<table>
<thead>
<tr>
<th>Manager</th>
<th>Optimal Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>39%</td>
</tr>
<tr>
<td>Enhanced index</td>
<td>34%</td>
</tr>
<tr>
<td>Active A (Value)</td>
<td>7%</td>
</tr>
<tr>
<td>Active B (Growth)</td>
<td>8%</td>
</tr>
<tr>
<td>Long-short</td>
<td>12%</td>
</tr>
</tbody>
</table>

Saunders has correctly calculated (using exact data without the rounding in the tables displayed here) that this allocation has an expected true active return of 1.61% and an expected true active risk of 1.13%.

i. State the name generally given to the manager allocation in Table 2.
ii. Determine whether this portfolio represents an improvement over the current allocation in part C. Show the calculations to support your answer.
iii. State and justify the likely level of misfit risk for the optimal allocation in Table 2 (no calculations required).

(6 minutes)

E. Sanders is considering replacing Active Manager B with a short extension manager who also selects investments from the S&P Growth sector. Active Manager B is a traditional long only investor.

i. Explain whether Saunders can most likely use the same normal benchmark or will need to use a different normal benchmark for the short extension manager than for Active Manager B.

ii. Explain two reasons why the short extension manager may be able to add more value to the total portfolio than added by Active Manager B. Simply stating that it is easier or the short side is less efficient will receive no credit.

(4 minutes)
40. Equity Portfolio Management

Howard Salomon is a portfolio manager at Turnstile Fund Managers (TFM). During 2015, Oliver Mason, a high net worth client, engaged Turnstile to manage GBP4,500,000 for one year using an active concentrated equity style. The management contract specified a fee calculated as 2.5% of initial assets under management (AUM), plus an incentive fee of 20% of the fund's capital appreciation in excess of that of a custom index of the stocks selected for investment. The performance fee was specified as symmetrical; thus if benchmark-relative performance were negative, then the total management fee would be reduced (although not below zero).

The following table gives data on four stocks that Salomon is considering for use in a custom benchmark for Mason.

Figure 40-1: Mason Custom Benchmark

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggreko</td>
<td>0.84</td>
<td>1,520.00</td>
<td>2,175.00</td>
<td>43.1%</td>
<td>4.06</td>
</tr>
<tr>
<td>BAE Systems</td>
<td>1.00</td>
<td>356.50</td>
<td>317.8</td>
<td>–10.9%</td>
<td>11.55</td>
</tr>
<tr>
<td>Barclays</td>
<td>1.00</td>
<td>311.10</td>
<td>234.05</td>
<td>–24.8%</td>
<td>37.95</td>
</tr>
<tr>
<td>Diageo</td>
<td>1.00</td>
<td>1,206.00</td>
<td>1,483.50</td>
<td>23.0%</td>
<td>30.15</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>83.71</td>
<td>81.75</td>
</tr>
</tbody>
</table>

Salomon and Mason later agreed on a different benchmark index for performance evaluation. That index had a 2.7% return for 2015, while Mason's portfolio returned 3.5%. Because of the favorable performance, Mason is considering also retaining Salomon to manage the larger, enhanced indexing portion of his assets for 2016. Salomon tells Mason that TFM offers three index type approaches. They are:

- Approach 1: Regression-based optimization to minimize tracking error.
- Approach 2: Fully collateralized 3-month futures contracts with the collateral invested in 3-month interest-bearing government securities.
- Approach 3: Stratified cell matching with discretionary controlled deviation in cell matching weights allowed.
1. Which of the following is closest to the price-only return on an equal-weighted index of the four stocks for 2015?
   A. 2.0%.
   B. 4.5%.
   C. 7.5%.

2. Which of the following is closest to the price-only return on a value-weighted index (not float adjusted) of the four stocks for 2015?
   A. 2.0%.
   B. -2.4%.
   C. -2.7%.

3. Without performing calculations, the return of a float-adjusted value-weighted index of the four stocks for 2015 would most likely differ from a non-float adjusted index of those stocks by being:
   A. higher.
   B. lower.
   C. This cannot be determined without calculations.

4. Which type of index construction approach would most likely require the most frequent rebalancing?
   A. Price-weighted.
   B. Value-weighted.
   C. Equal-weighted.

5. Calculate the total fee TFM earned for 2015 on Mason's account.
   A. GBP112,500.
   B. GBP119,700.
   C. GBP144,400.

6. Of the three index approaches, which is most likely to provide incremental value added above the index for Mason?
   A. 1.
   B. 2.
   C. 3.
41. Equity Portfolio Management

THIS QUESTION HAS ONE PART FOR A TOTAL OF 12 MINUTES.

Gerald Head is a U.S.-based pension fund advisor whose clients include General Stores Inc., a well-known U.S.-based retailer. General Stores Inc. (GS) has a defined benefit pension plan that has not been available to new employees for the past five years and a defined contribution scheme that was established ten years ago. Head has been asked to assist the Board of GS with several issues relating to each of the GS pension schemes.

The GS defined-benefit pension plan has assets of $58 million allocated over various asset classes each of which is separately managed by a specific investment manager. The plan still has a fairly long time horizon since the majority of the plan participants are still working for GS and these participants, on average, will retire in 15 years time. Having reviewed the performance of the plan assets over the past ten years, GS is considering changing the investment strategy followed for some asset classes and is contemplating the appointment of a new investment manager for its equity portfolio. Head has prepared a briefing document for the Board of GS in which he makes the following statements:

• For stocks or bonds, an index fund should not only be your benchmark. It should also be your investment vehicle of choice unless you can find a manager you are confident will do better—net of all fees and expenses.
• When evaluating new investment managers, you should select the manager that has generated the best performance over the last five years.
• One of the criteria used for selecting a new manager should be the expected impact on the volatility of your existing portfolio. This will require you to consider both the expected volatility of the manager’s investments and the expected correlation of the manager’s volatility with that of your existing portfolio.
• All active investment managers should be placed on a performance-based fee structure incorporating a “high-water mark” rather than a fee based solely on the size of the account, since this should reduce the overall fees you pay these managers.

Determine whether each of the four statements by Head is correct or incorrect. If incorrect, give one reason why the statement is incorrect.

Answer in the template provided.
<table>
<thead>
<tr>
<th>Statement</th>
<th>Determine whether each of the statements is correct or incorrect (circle one)</th>
<th>If incorrect, give one reason why the statement is incorrect.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For stocks or bonds, an index fund should not only be your benchmark. It should also be your investment vehicle of choice unless you can find a manager you are confident will do better—net of all fees and expenses.</td>
<td>Correct</td>
<td>Incorrect</td>
</tr>
<tr>
<td>When evaluating new investment managers, you should select the manager that has generated the best performance over the last five years.</td>
<td>Correct</td>
<td>Incorrect</td>
</tr>
</tbody>
</table>
One of the criteria used for selecting a new manager should be the expected impact on the volatility of your existing portfolio. This will require you to consider both the expected volatility of the manager’s investments and the expected correlation of the manager’s volatility with that of your existing portfolio.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
</table>

All active investment managers should be placed on a performance-based fee structure incorporating a “high-water mark” rather than a fee based solely on the size of the account, since this should reduce the overall fees you pay these managers.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
</table>
39. Equity Portfolio Management

A. Total active risk is versus Saunder's benchmark of the S&P 500. The manager’s true active risk is versus their benchmark of cash and S&P 500 futures. These are very similar but slightly different benchmarks so it is not surprising a little misfit risk is added. The additional misfit risk can be calculated as $6.6^2 = 6.5^2 + (\text{misfit risk})^2$, making misfit risk $= 1.14\%$.

B. The total active risk is given by:

$$\sqrt{\text{(true active risk)}^2 + (\text{misfit active risk})^2} = \sqrt{5%^2 + 7.13^2} = 8.71\%$$

C. For this portfolio, there is no misfit return (and hence no misfit risk) because the two managers’ normal benchmark is the same as the overall benchmark for this asset class.

i. Expected active return is a weighted average of the two managers’ true active returns:

$$(0.3 \times 0\%) + (0.7 \times 1\%) = 0.7\%$$

ii. Expected active risk for the portfolio can be estimated using the Markowitz formula with a covariance of zero. (Assuming that active returns are uncorrelated is indicated in the question and is also the default assumption unless stated otherwise.)

$$\text{active risk} = \sqrt{(w_i)^2(\text{active risk}_i)^2 + (w_{E_i})^2(\text{active risk}_{E_i})^2}$$

$$= \sqrt{(0.3^2 \times 0\%)^2 + (0.7^2 \times 1.5\%)^2} = 1.05\%$$

iii. Expected information ratio is given by:

$$\frac{\text{active return}}{\text{active risk}} = \frac{0.7\%}{1.05\%} = 0.67$$
D. i. Core-satellite

**Candidate note:** For part i, this is also alpha-beta separation, but that is a more general term and will not receive credit. Core-satellite will be a form of alpha-beta separation, but not all alpha-beta separation is core-satellite, so you should be as specific as possible in your answer.

ii. The efficient combination of managers leads to a portfolio with an information ratio based on true active return and risk that is higher than the existing ratio of 0.67.

\[
\frac{\text{true active return}}{\text{true active risk}} = \frac{1.61\%}{1.13\%} = 1.42 \quad \text{IR for the new portfolio}
\]

iii. Misfit risk will be low.

- Index and enhanced index use the same benchmark as the client and so no misfit risk. Long-short uses a similar index and will contribute little misfit risk.
- Manager's A and B receive fairly small allocations and so will add modest misfit risk. In addition, A is value style and B is growth style S&P so combined they will approximate the client's S&P benchmark and likely create very little misfit for the portfolio.

E. i. Use the same normal benchmark. A short extension manager is net 100% long, and both managers are using S&P 500 growth stocks. Therefore, the same benchmark suits both managers.

ii. It is argued that the short side is less efficient and value added is easier because:

- Many investors are long-only and pay less attention to overvalued securities.
- Sell-side analysts rarely make sell recommendations as it may antagonize those companies (or because there is a more limited market among long-only investors for such recommendations).
- Short selling is more complex and expensive.
- Window dressing can lead to additional selling of securities that are down in price, making them even more undervalued.
40. Equity Portfolio Management

1. C Equal weighted is the average return of the assets in the index.

\[(43.1 - 10.9 - 24.8 + 23.0) / 4 = 7.60\%\]

2. B Value (cap, or market cap) weighted weights the return of each asset by beginning market value.

<table>
<thead>
<tr>
<th>Price Change</th>
<th>Market Cap Year End 2014</th>
<th>Weight</th>
<th>weight × return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggreko</td>
<td>43.10%</td>
<td>4.06</td>
<td>0.0485</td>
</tr>
<tr>
<td>BAE</td>
<td>-10.90%</td>
<td>11.55</td>
<td>0.1380</td>
</tr>
<tr>
<td>Barclays</td>
<td>-24.80%</td>
<td>37.95</td>
<td>0.4534</td>
</tr>
<tr>
<td>Diageo</td>
<td>23.00%</td>
<td>30.15</td>
<td>0.3602</td>
</tr>
<tr>
<td>Total</td>
<td>83.71</td>
<td>1.0000</td>
<td>-2.37%</td>
</tr>
</tbody>
</table>

3. B Only Aggreko will be float adjusted. Float adjusting will reduce its weight, and as it is the best performer, float-adjusted return must be lower.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggreko</td>
<td>0.84</td>
<td>43.10%</td>
<td>4.06</td>
<td>3.41</td>
<td>0.0411</td>
</tr>
<tr>
<td>BAE</td>
<td>1</td>
<td>-10.90%</td>
<td>11.55</td>
<td>11.55</td>
<td>0.1391</td>
</tr>
<tr>
<td>Barclays</td>
<td>1</td>
<td>-24.80%</td>
<td>37.95</td>
<td>37.95</td>
<td>0.4569</td>
</tr>
<tr>
<td>Diageo</td>
<td>1</td>
<td>23.00%</td>
<td>30.15</td>
<td>30.15</td>
<td>0.3630</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>83.71</td>
<td>83.06</td>
<td>1.0000</td>
<td>-2.73%</td>
</tr>
</tbody>
</table>

4. C To maintain equal weighting, the index must be rebalanced every measurement period.

5. B The base or assets under management fee (AUM) was 4.5 million × 2.5% = 112,500. The incentive fee was 20% × (4.5 million × (3.5% − 2.7%)) = 7,200. This makes the total fee GBP 119,700.

6. C Normally, cell matching is an index replication approach and VA should be about zero. However, TFM allows discretionary deviations in weighting, and the only reason to do so is to seek +VA. In contrast, a regression approach that only seeks to minimize tracking error will likely have 0 VA. Using contracts to replicate the market with active management of cash is a VA enhanced index approach, but TFM simply uses government securities that match contract expiration, leaving no opportunity for VA on the cash management side.
## Equity Portfolio Management

<table>
<thead>
<tr>
<th>Statement</th>
<th>Determine whether each of the statements is correct or incorrect</th>
<th>If incorrect, give one reason why the statement is incorrect.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For stocks or bonds, an index fund should not only be your benchmark. It should also be your investment vehicle of choice unless you can find a manager you are confident will do better—net of all fees and expenses.</td>
<td>Correct Incorrect</td>
<td>____</td>
</tr>
<tr>
<td>When evaluating new investment managers, you should select the manager that has generated the best performance over the last five years.</td>
<td>Correct Incorrect</td>
<td>Past performance should be evaluated to determine if it is statistically significant. Or: The consistency of past performance with stated style needs to be analyzed. Or: Other factors such as adequacy of personnel and resources are equally important.</td>
</tr>
<tr>
<td>One of the criteria used for selecting a new manager should be the expected impact on the volatility of your existing portfolio. This will require you to consider both the expected volatility of the manager’s investments and the expected correlation of the manager’s volatility with that of your existing portfolio.</td>
<td>Correct Incorrect</td>
<td>____</td>
</tr>
<tr>
<td>All active investment managers should be placed on a performance-based fee structure incorporating a “high-water mark” rather than a fee based solely on the size of the account, since this should reduce the overall fees you pay these managers.</td>
<td>Correct Incorrect</td>
<td>For example, incentive fees are unlikely for index or low risk portfolios. Or: Incentive fees can also incent excessive risk taking and may be unsuitable for some clients.</td>
</tr>
</tbody>
</table>

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Level III Review Workshop Questions: Alternative Investments

42. Alternative Investments: Real Estate

Luke Halliwell, CFA, specializes in direct real estate valuation with Alternative Asset Management (AAM), a rapidly expanding asset management firm based in downtown New York City. Halliwell is currently focusing on adding either a direct allocation of real estate or real estate investment trusts (REITs) to a traditional portfolio of stocks and bonds. Currently, the portfolio has a 50% allocation to both stocks and bonds.

Halliwell decides to create a model portfolio that allocates 40% of the portfolio to bonds, 40% to stocks, and 20% to either a direct investment in real estate or REITs. Using data from 1990 to 2004 (rather old, of course, but the easiest figures to obtain at short notice and, he hopes, still broadly indicative of the asset classes’ potentials), he then calculates the model portfolio expected returns and standard deviations. (He also assumes an average risk-free return over the period of 4.33%.)

<table>
<thead>
<tr>
<th>Measure</th>
<th>50/50 Stocks &amp; Bonds</th>
<th>40/40/20 Stocks, Bonds &amp; REITs</th>
<th>40/40/20 Stocks, Bonds &amp; Real Estate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>9.6%</td>
<td>10.34%</td>
<td>9.33%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>7.87%</td>
<td>7.62%</td>
<td>6.59%</td>
</tr>
</tbody>
</table>

Halliwell then examines the details of two real estate benchmarks: the National Association of Real Estate Investment Trusts (NAREIT) index and the National Council of Real Estate Investment Fiduciaries (NCREIF) index.

Once his research is complete, Halliwell writes a research report to Dana Christie, head of research at AAM. Christie reads the report and highlights the following statements made by Halliwell.

Statement 1: Adding REITs to the traditional portfolio will provide a much higher risk premium per unit of risk than adding direct real estate.

Statement 2: Adding direct real estate to the traditional portfolio will decrease expected return.

Statement 3: The problem with adding either commingled real estate funds (CREFs) or real estate investment trusts (REITs) is that they buy listed traded shares of companies that invest in real estate and, therefore, do not provide the same diversification benefit in a stock and bond portfolio as buying a direct investment in real estate. Their benefit is they allow smaller investors to acquire diversified real estate exposure.
Statement 4: Assuming the data in the table was gross of costs, we should remember that commissions are generally lower for direct real estate investment than for stock trading.

Statement 5: The NAREIT index is cap-weighted, while the NCREIF index is value-weighted.

Statement 6: The level of volatility of both the NAREIT and NCREIF indices is downward biased.

Statement 7: Both NAREIT and NCREIF indices reflect the benefits of leveraging.

Statement 8: In modeling real estate as an asset class, the NAREIT index is clearly more suitable than the NCREIF index.

1. In relation to the statements highlighted by Christie in Halliwell’s report, determine which is(are) most likely to be accurate given the data presented.
   A. Statement 1 only.
   B. Statement 2 only.
   C. Statements 1 and 2.

2. In relation to the statements highlighted by Christie in Halliwell’s report, determine which is(are) most likely to be inaccurate.
   A. Statement 3 only.
   B. Statement 4 only.
   C. Statements 3 and 4.

3. In relation to the statements highlighted by Christie in Halliwell’s report, determine which is(are) most likely to be accurate.
   A. Statement 5 only.
   B. Statement 6 only.
   C. Neither statement 5 nor 6.

4. In relation to the statements highlighted by Christie in Halliwell’s report, determine which is(are) most likely to be accurate.
   A. Statement 7 only.
   B. Statement 8 only.
   C. Neither statement 7 nor 8.
43. Alternative Investments: Private Equity

THIS QUESTION HAS ONE PART FOR A TOTAL OF 18 MINUTES.

Casey Walker CFA, is the CEO of Dynamic Holdings a successful Private Equity firm based in Washington DC. Walker has been invited to give a talk at the 5th Annual Alternative Investment Conference in Geneva, Switzerland, and is looking forward to the trip.

Walker has led Dynamic Holdings in many successful private equity deals involving a wide range of venture capital and buyout deals in the United States and Europe. The conference organizers have given Walker a brief to compare venture capital investments with buyouts in the following areas.

Conference Brief—Private Equity

Key learning objectives:

To compare venture capital investments to buyouts in respect of the following:

- Error in measuring returns
- Transparency
- Leverage
- Cash flows
- Losses
- Upside potential

Walker prepares for his presentation by designing a template to help compare both venture capital and buyouts in these areas. The template is shown in the following.

Identify for each of the factors whether venture capital or buyout funds has a greater, smaller, or similar exposure to each factor. Justify your response with one reason.

Answer in the template provided.

(18 minutes)
## Template for Question 43

<table>
<thead>
<tr>
<th>Compare Venture Capital (VC) with Buy Outs (BO)</th>
<th>Circle the correct response</th>
<th>Justify your response with one reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error in measuring returns</td>
<td>VC less error</td>
<td>VC &amp; BO similar error</td>
</tr>
<tr>
<td>Transparency</td>
<td>VC greater transparency</td>
<td>VC &amp; BO similar transparency</td>
</tr>
<tr>
<td>Leverage</td>
<td>VC greater leverage</td>
<td>VC &amp; BO similar leverage</td>
</tr>
</tbody>
</table>

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**Level III Review Workshop Questions**  
**Alternative Investments**

<table>
<thead>
<tr>
<th></th>
<th>VC steady cash flows</th>
<th>BO steady cash flows</th>
<th>VC &amp; BO similar cash flows</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cash flows</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>VC less frequent losses</th>
<th>BO less frequent losses</th>
<th>VC &amp; BO similar frequency of losses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Losses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>VC greater upside</th>
<th>BO greater upside</th>
<th>VC &amp; BO similar upside</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upside potential</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
44. Alternative Investments: Distressed Debt & Managed Futures

THIS QUESTION HAS ONE PART FOR A TOTAL OF 18 MINUTES.

Alexa Colby, CFA, is a senior portfolio manager with New Universe Capital Management (NUCM), a rapidly growing fund management firm based in New York City. NUCM has rapidly built up a client base of wealthy private clients and has been attracting a lot of interest from institutional investors. Alexa attributes much of the success at NUCM to their open minded approach to alternative investments, especially hedge funds.

Crystal Carrington has been a private client of NUCM for three years and is very impressed with the firm. Carrington is interested in alternative investments and requested exposure to hedge funds when joining NUCM. It’s time for Carrington’s annual review meeting with Alexa Colby to review her IPS. Carrington gives Colby the following brief.

“My nephew suggested I consider managed futures and distressed debt as well as hedge funds in my portfolio. I would like a comparison between these investment areas to help me understand the opportunities available.”

Colby makes the following statements:

Statement 1: Hedge funds, managed futures, and distressed debt are, at least in part, skill-based strategies.

Statement 2: Distressed securities have a similar level of liquidity when classified as part of the hedge fund asset class as when they are classified as part of the private equity asset class.

Statement 3: The J-factor is a consideration in buyout funds.

Statement 4: In general, hedge funds and managed futures have a macro approach to investing.

Statement 5: Private commodity pools have less liquidity than public commodity pools, and a trend following strategy will have more diversification than a contrarian strategy.

Statement 6: Both long-short hedge funds and managed futures may follow absolute return strategies, and both are likely to invest in derivatives and underlying assets.

Determine if Colby’s statements are true or false and, if false, explain why the statement is false. Stating it is false because it is not true will receive no credit.

Answer in the template provided.

(18 minutes)
## Template for Question 44

<table>
<thead>
<tr>
<th>Determine if Colby’s statements are true or false</th>
<th>Circle the correct response</th>
<th>Explain why the statement is false. Stating it is false because it is not true will receive no credit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedge funds, managed futures, and distressed debt are, at least in part, skill-based strategies.</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>Distressed securities have a similar level of liquidity when classed as part of the hedge fund asset class as when they are classed as part of the private equity asset class.</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>The J-factor is a consideration in buyout funds.</td>
<td>True</td>
<td></td>
</tr>
</tbody>
</table>
### Alternative Investments

<table>
<thead>
<tr>
<th>Statement</th>
<th>True/False</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, hedge funds and managed futures have a macro approach to investing.</td>
<td>True/False</td>
</tr>
<tr>
<td>Private commodity pools have less liquidity than public commodity pools, and that a trend following strategy will have more diversification than a contrarian strategy.</td>
<td>True/False</td>
</tr>
<tr>
<td>Both long-short hedge funds and managed futures may follow absolute return strategies, and both are likely to invest in derivatives and underlying assets.</td>
<td>True/False</td>
</tr>
</tbody>
</table>
45. **Alternative Investments: Commodities**

Tito Mendez, CFA, is a portfolio manager with Voyager Asset Management (VAM), a medium-sized firm based in downtown Chicago. Voyager has been successful in combining traditional assets with relatively new asset classes, especially commodities, for their institutional and high-net-worth private clients.

Harry Montgomery is a private client with Voyager who likes to get involved in the commodity markets. He regularly talks to Mendez about opportunities for arbitrage in the fast-moving Chicago commodity markets.

Today, Mendez receives a call from Montgomery who provides the following details about the price of platinum and the price of gold.

**Details provided by Harry Montgomery**

<table>
<thead>
<tr>
<th><strong>Platinum</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot price of platinum:</td>
<td>$1,200/oz</td>
</tr>
<tr>
<td>Current 6-month platinum future price:</td>
<td>$1,229</td>
</tr>
<tr>
<td>Spot price of platinum 1 month ago:</td>
<td>$1,179</td>
</tr>
<tr>
<td>7-month futures price of platinum 1 month ago:</td>
<td>$1,205</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Gold</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot price of gold:</td>
<td>$800/oz</td>
</tr>
<tr>
<td>12-month gold futures price:</td>
<td>$822.72</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuously compounded risk-free rate:</td>
<td>4%</td>
</tr>
</tbody>
</table>

Montgomery mentions to Mendez that he has heard about a roll yield but is unsure what it is or how it is calculated.

Mendez provides the information that Montgomery has asked for and, for good measure, also talks through details of how commodities can be an excellent inflation hedge within a portfolio, but this can vary depending upon the type of commodity.

Finally, Montgomery asks Mendez to recommend a suitable benchmark for subsequent performance evaluation of his commodity performance.

1. The monthly roll yield (per ounce) for platinum over the past month is closest to:
   A. –$3.
   B. +$3.
   C. +$5.
2. Based on the data provided for the gold market, which of the following is most correct?
   A. The market is backwardation and a fully collateralized position will earn negative roll yield and positive collateral return for the next month.
   B. The seller of the contract will earn positive roll return over the life of the contract.
   C. The buyer of the contract will earn negative roll over each month till contract expiration.

3. Which of the following commodity subgroups is least likely to have a positive correlation with inflation?
   A. Energy.
   B. Precious metals.
   C. Agricultural products.

4. Mendez tells Montgomery that there are numerous commodity benchmarks available and, unlike benchmarks for most other alternative investments, they are investable. Which of the following statements is true?
   A. Futures contract-based benchmarks are available and investable.
   B. Benchmarks based on CTA accounts are available and investable.
   C. Both of the above are available and investable.
LEVEL III REVIEW WORKSHOP
QUESTIONS: ALTERNATIVE INVESTMENTS: ANSWERS

42. Alternative Investments: Real Estate

For questions 1 and 2, the following table reproduces the data from the question and adds in the computed Sharpe measures \((\text{return} - 4.33\%) / \text{standard deviation}\), where 4.33% is the risk-free rate per the question—the Sharpe measure quantifies the risk premium per unit of risk taken:

<table>
<thead>
<tr>
<th>Measure</th>
<th>50/50 Stocks &amp; Bonds</th>
<th>40/40/20 Stocks, Bonds &amp; REITS</th>
<th>40/40/20 Stocks, Bonds &amp; Real Estate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>9.6%</td>
<td>10.34%</td>
<td>9.33%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>7.87%</td>
<td>7.62%</td>
<td>6.59%</td>
</tr>
<tr>
<td>Sharpe measure</td>
<td>0.67</td>
<td>0.79</td>
<td>0.76</td>
</tr>
</tbody>
</table>

1. B Statement 1: Incorrect

The data in the question shows only marginal improvement (0.79 vs. 0.76), which is not much higher. In addition, REITs are traded as listed shares of stock and generally have higher correlation to traditional stock portfolios. For this reason they are not expected to provide dramatic improvements in return to risk when added to traditional portfolios.

Statement 2: Correct

Traditional at 9.6% versus including direct real estate at 9.33%. This is the normal expectation based on historical results.

2. C Statement 3: Incorrect

REITs are publicly traded shares of stock, but CREFs are not. CREFs are commingling funds to make direct real estate investments, which may or may not be leveraged. CREFs can be either closed or open to new investors. Both allow smaller investors to access a more diversified real estate portfolio.

Statement 4: Incorrect

Transaction costs (commissions) for real estate are generally high.

3. A Statement 5: Correct

The NAREIT index is cap-weighted by the market value of the stocks, while the NCREIF index is value-weighted based on estimated value of the properties.

Statement 6: Incorrect

The NAREIT index is based on traded stock prices, so this is not an issue for NAREIT. The volatility of the NCREIF index is downward biased because it is based on appraisal values.
4. C Statement 7: Incorrect

NCREIF reflects direct, unleveraged investment in real estate, making part of the statement false. (It is true that REITS reflect the performance of leveraged operating companies that own real estate.)

Statement 8: Incorrect

Neither is the clear best choice. NAREIT has many advantages in being based on investable shares, but it does not reflect pure real estate performance. NCREIF has issues related to the use of appraised value (which is inherent in ownership of direct real estate) and is not investable but (particularly after adjustments to remove smoothing) better reflects the performance of pure real estate.
43. Alternative Investments (Private Equity)

<table>
<thead>
<tr>
<th>Compare Venture Capital (VC) with Buy Outs (BO)</th>
<th>Circle the correct response</th>
<th>Justify your response with one reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error in measuring returns</td>
<td>VC less error</td>
<td>Buyout funds involve established companies and markets. Venture capital involves start-up companies with uncertain asset values in the early years. Buyout funds therefore have less measurement error.</td>
</tr>
<tr>
<td>Transparency</td>
<td>VC greater transparency</td>
<td>BO greater transparency</td>
</tr>
<tr>
<td></td>
<td>BO greater transparency</td>
<td>VC &amp; BO similar transparency</td>
</tr>
<tr>
<td></td>
<td>VC &amp; BO similar transparency</td>
<td></td>
</tr>
<tr>
<td>Leverage</td>
<td>VC greater leverage</td>
<td>BO greater leverage</td>
</tr>
<tr>
<td></td>
<td>VC &amp; BO similar leverage</td>
<td></td>
</tr>
<tr>
<td>Cash flows</td>
<td>VC steadier cash flows</td>
<td>BO steadier cash flows</td>
</tr>
<tr>
<td></td>
<td>BO steadier cash flows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VC &amp; BO similar cash flows</td>
<td></td>
</tr>
<tr>
<td>Losses</td>
<td>VC less frequent losses</td>
<td>BO less frequent losses</td>
</tr>
<tr>
<td></td>
<td>VC &amp; BO similar frequency of losses</td>
<td></td>
</tr>
<tr>
<td>Upside potential</td>
<td>VC greater upside</td>
<td>BO greater upside</td>
</tr>
<tr>
<td></td>
<td>VC &amp; BO similar upside</td>
<td>Venture capital has the greatest upside potential. To start with nothing leaves a big upside, ultimately leading to a successful IPO.</td>
</tr>
</tbody>
</table>

Buyout funds have a higher level of leverage. Being an existing company allows access to greater levels of debt. Venture capital, being start-up companies, is not able to take on as much debt. In the U.S., buyouts are often known as leveraged buyouts (LBOs).

Being an existing company, a BO has much earlier and steadier cash flows than VC. In the first four years of a VC project, there are often negative cash flows (i.e., the J curve).

A BO has less frequent losses because it is an established company with established products, services, and customers. A VC is a start-up company with unproven products, few initial customers, and uncertain markets.
### Alternative Investments (Distressed Debt & Managed Futures)

<table>
<thead>
<tr>
<th>Determine if Colby’s statements are true or false</th>
<th>Circle the correct response</th>
<th>Explain why the statement is false. Stating it is false because it is not true will receive no credit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedge funds, managed futures, and distressed debt are, at least in part, skill-based strategies.</td>
<td>True/False</td>
<td>Private equity is generally considered less liquid.</td>
</tr>
<tr>
<td>Distressed securities have a similar level of liquidity when classed as part of the hedge fund asset class as when they are classed as part of the private equity asset class.</td>
<td>True/False</td>
<td>The J-factor relates to the Judge in Chapter 11 proceedings—unsure as the outcome of the Judge’s ruling. It applies to distressed debt investing.</td>
</tr>
<tr>
<td>The J-factor is a consideration in buyout funds.</td>
<td>True/False</td>
<td>Many hedge funds focus on individual security misvaluation, a micro approach. For example long/short funds.</td>
</tr>
<tr>
<td>In general, hedge funds and managed futures have a macro approach to investing.</td>
<td>True/False</td>
<td>Trend following strategies generally provide less diversification when added to a portfolio.</td>
</tr>
<tr>
<td>Private commodity pools have less liquidity than public commodity pools, and that a trend following strategy will have more diversification than a contrarian strategy.</td>
<td>True/False</td>
<td>Managed futures use derivatives, not underlying assets.</td>
</tr>
<tr>
<td>Both long-short hedge funds and managed futures may follow absolute return strategies, and both are likely to invest in derivatives and underlying assets.</td>
<td>True/False</td>
<td></td>
</tr>
</tbody>
</table>
45. **Alternative Investments (Commodities)**

1. **B** The roll yield is the change in the futures price that is not explained by the change in the spot price.

   The roll yield is the change in the futures contract price over the month, minus the change in the spot price:

   \[
   \text{Change in futures price} = 1,229 - 1,205 = 24 \\
   \text{Change in spot price} = 1,200 - 1,179 = 21 \\
   \text{Therefore, roll yield} = 24 - 21 = +3
   \]

2. **B** \( f > S \) is, by definition, contango. That means the contract seller will earn + roll yield over the life of the contract and the buyer will earn – roll yield. However, roll yield by subperiod prior to contract expiration depends on actual market movements in \( f \) and \( S \); those cannot be known in advance. The fully collateralized position means long the contract and sufficient cash equivalents to pay the full contract price at expiration.

3. **C** Agricultural products, which generally are not storable, usually do not have a positive correlation with inflation.

4. **A** Both futures-based and CTA indices are available but CTA-based is not investable. CTA is based on the returns of commodity trading advisors. It is essentially the average return of commodity managers so it has the same investability limitations as the average manager in stocks or bonds. It is not knowable in advance.
46. Risk Management

You are attempting to estimate the annual VAR for a $65 million stock portfolio. You have used a Monte Carlo process to generate 500 random outcomes for the return for the portfolio next year. The worst 60 outcomes are shown below:

| -12.34% | -12.88% | -13.88% | -15.40% | -20.68% | -24.77% |
| -12.36% | -12.88% | -13.90% | -15.72% | -20.87% | -25.55% |
| -12.40% | -12.92% | -13.94% | -17.10% | -21.97% | -26.30% |
| -12.50% | -12.94% | -14.34% | -18.50% | -22.06% | -27.30% |
| -12.52% | -13.62% | -14.62% | -19.40% | -22.40% | -27.88% |
| -12.61% | -13.73% | -14.65% | -19.67% | -22.82% | -28.97% |
| -12.64% | -13.75% | -14.85% | -20.38% | -23.87% | -30.66% |
| -12.75% | -13.75% | -14.96% | -20.39% | -24.14% | -31.97% |
| -12.79% | -13.79% | -15.22% | -20.58% | -24.54% | -32.22% |
| -12.81% | -13.85% | -15.40% | -20.63% | -24.64% | -32.27% |

1. Which of the following is the most accurate figure for the portfolio’s 5% annual VAR?
   A. $8.06 million.
   B. $9.50 million.
   C. $12.79 million.

2. The $92 million Benson Fund has an expected return of 9% per annum. The annual 1% VAR has been estimated, using the analytical method, at $23.874 million. Which of the following is closest to the fund’s daily 1% VAR (assuming 250 trading days in a year, 2.33 standard deviations associated with 1% VAR, and statistical independence between the days)?
   A. $1.222 million.
   B. $1.51 million.
   C. $2 million.

Following are two statements regarding credit risk:

Statement 1: The theoretical potential credit risk of an equity swap is greatest towards the middle of the swap’s life, whereas the potential credit risk of a typical currency swap remains high as maturity approaches.

Statement 2: The long position in a forward contract on a stock will have increasing potential credit risk if the stock price increases and short-term rates decline.
3. Which of the following is correct regarding the accuracy of the previous statements?

<table>
<thead>
<tr>
<th>Statement 1</th>
<th>Statement 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Accurate</td>
<td>Accurate</td>
</tr>
<tr>
<td>B. Accurate</td>
<td>Inaccurate</td>
</tr>
<tr>
<td>C. Inaccurate</td>
<td>Inaccurate</td>
</tr>
</tbody>
</table>

The following graph shows weekly values for the Zeta Fund during 2012:

4. If the expected return on the Zeta fund is 12.8%, which of the following is the most accurate estimate for the Zeta fund’s annual RoMAD?

   A. 1.12.
   B. 1.36.
   C. 1.64.

Following are two statements regarding position limits:

Statement 1: Nominal position limits possess the advantage that they permit flexibility through the use of leverage or replicating transactions.

Statement 2: VAR-based position limits possess the advantage that, since they are expressed in the same units for all asset classes, they allow us to compute the total position limit (in risk-adjusted terms) as the sum of the individual limits.

5. Which of the following is correct regarding the accuracy of the previous statements?

<table>
<thead>
<tr>
<th>Statement 1</th>
<th>Statement 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Accurate</td>
<td>Accurate</td>
</tr>
<tr>
<td>B. Accurate</td>
<td>Inaccurate</td>
</tr>
<tr>
<td>C. Inaccurate</td>
<td>Inaccurate</td>
</tr>
</tbody>
</table>
6. Suppose that a firm has total assets of $75 million and an annual standard deviation of returns of 17%. Which of the following is closest to the level of capital at which there would be a 2.5% chance of insolvency over a one-year horizon? A 2.5% probability distributed over two tails is plus or minus 1.65 standard deviations. A 2.5% probability in one tail is 1.96 standard deviations.

A. $18.75 million.
B. $21 million.
C. $25 million.
47. Risk Management

THIS QUESTION HAS ONE PART FOR A TOTAL OF 8 MINUTES.

Gavin Gustavsen is an analyst who covers the engineering industry. His most recent report on Aeromotive Propulsion Inc. (API) includes the following section:

“API does business in many countries, and it is frequently the case that costs and revenues are denominated in foreign currencies. Additionally, dividends from subsidiary companies, and the investments in those subsidiaries, are frequently foreign currency-denominated. A variety of commodities, including energy and a range of raw and processed materials, are used as inputs to API’s manufacturing process, and these are mainly purchased from external suppliers. Finance is drawn from a range of sources; at the shorter end, this includes term debt, commercial paper, and lines of credit from at least five commercial banks. Surplus cash is invested in medium- and short-term fixed-rate securities. Many of the risks faced by API are hedged using derivative contracts. While some of these are exchange traded, the bulk of them are bilateral over-the-counter contracts.”

In the light of the previous, identify and justify four risk exposures that are clearly evident in the information provided and should be reported as part of an enterprise risk management system (ERM) for Aeromotive Propulsion, Inc.

(8 minutes)
Level III Review Workshop Questions
Risk Management

48. **Risk Management**

You are in the process of applying for a position as senior risk manager at a pension fund. You will have overall responsibility for putting in place a series of checks and procedures that all portfolio managers will be required to follow.

As part of the selection procedure, you are asked to give a response to the following questions.

1. Which of the following would you consider *least* necessary for the establishment of a risk governance procedure?
   A. Proper staff training and qualification.
   B. External reviews of procedures at periodic intervals.
   C. Evaluation procedures and a robust control method.

Following are two statements regarding the measurement and management of risk:

Statement 1: As a general rule, if a risk can be identified, and it is possible to reduce or eliminate it, then this should be done.

Statement 2: Market and credit risk for bonds are related; if interest rates increase, both risks increase.

2. Which of the following is correct regarding the accuracy of the previous statements?

<table>
<thead>
<tr>
<th>Statement 1</th>
<th>Statement 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Accurate</td>
<td>Inaccurate</td>
</tr>
<tr>
<td>B. Inaccurate</td>
<td>Accurate</td>
</tr>
<tr>
<td>C. Inaccurate</td>
<td>Inaccurate</td>
</tr>
</tbody>
</table>

A fund is assessing the monthly VAR of its $90 million stock portfolio using the variance/covariance method. The portfolio is currently 70% invested in large-cap stocks and 30% in small cap. The monthly expected return on the large-cap stocks is 1.5%, while that for the small-cap stocks is 1.9%. The corresponding monthly standard deviations are 3.9% and 4.6%. The correlation between the two asset classes is +0.871.

3. The one-month, 5% VAR is closest to:
   A. $2.133 million.
   B. $4.467 million.
   C. $5.925 million.
Following are two statements regarding VAR:

Statement 1: The variance-covariance method copes badly with skewed return distributions. For example, negative skewness, where a few extreme losses coexist with a large number of much smaller gains.

Statement 2: While the historical method has the advantage of being nonparametric, it makes the assumption that whatever distribution prevailed in the past will hold in the future.

4. Which of the following is correct regarding the accuracy of the previous statements?
   - Statement 1  Statement 2
     A. Accurate    Accurate
     B. Accurate    Inaccurate
     C. Inaccurate  Accurate

Following are two statements regarding credit risk:

Statement 1: Potential credit risk is always greater than actual credit risk.

Statement 2: At any point in time, potential credit risk is likely to overstate what will be lost due to credit risk.

5. Which of the following is correct regarding the accuracy of the previous statements?
   - Statement 1  Statement 2
     A. Accurate    Accurate
     B. Inaccurate  Accurate
     C. Inaccurate  Inaccurate

6. Which of the following most accurately describes stress testing?
   A. Stress testing is an alternative to VAR analysis.
   B. Stylized scenarios look at the situations that will cause the largest decline in portfolio value.
   C. Factor push is a computer-based approach designed to find the combination of events that will cause the largest decline in portfolio value.
LEVEL III REVIEW WORKSHOP
QUESTIONS: RISK MANAGEMENT: ANSWERS

46. Risk Management

1. C Out of the 500 simulated returns, the worst 5% are the bottom 25. Thus, the 5% VAR is calculated using the 25th-from-the-bottom return, which is –19.67%. Given the portfolio value of $65 million, this implies the VAR is 0.1967 × $65 million = $12.7855 million.

2. C The $23.874 million represents the loss in value associated with the rate of return 2.33 standard deviations (equivalent to a 98% confidence interval with 1% of observations in each tail) below 9% \([i.e., -23.874 = 92 \times (0.09 - 2.33\sigma_p)]\).

   Hence, \(-0.2595 = 0.09 - 2.33\sigma_p\) and \(\sigma_p = 0.3495/2.33 = 0.15\).

   To get to the daily VAR (using 250 days per year), we have to estimate the daily expected return \((= 0.09 / 250 = 0.00036)\) and the daily standard deviation \([=0.15 / (250)^{0.5} = 0.009487]\).

   Minimum daily return 1% of the time = 0.00036 – (2.33 × 0.009487) = –0.021745, implying the daily 1% VAR = $92 million × 2.1745% \(\cong\) $2 million.

3. B Statement 1 is true. The standard currency swap retains high credit risk until expiration because the large NPs remain to be exchanged up to expiration. With other swaps, NPs are not exchanged, so as time to expiration declines, the remaining cash flows to be exchanged and expected potential credit risk decline.

   Statement 2 is false. Value and potential credit risk to the long position is the new price of the underlying minus the PV of initial contract price. The increasing stock price does increase value, but the declining short-term rates means a lower discount rate for calculating PV and a higher PV of the initial contract price. A larger subtraction is leading to lower value for the long. Note that the price of the underlying is usually the more important factor, but it is false to believe that is the only factor determining value of the contract position. This case could only be resolved with a calculation, if the data were provided.

4. B A drawdown occurs from a high-water mark (HWM) during the period of data until the lowest low after that HWM. In this sequence of data, there are two HWM and drawdowns:

   i. Day 4 establishes a HWM at 476. The fund begins an irregular decline to 444.3 for a drawdown of 444.3 / 476 – 1 = –6.7%.

   ii. Day 29 sets a new HWM at 501.3 and begins another irregular decline, and the lowest subsequent low is day 47 at 454.2 for a drawdown of 454.2 / 501.3 – 1 = –9.4%.

   The maximum drawdown is 9.4% making RoMAD (return over maximum drawdown) = 12.8% / 9.4% = 1.36.
5. C  Statement 1 is false: The fact that nominal position limits can be circumvented through the use of leverage or replicating transactions is a disadvantage (from the risk management perspective).

Statement 2 is also false: Although VAR can be expressed in the same units for any asset class, position VARs cannot just be summed to produce a total portfolio VAR because of correlation effects.

6. C  Insolvency occurs if all equity capital is lost. If equity capital is equal to the 1-year 2.5% VAR, then there is a 2.5% chance of insolvency over a one-year horizon. In this case, 1-year 2.5% VAR = $75 million × (1.96 × 0.17) = $24.99 million. Note that VaR calculations normally consider expected return. Because no assumed rate of increase in equity capital was provided, that was ignored in this case and only the downside risk to equity capital based on standard deviation was considered.
47. Risk Management

The following risk exposures should be reported as part of an enterprise risk management system for Aeromotive Propulsion Inc.:

Market risks:

Currency risk
The fact that API has expenditures and receipts denominated in foreign currency terms means that it has exposures to exchange rates.

Interest rate risk
The fixed-rate securities in which API has invested will see their value affected by interest rate changes, as will the various forms of borrowing.

Commodity risk
API is exposed to a variety of commodity prices (and those commodity prices may, themselves, be influenced by currency movements).

Credit risk:
The various over-the-counter derivative contracts imply exposure to credit risk, since the default of a counterparty could result in significant losses for API, particularly if a contract that is intended as a hedge fails due to a default at a time when the positions being protected are making substantial losses.

Political risk:
API has operations in many countries and is vulnerable to acts by foreign governments (e.g., regarding the remittance of dividends, or more generally, regarding the repatriation of assets). The imposition of tariffs on API’s products is another possibility.

Candidate discussion: These risks are directly evident from the data. It is likely there are other risks, but unless one of those more directly flows from the case facts given, do not use it.
48. **Risk Management**

1. **B** External review might be desirable but was not specifically listed as a condition for a successful risk governance system. Both answers A and C were listed as components of risk governance.

2. **C** Statement 1 is false. The aim should not be the total elimination of risk, but rather its efficient allocation—the taking of risk is necessary for the generation of returns, although this should be done only in areas of expertise/comparative advantage.

   Statement 2 is also false. Increasing interest rates reduces the value of long positions in bonds. The losses are market value risk. However, potential credit risk is the market value of the position (if positive). The lower bond value is lower credit risk. This is why market risk is considered left tail (market value down) and credit risk is right tail (market value up) risk.

3. **B** The portfolio expected monthly return is calculated as the weighted average:

   \[ R_p = (0.7 \times 1.5\%) + (0.3 \times 1.9\%) = 1.62\% \]

   The portfolio standard deviation equals:

   \[ \sigma_p = \left( (0.7 \times 3.9\%)^2 + (0.3 \times 4.6\%)^2 + (2 \times 0.7 \times 0.3 \times 0.871 \times 3.9\% \times 4.6\%) \right)^{0.5} = 3.99\% \]

   The 5% VAR corresponds to the return that lies 1.65 standard deviations below the mean, consequently: \( 1.62\% - (1.65 \times 3.99\%) = -4.9635\% \).

   In absolute terms this equates to a potential loss of \( 4.9635\% \times 90 \text{ million} = 4.467 \text{ million} \).

4. **A** Statement 1 is true.

   Statement 2 is true.

5. **B** Statement 1 is false. Potential credit risk is market value, while actual credit risk is any cash flow immediately due to be received. At expiration, these will be the same thing.

   Statement 2 is true because market value is likely to overstate the loss. Estimating true loss would have to also consider probability of default and recovery after default.

6. **C** The description of factor push is accurate. It is a highly mathematical approach to finding the worst combination of events. In contrast, stress testing is a complement to VAR and not an alternative. VAR is concerned with quantifying loss under normal market conditions. Stress testing then further examines the circumstances and market conditions associated with loss. Scenario analysis is generally done by increasing and decreasing key variables; therefore, it will examine returns that are both better and worse than expected.
LEVEL III REVIEW WORKSHOP
QUESTIONS: DERIVATIVES

49. Derivatives

A. You have a $60 million equity portfolio with a beta of 1.2, and appropriate equity futures are trading at 2674 (having a multiplier of $125 and a beta of 0.96). What futures trade would be required to reduce the beta to 0.8?

(3 minutes)

B. Suppose that your fund wants to invest $55 million synthetically in U.S. stock.
• 5-month S&P 500 futures are quoted at 1,276 (the multiplier is $250).
• The S&P dividend yield is 1.3%.
• The U.S. risk-free rate is 3.5%.

At expiration, the position will be renewed with futures contracts.

How many futures contracts should be bought, and how much needs to be invested in cash (T-bills or risk-free bonds)?

(4 minutes)

C. Suppose another investor has $100 million of stock and wants to take a $55 million synthetic cash position. Using the information in Part B, calculate the initial positions in contracts, the risk-free asset, and stock required.

(4 minutes)

D. In 55 days, Boulder Bank will lend $45 million for 90 days at LIBOR plus 240bp; LIBOR is currently 3.85%.

A European-style put is purchased on 90-day LIBOR, to expire in 55 days, at an exercise rate of 3.75%, at a cost of $25,000.

If exercised, the payment will occur 90 days later (on maturity of the loan).

Calculate Boulder Bank's effective annual lending return (both with and without the put) assuming LIBOR in 55 days of 3.5%.

(10 minutes)
50. Derivatives

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

Belinda Berg is in charge of an international equity fund. She has approached you for advice concerning ways in which derivatives might be used.

A. The U.S. stocks in the fund (with a value of $50 million) are predominantly growth stocks, with a beta of 0.95. She wants to use futures to shift 25% of this to value stocks (with an average beta of 1.22). The betas of the corresponding S&P growth and value index futures contracts are 1.02 and 1.09, and they are currently quoted at 551.60 and 562.40, respectively. Both futures contracts have a multiplier of $250. **Determine** the appropriate strategy.

   (6 minutes)

B. **Discuss two** potential weaknesses with the previous strategy.

   (4 minutes)

Berg is also interested in evaluating the effectiveness of her derivative positions. In another portfolio, she implemented an overlay strategy using stock futures to increase beta to 1.2 from 0.9. The portfolio had a beginning value of EUR 10,000,000. The ending value of the portfolio (unhedged) was EUR 11,950,000. She used 23 contracts for the hedge with full (including multiplier) contract prices at initiation and close of 131,250 and 157,811. During the hedge period, the broad market return (beta of 1.0) was 21.1%.

C. **Calculate** the difference in EUR between the gain on the hedged portfolio and what the gain would have been if she had achieved the target beta of 1.2. **Show your calculations.**

   (5 minutes)
51. Derivatives

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

Tom Takemitsu is interested in the use of stock options as a way of obtaining exposures to stock movements that are not otherwise available. He has obtained current prices for options on Ives Inc.’s stock (current stock price = $84.20 and each contract is for 100 shares) as follows:

<table>
<thead>
<tr>
<th>Strike</th>
<th>Call Premia</th>
<th>15 day (May)</th>
<th>105 day (Aug)</th>
<th>195 day (Nov)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>4.73</td>
<td>7.84</td>
<td>10.11</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>1.44</td>
<td>4.94</td>
<td>7.28</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>0.22</td>
<td>2.87</td>
<td>5.05</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strike</th>
<th>Put Premia</th>
<th>15 day (May)</th>
<th>105 day (Aug)</th>
<th>195 day (Nov)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>0.30</td>
<td>2.05</td>
<td>2.98</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>2.00</td>
<td>4.04</td>
<td>4.96</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>5.76</td>
<td>6.88</td>
<td>7.55</td>
<td></td>
</tr>
</tbody>
</table>

A. **Compute** the maximum profit and loss and the breakeven stock price(s) for a November put butterfly. This strategy involves buying the 80 and 90 put while selling two 85 puts.

(6 minutes)

B. **Contrast** a reverse butterfly with a long straddle in terms of motivations, number of options, and strike prices used, plus likely maximum profits and losses.

(5 minutes)

C. **Compute** the maximum profit and loss and the breakeven stock price(s) for a collar constructed using a long position in the stock, together with options having August expiration and exercise prices of 80 and 90.

(6 minutes)
D. Tom informs you that the 80 August call has a delta of 0.73. Supposing that he has written 200 such calls, explain how he could use the stock to delta hedge his exposure. Discuss the likely effect of a subsequent decline in the stock price on the performance of the hedged position.

(6 minutes)

E. Immediately after setting up the delta hedge there was a significant fall in the volatility of Ives, Inc.’s stock. Explain the immediate effect on the hedged position.

(3 minutes)
52. **Derivatives**

A bank has a $50 million portfolio consisting of 6-year commercial interest-only loans with a fixed interest rate of 12%, payable semi-annually. The bank funds its loan portfolio by borrowing at 6-month LIBOR.

An insurance company has committed itself to pay a 9% rate for the next six years on a $50 million GIC it has issued. The insurance company will invest the $50 million in what it considers an attractive 6-year floating rate instrument in a private placement. The interest rate on this instrument is 6-month LIBOR plus 160 basis points. The coupon is set every six months.

For this question, assume the duration of a fixed-rate bond is 75% of its maturity, the duration of a floating-rate bond is 50% of its reset period, and that swap terms do not allow negative interest rates.

1. Which of the following statements correctly represents the interest rate risk faced by the insurance company on its overall asset/liability position?
   - A. Overall, its assets less liabilities have a positive duration, and consequently, it is at risk from interest rate falls.
   - B. Overall, its assets less liabilities have a negative duration, and consequently, it is at risk from interest rate falls.
   - C. Overall, its assets less liabilities have a negative duration, and consequently, it is at risk from interest rate rises.

2. Which of the following correctly represents the swaps needed by the bank and the insurance company that would enable each party to remove its asset/liability risk?
   - A. The bank needs to enter into a receive-fixed swap, and the insurance company needs to enter into a pay-fixed swap. The swaps must have a notional principal of $50 million, a tenor of six years, and interest settlements every six months.
   - B. The bank needs to enter into a pay-fixed swap, and the insurance company needs to enter into a receive-fixed swap. The swaps must have a notional principal of $50 million, a tenor of six years, and interest settlements every six months.
   - C. The bank needs to enter into a receive-fixed swap, and the insurance company needs to enter into a receive-fixed swap. The swaps must have a notional principal of $50 million, a tenor of six years, and interest settlements every six months.

3. The duration of the swap required by the bank is closest to:
   - A. +4.25.
   - B. –4.25.
   - C. –5.50.
4. Assume that the bank enters into the appropriate swap with a swap dealer at an annual rate 10.40%, and the insurance company enters into the appropriate swap with the same swap dealer at 10.20%. **Calculate** the spread income that each party earns each year on their overall position.

<table>
<thead>
<tr>
<th>Dealer</th>
<th>Bank</th>
<th>Insurance company</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 20 basis points</td>
<td>80 basis points</td>
<td>120 basis points</td>
</tr>
<tr>
<td>B. 20 basis points</td>
<td>160 basis points</td>
<td>120 basis points</td>
</tr>
<tr>
<td>C. 20 basis points</td>
<td>160 basis points</td>
<td>280 basis points</td>
</tr>
</tbody>
</table>

5. A firm sells an interest rate floor with a floor rate of 3% and purchases a cap with a cap rate of 4.4%. The cap and floor have quarterly settlement and a notional principal of $10 million. The maximum outflow and inflow the buyer can expect on a given settlement is (assume equal settlement periods):

| A. maximum outflow = $75,000, and maximum inflow = $140,000. |
| B. maximum outflow = $110,000, and maximum inflow = $140,000. |
| C. maximum outflow = $75,000, and maximum inflow = unlimited. |

6. Which of the following best describes the performance of a payer swaption in an environment of falling interest rates?

| A. The payer swaption becomes less valuable. |
| B. The payer swaption becomes more valuable. |
| C. Such a swaption would be used to synthetically extend the life of a pay-fixed swap. |
53. Derivatives

Malcolm Mahler manages the Bonzer Corporate bond fund. The bond fund has a current value of $350 million and a duration of 6.3. Mahler is convinced that yields are about to fall (by 80bp) and therefore would like to move the fund to a more aggressive stance. He feels that a duration of 7.7 would be appropriate given the circumstances.

The CTD underlying the T-bond futures has a duration of 10.65. The bond contract is quoted at 108.218, and each contract is for 100,000 par.

1. What trade in the T-bond futures would result in the desired change in modified duration?
   A. The purchase of 425 contracts.
   B. The sale of 441 contracts.
   C. The purchase of 441 contracts.

2. This trade will most likely produce imperfect results. Which of the following items is least likely to lead to the imperfect results?
   A. The number of contracts was rounded.
   B. The CTD can change.
   C. It is a cross hedge.

3. Suppose that Mahler were to use a plain vanilla swap (five-year maturity, semi-annual payments with a swap duration of 3.5) to effect the duration change. Which of the following would be the most appropriate transaction for him to undertake?
   A. Enter the swap as the floating-rate payer with a notional principal of $98 million.
   B. Enter the swap as the fixed-rate payer with a notional principal of $140 million.
   C. Enter the swap as the floating-rate payer with a notional principal of $140 million.
49. Derivatives

A. 

\[
\text{number of contracts} = \frac{0.8 - 1.2}{0.96} \times \frac{\$60,000,000}{2674(\$125)} = -0.4167 \times 179.51 = -75 \text{ (rounded)}
\]

B. Buy contracts and invest sufficient funds at risk-free to pay for the contracts at expiration.

\[
\text{number of contracts} = \frac{\$55m(1.035)^{5/12} / (1276)(\$250)}{174.9} = 174.9
\]

This is rounded to 175, so the required investment in cash (risk-free bonds) will be:

\[
(175)(1276 \times \$250) / 1.035^{5/12} = \$55,030,516
\]

C. Sell contracts and hold sufficient shares of the underlying that with dividends reinvested the shares can be “delivered” to close the position.

\[
\text{number of contracts} = \frac{\$55m(1.035)^{5/12} / (1276)(\$250)}{1.013^{5/12}} = 174.9
\]

Shares of the S&P to hold today:

\[
(175)(250) / 1.013^{5/12} = 43,515
\]

Synthetic cash does not require holding a position in the risk-free asset.

Note: The synthetic cash position is equivalent to investing the PV of the contracted shares at the contract price. If that question had been asked the initial amount in synthetic cash is:

\[
(175)(250)(1276) / 1.035^{5/12} = \$55,030,516, \text{ this is higher than the desired } 55m \text{ because the number of contracts was rounded up.}
\]
D. The put premium of $25,000, plus interest over 55 days at an opportunity cost of funds of 3.85% + 2.4% = 6.25%, amounts to:

\[ 25,000 \times \left(1 + \frac{0.0625 \times 55}{360}\right) = 25,239 \]

The $45m is loaned for 90 days at LIBOR + 2.4%.

LIBOR = 3.5%, so rate charged = 5.9%.

Repayment of loan produces:

\[ 45m \times \left(1 + \frac{0.059 \times 90}{360}\right) = 45,663,750 \]

The option will expire in-the-money, and will give a payoff of:

\[ 45m \times (0.0375 - 0.035) \times \frac{90}{360} = 28,125 \]

With the option, we have paid $45m + $25,239 = $45,025,239 and received $45,663,750 + $28,125 = $45,691,875 after 90 days.

The effective annual return is thus:

\[ \frac{45,691,875}{45,025,239}^{\frac{365}{90}} - 1 = 6.14\% \]

In the absence of the option the effective annual return would have been:

\[ \frac{45,663,750}{45,000,000}^{\frac{365}{90}} - 1 = 6.12\% \]
50. Derivatives

A. Belinda wants to shift 0.25 × $50 million = $12.5 million from growth (β = 0.95) to value stocks (β = 1.22). This requires two transactions. In each case, we use the formula:

\[
\text{number of contracts} = \frac{\beta_{\text{target}} - \beta_P}{\beta_P} \left( \frac{V_P}{P_f (\text{multiplier})} \right)
\]

Sell growth index futures contracts (β = 1.02): number = \(\frac{-0.95}{1.02} \times \frac{12.5m}{551.6 \times 250} = 84\) contracts.

Buy value index futures contracts (β = 1.09): number = \(\frac{1.22}{1.09} \times \frac{12.5m}{562.4 \times 250} = 100\) contracts.

Overall strategy = sell 84 growth index futures, buy 100 value index futures. (Both trades must be rounded to the closest whole number of contracts.)

B. • The stocks in the portfolio and the contracts may perform differently than the assumed betas used to construct the hedge.
  • The number of contracts used for the hedge was rounded.
  • We do not know if the expiration of the contracts differs from the desired hedging period, creating basis risk.
  • There is cross hedge risk because we know the portfolio and contract betas differ, so the growth and value stocks in the portfolio are not the same as in the indexes.

C. The market increased 21.1%. With a target beta 1.2, the hedged portfolio should have increased 1.2 × 21.1% = 25.32% on 10,000,000 beginning value for a gain of 2,532,000.

Her unhedged portfolio increased 1,950,000.

To increase beta, she would have purchased contracts. Her gain on contracts was:

\[23(157,811 - 131,250) = 610,903,\]

making her hedged portfolio gain 2,560,903.

Her portfolio outperformed her targeted gain by 2,560,903 – 2,532,000 = EUR 28,903.
51. Derivatives

A. First examine the butterfly payoff diagram.

To construct a butterfly with puts, start with the right side of the graph.

A November put butterfly = long Nov 90 put (prem = 7.55) + 2 short Nov 85 put (prem = 4.96) + long Nov 80 put (prem = 2.98) for a net premium paid of 7.55 – (2 x 4.96) + 2.98 = 0.61

Max loss occurs if the stock closes above 90 or below 80. At 90, the puts are worthless and the net premium of 0.61 is lost. At 80, each short 85 put is worth –5 for –10. The long 90 put is worth +10 for net put value of 0. Again, the net premium is lost.

Max profit is if the stock is 85. Only the long 90 put is ITM. It is worth 5 less the initial investment of 0.61 for a max gain of 4.39.

Lower breakeven = 80 + 0.61 = 80.61

Upper breakeven = 90 – 0.61 = 89.39

B. Same motivation, to profit from increasing volatility.

The straddle uses and a long call and a long put with the same strike price. The butterfly uses four options with three strike prices.

The reverse butterfly will include two long and two short options so (all else the same) a smaller initial investment and therefore a smaller max loss.

The two short positions will also reduce the max gain of the butterfly.
C. The collar is constructed using a long position in the stock (84.20), together with options having August expiration and exercise prices of 80 (long put, premium = 2.05) and 90 (short call, premium = 2.87), making the initial net investment is $84.20 + 2.05 – 2.87 = 83.38.

From the collar diagram:

Max loss is $S = 80$. Both options expire worthless. The portfolio is worth 80 for a loss of 3.38.

Max gain is $S = 90$. Both options expire worthless. The portfolio is worth 90 for a gain of 6.62.

From $S = 90$, the stock must decline 6.62 to 83.38 for breakeven. From $S = 80$, the stock must appreciate 3.38 to 83.38.

D. The short call has a negative delta of –0.73. It will lose (gain) 0.73 in value as the stock increases (decreases) 1.0. The hedge is to buy 0.73 shares of the stock for each short call.

But as the stock declines 1.0, the gain on option will be less than implied by the –0.73 delta. The gain on the option will not fully offset the loss on the stock position and the hedge will underperform.

E. As volatility declines, the long stock position’s value is unaffected. The call declines in value, which is a gain for the short position. Net, the hedged portfolio increases in value.
52. Derivatives

1. B Position before swaps:

<table>
<thead>
<tr>
<th>BANK</th>
<th>INSURANCE COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-month LIBOR</td>
<td>6-month LIBOR</td>
</tr>
<tr>
<td>Fixed 12%</td>
<td>Fixed 9%</td>
</tr>
</tbody>
</table>

Risk: Increase in LIBOR
Risk: Decrease in LIBOR
Positive duration
Negative duration

2. B Bank needs to enter into a pay-fixed swap. Insurance company needs to enter into a receive-fixed swap. The swaps must have a notional principal of $50 million, a tenor of six years, and interest settlements every six months.

3. B A pay-fixed swap is equivalent to being long a floating-rate bond and short a fixed-coupon bond. Hence, using the assumptions stated in the question of \( d(\text{floating}) = \frac{1}{2} \) reset period and \( d(\text{fixed}) = \frac{3}{4} \) maturity, the approximate duration is given by \( \frac{0.5}{2} - (0.75 \times 6) = -4.25 \).

4. C Position after swap:

<table>
<thead>
<tr>
<th>BANK</th>
<th>DEALER</th>
<th>INSURANCE COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-month LIBOR</td>
<td>6-month LIBOR</td>
<td>6-month LIBOR</td>
</tr>
<tr>
<td>Fixed 12%</td>
<td>10.4%</td>
<td>10.2%</td>
</tr>
</tbody>
</table>

Spread = (12 – 10.4) = 160 bps
Spread = (10.2 + 1.6 – 9) = 280 bps

5. C The firm’s maximum outflow would occur from the floor when the reference rate is zero: $10,000,000 \times (0.03 – 0) / 4 = $75,000. Although interest rates cannot go to infinity, there is no upper limit on what the owner can expect from the cap. Thus, unlimited is the best answer.

6. A The payer’s swaption becomes less valuable. In an environment of falling interest rates, investors would be better served to negotiate a new swap arrangement at a lower market interest rate than to exercise the payer’s swaption and pay a higher fixed rate.
53. Derivatives

1. A Number of contracts to adjust duration

   \[
   \frac{(D_{\text{target}} - D_{\text{initial}}) \times P_{\text{initial}}}{D_f \times P_f} \times \text{yield beta}
   \]

   \[
   = \frac{(7.7 - 6.3) \times 350,000,000}{10.65 \times 108,218 \times 100} \times 1 = 425
   \]

2. A The rounding is trivial. Less than 0.5 of 425 contracts. The success of the hedge depends on the accuracy of the duration estimates and duration assumes a parallel shift in rates, (i.e., a yield beta of 1.0 for the portfolio of corporate bonds versus the CTD). However, spreads can change and that assumption will have been incorrect. Spread changes are a significant risk. Change in the CTD is also a significant risk because the duration of the futures is determined by the duration of the CTD. The change could be significant.

3. C Enter the swap as the floating rate payer with a notional principal of $140 million:

   \[
   \text{NP} = V \left( \frac{MD_{\text{target}} - MD_{V}}{MD_{\text{swap}}} \right)
   \]

   where: \( D_{\text{pay floating}} = D_{\text{fixed}} - D_{\text{floating}} \)

   The notional principal required is approximately $350m \times (7.7 - 6.3) / 3.5 = $140m. Since we are aiming to increase the duration of the fund, we need to receive fixed and pay floating under the swap.
LEVEL III REVIEW WORKSHOP QUESTIONS: TRADING, MONITORING, AND REBALANCING

54. Trading, Monitoring, and Rebalancing

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

A. For each of the following, discuss which of the two orders in shares of Topform Corporation will have a greater market impact. Assume that all other factors are the same.

(3 minutes)

i. a) An order to buy 15,000 shares placed by a trader on the NYSE.
   b) An order to buy 100,000 shares placed by the same trader on the NYSE.

ii. a) An order to buy 20,000 shares placed by a trader on the NYSE.
   b) An order to buy 20,000 shares placed on the NYSE by another trader who is believed to represent informed investors in the stock.

B. A portfolio manager would like to buy 7,000 shares of a recently floated company. He was unsuccessful in securing any stock at the IPO price of $12. The portfolio manager would still like to have 7,000 shares, but not at a price above $16 per share.

(3 minutes)

i. State whether he should place a market or a limit order.
ii. Give one advantage of each type of order, given his purposes.
C. Steady Motors Inc. is a company listed on NASDAQ. A trader sold 100 shares of this company yesterday at 14:52:26 at a price of $5.32 per share. All the trades that occurred in Steady Motors yesterday are listed below.

<table>
<thead>
<tr>
<th>Time</th>
<th>Trade Price ($)</th>
<th>Shares Traded</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:49:44</td>
<td>5.42</td>
<td>200</td>
</tr>
<tr>
<td>10:50:06</td>
<td>5.44</td>
<td>200</td>
</tr>
<tr>
<td>11:50:11</td>
<td>5.52</td>
<td>100</td>
</tr>
<tr>
<td>13:50:14</td>
<td>5.54</td>
<td>100</td>
</tr>
<tr>
<td>14:35:57</td>
<td>5.40</td>
<td>1,100</td>
</tr>
<tr>
<td>14:52:26</td>
<td>5.32</td>
<td>100</td>
</tr>
<tr>
<td>15:54:57</td>
<td>5.30</td>
<td>100</td>
</tr>
</tbody>
</table>

The trader is analyzing the implicit costs of the trade, focusing on the bid-ask spread and the market impact using specified price benchmarks.

(6 minutes)

Calculate the estimated implicit transaction costs using each of the following as the price benchmark:

i. Opening price
ii. Closing price
iii. Volume-weighted average price (VWAP)

D. A portfolio manager is evaluating the trade execution strategy on a recent portfolio decision. The relevant information is that 1,000 shares were ordered to be bought on Tuesday with a benchmark (strike) price of $10.00. On Tuesday, 600 shares were purchased at $10.02 per share. Commissions and fees were $20. The stock closes at $9.99. On Wednesday, 100 more shares were purchased at $10.08 per share. Commissions and fees were $12. The stock closed on Wednesday at $10.01 per share. The remaining shares were not purchased, and the order was canceled on Thursday just as the market closed at $10.05 per share.

(8 minutes)

i. Calculate the implementation shortfall for this trade.
ii. Calculate the four components of the implementation shortfall for this trade as percentages of the cost of the paper portfolio.

E. Another manager placed a limit order to sell 20,000 shares at 47. The market price at the time was 46.90. After some delays, the manager sold 15,000 at 47 and paid total commissions of $1,500. The remaining order was canceled at 46.50. Calculate the total implementation shortfall for the trade. Show your calculations.

(3 minutes)
55. **Trading, Monitoring, and Rebalancing**

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

Jackie Sprit has been asked to advise the Scotts University Endowment Fund on an appropriate rebalancing strategy for its overall investment portfolio. Scotts University has seen its endowment fund grow over the past five years due to good investment performance and, as a consequence, the fund’s willingness and ability to assume risk have increased. The endowment fund receives little new funding each year.

Sprit’s outlook is for a bull market in growth assets over the next three to five years. He also believes that volatility will be below historical averages during that same time period. The Investment Committee of the endowment fund has directed Sprit to incorporate his views into his recommendation.

The Committee has stated that it does not want the market value of the portfolio to decline more than 20% below its current market value.

The committee is considering the following three rebalancing strategies:

i. Constant-mix (CM)
ii. Buy-and-hold (B&H)
iii. Constant-proportion (CPPI)

A. **Determine** which one of the three rebalancing strategies Sprit should recommend for the Scotts University endowment fund. **Justify** your response with two reasons based on the circumstances described in the case.

(5 minutes)

B. For each of the two rebalancing strategies not selected, **explain** one reason it is not suitable for Scott:

(4 minutes)
Arnold Jackson is the founder and CEO of Gammadyne Inc., a company that manufactures processor chips for smartphones. His new investment advisor, Bettany Davenport, schedules a meeting with him to discuss issues around his investment portfolio. Jackson has previously undertaken the management of the portfolio himself but has found that, as his business has grown, he has less and less time to devote to this process.

Jackson has been rebalancing his portfolio to strategic (target) weights at the start of each month, but Davenport strongly suggests that it would be preferable to adopt a percentage-of-portfolio rebalancing approach, with daily monitoring and rebalancing (when necessary) back to target weights.

As an illustration, she takes the following data for May 31 in order to show the effect of the two methods on the rebalancing that would be undertaken on June 1. She makes the assumption of corridor widths set at ± 7.5% of the strategic allocation. (For example, a 10% target allocation would have a corridor of 9.25% to 10.75%.)

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Strategic Asset Allocation: Target Weights</th>
<th>Closing Allocation on May 31</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. equity</td>
<td>40%</td>
<td>42%</td>
</tr>
<tr>
<td>International equity</td>
<td>25%</td>
<td>23%</td>
</tr>
<tr>
<td>U.S. fixed income</td>
<td>20%</td>
<td>19%</td>
</tr>
<tr>
<td>Other asset classes</td>
<td>15%</td>
<td>16%</td>
</tr>
</tbody>
</table>

A. State whether Davenport’s rebalancing method would result in a higher, lower, or identical weighting for U.S. equity and International equity on June 1 compared to the May 31 allocation shown in the table. Justify your answer.

(4 minutes)
Jackson's risk tolerance has substantially increased as his business has become more successful. This leads Davenport to wonder about the optimal corridor widths for the four asset classes in the first exhibit. To analyze this, she collects the following data.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Standard Deviation</th>
<th>Transaction Costs in b.p.</th>
<th>Correlation to Rest of Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. equity</td>
<td>15%</td>
<td>25</td>
<td>0.67</td>
</tr>
<tr>
<td>International equity</td>
<td>22%</td>
<td>37</td>
<td>0.55</td>
</tr>
<tr>
<td>U.S. fixed income</td>
<td>9%</td>
<td>16</td>
<td>0.62</td>
</tr>
<tr>
<td>Other asset classes</td>
<td>16%</td>
<td>127</td>
<td>0.15</td>
</tr>
</tbody>
</table>

B. Based on the new information, explain and justify why:
   i. all corridor widths should be increased.
   ii. U.S. fixed income should have a narrower corridor.
   iii. the “other asset classes” category should have a wider corridor.

Answer each part of this question independently and not in relation to the other parts of this question. Only one justification is required for each part (i, ii, and iii).

(6 minutes)
LEVEL III REVIEW WORKSHOP
QUESTIONS: TRADING, MONITORING, AND REBALANCING: ANSWERS

54. Trading, Monitoring, and Rebalancing

A. i. The second order will have a greater market impact because it is bigger in size.

ii. The second order will have a greater market impact because the trader placing it has a reputation of representing informed investors in the stock. Thus, other traders may believe that the stock's intrinsic value differs from the current market price and adjust their quotations accordingly.

B. i. Since the manager does not want to pay more than $16 per share, he should place a limit order to buy 7,000 shares at no more than $16 per share.

ii. Advantage of limit order is that he avoids the risk of paying too high a price. Since the share is recently floated, its price could be quite volatile. Advantage of market order is the certainty of execution. If the stock price rises rapidly, the manager will miss out on the opportunity since his limit order will not get executed.

C. Estimated implicit costs = trade size × (trade price – benchmark price) for a buy, or trade size × (benchmark price – trade price) for a sell. In this question, trade size = 100, and trade price = $5.32.

i. Opening price = $5.42

Estimated implicit costs = 100 × ($5.42 – $5.32) = $10

ii. Closing price = $5.30

Estimated implicit costs = 100 × ($5.30 – $5.32) = –$2

iii. We need to calculate VWAP = dollar volume / trade volume.

Dollar volume = (200 × $5.42) + (200 × $5.44) + (100 × $5.52) + (100 × $5.54) + (1,100 × $5.40) + (100 × $5.32) + (100 × $5.30) = $10,280

Trade volume = 200 + 200 + 100 + 100 + 1,100 + 100 + 100 = 1,900 shares

VWAP = $10,280 / 1900 = $5.4105

Estimated implicit costs = 100 × ($5.4105 – $5.32) = $9.05
D. i. Profit on paper portfolio = 1,000 × ($10.05 – $10.00) = $50

Profit on real portfolio can be calculated as follows:

Cost of buying 600 shares = (600 × $10.02) + $20 = $6,032
Cost of buying 100 shares = (100 × $10.08) + $12 = $1,020
Total profit = (700 × $10.05) – ($6,032 + $1,020) = –$17

Hence the implementation shortfall is $67 [= $50 – (– $17)]

This represents 67bp (or 0.67% of cost of paper portfolio)

ii. The shortfall can be broken into its components as follows:

Delay: 100/1,000 ($9.99 – $10.00 / $10.00) = –0.01%

Realized profit and loss: 0.12% + 0.09% = 0.21% (workings below)

Tuesday: \[ \frac{600}{1000} \times \frac{$10.02 - $10.00}{$10.00} = 0.12\% \]

Wednesday: \[ \frac{100}{1000} \times \frac{$10.08 - $9.99}{$10.00} = 0.09\% \]

Missed trade opportunity cost: \[ \frac{300}{1000} \times \frac{$10.05 - $10.00}{$10.00} = 0.15\% \]

Commission cost = 0.20% + 0.12% = 0.32%

Total implementation shortfall = –0.01% + 0.21% + 0.15% + 0.32% = 0.67%
(or 67bps)

E. EV with no cost: 20,000 × 46.90 = 938,000

Actual EV:

5,000 shares at 46.5 = 232,500
+ sale proceeds of (15,000 × 47) – 1,500 = 703,500
Total = 936,000

IS = 936,000 – 938,000 = a cost of $2,000

Note that there are other ways to get there. For example, the 15,000 sold at a net of 46.90 (= 703,500 / 15,000). This is zero IS versus the DP of 46.90.

The 5,000 missed trade was 5,000 (46.90 – 46.50) = 2,000 lost value.

This also produces the 2,000 total IS cost.
55. Execution: Monitoring & Rebalancing

A. Use CPPI

1) A specific floor value of 20% below current market value can be targeted with an initial allocation of less than 20% to risk-free.

2) This strategy performs best in the expected trending (bull) market.

3) Scott’s risk tolerance has increased when the portfolio has increased due to good performance and a CPPI strategy increases the amount in RA (i.e., risk tolerance) with an increasing market.

B. CM does not establish a floor value, it can decline to 0 portfolio value.

CM is the worst performer in a trending bull market.

CM does not increase risk tolerance as portfolio value increases, % RA is maintained.

B&H performs less well than CPPI in a trending bull market.
56. Execution; Monitoring & Rebalancing

A. Under the new method if any class violates its corridor, it and the other classes must be rebalanced.

International equity is below its corridor and it must be rebalanced higher from 23 to 25%.

U.S. equity is within its corridor but above target weight. Its weight must be lowered to allow the adjustment in international equation.

Candidate note: The full analysis to support the answer is shown below. Full credit (4 of 4) will require acknowledging that the increase in international requires sales somewhere. That is simple, professional common sense. It also appeared in a 2014 exam question.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Strategic Asset Allocation: Target Weights</th>
<th>Tolerance Band (+/- 7.5%)</th>
<th>Closing Allocation on May 31</th>
<th>Outside corridor?</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. equity</td>
<td>40%</td>
<td>37%–43%</td>
<td>42%</td>
<td>No</td>
</tr>
<tr>
<td>International equity</td>
<td>25%</td>
<td>23.125%–26.875%</td>
<td>23%</td>
<td>Yes</td>
</tr>
<tr>
<td>U.S. fixed income</td>
<td>20%</td>
<td>18.5%–21.5%</td>
<td>19%</td>
<td>No</td>
</tr>
<tr>
<td>Other asset classes</td>
<td>15%</td>
<td>13.875%–16.125%</td>
<td>16%</td>
<td>No</td>
</tr>
</tbody>
</table>

B. i. Jackson's higher risk tolerance supports widening all corridors to reduce turnover, lowering costs, and improving return.

ii. It has the lowest transaction costs, so there is little expense in setting a narrow corridor to control deviations in the allocation.

iii. Aside from Jackson's higher risk tolerance, it has the highest transaction costs and needs a wider corridor to control costs.

Candidate note: The instructions are to consider each question part in isolation. You are only examining the factors that increase or decrease corridor width. You cannot draw any overall conclusion or quantification of width for one class versus another.
57. **Performance Evaluation**

B. D. Bamford, CFA, has been engaged by the Turpin pension fund to undertake evaluation of the performance of the fund during the year, over which period the fund’s value grew from approximately $295 million to approximately $342 million.

Bamford starts by estimating the return for each month. For example, the fund was valued at $301.8 million at the start of March and at $304.4 million at the end. Additionally, $600,000 was contributed to the fund on March 1, and $1,300,000 was paid out from the fund on March 31.

1. Which of the following is closest to the value that Bamford should calculate for the fund’s return for March?
   A. 0.86%.
   B. 1.09%.
   C. 1.29%.

March turned out to be the easiest month, in that it was the only month in which the external cash flows only occurred at the start and end. Taking April as a more representative example, the fund’s value at the start of the month was $304.4 million, and the value at the end was $310 million. Contributions of $350,000 and $5.7 million were made to the fund on the 5th and 17th of the month, respectively, and $750,000 was withdrawn from the fund on the 30th. The fund uses a daily pricing system, and consequently, we know that the value at the end of the day on the 5th was $314.5 million, while at the end of day on the 17th, the fund was worth $320.6 million. The fund had periodic returns during April of 3.203%, 0.127%, and –3.072.

Given the previous data:

2. Which of the following is closest to the value that Bamford should calculate for the fund’s money-weighted rate of return for April?
   A. 0.10%.
   B. 0.16%.
   C. 0.22%.

3. In compliance with standard GIPS requirements, what is the rate of return that should be reported for April?
   A. 0.10%.
   B. 0.16%.
   C. 0.22%.
Lovett, a trustee of the pension fund, has seen Bamford’s calculations and expressed surprise at the existence of two different measures of performance, time-weighted (TWR) and money-weighted (MWR). Another trustee, Tunick, has attempted to explain to him the differences between the two measures and their appropriateness in various situations, and Lovett comes to Bamford for clarification.

Two of the statements made by Tunick are given below:

Statement 1: So long as the manager has a measure of control over the size and timing of external cash flows, then TWR can be seen as a more meaningful measure of their performance.

Statement 2: Unless there are external cash flows that are large, relative to the account’s value, and the account’s performance is fluctuating significantly during the measurement period, then there is unlikely to be a material difference between the MWR and the TWR.

4. Which of the following should be Bamford’s conclusion regarding the accuracy of the previous statements?

<table>
<thead>
<tr>
<th></th>
<th>Statement 1</th>
<th>Statement 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Accurate</td>
<td>Accurate</td>
</tr>
<tr>
<td>B</td>
<td>Inaccurate</td>
<td>Accurate</td>
</tr>
<tr>
<td>C</td>
<td>Inaccurate</td>
<td>Inaccurate</td>
</tr>
</tbody>
</table>

The trustees are currently debating whether to amend the fund’s benchmarks. They come to Bamford for advice.

5. Bamford states that if the benchmark for an active manager is well chosen, the portfolio should have largely positive positions.

A. This means that sum of the over- and underweights of the assets held in the portfolio will be positive.

B. Is not possible because over- and underweights must be equal.

C. Is not a relevant factor to consider.

6. Which of the following types of benchmark should Bamford identify as being the one that satisfies the fewest criteria for a valid benchmark?

A. Manager universes.

B. Factor-model based.

C. Custom-security based.
58. Performance Evaluation

Bamford continues with his analysis of the Turpin pension fund and moves on to the attribution of performance at the micro and macro levels.

He starts at the macro level and obtains the following data concerning the fund’s constitution and performance in October 201x:

Account valuations, cash flows, and returns

October 201x

<table>
<thead>
<tr>
<th>Asset category</th>
<th>Start value ($)</th>
<th>End value ($)</th>
<th>Net cash flows ($)</th>
<th>Actual return</th>
<th>Benchmark return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic equities</td>
<td>268,380,987</td>
<td>281,087,176</td>
<td>1,747,908</td>
<td>4.07%</td>
<td>3.14%</td>
</tr>
<tr>
<td>Equity manager 1</td>
<td>173,647,433</td>
<td>185,354,663</td>
<td>3,857,464</td>
<td>4.47%</td>
<td>4.02%</td>
</tr>
<tr>
<td>Equity manager 2</td>
<td>94,733,554</td>
<td>95,732,513</td>
<td>(2,109,556)</td>
<td>3.32%</td>
<td>2.13%</td>
</tr>
<tr>
<td>Domestic fixed-income</td>
<td>75,517,210</td>
<td>76,633,087</td>
<td>1,496,000</td>
<td>-0.50%</td>
<td>1.06%</td>
</tr>
<tr>
<td>Fixed-income manager 1</td>
<td>20,578,455</td>
<td>20,704,755</td>
<td>—</td>
<td>0.61%</td>
<td>0.47%</td>
</tr>
<tr>
<td>Fixed-income manager 2</td>
<td>54,938,755</td>
<td>55,928,332</td>
<td>1,496,000</td>
<td>-0.91%</td>
<td>1.89%</td>
</tr>
<tr>
<td>Total fund</td>
<td>343,898,197</td>
<td>357,720,263</td>
<td>3,243,908</td>
<td>3.06%</td>
<td>2.97%</td>
</tr>
</tbody>
</table>

The following table shows the benchmarks used, together with their policy weightings:

Investment policy allocations

<table>
<thead>
<tr>
<th>Asset category</th>
<th>Policy allocations</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic equities</td>
<td>80%</td>
<td>S&amp;P 500</td>
</tr>
<tr>
<td>Equity manager 1</td>
<td>60%</td>
<td>Large-cap value index</td>
</tr>
<tr>
<td>Equity manager 2</td>
<td>40%</td>
<td>Large-cap growth index</td>
</tr>
<tr>
<td>Domestic fixed-income</td>
<td>20%</td>
<td>Lehman govt/credit index</td>
</tr>
<tr>
<td>Fixed-income manager 1</td>
<td>35%</td>
<td>Lehman Treasury index</td>
</tr>
<tr>
<td>Fixed-income manager 2</td>
<td>65%</td>
<td>Lehman long credit index</td>
</tr>
</tbody>
</table>

Bamford is now half-way through the macro performance evaluation and has produced the following table:

October 201x

Turpin Fund Performance Attribution

<table>
<thead>
<tr>
<th>Decision-making level</th>
<th>Fund value ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning value</td>
<td>343,898,197</td>
</tr>
<tr>
<td>Net contributions</td>
<td>347,142,105</td>
</tr>
<tr>
<td>Risk-free asset</td>
<td>349,215,211</td>
</tr>
<tr>
<td>Asset category</td>
<td>356,404,888</td>
</tr>
<tr>
<td>Benchmarks</td>
<td>357,344,111</td>
</tr>
<tr>
<td>Investment managers</td>
<td>357,720,263</td>
</tr>
<tr>
<td>Allocation effects</td>
<td>357,720,263</td>
</tr>
<tr>
<td>Ending value</td>
<td>357,720,263</td>
</tr>
</tbody>
</table>

The risk free rate in October was 0.6%. (This figure, like the other rates of return given, is quoted per month.)
1. Which of the following is the value that Bamford should calculate for the incremental value contribution of the asset category investment strategy?
   A. $7,189,677.
   B. $9,262,783.
   C. $12,506,691.

2. Which of the following is the value that Bamford should calculate for the incremental return contribution of the asset category investment strategy?
   A. 2.08%.
   B. 2.12%.
   C. 2.31%.

3. Which of the following is the value that Bamford should calculate for the incremental return contribution to the pension plan of fixed-income manager 1?
   A. –0.032%.
   B. 0.010%.
   C. 0.140%.

Bamford now focuses on the performance of the funds managed by equity manager 1 and obtains the following data for the performance of this segment of the Turpin fund during October 201x:

<table>
<thead>
<tr>
<th>Sector</th>
<th>Portfolio Weight %</th>
<th>Sector Benchmark Weight %</th>
<th>Portfolio Return %</th>
<th>Sector Benchmark Return %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic materials</td>
<td>6.00</td>
<td>12.00</td>
<td>3.01</td>
<td>3.10</td>
</tr>
<tr>
<td>Capital goods</td>
<td>9.00</td>
<td>10.00</td>
<td>5.03</td>
<td>4.80</td>
</tr>
<tr>
<td>Consumer goods</td>
<td>21.00</td>
<td>26.00</td>
<td>2.25</td>
<td>2.46</td>
</tr>
<tr>
<td>Energy &amp; utilities</td>
<td>19.00</td>
<td>16.00</td>
<td>6.18</td>
<td>5.40</td>
</tr>
<tr>
<td>Financial</td>
<td>14.00</td>
<td>14.00</td>
<td>3.54</td>
<td>3.72</td>
</tr>
<tr>
<td>Technology</td>
<td>29.00</td>
<td>22.00</td>
<td>6.33</td>
<td>5.20</td>
</tr>
<tr>
<td>Cash &amp; equivalent</td>
<td>2.00</td>
<td>0.00</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>Buy/hold + cash</td>
<td>100.00</td>
<td>100.00</td>
<td>4.62</td>
<td>4.02</td>
</tr>
<tr>
<td>Trading &amp; other</td>
<td></td>
<td></td>
<td>–0.15</td>
<td></td>
</tr>
<tr>
<td>Total portfolio</td>
<td></td>
<td></td>
<td>4.47</td>
<td>4.02</td>
</tr>
</tbody>
</table>

4. Which of the following is the value that Bamford should calculate for the pure sector allocation return for basic materials?
   A. –0.19%.
   B. +0.06%.
   C. +0.19%.

5. Which of the following is the value that Bamford should calculate for the within-sector selection return for technology?
   A. 0.25%.
   B. 0.33%.
   C. 0.51%.
6. Given that the total pure sector allocation return is 0.18%, while the total within-sector selection return is 0.31%, which of the following is the value that Bamford should calculate for the total allocation/selection interaction return?
   A. −0.04%.
   B. +0.11%.
   C. +0.49%.
59.  Performance Evaluation

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

Bamford now considers the risk-adjusted performance of the equity elements of the Turpin fund. The fund employs three equity managers.

He collects the following data for the past year:

- Actual return from equity manager 1’s component of the Turpin fund equities: 5.53%
- Actual return from S&P 500: 4.9%
- Risk-free return: 3.7%
- Beta of manager 1’s component of the Turpin fund equities: 1.20
- Annualized standard deviation of manager 1’s component of the fund’s equities: 25.8%
- Annualized standard deviation of S&P 500 returns: 10.86%

<table>
<thead>
<tr>
<th></th>
<th>Manager 2</th>
<th>Manager 3</th>
<th>Market Portfolio (S&amp;P 500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>0.23%</td>
<td>0.45%</td>
<td>N/A</td>
</tr>
<tr>
<td>Treynor</td>
<td>1.46</td>
<td>1.60</td>
<td>1.20</td>
</tr>
<tr>
<td>Sharpe</td>
<td>0.113</td>
<td>0.065</td>
<td>0.110</td>
</tr>
<tr>
<td>( M^2 )</td>
<td>4.93%</td>
<td>4.51%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

A.  **Calculate** manager 1’s ex-post alpha, the Treynor measure, the Sharpe ratio, and \( M^2 \). **Show** your calculations.

(8 minutes)

B.  **Evaluate** the risk-adjusted performance of managers 2 and 3. Explain the reason for any disparity between the relative rankings of these managers under the various measures.

(4 minutes)

Bamford then compares the performance of manager 2’s component of the fund to a risk-adjusted style benchmark. The manager’s return was 4.97%. The style benchmark’s average return was 4.65%, and the standard deviation of the difference between the returns on the account and the return on the style benchmark was 0.8%.
C. If Bamford is prepared to assume that the size and the variability of the account’s excess return over the benchmark seen last year is representative of the future excess return size and variability, use the table below to compute the probability that manager 2’s component underperforms its risk-adjusted style benchmark over the next three years.

(3 minutes)

<table>
<thead>
<tr>
<th>IR</th>
<th>0.5</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>10</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>55.63%</td>
<td>57.93%</td>
<td>63.81%</td>
<td>67.26%</td>
<td>73.65%</td>
<td>81.70%</td>
</tr>
<tr>
<td>0.30</td>
<td>58.40%</td>
<td>61.79%</td>
<td>69.83%</td>
<td>74.88%</td>
<td>82.86%</td>
<td>91.01%</td>
</tr>
<tr>
<td>0.40</td>
<td>61.14%</td>
<td>65.54%</td>
<td>75.58%</td>
<td>81.45%</td>
<td>89.70%</td>
<td>96.32%</td>
</tr>
<tr>
<td>0.67</td>
<td>68.13%</td>
<td>74.75%</td>
<td>87.59%</td>
<td>93.20%</td>
<td>98.25%</td>
<td>99.86%</td>
</tr>
<tr>
<td>0.80</td>
<td>71.42%</td>
<td>78.81%</td>
<td>91.71%</td>
<td>96.32%</td>
<td>99.43%</td>
<td>99.98%</td>
</tr>
<tr>
<td>1.00</td>
<td>76.02%</td>
<td>84.03%</td>
<td>95.84%</td>
<td>98.73%</td>
<td>99.92%</td>
<td>99.99%</td>
</tr>
</tbody>
</table>
60. Performance Evaluation

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

The following quality control chart has been produced to show cumulative annualized value added for equity manager 1, relative to their benchmark over a 10-year period:

<table>
<thead>
<tr>
<th>Excess return (annualised)</th>
<th>Upper 95% confidence bound</th>
<th>Lower 95% confidence bound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A. **Determine** whether manager 1’s performance relative to the benchmark *most likely* demonstrates value added. **Support** your answer.

(4 minutes)

B. Suppose the manager is fired and then goes on to substantially outperform her benchmark. **Identify** and **explain** the type of decision error (Type I or Type II) *most likely* committed.

(4 minutes)
61. Performance Evaluation

THIS QUESTION HAS TWO PARTS FOR A TOTAL OF 8 MINUTES

Bryce Hamilton acts as a performance consultant to the Magnum group of funds. He has just undertaken a micro attribution of the Magnum Mega Growth Fund’s performance relative to its normal benchmark in April using a fundamental factor model. The results of this attribution analysis are shown in Exhibit 61-1:

<table>
<thead>
<tr>
<th>Exhibit 61–1</th>
<th>Fundamental Factor Model Micro Attribution Report for the Magnum Mega Growth Fund April</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Portfolio Exposure</td>
</tr>
<tr>
<td>Market return</td>
<td></td>
</tr>
<tr>
<td>Normal portfolio return</td>
<td></td>
</tr>
<tr>
<td>Cash timing</td>
<td>1.86</td>
</tr>
<tr>
<td>Beta timing</td>
<td>0.93</td>
</tr>
<tr>
<td>Total market timing</td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>1.09</td>
</tr>
<tr>
<td>Size</td>
<td>0.41</td>
</tr>
<tr>
<td>Leverage</td>
<td>–0.15</td>
</tr>
<tr>
<td>Yield</td>
<td>–0.12</td>
</tr>
<tr>
<td>Total fundamental risk factors</td>
<td></td>
</tr>
<tr>
<td>Information technology</td>
<td>22.60</td>
</tr>
<tr>
<td>Consumer discretionary</td>
<td>19.50</td>
</tr>
<tr>
<td>Health care</td>
<td>18.40</td>
</tr>
<tr>
<td>Consumer staples</td>
<td>14.30</td>
</tr>
<tr>
<td>Financials</td>
<td>6.30</td>
</tr>
<tr>
<td>Industrials</td>
<td>8.90</td>
</tr>
<tr>
<td>Energy</td>
<td>5.30</td>
</tr>
<tr>
<td>Materials</td>
<td>2.80</td>
</tr>
<tr>
<td>Telecommunication services</td>
<td>1.40</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.50</td>
</tr>
<tr>
<td>Total economic sectors</td>
<td></td>
</tr>
<tr>
<td>Specific (unexplained)</td>
<td></td>
</tr>
<tr>
<td>Actual portfolio return</td>
<td></td>
</tr>
</tbody>
</table>

A. Calculate the value added by active management and the value added by style for the Magnum Mega Growth Fund in April.

(4 minutes)
B.

i. **Identify** which underweight exposure added the most active value to the Magnum Mega Growth Fund.

ii. **Identify** which overweight exposure caused the most harm to the Magnum Mega Growth Fund.

*(4 minutes)*
57. Performance Evaluation

1. B In working out the return over a period, a net cash inflow to the fund at the start of the period is added to the opening value, whereas a net cash inflow at the end of the period is subtracted from the closing value. In this case:

\[ r = \frac{(304.4 + 1.3) - (301.8 + 0.6)}{301.8 + 0.6} = 1.09\% \]

Note that we added the $1.3 million to the ending value of the fund because it was an outflow from the fund. The $600,000 was added to the beginning value.

2. A To calculate the MWR, we need to solve for \( R \) in the equation:

\[ 310 = 304.4(1 + R)^{30/30} + 0.35(1 + R)^{30 - 5/30} + 5.7(1 + R)^{30 - 17/30} - 0.75(1 + R)^{30 - 30/30} \]

\[ 310.75 = 304.4(1 + R) + 0.35(1 + R)^{25/30} + 5.7(1 + R)^{13/30} \]

Given the multiple-choice nature of the question, we can use trial-and-error, trying each of the possible solutions until we discover the one that fits. This gives us 0.10% as by far the best answer. Since the CFs are not evenly spaced, we cannot calculate the IRR directly on a calculator.

3. B Unless the manager controls the timing of the ECFs, time-weighted return of the monthly subperiods is required.

\[(1.03203 \times 1.00127 \times 0.96928) - 1 = 0.16\% \]

The subperiod returns were given but their underlying calculations are shown below:

Sub period 1 (days 1–5)

\[ \text{Return} = \frac{[(314.5 - 0.35) - 304.4]}{304.4} = 3.203\% \]

Sub period 2 (days 6–17)

\[ \text{Return} = \frac{[(320.6 - 5.7) - 314.5]}{314.5} = 0.127\% \]

Sub period 3 (days 18–30)

\[ \text{Return} = \frac{[(310 + 0.75) - 320.6]}{320.6} = -3.072\% \]

4. B Statement 1 relates to the MWR, not TWR. Statement 2 is correct.

5. A This is a test of benchmark quality. Most managers are long only. A long only active manager should overweight what he likes and not own what he does not like. Thus, when the portfolio holdings are compared to the benchmark, there will mostly be overweightings. This is unrelated to a different issue, comparing what is in the portfolio to everything in the benchmark. In that later case, the over- and underweights would sum to zero.

6. A Manager universes have none of the required benchmark properties, other than measurability.
58. **Performance Evaluation**

1. **A** The incremental *value* contribution of the asset category investment strategy is calculated by taking the fund value at the asset category level (which represents the value the fund would have moved to at the end of the month had both asset classes been represented in the portfolio in their policy weightings, and had they earned their benchmark returns) and subtracting the fund value at the risk-free asset level (which would have been the end-of-month value if only the risk-free rate of return had been earned):

\[ \$356,404,888 - \$349,215,211 = \$7,189,677 \]

2. **B** The incremental *return* contribution of the asset category investment strategy is calculated as:

\[ \Sigma (\text{asset class policy weight} \times \text{excess of asset class benchmark return over } R_F) \]

\[ = 0.8 \times (3.14\% - 0.6\%) + 0.2 \times (1.06\% - 0.6\%) = 2.12\%, \text{ which rounds to } 2.12\%. \]

3. **B** FI manager 1 contributed 0.2 \times 0.35 \times (0.61\% - 0.47\%) = 0.010\%.

This is just one component of contributing total value added by the managers. The incremental return contribution of the investment managers is calculated as:

\[ \Sigma (\text{manager policy weighting multiplied by difference between manager actual return and manager benchmark return}) \]

\[ = [0.8 \times 0.6 \times (4.47\% - 4.02\%)] + [0.8 \times 0.4 \times (3.32\% - 2.13\%)] + [0.2 \times 0.35 \times (0.61\% - 0.47\%)] + [0.2 \times 0.65 \times (-0.91\% - 1.89\%)] \]

\[ = (0.48 \times 0.45\%) + (0.32 \times 1.19\%) + (0.07 \times 0.14\%) + (0.13 \times -2.8\%) \]

\[ = 0.2426\%, \text{ which rounds to } 0.24\% \]

For reference, the full macro attribution results are as follows:

<table>
<thead>
<tr>
<th>Decision-making level</th>
<th>Fund value ($)</th>
<th>Incremental return contribution</th>
<th>Incremental value contribution ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning value</td>
<td>343,898,197</td>
<td>0%</td>
<td>3,243,908</td>
</tr>
<tr>
<td>Net contributions</td>
<td>347,142,105</td>
<td>0%</td>
<td>2,073,106</td>
</tr>
<tr>
<td>Risk-free asset</td>
<td>349,215,211</td>
<td>0.60%</td>
<td>2,073,106</td>
</tr>
<tr>
<td>Asset category</td>
<td>356,404,888</td>
<td>2.12%</td>
<td>7,189,677</td>
</tr>
<tr>
<td>Benchmarks</td>
<td>357,344,111</td>
<td>0.17%</td>
<td>939,223</td>
</tr>
<tr>
<td>Investment managers</td>
<td>357,720,263</td>
<td>0.24%</td>
<td>376,152</td>
</tr>
<tr>
<td>Allocation effects</td>
<td>357,720,263</td>
<td>-0.07%</td>
<td>—</td>
</tr>
<tr>
<td>Ending value</td>
<td>357,720,263</td>
<td>3.06%</td>
<td>13,822,066</td>
</tr>
</tbody>
</table>
4. **B** The pure sector allocation return is calculated for each sector as:

\[
\left( \text{Actual weight for sector} - \text{Benchmark weight for sector} \right) \times \left( \text{Benchmark return for sector} - \text{Benchmark return for portfolio} \right)
\]

For the basic materials sector, this = (6% – 12%) × (3.1% – 4.02%)

\[= -6\% \times -0.92\% = +0.0552\%, \text{ which rounds to +0.06}\%
\]

5. **A** The within-sector selection return is calculated for each sector as:

\[
\text{Benchmark weight for sector} \times \left( \text{Actual return for sector} - \text{Benchmark return for sector} \right)
\]

For the technology sector, this = 22% × (6.33% – 5.2%)

\[= 22\% \times 1.13\% = +0.2486\%, \text{ which rounds to +0.25}\%
\]

6. **B** The total pure sector allocation return plus total allocation/selection interaction return plus total within-sector selection return equals the difference between the actual portfolio return (pre-trading and other costs) and the benchmark return. We know that the latter difference is 4.62% – 4.02% = 0.6%, so 0.18% + total allocation/selection interaction return + 0.31% = 0.6%; hence, total allocation/selection interaction return = 0.6% – 0.18% – 0.31% = 0.11%.

For reference, the full micro attribution results are as follows:

<table>
<thead>
<tr>
<th>Sector</th>
<th>Pure Sector Allocation %</th>
<th>Allocation/Selection Interaction %</th>
<th>Within Sector Selection %</th>
<th>Total Value-Added %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic materials</td>
<td>0.06</td>
<td>0.01</td>
<td>-0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>Capital goods</td>
<td>-0.01</td>
<td>0.00</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Consumer goods</td>
<td>0.08</td>
<td>0.01</td>
<td>-0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>Energy &amp; utilities</td>
<td>0.04</td>
<td>0.02</td>
<td>0.12</td>
<td>0.19</td>
</tr>
<tr>
<td>Financial</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.03</td>
<td>-0.03</td>
</tr>
<tr>
<td>Technology</td>
<td>0.08</td>
<td>0.08</td>
<td>0.25</td>
<td>0.41</td>
</tr>
<tr>
<td>Cash &amp; equivalent</td>
<td>-0.07</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.07</td>
</tr>
<tr>
<td>Buy/hold + cash</td>
<td>0.18</td>
<td>0.11</td>
<td>0.31</td>
<td>0.60</td>
</tr>
<tr>
<td>Trading &amp; other</td>
<td></td>
<td></td>
<td></td>
<td>-0.15</td>
</tr>
<tr>
<td>Total portfolio</td>
<td></td>
<td></td>
<td></td>
<td>0.45</td>
</tr>
</tbody>
</table>

Note: Totals may not add up due to rounding.
59. Performance Evaluation

Part A

For equity manager 1:

Sharpe ratio = \( \frac{1.83\%}{25.8\%} = 0.0709 \)

Treynor measure = \( \frac{1.83\%}{1.2} = 1.525 \)

Ex-post alpha (Jensen's alpha) = \( 5.53\% - [3.7\% + 1.2 \times (4.9\% - 3.7\%)] \)

\[ = 5.53\% - 5.14\% = 0.39\% \]

\( M^2 = 3.7\% + [(5.53\% - 3.7\%) \times (10.86\% / 25.8\%)] = 4.47\% \)

Part B

Manager 3 outperforms Manager 2 on alpha and Treynor measures. Both measures consider only systematic risk, beta. Both managers have positive alpha and therefore Treynors in excess of the market's.

Sharpe and \( M^2 \) are based on total risk, sigma. Manager 3 underperforms Manager 2 on both of these measures.

The poor ranking on Manager 3 on total risk is explained by Manager 3 having significantly more diversifiable risk than Manager 2.

Candidate note: While not needed to answer the question, recall that the alpha of the market is 0 and its \( M^2 \) is its return of 4.90%.

Part C

The historical information ratio (IR) for equity manager 2’s component of the Turpin fund equities is calculated as follows:

\[ IR_2 = \frac{\text{Active return}}{\text{Active risk}} = \frac{\overline{R}_2 - \overline{R}_B}{\overline{\sigma}_2 - \overline{\sigma}_B} = \frac{4.97\% - 4.65\%}{0.8\%} = 0.4 \]

Given that Bamford is prepared to assume that this is representative of the future excess returns and their risk, we can use the table supplied to compute that the probability of outperforming the benchmark over the next three years is 75.58%, so the probability of underperforming is \( 100\% - 75.58\% = 24.42\% \).
60. Performance Evaluation

Part A

Other than a brief initial period of positive value added (VA), the longer term record of the manager is negative value added. However this is not statistically significant and the best conclusion is zero value added.

Part B

The null hypothesis is zero VA. The manager was fired because statistically the null was not rejected. If the manager then outperforms, the null was incorrectly not rejected and this is called a Type 2 error.
61. **Performance Evaluation**

A. The value added by active management is the excess of the actual portfolio return over the normal portfolio return (the benchmark):

3.34% - 3.02% = 0.32%

Alternatively, it can be calculated as the sum of total market timing, total fundamental risk factors, total economic sectors, and specific: -0.03% + 0.69% + 0.05% - 0.39% = 0.32%.

The value added by style is the excess of the normal portfolio return over the market return:

3.02% - 2.58% = 0.44%

B.

i. We are looking for the largest positive number in the “Active Impact” column where the active exposure is negative. This is 0.41% for Yield.

ii. We are now looking for the largest negative number in the “Active Impact” column where the active exposure is positive. This is -0.21% for Cash Timing.
62. **GIPS**

Germaine Asset Management’s performance presentation for its large cap U.S. growth composite is shown below:

Germaine Asset Management
U.S. Large Cap Growth Composite
1 January 2005 through 31 December 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Composite Return (%)</th>
<th>Benchmark Return (%)</th>
<th>Mean Absolute Deviation</th>
<th>Composite 3-year Mean Absolute Deviation</th>
<th>Number of Accounts</th>
<th>Total Composite Assets ($millions)</th>
<th>Total Firm Assets ($millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>9.43</td>
<td>7.42</td>
<td>4.56</td>
<td></td>
<td>32</td>
<td>1,098.0</td>
<td>10,234.8</td>
</tr>
<tr>
<td>2006</td>
<td>8.57</td>
<td>8.47</td>
<td>3.21</td>
<td></td>
<td>38</td>
<td>1,244.5</td>
<td>11,897.3</td>
</tr>
<tr>
<td>2007</td>
<td>6.23</td>
<td>7.01</td>
<td>2.11</td>
<td></td>
<td>44</td>
<td>1,321.9</td>
<td>9,876.4</td>
</tr>
<tr>
<td>2008</td>
<td>–7.23</td>
<td>–6.34</td>
<td>3.00</td>
<td></td>
<td>31</td>
<td>1,089.0</td>
<td>9,756.3</td>
</tr>
<tr>
<td>2009</td>
<td>–5.87</td>
<td>–7.21</td>
<td>1.49</td>
<td></td>
<td>28</td>
<td>987.6</td>
<td>9,435.9</td>
</tr>
<tr>
<td>2010</td>
<td>8.14</td>
<td>7.89</td>
<td>4.22</td>
<td></td>
<td>27</td>
<td>1,145.4</td>
<td>10,604.7</td>
</tr>
<tr>
<td>2011</td>
<td>5.17</td>
<td>5.67</td>
<td>3.67</td>
<td>8.7</td>
<td>29</td>
<td>1,245.2</td>
<td>11,798.4</td>
</tr>
<tr>
<td>2012</td>
<td>9.23</td>
<td>8.77</td>
<td>6.54</td>
<td>9.2</td>
<td>29</td>
<td>1,354.7</td>
<td>19,739.7</td>
</tr>
<tr>
<td>2013</td>
<td>5.44</td>
<td>5.40</td>
<td>3.81</td>
<td>8.7</td>
<td>28</td>
<td>1,145.1</td>
<td>18,428.5</td>
</tr>
</tbody>
</table>

Germaine Asset Management claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. Germaine Asset Management has been independently verified for the periods 1 January 2009 through 31 December 2013. The verification reports are available upon request.

Verification assesses whether (1) the firm has complied with all the composite requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standard. Verification does not ensure the accuracy of any specific composite presentation.

Notes:

- To comply with the GIPS standards, the firm is defined as all institutional accounts managed by Germaine Asset Management.
- The strategy of the U.S. Large Cap Growth Composite is to invest in U.S. large cap growth equity securities. The composite consists of all fee-paying and non-fee-paying discretionary accounts with a minimum market value of $15 million.
- The composite was created on 1 January 2005.
- The benchmark is a custom equity benchmark that is rebalanced quarterly.
Germaine charges a bundled fee that includes investment management and administrative fees. Returns are presented net of all bundled fees. The fee schedule is available upon request. Contact our office at (212) 555-1111 or email us at GAMFEE@gammon.com.

There are many errors and omissions in Germaine’s performance presentation. The questions that follow do not necessarily address all of these errors and omissions.

1. Regarding the time period covered by the report and the requirements of GIPS, Germaine:
   A. is in compliance with GIPS.
   B. must report returns for 5 years or 10 years.
   C. must report 1-, 3-, and 5-year annualized returns.

2. Regarding the disclosures made by Germaine, Germaine is most likely out of compliance regarding:
   A. labeling the composite returns as gross or net of investment management fees.
   B. disclosing the extent and kinds of derivatives used.
   C. including an appropriate fee schedule.

3. Regarding dispersion reporting, Germaine is not in compliance. To be in compliance, Germaine must make the following changes:
   A. report standard deviation of returns of the accounts in the composite as well as three-year standard deviation of the monthly returns for the composite and benchmark.
   B. report three-year standard deviation of the monthly returns for the composite and benchmark.
   C. report internal and external dispersion measures for all the years covered by the report.

4. Regarding the report, Germaine is:
   A. in compliance when reporting the number of accounts in the composite but must also report what percentage of firm assets are in the composite.
   B. in compliance with the requirement to disclose the nature of the benchmark used.
   C. in compliance with the requirement to disclose the use of subadvisors.

5. Regarding the report, Germaine is in compliance regarding:
   A. the definition of the firm.
   B. the criteria for inclusion of accounts in the composite.
   C. the compliance statement used.

6. To be in compliance with GIPS, Germaine must:
   A. value portfolios on the date of all large external cash flows and at least quarterly.
   B. weight composite returns by beginning of period fair value plus time weighted external cash flows.
   C. use market value of assets for fair value whenever market value is available.
63. **GIPS**

Germaine Asset Management is a large asset manager with multiple investment styles. Ace Reilly is a charterholder and was recently assigned responsibility for GIPS compliance issues at the firm. He has been reviewing a number of issues to determine whether firm policies are in compliance with GIPS.

1. It is *most accurate* to say the firm:
   A. must adopt GIPS to meet ethical requirements.
   B. must adopt GIPS to meet business requirements.
   C. does not have to adopt GIPS.

2. If an account is anticipating an inflow of funds from the client that is so large the firm cannot reasonably invest the funds in short order without disrupting the account investment results, the firm should:
   A. immediately remove the account from its composite as being non-discretionary.
   B. include the account in the appropriate composite with a disclosure that returns have been materially distorted.
   C. place the inflow of funds in a separate account and exclude the results of that separate account from the composite.

3. For the firm's balanced accounts (for example 60% equity and 40% fixed income), the firm:
   A. must use carve-out accounting to also report the equity return in the equity composite and the fixed-income return in the fixed-income composite.
   B. must have the equity assets managed by the equity management team and the fixed-income assets by the fixed-income team, if carve-out reporting is going to be made.
   C. must allocate the effects of any cash equivalents held in the account and managed within the firm to the results reported for carve-out equity and fixed-income results.

4. If Germaine acquires another investment firm:
   A. Germaine may continue to claim GIPS compliance for the next full year even if the acquired assets are not in compliance.
   B. and the acquired firm has a composite that is different from any of Germaine's and was in compliance with GIPS, Germaine may immediately begin reporting the results of that composite in Germaine's GIPS report.
   C. Germaine must cease any claims of GIPS compliance until it is verified the acquired firm was in compliance with GIPS.

5. In compliance with the GIPS Advertising Guidelines, Germaine:
   A. is not required to complete a full GIPS report for small composites with less than 10 accounts.
   B. may present supplemental information on the performance of a hypothetical model portfolio.
   C. does not have to disclose the performance of the composite’s benchmark.
6. To comply with after-tax composite reporting the firm:
A. should report the average after-tax return of the accounts in the composite using the client’s tax data as composite return.
B. may simulate the after-tax return of a mutual fund as a benchmark.
C. may not use simulated numbers.
62. **GIPS**

1. **A**  The rule is to report at least five years of data when GIPS is adopted (unless the composite has existed for less time in which case report since inception), then add one year each year until at least a 10-year rolling period of data is reported. Composite creation date disclosure is also required and it was January 1, 2005. Reporting 2005 through 2013 is acceptable.

   1-, 3-, and 5-year reporting is one method of meeting the advertising reporting requirements, not the basic GIPS requirements.

2. **C**  Inclusion of an appropriate fee schedule is required and this was not done. Disclosure of returns as gross or net of investment management fees is required but that was done in the last bullet point. Bundled fees complicate fee reporting and require disclosure of what is included in the bundled fee. This was also done in the bullet. Derivative disclosures reporting is only required if the use is material. A lack of any disclosure cannot be taken as an indicator of noncompliance, unless there is evidence that there was disclosable material.

3. **B**  Internal dispersion reporting must cover all years of the report but any method of internal dispersion reporting is allowed. MAD is the average of the sum of the absolute deviation of each account from average return and is a standard measure of dispersion. In contrast, external (ex post) standard deviation of the composite and benchmark is required, but only starting in 2011 (not for all years of the report).

4. **C**  Use of sub-advisors, like derivatives, must only be reported if they are used. Therefore, compliance must be assumed in the absence of any other evidence. Reporting both the assets in the composite and of the firm is an acceptable way to disclose the composite as a percentage of firm assets, so there is no problem. Stating something is a custom benchmark is not adequate without information regarding how it is constructed and what it represents.

5. **B**  All fee-paying discretionary accounts must be included. Non-fee paying discretionary accounts may be included if this is disclosed. Minimum account size for inclusion is allowed if disclosed. The disclosures were acceptable. Note that the minimum size must be rationally related to what is required to implement the intended strategy. However, the firm must be a business entity and not just some types of accounts within the organization. While the GIPS compliant statement is worded correctly, it cannot be used because there are numerous noncompliance issues in the report.

6. **C**  Fair value accounting means market value, unless market value does not exist. Portfolios must be valued on the date of large external cash flows and at least monthly (some exceptions exist but are not applicable to large cap equity). Composite weighting can also be based on beginning of period value only.
63. **GIPS**

1. **C** GIPS compliance is encouraged but voluntary. While it might be a practical business necessity in some cases, many firms do not adopt GIPS.

2. **C** The firm may either (1) temporarily exclude the account from the composite from any month in which the cash flow disrupted the intended strategy or (2) place the funds in a temporary account until they have been invested and exclude the temporary account from the composite while continuing to report results for the primary account in the composite.

3. **B** Carve-out accounting is completely optional for the firm. If the firm adopts it, then an equity subaccount managed by the equity managers and a fixed-income subaccount managed by the fixed-income managers must be used. Actual cash must be held in each subaccount. Just allocating return of cash is not allowed under current GIPS rules.

4. **A** Germaine has one year from date of acquisition to bring the noncompliant firm's assets into compliance. Answer B would only be true under additional considerations: substantially all decision makers remain with Germaine, their decision process remains substantially the same and independent, and Germaine can document the past history of the composite.

5. **B** Both GIPS and GIPS advertising may include simulated results as supplemental information as long as it is clearly marked as such and not displayed more prominently than the required GIPS data. The full GIPS report must still be available and benchmark results must be included in the advertising.

6. **B** After-tax reporting of composite returns is optional. Essentially everything in the after-tax data is a simulation using disclosed assumptions for tax and trading rules. Simulating mutual fund results is one of the ways to create a comparison benchmark. Aggregating after-tax results of individual clients would not likely work. Each client's tax situation is unique and it would not be possible to disclose the assumptions used to create the after-tax results of the composite's return and then apply the same assumptions to the benchmark. Plus, the clients have no obligation to supply their tax returns to the firm nor can the firm disclose such confidential client information.
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