QFI PM Model Solutions
Fall 2024

1. Learning Objectives:

3. The candidate will understand the variety and assess the role of equities in investment portfolios. The candidate will demonstrate an understanding of the distinguishing investment characteristics and potential contributions to investment portfolios of the following major asset groups:
   - Real Estate
   - Public Equity
   - Private Equity
   - Commodities
   - Hedge Funds
   - Distressed debts

Learning Outcomes:

(3a) Demonstrate an understanding of the investment strategies and portfolio roles that are characteristic of various types of equity and alternative investments.

(3b) Use different types of equity and alternative investments available for an investor's growth allocation in portfolio construction, considering portfolio design, risk management, liquidity management, manager selection, and implementation.

Sources:

Handbook of Alternative Assets, Mark Anson, 2nd edition, 2006, Ch 12: Introduction to Commodities

Commentary on Question:

This question tests the candidates' understanding of commodities markets, including the ability to perform calculations involving a commodities index.

Solution:

(a) Explain two of the differences between commodities and capital assets.

Commentary on Question:

The candidates performed brilliantly on this section. Most candidates earned full credit on this section.

1. Continued

- Capital assets (such as stocks and bonds) can be valued on the basis of the net present value of expected future cashflows, whereas commodities cannot.
- Commodities generally do not provide a claim on an ongoing stream of revenue like stocks and bonds do.
- Interest rates have only a small impact on commodity values, but conversely, they are integral to determining the value of capital assets.
- Commodities generally fall into the category of consumable or transformable assets (ex: you can transform crude oil into gas or other petroleum products).
- Commodity values are determined globally, while capital asset values are determined regionally. Commodity values are dependent upon global supply and demand imbalances. Capital assets have different regional markets (ex: U.S. stock market, foreign stock markets).
- Commodities do not conform to traditional asset pricing models such as CAPM because: (i) commodity prices are dependent on global supply and demand factors, and (ii) it is hard to distinguish between market/systematic risk and company specific/unsystematic risk

(b) Explain four reasons why a commodity producer or ABC may be willing to enter into a commodities futures contract that has a slightly negative expected payoff.

Commentary on Question:
The candidates performed below average on this section. Very few candidates earned full credit on this section. Many candidates provided general statements regarding futures and/or commodities markets that were not applicable to the question at hand. These responses received no credit. Partial credit was awarded for each appropriate explanation.

- Commodity producers are naturally long to the commodity they produce and are therefore at risk to declining prices.
- To reduce this long exposure, the commodity producer will sell futures contracts to separate the commodity price risk from other business risks.
- This allows the commodity producer to better allocate their capital to other business risks, allowing for a more efficient use of capital.
- To entice a speculator to take on the commodity price risk, the speculator must be compensated by being able to purchase the contract at a price lower than the expected future spot price of the commodity.
- This reduces the correlation of the producer's stock price to fluctuations in commodity prices
- For ABC, the futures contract will serve as a hedge against the potential for rampant commodities inflation

1. Continued

(c)

(i) Calculate the expected returns of both investment options.

(ii) Recommend the best investment option for ABC.

Commentary on Question:
The candidates performed as expected on this section. Numerous candidates arrived at the correct expected returns for both investment options. Overall, candidate performance was better on the futures return than the call option return. Common mistakes on the call option return were to (1) calculate the expected return using only the expected value of the index at maturity instead of considering the respective payoffs associated with each of the possible index values, and (2) not using the strike price of 925 in the divisor for the option return. A common mistake on the futures return was using the wrong sign on the payoff amounts for each possible index value. Some candidates had the correct formulas but made calculation errors and thus received partial credit. Some candidates only provided their final answers for the expected returns in part (i) without showing any work and therefore received no credit. Most candidates correctly recommended the call option in part (ii) due to its higher expected return, and many also noted the principal protection of the call option as well. Very few candidates noted either of the other two explanations provided below in the model solution.

- Return of structured note w/ call = 4.5% + 30%*(950-925)/925 + 15%*(1000-925)/925 = 6.53%
- Return of structured note w/ futures = 5% + 15%*(800-900)/900 + 15%*(850-900)/900 + 25%*(900-900)/900 + 30%*(950-900)/900 + 15%*(1000-900)/900 = 5.83%
- Recommend choosing the structured note with the call option because:
    - It has the highest expected return
    - The embedded call option is relatively cheap as the base coupon on the structured note with the call option is only 0.5% less than that of the structured note with the futures contract
    - The strike price on the call option is only slightly out of the money, so it provides ample protection against rampant commodities inflation
    - The principal is protected with the call option but may not be in the case of the futures contract if the index drops enough

2. Learning Objectives:

1. The candidate will understand how to work with the variety of fixed income instruments and evaluate fixed income portfolios.

2. The candidate will understand the credit risk aspects of individual securities, portfolios, and sectors and be able to apply a variety of credit risk theories and models to the investment management process.

Learning Outcomes:

(1a) Demonstrate an understanding of various fixed income investments considering:

- cash flow characteristics,
- markets in which they trade, and
- underlying risks such as interest rate, credit and event risks

(2a) Demonstrate an understanding of credit analysis.

(2b) Demonstrate an understanding of and the ability to apply both the concepts and techniques used in the measurement of default risk of individual securities.

Sources:

Private Debt Fund Returns, Persistence, and Market Conditions

Leveraged Finance Chapter 2

Handbook of Credit Risk Management Chapter 20

QFIP-157-23: Ch 12 Credit Risk of Quantitative Enterprise Risk Management, Hardy & Saunders

Commentary on Question:

Candidates performed as expected for this question, especially on parts a) and b).

Solution:

(c) Compare in terms of return, risk, market, and cash flow characteristics each of the following as they relate to investment grade bonds.

(i) Private debt funds

(ii) High yield bonds

2. Continued

Commentary on Question:
Overall, candidates did better on part (ii) than part (i). For the part (i), many candidates were able to get credit for the risk and market aspects. However, very few candidates successfully explained risk and cash flow characteristics. For part (ii), most candidates got partial credit for the risk and return, and many candidates got credit for the market and cash flow too. Candidates needed to mention at least one key point listed in the answers for each term to get the full credit.

Private Debt Funds

- Return: Higher Yield compared to IG bonds
- Risk: Default rate and Recovery rate highly depends on the skills, due diligence and monitoring of the GPs. On average, it is lower default and higher recovery rates than public bonds
- Market: Invest through partnership. Not traded in public. Not rated. Lack of transparency. GPs control all the investment decisions
- Cash Flow: Loan coupon and principal. Early repayment penalties. portfolio company's fees. Investments on the secondary markets

High-Yield Bonds

- Return: Higher Yield compared to IG bonds
- Risk: Higher default, higher credit risk than IG bonds
- Market: Traded in public market. Below investment grade bond rating. More transparency – required by the regulators.
- Cash Flow: Debt coupon rate and principal. Bond structure may be fixed term/fixed coupon rate or flexible such as deferred interest bonds, step-up bonds, Payment-in-kind bonds.

(d) Recommend which of these two assets to add to the portfolio.

Commentary on Question:
Candidates performed as expected for this question. Many candidates made the correct recommendation and earned at least partial scores for the explanations. Candidates who did not receive full credit did not provide enough support for their recommendation.

2. Continued

High yield bond is recommended for this block of business.

- Both assets can improve the overall return of the portfolio since they have higher return than IG bonds.
- Both assets can provide consistent cash flow that fit the liabilities
- However, the credit risk of the private debt fund is harder to manage as it is less transparent and highly depends on the skills and due diligence of the GPs of the private debt funds
- Private debt fund is regards as illiquid as they are not traded in public market and investment period end when GP exists investments and distributes all proceeds to investors (LPs)
- The default information of High yield bonds is more readily available
- High yield bond is more liquid as it is traded in public market

(c) An analyst on the asset management team suggests selling credit default swaps (CDS) with reference to high yield bonds instead of investing in high yield bonds directly. This would limit the cash outflow and eliminate interest rate risk.

Critique the analyst's suggestion.

Commentary on Question:
Candidates performed below average for this question. Many candidates explained the credit risk exposure and some candidates mentioned the cash flow characteristics. Some candidates failed to understand the interest rate risk impact correctly. Very few candidates mentioned the counterparty risk. Candidates needed to cover all four aspects to get the full score.

- Both instruments are exposed to the credit risk of the reference bond
- CDS sellers have less cash outflow compared to bond investors. Both investors receive regular cash payments while bond investors need to pay principal and repayment at the start and end of the term. Sellers of CDS only have cash outflow in the event of default of the reference bond.
- CDS is a swap. It introduces counterparty risk to the portfolio (a more modern reference may refer to central counterparty risk)
- CDS does not eliminate interest rate risk. The present value of the loss payment leg or the premium leg are sensitive to interest rate fluctuation.

3. Learning Objectives:

2. The candidate will understand the credit risk aspects of individual securities, portfolios, and sectors and be able to apply a variety of credit risk theories and models to the investment management process.

Learning Outcomes:

(2a) Demonstrate an understanding of credit analysis.

(2b) Demonstrate an understanding of and the ability to apply both the concepts and techniques used in the measurement of default risk of individual securities.

(2c) Understand and apply various approaches for managing credit risk in a portfolio setting, including the use of Credit Default Swaps

Sources:

Bouteille & Coogan-Pushner, 2nd Edition, 2022, The Handbook of Credit Risk Management, Ch 13

Bouteille & Coogan-Pushner, 2nd Edition, 2022, The Handbook of Credit Risk Management, Ch 20

Commentary on Question:

This question tests the candidate's understanding of credit portfolio management and credit derivatives

Solution:

(a) Describe four practices that occur at Level 2 (Intermediate) CPM as defined in Bouteille, "The Handbook of Credit Risk Management".

Commentary on Question:

The candidates performed as expected on this section. Most candidates correctly identified four practices, although many did not provide a sufficient description of those practices. Partial credit was awarded to candidates who only listed practices without including description, or the description was not sufficiently detailed.

-Quantification of the Capital at Risk, performing value at risk (VaR) calculations and other methods to determine how large unexpected losses could be.
-Allocation of Capital and Profitability at Individual Transaction Level, to determine how much capital at risk could be allocated to individual transactions, which assists with pricing transactions and computing the profitability of each transaction.
-Stress Testing, to evaluate the economic consequences of unexpected but plausible events that may impact the performance of counterparties, and thus the entire portfolio.

3. Continued

Stress testing evaluates how the portfolio will behave in extreme circumstances.
-Hedging Strategy, defensive investment strategy that is proactively performed and can offset losses with gains from different investments, or offload risk entirely.
-Rebalancing Transactions, regularly fine-tuning a portfolio by replacing transactions that provide little income relative to capital with those that produce more income relative to capital.

(b) Describe three uses for CDS in the market.

Commentary on Question:
The candidates performed above average on this section. Almost all candidates were successful at justifying the protection of the credit exposure with purchase of CDS'. Most candidates successfully explained the speculative use of CDS'. Candidates received partial credit for correct identification without providing a description of three uses.

-Protection of a Credit Exposure, purchasing CDS' hedges exposure to credit risk.
-Investment in Credit, selling CDS allows investors to increase their exposure to credit risk and earn premium from protection buyer.
-Speculation in Credit, speculating on a credit trend of a company for when the reference entity deteriorates or defaults.

(c) Recommend whether XYZ should utilize CDS.

Commentary on Question:
The candidates performed as expected on this section. Only a few candidates provided a clear recommendation to buy or sell CDS', although most candidates recommended they should be used without clearly stating a long or short position..
Most candidates recognized additional credit risk associated with possible future economic downturn in the housing market, and that CDS' could be a tool to protect the portfolio. Those candidates that addressed the magnitude of high-yield assets in the portfolio and its impact on the risk of default and the value of CDS received full credit.

Because of XYZ's exposure to high yield assets, including mortgage-backed securities, I recommend purchasing CDS to protect against default. This is particularly important since XYZ's analysts believe that an economic downtown in the housing market is possible within the next 2 years and CDS can specifically protect against credit events that may directly impact the Company's asset portfolio.

4. Learning Objectives:

6. The candidate will understand how to construct and manage investment portfolios relative to a portfolio of liabilities.

Learning Outcomes:

(6b) Develop and critique asset allocation strategies appropriate to underlying liability profiles such as pension plans and long-tail insurance liabilities.

Sources:

Maginn & Tuttle, *Managing Investment Portfolios 3rd* Edition, Section 6.5.2.

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) List three considerations in which Monte Carlo simulation methods can help to confirm the quality of mean-variance or surplus optimization recommended allocations.

Commentary on Question:

Candidates performed below average on this section. Candidates demonstrated broad understanding of Monte Carlo principles in analyzing probabilities for portfolio outcomes. Few candidates were able to explicitly reference the detailed listing of considerations provided in the source. Full credit was given if 3 out of the 4 points were listed.

- MVO and surplus optimization is typically confined to a single period.
- Monte Carlo simulation is useful in defining the probability of funding shortfalls.
- Monte Carlo simulation is useful in defining the likelihood of breaching return thresholds.
- Monte Carlo simulation is useful in evaluating portfolio growth with or without distributions.

(b) You are assisting in this simulation exercise and have elected to apply a three-step asset-liability management method as defined by Sharpe. The objective function is:

$$U_m^{ALM} = E(SR_m) - 0.5R_A\sigma^2(SR_m)$$

Describe each expression within the above objective function.

4. Continued

Commentary on Question:
Candidates performed above average on this section. Candidates were successful in describing each quantity in the equation in sufficient detail. Points were deducted for not fully defining each component that drives a given quantity, or describing the "m" subscript as referencing the market rather than the asset mix.

- UmALM is the surplus objective function's expected value for a particular asset mix m, for a particular asset investor with the specified risk aversion.
- E(SRm) is the expected surplus return for asset mix m, with surplus return defined as (Change in asset value – Change in liability value)/(Initial asset value).
- σ2(SRm) is the variance of the surplus return for the asset mix m.
- RA is the investor risk aversion level.

(c)

(i) Calculate the increase in expected surplus return required for Insurer XYZ to prefer Alternative Portfolio A over its current portfolio.

(ii) Calculate the decrease in standard deviation required for Insurer XYZ to prefer Alternative Portfolio B over its current portfolio.

Commentary on Question:
Candidates performed brilliantly on this section. Almost all candidates used the given information within the objective function to determine the required change in surplus expected return or decrease in standard deviation. Some candidates did not explicitly state the required change amount.

We first determine the value from the objective function for the initial portfolio.

$U_m^{ALM} = E(SR_m) - 0.005R_A\sigma^2(SR_m)$

$U_c^{ALM} = 4 - 0.005(8)(10)^2 = 0$

Our decision criteria is based on selecting a higher U_m^{ALM} value, so Insurer XYZ will only prefer Alternative Portfolio A if the value of U_A^{ALM} is greater than 0. So, for Portfolio A, we have:

$U_A^{ALM} = E(SR_A) - 0.005(8)(14)^2 > 0,\ E(SR_A) > 7.84$

This indicates that the needed increase in surplus expected return is 7.84 – 4 = 3.84% for A.

In order to prefer Alternative Portfolio B, we again need to have a value of U_B^{ALM} that is greater than 0. Thus our calculation is

4. Continued

$U_B^{ALM} = 2 - 0.005(8)\sigma^2(SR_B) > 0,\ \sigma(SR_B) < 7.07$

This indicates that the needed decrease in standard deviation is 7.07 – 10 = -2.93% for B.

(d)

(i) Recommend statistical measures by which to judge the projected performance of the portfolio with respect to the funded ratio.

(ii) Propose a criterion that Insurer XYZ could utilize in determining the appropriateness of the portfolio.

Commentary on Question:
Candidates performed below average on this section. Most candidates were able to recall appropriate statistical measures. Partial credit was given for reasonable suggestions for criteria. Candidates performed worse in part (ii). Most candidates were unable to state clear criterion that would determine a portfolio's success.

i. Appropriate example measures may include the mean, median, or tail risk level suggested by the distribution of the projections.

ii. An example criterion should address a short or long-term time frame by which to judge the projected performance, such as:
• Median funded ratio after 20 years equals at least 100 percent.
• No more than a 10 percent probability of a funded ratio less than 90 percent in any one year.

5. Learning Objectives:

5. The candidate will understand:
   - The design and management of asset portfolios in alignment with investment objectives and strategies, including investments in fixed income, equity and alternative assets.
   - The theory and techniques of portfolio asset allocation.

Learning Outcomes:

(5c) Construct and manage portfolios of equity and alternative investments under various strategies, including active, passive and style management.

(5g) Explain the manager selection process.

Sources:

Maginn & Tuttle Ch 7: Equity Portfolio Management

Commentary on Question:

This question tests the different approaches and measurement of equity investment, in the context of mutual funds vs. ETFs, passive, semi-active vs. active investment approach, as well as the concept of attribution analysis of risk and return.

Solution:

(a) Describe the economically significant differences between conventional index mutual funds and ETF's.

Commentary on Question:

Most candidates performed below average on this section. A few candidates correctly mentioned the transaction costs including commissions to trade ETFs. However, most candidates did not state the shareholder accounting expense of mutual funds, as well as the higher index license fees and tax efficiency for ETFs in many markets.

Shareholder accounting at the fund level can be a significant expense for conventional mutual funds in some markets, but ETFs do not have fund level shareholder accounting.

Exchange-traded funds generally pay much higher index license fees than conventional funds.

Exchange-traded funds are often much more tax-efficient than conventional funds in many markets, including the United States.

Users of exchange-traded funds pay transaction costs including commissions to trade them, but for their ongoing shareholders, ETFs provide inherently better protection from the cost of providing liquidity to shareholders who are selling fund shares.

5. Continued

(b) ABC Life has been maintaining a passive investment approach in its equity portfolio.

Explain the hidden danger in ABC's approach.

Commentary on Question:
Most candidates performed below average on this section (b). Most candidates correctly mentioned the over-valuation and blind allocation to all stock. However, most candidates did not state the suffering of market efficiency and the lack of differentiating stock winners from losers.

When too many investors rely on passive strategies, market efficiency suffers and opportunities for active managers emerge.

Passive Strategies Are Blind to Relative Value. When an index fund or ETF receives inflows, the fund essentially has no choice but to invest in stocks based on their index allocation at that moment, without any consideration of fundamentals, valuation, or anything else.

Broad over-valuation is an unintended consequence of large, uninterrupted inflows into ETFs and other passive index products.

Instead of blindly allocating to all stocks through a passive strategy, those looking to generate above market returns should be more selective in their investing process.

When an investment process makes no effort to differentiate winners from losers, and instead blindly allocates based on index weights, there is no diligence, no intelligent capital allocation, and eventually, no efficient market.

5. Continued

(c) A year later, ABC's equity portfolio began to explore semi-active equity management. It evaluated 3 investment managers using Grinold and Kahn's Fundamental Law of Active Management, considering the Information Coefficient (IC) and Breadth to compute the Information Ratio (IR).

Manager A follows 200 stocks with annual forecasts; IC of each forecast is 0.03.

Manager B follows 100 stocks with annual forecasts, IC for each forecast is 0.04.

Manager C follows 300 stocks, with 200 independent forecasts (IC is 0.02 for each), while the remaining 100 are dependent forecast (IC is 0.03 for each).

Assess which manager gives the highest IR.

Commentary on Question:
Most candidates performed above average on this part (c). Most candidates correctly calculated the IC for Manager A and B. However, a small number of candidates overlooked the dependent forecast (100 of the stocks) for Manager C, in which dependent stocks' IC should contribute nothing to the Manager's IC.

(d) Describe possible limitations of the semi-active stock selection approach.

Commentary on Question:
Most candidates performed below average on this section (d). Most candidates correctly mentioned techniques that generate positive alpha may become obsolete over time. However, most candidates did not mention the other points noted below.

The first is that any technique (Factor or Smart-beta) that generates positive alpha may become obsolete as other investors try to exploit it.

A successful enhanced indexer is always innovating.

Also, quantitative and mathematical models derived from analysis of historical returns and prices may be invalid in the future.

Markets undergo secular changes, lessening the effectiveness of the past as a guide to the future.

Markets also occasionally undergo shocks that, at least temporarily, render forecasting or risk models ineffective.

5. Continued

(e)

(i) Total active risk of Manager X

(ii) IR of Manager X

Commentary on Question:
Most candidates performed above average on this section (3). Most candidates correctly calculated the active risk and active return. However, a few candidates did not use the formula of IR correctly, which is the ratio True Active Return / True Active Risk.

(e) (i) Active Risk
Active Risk = SQRT(True Active Risk^2 + Misfit Risk^2)
Active Risk = SQRT(0.05^2 + 0.04^2)
Active Risk = SQRT(0.0025 + 0.0016)
Active Risk = SQRT(0.0041) = 0.064031242..

So the Total Active Risk of Manager X is 6.403%

(ii) Information Ratio (IR)
The Information Ratio (IR) measures a portfolio manager's true risk-adjusted return by dividing the portfolio's true active return (portfolio return minus benchmark return) by the active risk.

Since Manager X is a value-oriented manager, the S&P 500 Value Index (14%) is a better benchmark than the S&P 500 Index (10%).

True Active Return = Portfolio Return – S&P 500 Value Benchmark Return

True Active Return = 15% - 14% = 1%

Now, we can calculate the true Information Ratio (IR) of Manager X:
IR = True Active Return / True Active Risk
IR = 1% / 6.403%
IR = 0.156 = 15.6%

(f) Explain how the distinction between “true” and “misfit” can be used in portfolio construction optimization.

Commentary on Question:
Most candidates performed poorly on this section (f). Most candidates stated the definitions of “true” and “misfit” risk and return without explaining the connection between the two in the context of portfolio construction optimization.

5. Continued

By disaggregating each of the active risk and return into two components, it is possible to create optimal solutions that maximize total active return at every level of total active risk,

and that also for the optimal level of ‘‘misfit’’ risk.

Although it may seem that no ‘‘misfit’’ risk is desired, a nonzero amount of “misfit” risk may actually be optimal,

because a high level of ‘‘true’’ active return may more than compensate for a given level of ‘‘misfit’’ risk.

6. Learning Objectives:

1. The candidate will understand how to work with the variety of fixed income instruments and evaluate fixed income portfolios.

Learning Outcomes:

(1a) Demonstrate an understanding of various fixed income investments considering:
- cash flow characteristics,
- markets in which they trade, and
- underlying risks such as interest rate, credit and event risks

Sources:

Fabozzi, F.J., 9th Edition, 2021, Handbook of Fixed Income Securities, Chapter 25: Nonagency Residential Mortgage-Backed Securities: Legacy, RMBS 2.0, and Non-QM

Bouteille & Coogan-Pushner, 2nd Edition, 2022, The Handbook of Credit Risk Management, Chapter 4: Measurement of Credit Risk

Bouteille & Coogan-Pushner, 2nd Edition, 2022, The Handbook of Credit Risk Management, Chapter 5: Dynamic Credit Exposure

Commentary on Question:

This question tests the concept of measuring credit risk and its application to mortgage securities. Overall, candidates performed below average on this question. Some candidates provided brief descriptions that earned only partial points.

Solution:

(a) Your manager expects that interest rates will decrease in the next few years and does not expect collateral credit loss to be a major concern. They recommend utilizing a senior subordination shifting interest structure as an internal credit enhancement structure.

Describe the mechanics of the recommended structure.

Commentary on Question:

Candidates performed below average on this part. Most candidates only described the supporting classes and loss structure and did not opine on why the senior subordination shifting interest structure was appropriate and thus only received partial points on this part.

Shift-interest structure designed mainly to deal with prepayment risk for senior bondholders
Since interest rates are expected to decline, prepayment speeds may increase
OC/XS structure used when collateral credit loss is a concern
Senior classes have supporting classes, called mezzanines and subs.

6. Continued

Lockout period when all of the unscheduled principal payments are allocated to the senior tranches and the subordinate bonds are locked out from receiving prepayments
Losses are absorbed from the bottom up
After lockout period, if triggers are passed, subordination start to receive prepayments pro-rata
Mezzanines and subs receive scheduled principal payments & scheduled interest during lockout period

(b) Your intern provides you with a summary of the company's counterparty exposure:

- Gross exposure is the absolute amount at risk and, thus, the worst case scenario
- There is one contract that posted a letter of credit issued by the counterparty's parent as collateral, so we don't have any credit exposure to this counterparty.
- We've provided a revolver to some of our borrowers in the auto industry but they've never used it, so we should adjust the exposure to reflect the actual historical usage.

Critique each of the above statements.

Commentary on Question:
Candidates performed below average on this part. Almost all candidates did not consider scenarios where the credit exposure could be dynamic or the concentration within an industry.

In long-term supply contracts of physical commodities and derivative contracts where the credit exposure is dynamic, gross exposure does not represent the worst case.
The collateral (letter of credit) can be considered worthless, since it is correlated with the underlying exposure.
In normal economic times, utilization of the revolver has been low and is not indicative of utilization during stressed times.
On top of that, there is concentration within an industry that could warrant further adjustments.

6. Continued

(c) Describe the most commonly used methodology to assign a default probability to a counterparty.

Commentary on Question:
Candidates performed below average on this part. Most candidates considered using historical data but did not contemplate internal and external credit ratings.

Analyze a counterparty's financial strength and assign a rating to it that represents its perceived financial strength
For smaller companies, access financial data through companies' annual disclosures or by purchasing financials through a data vendor
Establish a hierarchy – internal ratings typically rank higher than external ratings.
Deal with inconsistencies – if external vendors have different views or split ratings, firms normally adopt a conservative posture and select the lowest indicator.
Map the internal ratings with external ratings, so historical data can be used appropriately
Use historical data to observe the historical default frequency of entities with similar ratings. The observed relative frequency is the estimate of the probability of default.
Consider the recovery rate or the net loss after recovery
Tenor of the transaction – long-term financial strength is harder to predict and the default probability increases with time

(d) You are concerned about interest rates falling and enter into a 5-year, $100M notional interest rate swap to manage the duration. The agreement specifies that you will pay a floating rate of SOFR + 100 bps per annum and the counterparty will pay you a fixed rate of 4%, with annual payments. At the end of the 3rd year, your counterparty goes bankrupt.

Your intern remarks that this simply means that the swap is terminated, there is no further settlement to consider, and we are lucky that we did not have any financial loss from this transaction.

Assess your intern's statement.

Commentary on Question:
Candidates performed above average on this part. Most candidates correctly identified that the intern's statements are incorrect but only provided one reason for why they are incorrect.

6. Continued

The statement is incorrect
If SOFR+100 was higher than the fixed rate at the time of bankruptcy, then a payment may be owed to the counterparty depending on the requirements of the swap contract
We are also subject to reinvestment risk, since we may not be able to enter into another contract with as favorable terms/conditions

7. Learning Objectives:

4. The candidate will:
   - Demonstrate an understanding of regulatory and accounting frameworks around investment governance.
   - Understand how to develop an investment policy including governance for institutional investors and financial intermediaries within regulatory and accounting constraints.

Learning Outcomes:

(4b) Explain how investment policies and strategies can manage risk and create value.

Sources:

Maginn & Tuttle Ch 1

Commentary on Question:

This question tests the candidates' knowledge of investment policy creation for a life insurance company.

Solution:

(a) Describe the four planning steps that ORD should go through as part of the portfolio management process.

Commentary on Question:

Candidates performed as expected for this part of the question.
Most candidates were able to identify each of the four steps; however, most were not able to describe the steps in adequate detail.

Identify and specify MDW's return and risk objective and constraints: As a life insurer returns should be to meet liabilities, and minimize volatility of surplus of assets relative to liabilities and use ALM strategies to protect surplus from changes in interest rates. Insurance constraints are time horizon which is usually long , liquidity concerns and taxes.
Creation of the Investment policy statement which documents investment strategy, rules for reallocation, roles of parties defined, rebalancing guidelines, and a brief client description.
Form capital market expectations: Long run forecasts of risk and return to determine asset classes available for investment.
Form the strategic asset allocation based on knowledge of capital market expectation, investor objectives and constraints to determine target asset class weights

7. Continued

(b) Describe active, semi-active, and passive investment strategies.

Commentary on Question:
Candidates performed as expected for this part of the question.
Most candidates were able to distinguish the main differences among active, passive and semi-passive investment strategies.
However, most candidates failed to mention alpha and/or describe how it works as part of the active approach.
Also, most candidates mentioned indexing as passive investment strategies, but did not explain how it works in sufficient detail.

Active investment strategies are ones that include decisions on securities based on capital market behavior expectation, go beyond the benchmark, creating more alpha, which is value added return
Passive is managing portfolio against an index. Indexing is most common form, another form is buy and hold strategy.
Semiactive allows for reacting to capital market changes, but tries to limit risk. Tracks against benchmark and tries to add alpha while keeping tracking risk to a minimum.

(c) Describe a situation where the portfolio's actual asset allocation differs from the strategic asset allocation.

Commentary on Question:
Candidates performed above average for this part of the question.
Most candidates were able to identify tactical asset allocation and provide a reasonable description of how that works. Candidates who didn't earn full credit tended to identify a situation but did not fully describe it.

A situation where the portfolio's actual asset allocation can very from its SAA is when a TAA (Tactical Asset Allocation) is used to take advantage of short term fluctuations in the capital market expectations.

(d) Explain how the merger impacts ORD's IPS.

Commentary on Question:
Candidates performed as expected for this part of the question.
Most candidates were able to identify at least one of the changes that happened and explained how that could impact the company's IPS. Candidates who earned less than full credit did not fully describe the impacts in terms of the annuity risk and profile, or the investor circumstances.

7. Continued

The IPS will have to be revisited since the risk objective and constraints of a merged company might be different since investor circumstances have changed. Annuities have a different risk and liquidity needs profile than life and disability products. That also calls for a review and update of the PI.

(e) Five years later ORD conducts an assessment of its investment performance.

Identify two components that are part of this assessment.

Commentary on Question:
Candidates performed as expected for this part of the question.
Most candidates were able to identify at least one of the three components that are part of investment performance assessment. A good number of candidates were able to identify two.

The components of assessing investment performance are performance measurement performance appraisal and performance attribution.

8. Learning Objectives:

7. The candidate will understand the need for and goals of assessing the performance of a portfolio, and the methods and limitations of performance attribution.

Learning Outcomes:

(7a) Explain the use of segmented asset portfolios for supporting different investment objectives.

(7b) Apply performance measurement methodologies to various asset portfolios.

(7c) Describe and assess techniques to select or build an asset benchmark for a given investment objective.

(7d) Assess and interpret performance attribution metrics for a given asset or portfolio.

Sources:

QFIP-145-19: Determinants of Portfolio Performance *Managing Investment Portfolios: A Dynamic Process*, Maginn & Tuttle, 3rd Edition, Ch 12

Commentary on Question:

This question tests performance valuation and benchmark selection.

Solution:

(a) Describe three additional steps in designing this new investment portfolio.

Commentary on Question:

The candidates performed as expected on this section. Most were able to describe additional steps to portfolio design. Many candidates did not receive credit for describing steps to select asset classes even though the problem had indicated that asset classes were already chosen.

Design of a portfolio involves at least three additional steps:

- Decide upon the normal, or long-term, weights for each of the asset classes allowed in the portfolio
- Strategically altering the investment mix weights away from normal in an attempt to capture excess returns from short-term fluctuations in asset class prices (market timing)
- Select individual securities within an asset class to achieve superior returns relative to that asset class (security selection).

(b) Critique the benchmarks below in measuring portfolio performance.

(i) Investment style index

(ii) Factor model

8. Continued

Commentary on Question:
Candidates performed as expected in this section. Some candidates received full credit for listing both pros and cons to each benchmark. Some candidates received partial credit for only listing cons.

Investment style index
Pros
- Well known
- Easy to understand: Benchmark corresponds to the manager's investment style
- Widely available: Common style indices already exist for reference

Cons
- Some style indexes contain weightings in certain securities and economic sectors that are much larger than what many managers consider prudent.
- The definition of investment style implied in the benchmark may be ambiguous or inconsistent with the investment process of the manager being evaluated.
- Differing definitions of investment style at times can produce rather extreme return differentials.

Factor model
Pros
- Captures the systematic sources of return that affect an account's performance
- Helps managers and fund sponsors better understand a manager's investment style

Cons
- Not always intuitive to the fund sponsor and particularly to the investment managers
- Ambiguous. We can build multiple benchmarks with the same factor exposures, but each can earn different returns.
- The composition of a factor-based benchmark is not specified with respect to the constituent securities and their weights, we cannot verify all the validity criteria (the benchmark may not be investable, for example).

(c) Calculate both the time-weighted rate of return (TWR) and the money-weighted rate of return (MWR) over the year.

8. Continued

Commentary on Question:
Candidates performed above average in this section. Most candidates received partial credit for correctly calculating the portfolio values and time-weighted rate. Some candidates did not annualize the rate after deriving the quarterly return. As the problem did not specify whether cash flows occurred at the beginning or end of the quarter, answers using either assumption were accepted.

See Excel file

(d) Explain the challenges in determining the rate of return in a long/short hedge fund.

Commentary on Question:
Candidates performed below average in this section. Many candidates received partial credit for indicating that long and short positions interfere with the account value and return calculation. A common error was describing items that were not relevant to rate of return or not explaining how their points connect to the return calculation.

In theory, the net assets of a long-short portfolio could be zero; the value of the portfolio's long positions equal the value of the portfolio's short positions. In this case, the beginning market value would be zero and the account's rate of return would be either positive infinity or negative infinity. In the real world of long-short investing, an account will typically have a positive net asset value due to various margin and administrative requirements. However, as the net asset value gets smaller and approaches zero, the account's return will become nonsensically extreme (large positive or large negative).

(e) Describe the difficulty in creating benchmarks for hedge funds and recommend a solution.

Commentary on Question:
Candidates performed above average in this section. Most candidates received full credit for describing an issue and proposing an appropriate solution. Some candidates did not adequately explain how their items would be an issue in benchmarking or did not provide a reasonable solution.

Difficulty in creating benchmarks for hedge funds:
A wide variety of active investment strategies fall under the category of hedge funds. Some hedge fund managers have very clearly definable investment universes composed of highly liquid, daily priced securities. Other hedge fund managers, such as macro hedge fund managers, take rapidly changing long-short leveraged positions in an array of asset categories ranging from equities to commodities, which present significant benchmark-building challenges.

8. Continued

Solutions to create benchmarks:

- Construct separate long and short benchmarks, then combine in appropriate proportions to create a valid benchmark. This requires the historical returns and holdings of the manager's long and short portfolios.
- Use the Sharpe ratio or information ratio. This is a measure of excess returns over a risk-free return relative to the volatility of returns. It can be calculated without reference to the manager's underlying investment universe. Typically, a hedge fund's Sharpe ratio is compared to that of a universe of other hedge funds that have investment mandates assumed to resemble those of the hedge fund under evaluation.

9. Learning Objectives:

3. The candidate will understand the variety and assess the role of equities in investment portfolios. The candidate will demonstrate an understanding of the distinguishing investment characteristics and potential contributions to investment portfolios of the following major asset groups:
   - Real Estate
   - Public Equity
   - Private Equity
   - Commodities
   - Hedge Funds
   - Distressed debts

Learning Outcomes:

(3a) Demonstrate an understanding of the investment strategies and portfolio roles that are characteristic of various types of equity and alternative investments.

(3b) Use different types of equity and alternative investments available for an investor's growth allocation in portfolio construction, considering portfolio design, risk management, liquidity management, manager selection, and implementation.

Sources:

Managing Investment Portfolios, Maginn & Tuttle, 3rd Edition, 2007 Chapter 7 Section 4

Commentary on Question:

This question tests the fundamentals of equity and alternative investments. The candidate need to demonstrate an understanding of different portfolio weightings and their relative bias. It also tests the candidates' ability to construct a portfolio with a benchmark index.

Overall, candidates performed as expected on this question.

Solution:

(a) Describe the following index weighting choices, including their respective biases.

(i) *Price Weighted*

(ii) *Value Weighted*

(iii) *Equal Weighted*

Commentary on Question:

The candidates performed above average on this section. Most candidates were able to identify what each index weighting choices is weighted on, and what they are biased towards, but failed to provide sufficient description on the weighting choices, hence only got partial credit.

9. Continued

1. Price Weighted

In a price weighted index, each stock in the index is weighted according to its absolute share price.
The index is the sum of the share prices divided by the number of shares in the index.
The price weighted index is biased towards companies with a high stock price, since the stocks with higher prices receive higher weighting regardless of market share.

2. Value Weighted

In a value weighted index, each stock is weighted according to its market capital.
There may be float-weighted index, in which the market capitalization is based on outstanding shares available to investors.
A value weighted index is biased (overweighted) towards large market cap companies since they receive higher weighting.

3. Equal weighted

In an equal weighted index, each stock in the index is weighted equally.
In an equal weighted index, small companies have the same weight in the index as very large companies.
Therefore, it is biased towards smaller companies.

(b) Explain the expected net change in your portfolio as the result of this drop.

Commentary on Question:
The candidates performed as expected on this section. Most candidates were able to conclude that the net change is a loss in the portfolio, because the drop in long position is larger than the gain in the short position. Full credit was only given to candidates who were able to discuss the impact of the 2nd largest company in each index.

- S&P 500 is a value-weighted index, where stocks are weighted according to its market capitalization. S&P 500 equal weight is an equal weighted index.
- 2nd largest is a large cap company; therefore, it is overweighted in the S&P 500. In the S&P 500 equal weighted index (S&P500 EWI), 2nd largest is weighted equally with other stocks.
- When 2nd largest drops by 10%, it has a larger impact on S&P500 than S&P 500 EWI. Therefore, S&P 500 index will drop more than S&P500 EWI.
- The portfolio has a long position in S&P500 and a short position in S&P500 EWI. Therefore, your portfolio will drop but expected to be less than 10%.

9. Continued

(c) You are now asked to construct a portfolio to track the S&P 500 index utilizing full replication, stratified sampling, or optimization.

Compare these three methods.

Commentary on Question:

The candidates performed as expected on this section. Most candidates were able to describe full replication, stratified sampling and optimization and compare the tracking error or transaction costs between the 3 methods, but only a few candidates were able to comment on some of the main differences between the methods. For example, stratified sampling assumes no correlation between cells, and there is not enough diversification, etc., hence only got partial credits.

Full replication: every component in the index will be represented in the portfolio, and each portfolio position will have approximately the same weight in the fund as in the index. Full replication has the least tracking error and highest transaction cost.

Stratified sampling: a portfolio manager divides the index along a number of dimensions (e.g., market capitalization, industry, value, and growth), creating multidimensional cells. Each index stock is placed into the cell that best describes it to mimic the index. Stratified sampling implicitly assumes that there is no correlation between the stratified cells and this portfolio does not provide enough diversification since only a few stocks are included in the portfolio.

Optimization uses a subset of the indexed fund to track the risk exposure and the return of the index. Optimization potentially has the greatest tracking error since it is based on mathematical models.

Given that the S&P500 is relatively easy to replicate, optimization is not the best choice.

10. Learning Objectives:

3. The candidate will understand the variety and assess the role of equities in investment portfolios. The candidate will demonstrate an understanding of the distinguishing investment characteristics and potential contributions to investment portfolios of the following major asset groups:
   - Real Estate
   - Public Equity
   - Private Equity
   - Commodities
   - Hedge Funds
   - Distressed debts

Learning Outcomes:

(3a) Demonstrate an understanding of the investment strategies and portfolio roles that are characteristic of various types of equity and alternative investments.

(3d) Recommend and justify an optimal portfolio allocation in a risk-return framework.

Sources:

Ch 17: Introduction to Leveraged Buyouts, p.440

Ch 17: Introduction to Leveraged Buyouts, p.424-425

Ch 17: Introduction to Leveraged Buyouts, p.446-453

Commentary on Question:

This question tests the concept of leveraged buyouts, and the analysis on how LBOs add value.

Solution:

(a) Your manager claims ABC is a good LBO candidate.

Explain whether you agree with your manager.

Commentary on Question:

The candidates performed above average on this section. Many candidates were able to explain why ABC is a good LBO candidate by discussing about the operating and net margins, the liquidity, the debt/equity ratio and the price per share. Candidates who earned less than full credit did not provide sufficient reasoning.

10. Continued

- Operating and net margins are 15% and 8%, which is sufficient to generate interest (*in most interest rate environments*).
- 65% of assets identified as current assets. Also, current assets greatly exceed current liabilities. This demonstrates excellent liquidity.
- Debt/equity ratio is 50% debt/50% equity. This would allow additional debt in a leveraged buyout.
- It generates a significant free cash flow. This shows the ability to support and service a higher debt ratio.
- Price per share declined dramatically, primarily because it indicates that there could be an opportunity to buy it out at a more favorable valuation. The increase in stock price later on would be related to management actions to improve the business.
- Mature firm with a strong brand name and competitive market position as one of the largest clothing companies in the world.
- Not subject to technological obsolescence as it is one of the largest clothing retailers, OR diversified customer base that generates recurring revenues as it is one of the largest clothing retailers

(b)

(i) Calculate the return on capital for the company's shareholders and debtholders in aggregate.

(ii) Calculate the return for the equity holders if they sell their shares to the LBO offer.

Commentary on Question:
The candidates performed as expected on this section. Mosl candidates were able to correctly calculate the return for the equity holders if they sell their shares to the LBO offer. Only a few candidates calculated the return on capital correctly.

See excel spreadsheet for solutions.

(c)

(i) Calculate the annual interest payment obligation.

(ii) Calculate the number of years it will take the company to clear the debt, assuming no dividends and using free cash flow to pay down the existing debt.

(iii) Calculate the value of the company after it pays off the debt, assuming a long-term growth rate of 2% per year and a discount rate of 12%.

(iv) Calculate the total return on the investment for the LBO transaction.

10. Continued

Commentary on Question:
The candidates performed below average on this section. Most candidates successfully calculated (i) the annual interest payment and (iii) the value of the company after it pays off debt. However, not many candidates knew how to correctly calculate (ii) the number of years it will take the company to clear debt and (iv) the total return on investment.

See excel spreadsheet for solutions.

11. Learning Objectives:

6. The candidate will understand how to construct and manage investment portfolios relative to a portfolio of liabilities.

Learning Outcomes:

(6c) Evaluate the difficulties of investing for long-tail liabilities (i.e. beyond 30 years) such as inflation indexed pension plans and secondary guarantee universal life insurance.

Sources:

QFIP-154-20: The Evolution of Insurer Portfolio Investment Strategies for Long-term Investing

Commentary on Question:

This question tests the concept of asset liability management with respect to long-tail or complex liabilities.

Solution:

(a) Explain how pension funds have similar needs for long term asset and liability management strategies as life insurers.

Commentary on Question:

The candidates performed below average on this section. Most candidates were able to identify the similarity in the long-term nature of the liability cash flows. Fewer candidates correctly identified the predictability in the nature of the cash flows and the ability to invest in long-term illiquid assets.

Similar to life insurers, pension funds are long-term investors with relatively predictable liquidity needs.
The cash inflows of pension funds can be assessed with considerable accuracy, since each employee/beneficiary usually pays in a fixed percentage of their salary.
The cash outflows of pension funds can be well forecasted because the formula for benefit payments is set out in the contract between the fund and its beneficiaries.
These characteristics enable pension funds to invest in long-term assets like bonds, equity, mortgages, and real estate for a relatively long-term.

(b)

(i) Identify three common types of derivatives used by insurance companies and/or pension funds to manage interest risk.

(ii) Explain why Company XYZ might use each of the identified derivatives as a tool for asset liability management.

11. Continued

Commentary on Question:
Candidates performed above average on this section. Most candidates were able to identify three derivative types that can be used with almost all candidates getting at least one. Candidates lost points for not being able to articulate the reasoning for including the derivatives in part b(ii).

(i) Swaps
Options
Credit derivatives
Futures/forwards

(ii) Swaps: Interest rate swaps used to manage cash flow risks caused by interest rate changes. Exchange rate swaps help insurers manage foreign currency denominated investments.
Options: Options are used frequently by life insurers and pension funds to hedge against interest rate risk, and particularly for products embedded with minimum guaranteed returns.
Credit derivatives: Can be utilized by insurers and pension funds as alternatives to debt security portfolios.
Futures/Forwards: Can be utilized by life insurers to shorten or lengthen duration of asset portfolio.

(c) Describe how the rolling 1-year crediting rate in the cash surrender value adds complexity to asset liability management.

Commentary on Question:
Candidates performed below average on this section. Some candidates were able to identify the decreasing predictability in the cash flows brought on by the product feature. Very few candidates were able to identify the mismatch between the long-duration assets that would typically back this type of product and the linkage with the short-term rate.

The product is a Whole Life product which has a long duration of cash outflows and would typically be supported with long-term assets.
The rolling 1-year crediting rate links the liability to short term interest rates which may not move in tandem with the long-term rates supporting the liability.
The policyholder has the right to surrender, decreasing the predictability of the cash outflows.

(d) Describe how this guaranteed interest rate feature adds complexity to asset liability management.

11. Continued

Commentary on Question:
Candidates performed below average on this section. Few candidates scored full marks on this question. Most candidates either identified the asymmetric cash flows that the product feature would bring on, or recognized the uncertainty this brings into the policyholder behaviour and the optionality created.

The guaranteed interest rate only kicks in when rates drop below a specific threshold which creates asymmetric cash flow dependency on whether interest rates increase or decrease. The creates an embedded option for the policyholder, which decreases the predictability of cash flows since the policyholder has the discretion of when to exercise the option.

(e) Explain how derivatives can be used to manage the risks introduced by the rolling 1-year crediting rate and guaranteed interest rate features described above.

Commentary on Question:
Candidates performed as expected on this section. Many candidates successfully identified at least one of the ways that derivatives could be used to manage the product features. Candidates received full marks so long as an adequate explanation was provided as to how the derivatives could be used.

Interest rate floors can be purchased by the insurance company to supplement the cash flow required to meet the guaranteed interest rate if market interest rates drop below the guaranteed level.
Interest rate options or bond futures can be purchased by the insurance company to manage the interest rate risk from the rolling 1-year CSV crediting feature by matching key rate durations.

12. Learning Objectives:

5. The candidate will understand:
   - The design and management of asset portfolios in alignment with investment objectives and strategies, including investments in fixed income, equity and alternative assets.
   - The theory and techniques of portfolio asset allocation.

Learning Outcomes:

(5a) Demonstrate an understanding of common techniques to enhance yield and manage liquidity in fixed income portfolios.

(5b) Construct and manage portfolios of fixed income investments under various strategies, including indexing and target return.

Sources:

Managing Investment Portfolios: A Dynamic Process, Maginn & Tuttle, 3rd Edition, 2007 Ch 6

Commentary on Question:

The candidates performed as expected on this question. This question tested the candidates' knowledge of using various methods to manage a portfolio to a target duration. Candidates performed best on parts (a) and (b) and had difficulty on part (d).

Solution:

(a) Calculate the number of futures contracts your manager needs to buy or sell to meet the $150M dollar duration target.

Commentary on Question:

The candidates performed above average on this part with many candidates receiving full points. For candidates who did not receive full points, common errors included not accounting for the existing dollar duration of the portfolio and not recognizing the need for the company to sell contracts to achieve the duration target.

$$DD_{portfolio} = 4.8 * 5 + 7.3 * 3.2 + 12.7 * 10.4 = 179.44MM$$

$$DD_{target} = DD_{portfolio} + DD_{future} * \frac{Contracts}{ConvFact}$$

$$150MM = 179.44M + \frac{100{,}000 * 5}{100{,}000 * 1.2} * Contracts$$

$$Contracts = -70.656$$

Sell* 71 *Futures Contracts

(b) Calculate the amount and position in the swap needed to match the $150M target dollar duration.

12. Continued

Commentary on Question:
Candidates performed above average on this part with many candidates receiving full points. For candidates who did not receive full points, the most common mistake was incorrectly calculating the duration of the swap and stating the wrong position the company needed to enter. Candidates who carried forward an incorrect dollar duration from part (a) received full points for correct calculations in part (b)

$$Dollar\ Duration\ of\ Swap\ (Pay\ fix\ point\ of\ view) = DD_{floatbond} - DD_{fixedbond}$$
$$DD_{swap\ pay\ fix} = 100{,}000 * 0.4 - 100{,}000 * 6.5 = -610{,}000$$
$$DD_{target} = DD_{portfolio} + DD_{swap\ pay\ fix} * AmountInvested$$
$$150MM = 179.44MM + \frac{-610{,}000 * X}{1{,}000{,}000}$$

$$\boldsymbol{X = 48.26MM\ in\ fixed\ rate\ payer\ side\ of\ swap}$$

(c) Compare using futures or interest rate swaps to meet the target dollar duration.

Commentary on Question:
Candidates performed as expected on this part of the question. Most candidates were able to compare futures and swaps, but few tied their comparisons to the situation in this question. Full points were awarded to candidates who compared futures and swaps and suggested which would better for managing dollar duration. There were different areas of the syllabus candidates could pull information for this part, so candidates who stated the company should use swaps and candidates who stated the company should use futures was accepted with proper support.

Both swaps and futures can accomplish target duration management; in contrast to cash markets, both can also be used to reduce the duration of a portfolio and are generally considered to be liquid markets. However, swaps generally have lower transaction costs and are considered to be more efficient than futures.

(d) Recommend whether your manager would hedge the fund's exposure using dollar-yen forward contracts.

Commentary on Question:
Candidates performed below average on this section. Many candidates were unable to use the information given to calculate the unhedged vs hedged returns with few arriving at the correct answer. Candidates who stated the manager should or should not hedge using forward contracts without supporting work did not receive credit.

12. Continued

The interest rate differential between the dollar and yen is 4% - 4.5% = -0.5% which is less than the manager's expected return on the yen of 0.8%. The manager should not enter a forward rate contract and lock-in the -0.5% return but should let the funds' exposure to the yen remain unhedged and realize the 0.8% expected return.

13. Learning Objectives:

3. The candidate will understand the variety and assess the role of equities in investment portfolios. The candidate will demonstrate an understanding of the distinguishing investment characteristics and potential contributions to investment portfolios of the following major asset groups:
   - Real Estate
   - Public Equity
   - Private Equity
   - Commodities
   - Hedge Funds
   - Distressed debts

Learning Outcomes:

(3b) Use different types of equity and alternative investments available for an investor's growth allocation in portfolio construction, considering portfolio design, risk management, liquidity management, manager selection, and implementation.

(3d) Recommend and justify an optimal portfolio allocation in a risk-return framework.

Sources:

1. Commercial Real Estate Analysis and Investments, Geltner & Miller, 3rd Edition, 2014, Ch. 12: Advanced Micro-Level Valuation (excluding Appendix 12B), p.256-7

2. Commercial Real Estate Analysis and Investments, Geltner & Miller, 3rd Edition, 2014, Ch. 12: Advanced Micro-Level Valuation (excluding Appendix 12B), p.267

3. Commercial Real Estate Analysis and Investments, Geltner & Miller, 3rd Edition, 2014, Ch. 12: Advanced Micro-Level Valuation (excluding Appendix 12B), p.274

Commentary on Question:

This question tests the student's understanding of Real Estate as an alternative investment, including but not limited to the differences between the RE market and typical securities; differences between two levels of asset markets relevant for RE investments; and special characteristics of RE and how investors make decisions on RE investments.

Solution:

(a) Describe two characteristics that differentiate the real estate market from the typical securities investment environment.

13. Continued

Commentary on Question:
Most candidates performed worse than expected on this question. Many candidates earned credit for mentioning market and information inefficiency. However, many seemed to misunderstand the question, and forgot about the two levels of asset markets relevant to the RE market and gave characteristics of physical assets only.

- A well-functioning market usually exists for the underlying physical assets that are being considered, namely, commercial buildings.
- The commercial RE asset market is not as informationally efficient.
- There are two levels of asset markets relevant for real estate investment (private RE asset market and publicly traded REIT shares in the stock exchange)

(b) Analyst A highly recommends direct investment in properties because:

- the company can take advantage of the predictability to buy low and sell high with extensive research and
- there are greater opportunities for making successful market timing decisions.

Evaluate analyst A's comments.

Commentary on Question:
Candidates performed as expected on this section. Most students were able to identify the limitations in Analyst A's comment and gave proper explanations but only a few of them were able to get full credit and stated sufficient details.

Final conclusion: Do not agree with Analyst A's comment.

Reasons:
-Real estate markets are far from fully predictable – though asset prices move more slowly in response to news, and thus only partially adjusting in a short/medium time horizon.
-Transaction costs in buying and selling assets in the direct property market are much greater than in the securities market and can easily remove much of the profit investors could otherwise obtain from trading on predictable asset movements.
-Transaction costs can be mitigated by holding RE investment for long periods of time, but long holding periods also mitigate the per-annum percentage profit that can be earned from timing the volatility of the markets.
-Investment returns over long holding periods are often more sensitive to how well the property is managed than to the timing of the transactions.

13. Continued

(c) Contrast the quantification of REIT NAVs and REIT share prices.

Commentary on Question:
Candidates performed much worse than expected on this question. Many earned partial credit for mentioning REIT share prices and future growth. However, many students confused the definition of REIT NAVs and REIT share prices.

- NAVs are based on existing property values
- NAVs are based on private market valuations
- debt liabilities need to be removed to arrive at the NAV
- REIT share prices consider future growth opportunities

(d) Assess whether REIT Company C can afford to pay a higher price for a given property than REIT D based on the above two metrics.

Commentary on Question:
Candidates performed poorly on this question. Most students were able to mention that these two metrics were not sufficient to reach the conclusion. However, they did not provide sufficient support for their conclusion.

Neither company level cost of capital nor company's earnings yield has a causal relationship with the OCC when evaluating investment value of a specific property.

The OCC for evaluating a given property should reflect the risk in the property, while both metrics mentioned above are at company level.

- The cost of capital of a company is an average based on the company's current holding, and is different from the marginal cost of capital of the new property.
- A higher P/E ratio means that a stock's price is higher relative to earnings and possibly overvalued. Investors may use this metric to determine a stock's market value and future earnings growth of a company

However, REIT Company C may be able to afford to pay a higher amount due to other metrics, for example, it may have a higher Investment Value to the company (e.g. tax benefits, synergies with the existing property holdings and etc.).

14. Learning Objectives:

1. The candidate will understand how to work with the variety of fixed income instruments and evaluate fixed income portfolios.

Learning Outcomes:

(1a) Demonstrate an understanding of various fixed income investments considering:

- cash flow characteristics,
- markets in which they trade, and
- underlying risks such as interest rate, credit and event risks

Sources:

Commercial Real Estate Analysis and Investments, Miller & Geltner, 2014, Third Edition, OnCourse Learning Publishing, Chapters 16, 20

Commentary on Question:

This question is intended to test the candidate's understanding of the concepts underpinning the underlying loans backing the CMBS, the hierarchy of CMBS payments, the risk characteristics of each tranche within the hierarchy structure, and the challenges faced by the CMBS industry. To earn full credit, candidates needed to demonstrate an understanding of residential versus commercial mortgages, the CMBS securitization process, the risk-return profile of CMBS tranches, and how moral hazard and adverse selection impact CMBS. The most successful candidates were able to provide a comprehensive list with proper explanation for parts (a) and (b), identify the key characteristics of each tranche and how they affect the risk-return profile of the enterprise for part (c), and clearly define moral hazard and adverse selection in general and in the context of CMBS.

Solution:

(a) Identify four differences between residential and commercial mortgages.

Commentary on Question:

Candidates performed above average for this part. Most candidates were able to list at least two differences with proper explanation to receive partial credits. Full credit was given if four differences are identified.

- Individual residential loans are much smaller on average, but much more numerous than commercial loans.
- Residential owner-occupied properties generate no income, so the lender depends on the individual borrower's income to service the loan, while commercial loans can be serviced from the income produced by the property securing the debt.
- Residential borrowers are usually not financial or business professionals and are typically in the market for a loan only occasionally, while commercial borrowers are typically commercial or financial entities staffed by business professions with much greater expertise than the typical homeowner.

14. Continued

- Commercial properties tend to be more unique, while single-family homes tend to be relatively homogeneous.
- Social and political concerns, and the resulting government involvement, are much greater regarding residential loans than commercial loans, including different statutory and common laws governing foreclosure and bankruptcy for residential versus commercial loans.

(b) Describe key players in the CMBS securitization process.

Commentary on Question:
Candidates performed as expected for this part. Few candidates were able to identify steps in the securitization process and list the corresponding key players. Some candidates received credit for providing a proper explanation of the key player without correctly naming it or for giving a name without complete explanation.

- Mortgage borrowers are provided mortgage loans by Lenders.
- Lenders sell the individual mortgage loans to investment banks.
- Investment banks package the loan and transferred to a Trust.
- The Trust issues and sells classes of bonds, also known as tranches, to Investors.
- Investors receive cash flows from the mortgage loans depending on the claim assigned by the tranche.
- Servicers collect cash flows from the mortgage borrowers, deal with defaults, and receive a portion of the mortgage cash flow for their servicing.

(c) Critique the appropriateness of each of the above tranches that ABC Insurance Co. is considering adding to its investment portfolio.

Commentary on Question:
Candidates performed below average for this part. Most candidates were able to identify Tranche A as the senior and protected tranche, but only a few identified the diversification benefit. Many candidates incorrectly stated that the IO strip is junior to Tranche B, and only a few mentioned the volatile duration of the IO strip. Candidates received partial credits for identifying key characteristics of each tranche but failed to recommend Tranche A.

- Tranche A, as a senior tranche, receives priority cash flows and is also protected from default by the lower Tranches, such as Trance B.
- While Tranche B has a higher coupon, the additional risk associated with default is too risky for a Life Insurance Company.
- The IO strip is a possible option and gives an interest-only return for the duration of the CMBS, but the coupon for this strip is lower and the investment duration could be highly variable.

14. Continued

- Tranche A is appropriate for a Life Insurer as additional diversification for the current portfolio.

(d) Describe moral hazard and adverse selection and how they create challenges for the CMBS industry.

Commentary on Question:
Candidates performed as expected for this part. Most candidates successfully identified the moral hazard or adverse selection in the context of CMBS, but only a few were able to describe both and provide a clear definition to receive full credit.

- Moral hazard exists when one party has control over an action or decision that affects the risk of well-being of another party.
- Adverse selection occurs when a relevant sample or selection tends to have unfavorable characteristics compared to the average characteristics in a population.
- An example of moral hazard could be if loan issuers determine the amount of risk in the loans, they issue by underwriting standards they employ, but then immediately pass that risk on to other parties.
- An example of adverse selection could be if CMBS are viewed by the bond market as being riskier and require higher yields, which in turn requires borrowers of CMBS loans to pay higher interest rates, and so the best borrowers and loans go to competing non-CMBS types of lenders.