

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

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

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

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

**Exhibit 1**  
**Selected Data from Lima's Home Country**

Taxes	<ul style="list-style-type: none"> <li>• Flat income tax rate of 25%.</li> <li>• Wages, realized capital gains, and interest are taxed as income.</li> <li>• Dividends are not taxed.</li> <li>• Realized losses may be offset against income and may be carried forward to offset income in future years.</li> </ul>
Health insurance	<ul style="list-style-type: none"> <li>• Government provides at no direct cost to citizens.</li> </ul>
Tax-deferred accounts (TDAs)	<ul style="list-style-type: none"> <li>• Contributions are pretax and annual maximum is USD 40,000.</li> <li>• Income and gains grow tax-deferred and portfolio reallocations are not subject to tax.</li> <li>• Income taxes are paid on full amount of withdrawals.</li> <li>• No penalties on withdrawals for housing or education.</li> </ul>

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

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

DuBord notes the following factors:

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

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

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

- i. liquidity
- ii. time horizon

(4 minutes)

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

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

(12 minutes)

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

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

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

(8 minutes)

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

(3 minutes)

During a recent review with Rual, DuBord notes that tax law changes, effective next year, will lower the tax on capital gains to 15% but eliminate the ability to offset income with realized losses. To minimize Rual's tax liability, DuBord is considering the optimal location (tax-deferred or taxable) for her assets prior to the tax law changes. DuBord and Rual agree to maintain Rual's current asset allocation. Rual's investment portfolio and asset location are shown in Exhibit 2.

**Exhibit 2**  
**Rual's Investment Portfolio**

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

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

- E. i. **Determine** the “sell” amount of bonds and the “sell” amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).
- ii. **Determine** the “buy” amount of bonds and the “buy” amount of equities to achieve the *most* tax-efficient allocation in *each* account (tax-deferred and taxable).
- iii. **Justify**, with *two* reasons, why this is the *most* tax-efficient allocation.

Note: Assume no transaction costs or liquidity needs.

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

**(8 minutes)**

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# Answer Question 1 on This Page

**Template for Question 1-E**

**Note: Assume no transaction costs or liquidity needs.**

Asset class	i. Determine the “sell” amount of bonds and the “sell” amount of equities to achieve the <i>most</i> tax-efficient allocation in <i>each</i> account (tax-deferred and taxable).	
	Tax-deferred Account	Taxable Account
Bonds		
Equities		
Asset class	ii. Determine the “buy” amount of bonds and the “buy” amount of equities to achieve the <i>most</i> tax-efficient allocation in <i>each</i> account (tax-deferred and taxable).	
	Tax-deferred Account	Taxable Account
Bonds		
Equities		
<b>iii. Justify, with <i>two</i> reasons, why this is the <i>most</i> tax-efficient allocation.</b>		
1.		
2.		

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

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

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

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

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

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

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

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

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

**Justify** *each* response with *one* reason.

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

**(9 minutes)**

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

**(6 minutes)**

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

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

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

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

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

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

(6 minutes)

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

(4 minutes)

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# Answer Question 2 on This Page

**Template for Question 2-A**

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

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

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

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

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

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

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

**(12 minutes)**

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

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

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

**Exhibit 1  
Current Pension Plan Asset Allocations**

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

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

**Exhibit 2**  
**Potential Trades**

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

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

**Justify** *each* response with *one* reason.

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

(12 minutes)

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# Answer Question 3 on This Page

**Template for Question 3-A**

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

# Answer Question 3 on This Page

## Template for Question 3-B

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

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

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

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

**Exhibit 1**  
**Selected U.S. Cyclical Indicators**

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

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

**(6 minutes)**

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

**(4 minutes)**

Liu responds to Martin’s observation: “The economy appears to be weakening, but I believe this has already been priced into the market. The S&P 500 Index is currently at 760. Inflation is low and corporate earnings of the S&P 500 Index constituents are \$51.80. The dividend yield (on a trailing annual basis) is 3.5% and I expect the dividend growth rate to be constant at 5%. With the risk-free rate at 2%, if I assume a 6% equity risk premium, both the dividend discount model and the earnings multiplier approach indicate that the equity market is undervalued at these levels.”



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

(4 minutes)

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

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

**Exhibit 1  
Thompson Foundation  
Key Objectives of Investment Policy Statement**

Return objective: <ul style="list-style-type: none"> <li>• Required annual rate of return on investment portfolio is 9.6%.</li> </ul>
Risk objectives: <ul style="list-style-type: none"> <li>• Diversify the portfolio consistent with prudent investment practices.</li> <li>• Minimize portfolio risk while achieving return objective.</li> <li>• Leverage is not allowed.</li> </ul>

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

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

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

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

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

(3 minutes)

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

(3 minutes)

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

(3 minutes)

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

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

(3 minutes)

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

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

(3 minutes)

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

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

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

**Exhibit 1**  
**Existing Portfolio Bonds**

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

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

**Exhibit 2**  
**Bonds Available to Complete Immunized Portfolio**

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

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

**(8 minutes)**

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

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

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

(6 minutes)

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

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

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

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

Note: Simply reversing the statements will receive no credit.

(4 minutes)

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

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

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

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

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

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

**Show** your calculations.

**(4 minutes)**

- B. **Explain** why *each* of the following option strategies is *less* appropriate than a straddle, given Jacob's beliefs:
- i. bull spread
  - ii. short butterfly spread
  - iii. zero cost collar

**(6 minutes)**

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

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

**Exhibit 2**  
**Bold Beverages Pension Fund and Market Data**

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

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

(5 minutes)

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

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

(5 minutes)

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

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

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

**Exhibit 1**  
**Brown Asset Allocation**

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

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

**(4 minutes)**

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

- Brown’s tolerance for risk has declined as volatility in the international equity markets has increased.
- Brown is concerned about taxes and transaction costs associated with frequent rebalancing. Transaction costs for international equity investments are higher than for Brown’s other asset classes.
- Global equity market correlations are increasing and the correlation of international equity with the rest of the portfolio is higher than the correlation of U.K. fixed income with the rest of the portfolio.

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

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

(4 minutes)

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

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

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

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

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

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

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

- C. **Recommend** the *most* appropriate trade execution tactic (crossing system, implementation shortfall, or VWAP) for *each* order.
- i. Buy 5,000 shares ABCD
  - ii. Buy 40,000 shares EFGH

**Justify** *each* recommendation with *one* reason.

**ANSWER QUESTION 8-C IN THE TEMPLATE PROVIDED ON PAGE 63.**

(6 minutes)

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

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

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

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

(3 minutes)

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# Answer Question 8 on This Page

**Template for Question 8-C**

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

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

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

- S&P 500
- Russell 1000
- Russell 3000

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

**Exhibit 1**  
**Comparison of Tamui's Portfolio to Possible Benchmarks**

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

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

(5 minutes)



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

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

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

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

(4 minutes)

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

(3 minutes)

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NOT BE GRADED**