

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

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

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

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

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

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

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

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

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

(5 minutes)

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

(4 minutes)

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

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

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

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

(8 minutes)

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

(4 minutes)

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

Exhibit 1
Alonso's Current Portfolio Allocation

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

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

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

(6 minutes)

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Answer Question 1 on This Page

Template for Question 1-C

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

Answer Question 1 on This Page

Template for Question 1-E

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

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

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

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

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

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

Justify *each* response with *one* reason.

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

(6 minutes)

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

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

Note: No calculations are required.

(3 minutes)

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Answer Question 2 on This Page

Template for Question 2-A

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

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

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

Exhibit 1
Alphastan and Betania Equity Markets

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

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

Exhibit 2
Limit Order Book for a Typical Alphastan Equity

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

Exhibit 3
Limit Order Book for a Typical Betania Equity

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

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

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

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

(9 minutes)

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

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

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

(6 minutes)

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

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

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

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

(6 minutes)

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Answer Question 3 on This Page

Template for Question 3-A

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

Template for Question 3-B

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Answer Question 3 on This Page

Template for Question 3-C

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

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

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

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

Sample diagnostic questions are shown in Exhibit 1.

Exhibit 1
Alesi Capital Management
Sample Diagnostic Questions

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

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

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

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

(6 minutes)

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

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

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

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

- endowment
- conservatism
- mental accounting
- illusion of control

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

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

(6 minutes)

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

(5 minutes)

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Answer Question 4 on This Page

Template for Question 4-A

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

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

Answer Question 4 on This Page

Template for Question 4-B

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

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

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

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

Exhibit 1
Economic Analyses of Emergistan

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

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

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

Justify *each* response with *one* reason.

Note: Consider *each* source of error independently.

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

(9 minutes)

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

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

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

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

- i. purchasing power parity
- ii. capital flows

Justify *each* response with *one* reason.

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

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

(6 minutes)

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

Exhibit 3
Emergistan Equity Market Information

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

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

(4 minutes)

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

(5 minutes)

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Answer Question 5 on This Page

Template for Question 5-A

Note: Consider *each* source of error independently.

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

Answer Question 5 on This Page

Template for Question 5-B

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

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

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

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

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

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

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

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

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

(4 minutes)

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

(4 minutes)

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

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

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

(6 minutes)

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

(4 minutes)

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

Exhibit 1
Estimated Components
of the Plan's Benefit Payments

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

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

Justify *each* response with *one* reason.

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

(8 minutes)

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

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

(8 minutes)

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Answer Question 6 on This Page

Template for Question 6-E

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

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

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

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

(8 minutes)

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

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

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

(6 minutes)

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

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

(3 minutes)

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

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

(3 minutes)

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

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

(3 minutes)

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Answer Question 7 on This Page

Template for Question 7-B

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

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NOT BE GRADED**

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

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

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

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

Exhibit 1
Investment Portfolio Characteristics

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

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

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

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

- equity targets.
- bond targets.

Show your calculations.

(8 minutes)

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

Exhibit 2
Transactions for Rebalancing the Peterson Portfolio

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

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

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

(5 minutes)

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

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

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

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

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

(4 minutes)

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

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

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

(3 minutes)

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

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

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

(5 minutes)