Mercier Asset Management

Lynne Brosch, a portfolio manager at Mercier Asset Management, is launching the Mercier Global Fixed-Income Fund. The fund's objective is to replicate primary risk factors of the global fixed-income index, which tracks the total return performance of liquid bonds denominated in local currencies.

Lewis Olivera, Mercier's CIO, asks Brosch about the challenges of trading and valuing fixed-income securities in her fund. Brosch highlights the following challenges, noting that she:

Challenge 1:Tends to trade with dealers in smaller sizes due to Basel III capital requirements
Challenge 2:Rebalances her portfolio infrequently due to the illiquid nature of most fixed-income instruments
Challenge 3:Relies on matrix pricing to minimize variation between index performance and portfolio returns

Brosch uses a representative sample of the bonds in the index for constructing the fund. Given the complexity of managing bond investments in global markets, Brosch targets a tracking error for her fund of 3%. Olivera believes that Brosch's tracking error target is too high and asks Brosch to reduce the tracking error using the PV of distribution of cash flows methodology.

Eunice Lee, a fixed-income analyst at Mercier, worries about the increased costs to achieve the fund's objective while complying with Olivera's request to reduce the tracking error. Brosch responds that she can create an enhanced index replication and then use the following additional enhancement strategies to achieve the fund's objective:

Strategy 1:Evaluate specific call features to identify value given small yield changes.
Strategy 2:Use a model to gauge relative value at various points along the yield curve.
Strategy 3:Tilt exposure toward corporates given a tighter yield spread relative to duration exposure.

Another client of Mercier is the Redlinger Family Office. One of the Office's wealth managers asks Olivera to devise an investment strategy to manage the interest rate risk of its fixed-income investment portfolio against one-time shifts in the yield curve. Olivera proposes immunizing the single liabilities by using coupon bonds while continuously matching duration. The wealth manager suggests that this can be achieved with zero-coupon bonds held to maturity.

Question 1.1

Which of Brosch's challenges is *most likely* stated correctly?

A. Challenge 1

B. Challenge 2

C. Challenge 3

Question 1.2

Olivera's recommendation of the PV of distribution of cash flows methodology is *most strongly* supported by that method's:

A. matching the yield curve risk of an index over continuous time.

B. alignment of the contribution to portfolio duration with that of the index.

C. measurement of the percentage difference from market value to quantify the tracking error.

Question 1.3

Which of Brosch's enhancement strategies will *most likely* reduce the index's tracking error?

A. Strategy 1

B. Strategy 2

C. Strategy 3

Question 1.4

The *most likely* reason for Olivera to reject the wealth manager's suggestion is that:

A. zero-coupon bonds will not eliminate price risk.

B. the appropriate zero-coupon bonds may not be available.

C. the portfolio's Macaulay duration cannot be matched with that of the zero-coupon bond.

Delong Asset Management

Estipona Bank, operating in the US, has various liability portfolios. Danica Abad, Estipona's CFO, asks Taylor Chan, a fixed-income adviser at Delong Asset Management, to recommend a single 5-year liability for interest rate immunization.

Chan proposes choosing one of two portfolios of coupon-bearing government bonds. Exhibit 1 shows annualized data based on aggregated bond cash flows.

Exhibit 1 Portfolios of Coupon-Bearing Government Bonds

	Portfolio 1	Portfolio 2
Cash flow yield	4.0%	4.5%
Macaulay duration	12	10
Portfolio dispersion	35	40

After reviewing the portfolios proposed by Chan, Abad asks about the characteristics of a bond portfolio for single liability immunization. Chan describes three characteristics of such a portfolio:

Characteristic 1: It maximizes the portfolio convexity measure.
Characteristic 2: It requires regular rebalancing over the horizon to maintain the target duration.
Characteristic 3: It requires an initial market value equal to or greater than the amount due on the liability.

Abad also aims to minimize the duration gap stemming from Estipona's multiple liabilities. Exhibit 2 displays the current values and statistics of Estipona's liabilities and asset portfolio:

Exhibit 2 Estipona's Liabilities and Asset Portfolio

	Liabilities	Assets
Market value	USD 50 million	USD 65 million
Modified duration	7	4
Basis point value (BPV)	USD 35,000	USD 24,000

Chan recommends using a futures contract based on the 10-year US Treasury to manage the duration gap. Each contract has a notional value of USD 100,000, a 6% coupon rate, and an estimated BPV of USD 50 per contract based on deliverable bonds.

Abad expects 10-year yields to decline soon. He asks Chan if using a contingent immunization strategy would be cheaper than using futures contracts, given the initial surplus and negative duration gap.

Question 2.1

The immunized portfolio convexity for Portfolio 2 is *most likely*:

A. less than that for Portfolio 1.

B. the same as that for Portfolio 1.

C. greater than that for Portfolio 1.

Question 2.2

Which of Chan's listed characteristics *best describes* a single liability bond portfolio?

A. Characteristic 1

B. Characteristic 2

C. Characteristic 3

Question 2.3

To minimize Estipona's portfolio duration gap, the required number of Treasury futures contracts is *closest* to:

A. 50

B. 150

C. 220

Question 2.4

If Abad's recommended contingent immunization strategy is implemented, Chan would *most likely*:

A. under-hedge.

B. not hedge.

C. over-hedge.

Alcantar Corporation

The Alcantar Corporation, a US-based manufacturer, has a defined benefit pension plan that is currently underfunded, based on the projected benefit obligation (PBO) measure. Kong Shang, Alcantar's CFO, asks Lori Mitchell, the plan's actuarial advisor, why she uses PBO instead of the accumulated benefit obligation (ABO). Mitchell provides the following explanations:

Explanation 1:PBO is appropriate to use if the pension plan intends to keep the current design.
Explanation 2:PBO reflects less in total liabilities compared with ABO, assuming nominal wage growth.
Explanation 3:PBO signifies the sponsor's current legal obligation, regardless of changes to the plan's structure.

Shang and Paul Penttila, Schober Asset Management's fund manager, discuss the pension's funding status and duration gap. The pension fund's asset allocation is 60% equity and 40% fixed income. Exhibit 1 displays the 20X3 information about Alcantar's pension plan, as estimated by Mitchell:

Exhibit 1 Alcantar's Pension Plan Information

	Assets: Market Value	Liabilities: PV of Retirement Obligations
Amount (USD millions)	1,000	1,200
Basis point value (BPV) (USD millions)	0.5	1.2
Effective duration	25	9

Penttila anticipates an equity market recovery and narrowing corporate spreads. He suggests using interest rate derivatives to partially close the duration gap between the plan's assets and liabilities. Penttila presents Strategy 1 to Shang for further discussion.

- **Strategy 1**: A 30-year, 4.0% receive-fixed swap in exchange for a floating leg paying the three-month market reference rate (MRR), which has an effective duration of 15 and a BPV of 0.20 per USD 100 of notional principal

Shang asks Penttila about additional approaches. Penttila provides two more strategies using interest rate derivatives. Both strategies are based on a 30-year swap.

- **Strategy 2**: A receiver swaption with a 3.5% strike rate, paying an upfront premium of 50 bps
- **Strategy 3**: A swaption collar to buy a 2.7% receiver swaption with a 45-bps upfront premium and sell a 4.7% payer swaption with a 75-bps upfront premium

Lastly, Shang asks Penttila about the potential issues associated with implementing these three strategies. Penttila outlines the following risks with his recommended strategies,

specifically that the pension plan would be exposed to:

- greater spread risk than Treasury futures contracts if Strategy 1 were adopted.
- collateral exhaustion risk if Strategy 2 were adopted with collateralization.
- credit risk if Strategy 3 were adopted.

Question 3.1

Which of Mitchell's explanations regarding PBO is *most likely* correct?

A. Explanation 1

B. Explanation 2

C. Explanation 3

Question 3.2

If Penttila chooses to achieve an 80% hedging ratio for Strategy 1, the notional principal on the interest rate swap (in USD millions) is *closest* to:

A. 200

B. 280

C. 350

Question 3.3

Strategy 3 is a *more appropriate* choice than Strategy 2 based on its:

A. lower cost.

B. limited potential loss.

C. greater potential gain.

Question 3.4

Which of the following risks is *most likely* associated with Penttila's recommended strategies? The pension plan would be exposed to:

A. credit risk if Strategy 3 is adopted.

B. collateral exhaustion risk if Strategy 2 is adopted with collateralization.

C. greater spread risk than Treasury futures contracts if Strategy 1 is adopted.