SS11&12 Fixed-Income Portfolio Management

1. Cécile Perreaux is a junior analyst for an international wealth management firm. Her supervisor, Margit Daasvand, asks Perreaux to evaluate three fixed-income funds as part of the firm's global fixed-income offerings. Selected financial data for the funds Aschel, Permot, and Rosaiso are presented in Exhibit 1. In Perreaux's initial review, she assumes that there is no reinvestment income and that the yield curve remains unchanged.

	Aschel	**Permot**	**Rosaiso**
Current average bond price	$117.00	$91.50	$94.60
Expected average bond price in one year (end of Year 1)	$114.00	$96.00	$97.00
Average modified duration	7.07	7.38	6.99
Average annual coupon payment	$3.63	$6.07	$6.36
Present value of portfolio's assets (millions)	$136.33	$68.50	$74.38
Bond type*			
Fixed-coupon bonds	95%	38%	62%
Floating-coupon bonds	2%	34%	17%
Inflation-linked bonds	3%	28%	21%
Quality*			
AAA	65%	15%	20%
BBB	35%	65%	50%
B	0%	20%	20%
Not rated	0%	0%	10%
Value of portfolio's equity (millions)	$94.33		
Value of borrowed funds (millions)	$42.00		
Borrowing rate	2.80%		
Return on invested funds	6.20%		

The levered portfolio return for Aschel is closest to:

A. 7.25%.

B. 7.71%.

C. 8.96%.

Solution: B

The return for Aschel is 7.71%, calculated as follows.

$$rp=\frac{r_l\times(V_E+V_B)-V_E\times r_B}{V_E}=r_l+\frac{V_B}{V_E}(r_l-r_B)$$

$$=6.2\%+\frac{42\text{ million}}{94.33\text{ million}}\times(6.2\%-2.8\%)=7.71\%$$

2. Exhibit 2. Possible AAA Rated Duration-Matching Portfolios

	Portfolio A	Portfolio B	Portfolio C

Bonds (term, coupon)	4.5 years, 2.63% 7 years, 3.50%	3.0 years, 2.00% 6.0 years, 3.25% 8.5 years, 3.88%	1.5 years, 1.25% 11.5 years, 4.38%
Macaulay duration	5.35	5.34	5.36
Cash flow yield	3.16%	3.33%	3.88%
Convexity	31.98	34.54	50.21
BPV	$10,524	$10,506	$10,516

Based on Exhibit 2, the portfolio with the greatest structural risk is:

A. Portfolio A.

B. Portfolio B.

C. Portfolio C.

Solution: C

Structural risk arises from the design of the duration-matching portfolio. It is reduced by minimizing the dispersion of the bond positions, going from a barbell structure to more of a bullet portfolio that concentrates the component bonds' durations around the investment horizon. With bond maturities of 1.5 and 11.5 years, Portfolio C has a definite barbell structure compared with those of Portfolios A and B, and it is thus subject to a greater degree of risk from yield curve twists and non-parallel shifts. In addition, Portfolio C has the highest level of convexity, which increases a portfolio's structural risk.

3. Exhibit 2. Possible AAA Rated Duration-Matching Portfolios

The convexity of liability is 33.05.

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Which portfolio in Exhibit 2 fails to meet the requirements to achieve immunization for multiple liabilities?

A. Portfolio A

B. Portfolio B

C. Portfolio C

Solution: A

The two requirements to achieve immunization for multiple liabilities are for the money duration (or BPV) of the asset and liability to match and for the asset convexity to exceed the convexity of the liability. Although all three portfolios have similar BPVs, Portfolio A is the only portfolio to have a lower convexity than that of the liability portfolio (31.98, versus 33.05 for the $20 million liability portfolio), and thus, it fails to meet one of the two requirements needed for immunization.

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4. Exhibit 1. Current Treasury Yield Curve and Forecasted Yields

Maturity (years)	Starting Yield (Current)	Forecasted Change in Yield	Ending Yield
2	1.01%	+0.04%	1.05%
5	1.55%	+0.40%	1.95%
10	2.75%	+0.50%	3.25%
30	3.50%	+0.00%	3.50%

Using the yield curve forecast shown in Exhibit 1, which portfolio strategy should Donaldson recommend for the year ahead?

A. The bullet portfolio
B. The barbell portfolio
C. The laddered portfolio

Solution: B

McLaughlin expects the yield curve to experience an increase in the butterfly spread, with the 30-year yield remaining unchanged, which implies that the yield curve will increase its curvature, pinned at the 30-year yield, as shown in Exhibit 1. The barbell portfolio, consisting of 2-year and 30-year bonds, would be expected to perform best. Although the two- year rate is expected to increase, the effective duration of two-year bonds is quite small, resulting in minimal price impact. Similarly, the 30-year yield is expected to remain constant, resulting in minimal price impact as well. Relative to the barbell portfolio, the laddered portfolio has greater exposure to the expected increases in the 5-year and 10-year yields, and the bullet portfolio has greater exposure to the expected increase in the 10-year yield. Therefore, the barbell portfolio would be expected to perform best given McLaughlin's interest rate expectations.

5. Susan Winslow manages bond funds denominated in US Dollars, Euros, and British Pounds. Each fund invests in sovereign bonds and related derivatives.

Exhibit 1. Sovereign Yields in Five Markets						
	Floating	Fixed Rate with Semi-annual Payments				
	6 Mo Libor	1 Yr	2Yr	3 Yr	4 Yr	5 Yr
Mexico	7.10%	7.15%	7.20%	7.25%	7.25%	7.25%
Greece	—	3.30%	5.20%	5.65%	5.70%	5.70%
Euro	0.15%	0.25%	0.30%	0.40%	0.50%	0.60%
UK	0.50%	0.70%	0.80%	0.95%	1.00%	1.10%
US	1.40%	1.55%	1.70%	1.80%	1.90%	1.95%

Winslow expects yields in the US, Euro, UK, and Greek markets to remain stable over the next

six months. She expects Mexican yields to decline to 7.0% at all maturities. Meanwhile, she projects that the Mexican Peso will depreciate by 2% against the Euro, the US Dollar will depreciate by 1% against the Euro, and the British Pound will remain stable versus the Euro. Winslow believes bonds of the same maturity may be viewed as having the same duration for purposes of identifying the most attractive positions.

Among the carry trades available in the US, Euro, and UK markets, the highest expected return for the USD-denominated portfolio over the next 6 months is closest to:

A. 0.275%.

B. 0.85%.

C. 0.90%.

Solution: B

The highest potential return, 0.85%, reflects borrowing USD for 6 months and buying the UK 5-year bond. The carry component of the expected return is actually a loss of 0.15% [= (1.10% – 1.40%)/2], but this is more than offset by the 1% expected appreciation of GBP versus USD.

A much higher carry component +0.90% = (1.95% – 0.15%)/2 could be obtained by borrowing for 6 months in EUR to buy the US 5-year note, but that advantage would be more than offset by the expected 1% loss from depreciation of the USD (long) against the Euro (short).

A is incorrect because a higher expected return of 0.85% can be obtained. This answer, +0.275% [= (1.95%–1.40%)/2], is the highest carry available over the next 6 months within the US market itself (an intra-market carry trade).

C is incorrect. This answer (+0.90%) is the highest potential carry component of return but ignores the impact of currency exposure (being long the depreciating USD and short the appreciating Euro).

6. Deveraux and Foster review the total expected 12-month return (assuming no reinvestment income) for the global bond portfolio. Selected financial data are presented in Exhibit 2.

Exhibit 2. Selected Data on Global Bond Portfolio

Notional principal of portfolio (in millions)	€200
Average bond coupon payment (per €100 par value)	€2.25
Coupon frequency	Annual
Current average bond price	€98.45
Expected average bond price in one year (assuming an unchanged yield curve)	€98.62

Average bond convexity	22
Average bond modified duration	5.19
Expected average yield and yield spread change	0.15%
Expected credit losses	0.13%
Expected currency gains (€ appreciation vs. $)	0.65%

Based on Exhibit 2, the total expected return of the fund's global bond portfolio is closest to:

A. 0.90%.

B. 2.20%.

C. 3.76%.

Solution: B.

The total expected return is calculated as:

Total expected return = Rolling yield +*E* (Change in price based on investor's yield and yield spread view) – *E* (Credit losses) + *E* (Currency gains or losses)

Rolling yield = Yield income + Rolldown return

Return Component	**Formula**	**Calculation**
Yield income	Annual coupon payment/Current bond price	€2.25/€98.45 = 2.29%
+ Rolldown return	$\frac{Bond\ price_{\text{End}} - Bond\ price_{begining}}{Bond\ price_{begining}}$	(€98.62 – €98.45)/ €98.45 = 0.17%
= Rolling yield	Yield income + Rolldown return	2.29% + 0.17% = 2.46%
+*E*(Change in price based on investor's yield and yield spread view)	[–MD×ΔYield] + [$^1/_2$×Convexity×(Yield)^2]	[–5.19×0.0015] +[½×22×(0.0015)^2]=–0.78%
–*E*(Credit losses)	Given	–0.13%
+*E*(Currency gains or losses)	Given	0.65%
=Total expected return		**2.20%**