SOCIETY OF ACTUARIES
Advanced Portfolio Management

Exam APM

MORNING SESSION

Date: Friday, November 4, 2011
Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).

   a) The morning session consists of 10 questions numbered 1 through 10.

   b) The afternoon session consists of 8 questions numbered 11 through 18.

   The points for each question are indicated at the beginning of the question. Questions 1 through 9 pertain to the Case Study, which is enclosed inside the front cover of this exam booklet.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets since they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam APM.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

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Exam APM-Front Cover

CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

****BEGINNING OF EXAMINATION****
Morning Session

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

1. (*6 points*) Wonka Life's management board revisited their performance measurement system during a recent regular meeting. The management board decided to construct a new performance measurement system using liability-based benchmarks. The meeting discussed how to establish a performance measurement system at the following levels.

Level I: Characterize each of the liability groups
Level II: Set up benchmark asset portfolios (i.e. sub-liability benchmarks (SLBs)) to mirror the behavior of each kind of liability
Level III: (To be discussed in the next meeting)
Level IV: Set up an overall asset proxy portfolio (APP) to reflect their investment strategy and risk appetite.
Level V: (To be discussed in the next meeting)
Level VI: (To be discussed in the next meeting)
Level VII: Actually implement the investment program.

(a) (*1 point*) Describe what a liability-based benchmark is and identify key characteristics.

(b) (*2 points*) For Level II, Wonka Life needs to set up benchmark asset portfolios to mirror the behavior of the different kind of liabilities. Wonka Life is considering using the following assets to construct benchmark asset portfolios for their Life Insurance Products portfolio:

- U.S. Treasury bonds including TIPS
- High yield bonds
- Mortgage Backed Securities
- Common stocks
- Private Equity

Evaluate briefly each of the above asset(s) as to whether they are appropriate to be selected as sub-liability benchmark portfolio asset(s).

(c) (*3 points*) Describe construction and composition of Levels III, V, and VI of the proposed performance measurement structure and explain how they can be used in performance attribution.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

2. (*5 points*) Wonka Life's CIO, Peter Fish, has recommended the S&P 500 equity index as a benchmark for Wonka Life's proposed "Volatility Arbitrage" hedge fund.

(a) (*1 point*) Critique the choice of using a U.S. equity index as a benchmark for the "Volatility Arbitrage" hedge fund.

(b) (*1 point*) Recommend approaches and criteria for evaluating the performance of the hedge fund.

(c) (*2 points*) Explain survivorship bias and why it may be more of a concern in hedge fund indices than large cap equity indices.

(d) (*1 point*) Explain the limitations the Sharpe Ratio has in measuring hedge fund performance relative to Wonka Life's overall asset allocation.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

3. (*8 points*) The Wonka Life SPDA portfolio manager is invested in a AAA-rated senior tranche of a Structured Finance vehicle with a pool of credit-risky collateral diversified across industry sectors. In order to increase the yield on the portfolio, he is proposing switching out of this vehicle into a senior tranche of a similar Structured Finance vehicle that is primarily invested in a single industry sector.

(a) (*1 point*) Describe the process of creating a Structured Finance investment vehicle.

(b) (*1 point*) Describe the motivations behind the creation of Structured Finance investment vehicles.

(c) (*2 points*) Evaluate the potential risks of the portfolio manager's proposal.

(d) (*2 points*) Evaluate how your answer in (c) would change if the two tranches under consideration were equity tranches.

(e) (*2 points*) Describe how the recent financial crisis is likely to impact the future Structured Finance Product market.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

4. (*4 points*) Thomas Lyon, Wonka's President, has asked you to review his response to Byrd Ratings & Analysis cover letter and the attached Byrd Financial Wherewithal Rating™ Report.

(a) (*1 point*) Describe the Financial Assessment process used by rating agencies to determine the Obligor's initial risk rating.

(b) (*1.5 points*) Describe briefly the categories of adjustment factors for the obligor credit rating used by rating agencies as listed by Crouhy.

(c) (*1.5 points*) Explain how the Business Review from Byrd Ratings & Analysis' report applies the Financial Assessment process and the adjustment factors.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

5. (*7 points*) Following the most recent Investment Committee meeting considering the Wonka Life Employees' Pension Plan, it was decided the investment strategy would shift to manage the Plan's overall risk exposure because of increasing volatility in the financial position of the Plan.

(a) (*1 point*) Show that the interest rate hedge ratio of the Wonka Life Employees' Pension Plan is 5.6%.

(b) (*3 points*) Recommend potential investment asset allocation and derivative overlay strategies which would mitigate the interest rate risk of the Plan.

(c) (*1 point*) Calculate the Notional Portfolio ("NP") required to provide a duration gap of zero given that an interest rate swap is available with a duration of 10.1.

(d) (*2 points*) Formulate the characteristics of a benchmark that would be appropriate to measure the risk characteristics of the pension plan given that pension plan liabilities are not traded on an organized public exchange.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

6. (*7 points*) Wonka Life's Chief Actuary, Wanda Fox, is concerned about the inflation-linked aspect of Wonka Life's Payout Annuity. Your money market trader says that when inflation picks up, it is usually because the Fed has raised rates, and so suggests investing in money market instruments as an inflation hedge. Wanda has asked you to investigate using TIPS or money market investments to hedge this risk.

You are given the following information for a TIPS bond and NSA CPI-U Index levels for the year 2010:

Issue Date	1/1/2010
Issue Price	$100.00
Maturity	1 year
Real Coupon	6% paid semi-annually

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
400.0	400.6	401.0	401.5	401.6	401.9	402.0	402.2	403.0	403.3	403.9	404.0

(a) (*2 points*) Calculate the settlement price on 6/10/2010 for this TIPS bond.

(b) (*2 points*) Discuss the approaches that can be used to quantify investment risk in TIPS.

(c) (*1 point*) Evaluate using money market instruments to hedge the inflation-linked aspect of the Payout Annuity line.

(d) (*1 point*) Evaluate using TIPS to hedge the inflation-linked aspect of the payout line.

(e) (*1 point*) Recommend one of the two approaches and justify your recommendation.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

7. (*9 points*) Wonka Life uses the following three lines of business (LOB) in its first calculation of Economic Capital (EC):

LOB A consists of Traditional Life Products, Non-Traditional Life Products, and Group Benefits.

LOB B consists of Accumulation Annuities

LOB C consists of Institutional Pension – Payout, and Institutional Pension – GIC

And the calculated ECs in various combinations of LOBs are given (in $millions):

	A	**B**	**C**	**A & B**	**B & C**	**C & A**	**Enterprise**
EC	75	90	110	140	190	180	250

The Board of Directors has asked why management is considering using Economic Capital, and has asked for alternative approaches and their appropriate rationale.

Draft a report that will:

(a) (*3 points*) Evaluate how and why Wonka Life should use EC or other measures of risk.

(b) (*2 points*) Describe the steps of using full Economic Scenarios approach to calculating EC.

(c) (*1 point*) Describe and critique the marginal approach to allocating EC.

(d) (*3 points*) Calculate the allocation of the Enterprise EC to LOBs A-C and Corporate under each of the following approaches:

(i) Marginal

(ii) Pro-rata

(iii) Mono-line

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

8. (*5 points*) Wonka Life's CIO is concerned about its interest rate sensitivity. Selling one of its smaller blocks of business may improve its interest rate sensitivity.

Alternative:

1. Sell the Institutional Pension - Payout block with its associated assets for $10 million and invest the proceeds in assets with an effective duration of 4.0.

2. Sell the Group Benefits block with its associated assets for $15 million and invest the proceeds in assets with an effective duration of 7.4.

(a) (*2 points*) Calculate the current Surplus Duration for Wonka Life.

(b) (*2 points*) Calculate the Surplus Duration for Wonka Life under each of the alternatives above.

(c) (*1 point*) Recommend and justify choosing one of the above alternatives to minimize Wonka's exposure to changes in interest rates.

Questions 1 - 9 pertain to the Case Study
Each question should be answered independently.

9. (*6 points*) According to Wonka Life's Asset Liability Management Report (December 31, 2009), the Traditional Life Product portfolio has a large duration mismatch that concerns you. Since Wonka Life performs Asset-Liability Management on a segment by segment basis, you are worried about a large floating rate position funding that liability segment.

This floating rate security was created by splitting a fixed rate Treasury note into a floater and inverse-floater.

Fixed rate Treasury:

Par value:	100 million
Coupon:	6% paid annually, fixed for life
Term:	3-years
Issue date:	July 10, 2009
Options:	None

Floater information:

Par value:	30 million
Reference:	1-year Treasury yield
Quoted spread:	+ 0.75 bps
Term:	3 years
Issue date:	July 10, 2009
Coupons paid:	Annually
Coupons reset:	Annually
Options:	None

(a) (*1 point*) Define the features of Floaters and Inverse Floaters.

(b) (*2 points*) Critique the appropriateness of using Floaters and/or Inverse Floaters to support Wonka's Traditional Life Product segment.

(c) (*2 points*) Calculate the price of the floating rate security assuming the annual Treasury yield at issue on July 10, 2009 was 1.55%, as of:

(i) July 9, 2010

(ii) July 10, 2010

(d) (*1 point*) Calculate the July 10, 2010 coupon amount received from the inverse floater.

10. (*3 points*) You are given the following information on the return performance of an investment portfolio relative to a benchmark.

	Economic Sector		
	Materials	Consumer staples	Financial
Portfolio Weight	20%	30%	50%
Sector Benchmark Weight	25%	20%	55%
Actual Return	–5.0%	3.0%	–1.0%
Benchmark Return	–4.5%	3.0%	1.0%

Calculate for each economic sector:

(i) Pure Sector Allocation

(ii) Allocation/ Selection Interaction

(iii) Within-Sector Selection

(iv) Total Value Added

****END OF EXAMINATION****
Morning Session

USE THIS PAGE FOR YOUR SCRATCH WORK

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