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**SOCIETY OF ACTUARIES**  
**Exam RETRPIRM**  
**Retirement Plan investment & Risk Management Exam**

# Exam RETRPIRM

**Date:** Tuesday, October 29, 2013

**Time:** 2:00 p.m. – 4:15 p.m.

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## INSTRUCTIONS TO CANDIDATES

### General Instructions

1. This examination has a total of 40 points.  
  
This exam consists of 6 questions, numbered 1 through 6.  
  
The points for each question are indicated at the beginning of the question. Question 6 pertains 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 Exam RETRPIRM.
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.



## **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\*\***

- 1.** (3 points) Describe the challenges in valuing pension liabilities using a bond model.
  
- 2.** (10 points) Company ABC is reviewing various investment options for their defined benefit pension plan fund.
  - (a) (7 points) Compare and contrast investing the pension assets in equities and fixed income with respect to the following:
    - (i) active management;
    - (ii) passive management;
    - (iii) interest rate risk; and
    - (iv) default risk.
  - (b) (3 points) Compare and contrast investing the pension assets in public and private equities with respect to the following:
    - (i) liquidity;
    - (ii) transaction costs; and
    - (iii) valuation approaches.

3. (6 points) The assets of a defined benefit pension plan are invested in a portfolio which is invested 70% in equities and 30% in fixed income.

Describe the advantages and disadvantages of the current asset allocation in respect of the following stakeholders:

- (i) shareholders;
- (ii) plan participants; and
- (iii) the company.

4. (6 points) Your client is considering hedging the interest rate risk in their defined benefit pension plan using interest rate swaps.

- (a) (3 points) Describe the characteristics of an interest rate swap.
- (b) (2 points) Explain how interest rate swaps are used to hedge interest rate risk in pension plans.
- (c) (1 point) You are given:

Asset duration of the pension asset portfolio	2.0
Liability duration of the pension plan	8.4
Duration of the fixed-rate bond	10.2
Duration of the floating-rate bond	0.2
Market value of assets	\$690,000

Calculate the notional principal of the interest rate swap required to reduce the asset/liability duration gap to zero.

Show all work.

**5.** (11 points)

- (a) (4 points) Compare and contrast the objectives of the following stakeholders in the context of a public pension plan:
- (i) taxpayers versus elected officials
  - (ii) public employee unions versus government body administering the plan
- (b) (3 points) Describe how each of the four stakeholders in part (a) can achieve their objectives.
- (c) (4 points) Describe how annual changes in the funded status of a public defined benefit plan affect the stakeholders in part (a).

*Question 6 pertains to the Case Study.*

- 6.** (4 points) NOC and the Union have agreed to freeze the Full-Time Hourly Union Pension Plan. NOC is considering fully immunizing their pension liabilities.

Identify the provisions of NOC's newly frozen pension plan that are difficult to hedge. Provide justification for your answer.

**\*\*END OF EXAMINATION\*\***

**USE THIS PAGE FOR YOUR SCRATCH WORK**