SOCIETY OF ACTUARIES
Retirement Plan Investment & Risk Management Exam

Exam RETRPIRM

Date: Friday, May 6, 2016
Time: 2:00 p.m. – 4:15 p.m.

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.

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 because 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.

****BEGINNING OF EXAMINATION****

1. (*6 points*)

(a) (*2 points*) List the factors that generate longevity risk in a defined benefit pension plan.

(b) (*4 points*) Describe four solutions used to mitigate longevity risk in a defined benefit pension plan.

2. (*7 points*) ABC Company offers a defined contribution (DC) pension plan to its U.S. employees with the following investment options:

(i) U.S. Large-Cap Equity Fund

(ii) Bond Fund

(iii) Money Market Fund

(iv) ABC Company Shares

The default investment option is the U.S. Large-Cap Equity Fund.

(a) (*4 points*) Critique the investment options in the context of ABC's fiduciary responsibilities.

(b) (*3 points*) Describe the process ABC should follow when choosing fund managers for the DC investment options.

3. (*7 points*) A government is planning to implement a new pension benefit guarantee program (PBGP) with the following objectives:

- Protection of member pension benefits;
- Equity between plan sponsors; and
- No government financial involvement.

The proposed PBGP design is as follows:

- Mandatory for all defined benefit pension plans;
- Annual sponsor contributions of $200 per plan member;
- Sponsors can make claims against the PGBP in the event of severe financial distress if their pension plan is underfunded; and
- Member pension amounts are insured up to $10,000 per month.

In light of the government's objectives:

(a) (*4 points*) Critique the proposed PBGP design.

(b) (*3 points*) Evaluate the following two alternatives to the proposed PBGP from the perspective of the government's objectives:

(i) stricter funding rules; and

(ii) private insurance.

4. (*7 points*)

(a) (*4 points*) Describe three different types of pension liability measures from a financial economics perspective.

(b) (*3 points*) Describe the following risks to a defined benefit pension plan from a financial economics perspective:

(i) interest rate risk;

(ii) credit risk; and

(iii) alpha risk.

5. (*7 points*) DEF Corporation sponsors a defined benefit pension plan. The DEF pension committee has the following objectives:

- minimize interest rate risk;
- maximize returns on plan investments; and
- minimize investment costs.

The pension committee is considering the following two strategies:

(i) establishing an interest rate swap overlay; or

(ii) investing 100% of the assets in fixed income.

(a) (*1 point*) Explain how interest rate swaps work.

(b) (*4 points*) Compare and contrast the two strategies in the context of the pension committee's objectives.

(c) (*2 points*) You are given:

Projected Benefit Obligation	$ 600 million
Duration of Projected Benefit Obligation	14 years
Fair Value of Assets	$ 500 million
Equity Allocation	60%
Fixed Income Allocation	40%
Duration of Fixed Income	5 years
Duration of Equity	0 years

An interest rate swap with a duration of 16 years is available in the market.

Calculate the notional principal of the swap required to minimize the interest rate risk of the funded status of the plan.

Show all work.

6. (*6 points*) You are evaluating an asset benchmark and are given periodic returns for a portfolio (P), its benchmark (B), and the market (M).

(a) (*2 points*) Describe two statistical tests that can be performed using the periodic returns to measure systematic biases in the benchmark.

(b) (*1 point*) List the outcomes that validate and would indicate no systematic biases in the benchmark for the statistical tests identified in (a).

(c) (*1 point*) Explain how tracking error is used to demonstrate that a benchmark is capturing a manager's investment style.

(d) (*2 points*) Describe two additional criteria that can be used to evaluate the quality of a benchmark.

****END OF EXAMINATION****

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