SOCIETY OF ACTUARIES
Retirement Plan Investment & Risk Management Exam

Exam RETRPIRM

Date: Tuesday, October 31, 2017
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.

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BEGINNING OF EXAMINATION

1. (*4 points*)

(a) (*2 points*) Describe four sources of risk inherent in fixed income investments.

(b) (*2 points*) Describe four active management strategies for fixed income investments.

2. (*8 points*) You have been asked to perform a macro-level attribution return analysis on a defined benefit pension fund. You are given the following investment policy allocations:

Asset Class	**Asset Allocation**
Equity Manager A	28.0%
Equity Manager B	42.0%
Total Equities	**70.0%**
Fixed Income Manager C	7.5%
Fixed Income Manager D	22.5%
Total Fixed Income	**30.0%**

You are also given for the month of October 2017:

	Value ($000)		Net Cash Flow ($000)	Actual Return	Manager Benchmark Return
	Beginning of month	End of month			
Equity Manager A	$90,000	$91,000	$250	0.83%	0.80%
Equity Manager B	$110,000	$111,000	$250	0.68%	0.90%
Total Equities	**$200,000**	**$202,000**	**$500**	**0.75%**	
Fixed Income Manager C	$10,000	$10,100	$55	0.45%	0.10%
Fixed Income Manager D	$40,000	$40,200	$160	0.10%	0.25%
Total Fixed Income	**$50,000**	**$50,300**	**$215**	**0.17%**	
Total	**$250,000**	**$252,300**	**$715**	**0.63%**	

Other additional information:

- The market benchmark return during the month for all equities is 0.85%
- The market benchmark return during the month for all fixed income is 0.20%
- Cash flows occurred at the beginning of the month
- The risk-free rate during the month is 0.10%.

2. Continued

Calculate the following macro-level attributions of the fund return:

(i) Net contributions

(ii) Risk-free asset

(iii) Asset categories

(iv) Benchmarks

(v) Investment manager

(vi) Allocation effects

Show all work.

3. (*8 points*) ABC Company sponsors a defined benefit pension plan with the following characteristics:

	Value	Duration
Liability	$518 million	8.7
Market Value of Assets	$382 million	4.2

ABC Company wants to use interest rate swaps to minimize the impact of interest rate changes on the funded status of the plan.

(a) (*2 points*) Explain whether the plan should be the "receive-fixed" or "receive-floating" party in an interest rate swap.

(b) (*2 points*) Describe when ABC Company would enter into an interest rate swap versus an interest rate swaption.

ABC Company entered into an interest rate swap agreement with a duration of 10.6.

(c) (*2 points*) Calculate the notional value of the interest rate swap that would fully hedge the plan's interest rate risk.

Show all work.

(d) (*2 points*) Calculate the change in the plan's unfunded liability assuming a 0.50% decrease in interest rates.

Show all work.

4. (*8 points*) XYZ Company sponsors a defined benefit pension plan. The pension plan has $100 million in assets which are invested 60% in equities and 40% in fixed income. The CFO is considering adding illiquid private market alternative investments to the pension fund asset allocation.

(a) (*2 points*) Describe the advantages of investing in illiquid alternatives.

(b) (*2 points*) Explain the J-Curve as it relates to the return of private market investing.

The CFO has proposed the following new asset allocation:

Asset Class	**Allocation**
Equities	50%
Fixed Income	40%
Private Market Alternative Investments	10%

The CFO has made the following two statements about the new allocation to private market alternative investments.

(i) The private market alternative investment is expected to maintain a constant $10 million asset value over the investment horizon.

(ii) In the future, the allocation to private market alternative investments can easily and quickly be increased from 10% to 20%.

(c) (*4 points*) Critique each of the statements.

5. (*6 points*) XYZ Company is considering implementing a dynamic liability-responsive asset allocation (glide path) strategy for its defined benefit pension plan.

Describe how the following four considerations influence the implementation and on-going management of XYZ Company's asset strategy:

(i) Data availability

(ii) Contributions

(iii) Trading

(iv) Governance

6. (*6 points*) The financial economics viewpoint is that, in most cases, company-sponsored pension plans should only be invested in bonds.

(a) (*2 points*) Describe four assumptions underlying this viewpoint.

(b) (*4 points*) Critique the assumptions in (a) with respect to investing only in bonds.

****END OF EXAMINATION****

USE THIS PAGE FOR YOUR SCRATCH WORK