SOCIETY OF ACTUARIES
Exam AFE
Advanced Finance/ERM

Exam AFE

MORNING SESSION

Date: Thursday, November 4, 2010
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 7 questions numbered 1 through 7.

   b) The afternoon session consists of 5 questions numbered 8 through 12.

   The points for each question are indicated at the beginning of the question. Questions 1 - 5 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 AFE.

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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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 1-5 pertain to the Case Study.
Each question should be answered independently.

1. (*5 points*) You are assisting in the selection of a new Zoolander Board Member to replace Hermine Dauphin.

(a) (*1 point*) Describe four characteristics of ideal insurance company Boards of Directors which lead to good governance.

(b) (*2 points*) Describe how Zoolander's Board of Directors meets or does not meet these criteria.

(c) (*2 points*) Identify three characteristics for Hermine Dauphin's replacement that would strengthen the composition of Zoolander's Board of Directors. Justify your response.

Questions 1-5 pertain to the Case Study.
Each question should be answered independently.

2. (*16 points*) Tomas Lyon has stated to all senior management staff: "We need to make the best use of our time in Palm Beach. I want you to focus your efforts on developing action plans to address our top three strategic risks – Stagnation, Project and Customer (in that order) that I identified using the final report from the folks at Cobalt, and forget the rest! We can look at those next year!"

Cobalt's final report contained the following quantitative information with respect to certain risks referenced in Cobalt's preliminary Risk Map of Zoolander's Strategic Risks:

Type of Risk	Probability of Loss	Mean ($ Millions)	Aggregate Loss ($ Millions)	
			VaR(95)	CTE(95)
(1) Industry: Rising Capital Costs	20%	$10	$25	$35
(2) Industry: New Regulations	30%	$5	$16	$20
(3) Competitor: Emerging Global Rivals	20%	$14	$40	$50
(4) Project: New Product Development Failure	70%	$7	$12	$15
(5) Customer: Customer Priority Shift	60%	$5	$9	$11
(6) Stagnation: Flat or Declining Volume	70%	$10	$15	$18

2. Continued

Additionally, for the purpose of aggregating the risks, you have estimated a correlation matrix of the above Strategic Risks:

Correlation of Risks:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(1) Industry: Rising Capital Costs	1.0	0.5	0.4	0.1	0.1	0.1
(2) Industry: New Regulations		1.0	0.6	0.8	0.0	0.0
(3) Competitor: Emerging Global Rivals			1.0	0.1	0.2	0.0
(4) Project: New Product Development Failure				1.0	0.0	0.0
(5) Customer: Customer Priority Shift					1.0	0.0
(6) Stagnation: Flat or Declining Volume						1.0

(a) (*2 points*)

(i) Define strategic risk.

(ii) Explain the threat strategic risk poses.

(iii) Explain the potential opportunity available through appropriate strategic risk management.

(b) (*2 points*) Assess and rank the six strategic risks using:

(i) The COSO approach to measuring Operational Risk;

(ii) A risk metric consistent with a risk management approach.

Show your work.

Question 2 continued on next page

2. Continued

(c) (*1 point*) Explain why the risk management approach to assessing strategic risk is more appropriate than the COSO approach used by Tomas Lyon.

(d) (*3 points*) Assuming the correlations of strategic risks in the table are linear, calculate and compare the aggregate VaR(95) between Lyon's top three risks and the top three risks identified in part (b)(ii). Show your work.

(e) (*1 point*) Calculate and compare the greatest possible aggregate CTE(95) risk between Lyon's top three risks and the top three risks identified in part (b)(ii). Show your work.

(f) (*2 points*) Recommend one of the three risk metrics Cobalt suggested Zoolander use when performing its strategic risk review, and justify why this metric is preferable to each of the other two options.

(g) (*2 points*) For each of the following strategic risks, elaborate on Cobalt's summary of the particular risks facing Zoolander, and identify a potential countermeasure that Zoolander could employ:

(i) Industry: Rising Capital Costs;

(ii) Stagnation: Flat or Declining Volume.

(h) (*3 points*)

(i) Identify and describe three ways in which Zoolander could exploit the strategic risk from Competitor: Emerging Global Rivals to gain a competitive advantage.

(ii) For each of these, propose how each could be achieved at Zoolander.

Questions 1-5 pertain to the Case Study.
Each question should be answered independently.

3. (*7 points*) The Risk Management Committee (RMC) of Zoolander's Board of Directors is considering how best to improve Zoolander's ERM processes.

(a) (*3 points*)

(i) Identify three risk reduction strategies Zoolander is currently pursuing.

(ii) Using A.M. Best's ERM assessment framework, explain how improved ERM processes at Zoolander would enhance the effectiveness of each strategy.

(b) (*3 points*) Describe four existing weaknesses in Zoolander's ERM program and, for each weakness, recommend a Board action the RMC could suggest to improve Zoolander's risk management practices.

(c) (*1 point*) Recommend, with justification, which one of these four actions the Board should implement first.

Questions 1-5 pertain to the Case Study.
Each question should be answered independently.

4. (*14 points*) Wanda Fox has requested your input regarding the economic capital calculation, which includes stress tests on the following four risks:

- Liquidity risk
- Mortality risk
- Operational risk
- Interest rate risk

A variance-covariance matrix will be used to aggregate the four risks. The economic capital calculation includes the impact of the proposed new VA riders. To minimize sensitivity runs, Wanda has decided to limit the number of product lines run for each risk above.

(a) (*2 points*) Between each of six pairs of risk categories (i – vi), recommend whether Wanda should apply a significantly positive, near zero or significantly negative correlation, justifying each response.

	Liquidity	Mortality	Operational	Interest
1. Liquidity		(i)	(ii)	(iii)
2. Mortality			(iv)	(v)
3. Operational				(vi)
4. Interest				

(b) (*6 points*) For each of the four risks above, identify two product lines that contribute significantly to that risk, giving specific considerations to validate your response. (The products chosen may be different for each risk.)

(c) (*4 points*) Within each of the four risks above, recommend whether Ms. Fox should apply a significantly positive, near zero or significantly negative correlation between the two product lines chosen in part (b). Justify each response.

(d) (*2 points*) Propose, with supporting reasons, how Kelly Ratings will rate this economic capital process assuming Kelly uses the same rating methodology as A.M. Best.

Questions 1-5 pertain to the Case Study. Each question should be answered independently.

5. (*5 points*) Bill has reviewed John Badger's memo to Hugh Dodo regarding the proposed VA risk management program and is concerned with potential model risk invalidating Wanda's CTE calculation. You are given the following unitized loss amounts for the worst 5 of 100 scenarios for a typical policy-level CTE calculation:

1.00
1.02
1.05
1.10
1.83

(a) (*2 points*) Approximate the 95% confidence interval for the CTE(95) estimate, given:

$\Phi^{-1}(0.95) = 1.645$ and $\Phi^{-1}(0.975) = 1.960$

Estimated standard error for CTE = $s / \sqrt{N(1-\alpha)}$

(b) (*1 point*) Wanda then tests for parameter uncertainty by running 300 scenarios while varying the parameters. The following are the worst 5% scenarios' results:

1.00	1.05	1.10
1.01	1.06	1.83
1.02	1.07	2.22
1.03	1.08	3.30
1.04	1.09	3.60

Calculate the excess CTE due to parameter uncertainty.

(c) (*2 points*) Explain the impact of the CTE calculation's standard error and parameter uncertainty on Badger's VA risk management program.

6. (*9 points*) Risky Life only sells single premium fixed deferred annuities with no market value adjustments or surrender charges. The guaranteed minimum crediting rate is 3%. Reserves equal account value. Two proposed strategies to invest $100 million in cash supporting the entire portfolio are:

- Strategy 1: Buy 30-year corporate A bonds with a current yield of 7% and a duration of 12. The credited rate, currently 5%, will be annually reset to the portfolio yield less 200 bps.

- Strategy 2: Buy 2-year corporate A bonds, currently yielding 5%. The crediting rate will be set to the guaranteed minimum in all years. For this strategy, the simulated 2-year corporate A bond rates produced by a risk neutral generator are as follows:

Scenario	Probability	2-year corporate A bond rates (immediate and permanent change)	20-year discount rate for fair value calculation
1	30%	1%	2%
2	20%	2%	3%
3	18%	4%	5%
4	32%	10%	11%

Assume that the entire block lapses immediately when the credited rate falls below the 2-year corporate A bond rate. Otherwise, the block will mature in 20 years with no surrenders before then. There are no other decrements.

(a) (*2 points)* Identify and describe the categories of the interest rate risk. For Strategy 1, evaluate the importance of each risk as high, medium, low, or not applicable.

(b) (*2 points*) Assuming Risky Life executes Strategy 2, calculate the fair value of the liabilities.

(c) (*2 points*) Assuming Risky Life executes Strategy 1 and then the 2-year corporate A bond rate rises to 10% immediately. Describe the events that will likely happen and calculate the effect on the balance sheet using the duration approach.

(d) (*3 points*) Describe strategies available to Risky Life to alleviate disintermediation risk, as related to:

(i) Product design;

(ii) Investment choices.

7. (*4 points*) Three Lions Savings and Loan (TL) is a mid-sized bank that uses a firm-wide risk-adjusted return on capital (RAROC) approach to support the bank's risk management and business activities. TL currently has a $1 billion highly rated loan portfolio, for which 90% of the funds are provided by deposits, with the remainder provided by Economic Capital invested in risk-free government securities. You are given the following additional information for TL:

Average Annual Loan Rate:	6%
Expected Loss on Loans:	1%
Risk-Free Rate:	3%
Interest Credited on Deposits:	2%
Annual Operating Costs:	$20 million
Hurdle Rate:	12%

(a) (*2 points*) Determine whether TL is meeting its hurdle rate on the loan portfolio. Show your work.

(b) (*2 points*) TL is considering entering into a government program which would provide funds at a reduced cost but require loans to be made to more risky borrowers. Explain how each of the individual components of the RAROC calculation for TL might change if TL were to participate in the government program.

****END OF EXAMINATION****
MORNING SESSION

USE THIS PAGE FOR YOUR SCRATCH WORK

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