

Exam GIFREU

AFTERNOON SESSION

Date: Wednesday, April 29, 2020

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 9 questions numbered 14 through 22 for a total of 40 points. The points for each question are indicated at the beginning of the question. No questions pertain to the Case Study.
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 morning or afternoon session for Exam GIFREU.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

****BEGINNING OF EXAMINATION****

Afternoon Session

Beginning with Question 14

14. (4 points) One of the benefits of creating a captive insurer is that it is subject to less regulation than a traditional insurance company.

- (a) (1.5 points) Explain three ways that captive insurers are subject to less regulation than traditional insurance companies.

There are also several drawbacks to creating a captive insurer

- (b) (1.5 points) Describe three drawbacks.

Various different types of captive insurers have been created.

- (c) (1 point) Define the following types of captive insurers:

- (i) Diversified
- (ii) Agency-owned

15. (6 points) You are given the following information for a general insurance (GI) company subject to Solvency II:

Tail Correlation Matrix between GI Underwriting Risk Components		
	Premium & Reserve	Catastrophe
Premium & Reserve	1.00	
Catastrophe	0.25	1.00

Tail Correlation Matrix between Risk Components			
	Market	Default	GI
Market	1.00		
Default	0.25	1.00	
GI	0.25	0.50	1.00

Solvency Capital Requirement (SCR)		
Risk	Notation	Amount
Premium and reserve risk	SCR _{PR}	950 million
Catastrophe risk	SCR _{CAT}	200 million
GI underwriting risk	SCR _{gen}	1,019 million
Market risk	SCR _{mkt}	465 million
Default risk	SCR _{DEF}	115 million
Intangible asset risk	SCR _{int}	50 million
Operational risk	SCR _{op}	30% of BSCR

- The adjustment for the risk-absorbing effect of technical provisions and deferred taxes is 66 million.
- (a) (1.5 points) Demonstrate that the GI underwriting risk SCR is 1,019 million.
- (b) (2 points) Calculate the Solvency II Basic Solvency Capital Requirement (BSCR).
- (c) (0.5 points) Calculate the Solvency II Standard Formula.
- (d) (1 point) Explain the rationale of including tail correlations instead of correlations in the Solvency II formulas.
- (e) (1 point) Explain how Type 1 and Type 2 counterparty default risk are determined for the calculation of SCR_{DEF}.

16. (5 points) Most accounting standards permit certain bonds to be reported at amortized cost instead of market value.

- (a) (2.5 points) Describe the conditions required for bonds to be reported at amortized cost under each of the following accounting standards:
 - (i) U.S. statutory accounting
 - (ii) U.S. GAAP
 - (iii) International Financial Reporting Standards (IFRS)
- (b) (1 point) Compare the U.S. statutory accounting treatment of the change in reported value for bonds reported at amortized cost versus bonds reported at market value.

U.S. statutory accounting is generally conservative. However, U.S. statutory accounting permits amortized cost for certain bonds even though this value may be higher than the market value.

- (c) (1.5 points) Provide the reasons for this apparent contradiction.

- 17.** (4 points) On-the-Double Motors (ODM) was sued for negligence by Carla Brando regarding a repair that was improperly done on her vehicle. The suit alleged that the improper repair caused an accident that resulted in a total loss of the vehicle and permanent bodily injuries to the driver of the vehicle, Carla Brando. Carla asked for \$10 million to cover economic and non-economic damages. The evidence supported the argument that ODM was negligent.

ODM has a liability policy with Take-a-Chance Insurance (TACI). The limit of the policy is \$4 million. Before trial, Carla's lawyer puts forth a settlement offer to TACI in the amount of \$4 million. TACI did not inform ODM of the offer as TACI was willing to take the chance that it could win the case in a trial.

ODM subsequently lost the case and Carla was awarded \$10 million. TACI promptly paid Carla \$4 million and suggested that ODM sell their business to come up with the other \$6 million. ODM then filed a suit against TACI for *bad faith*.

- (a) (0.5 points) Describe what is meant by a claim of *bad faith* against an insurer.
- (b) (1.5 points) Explain why ODM would likely win its suit against TACI for *bad faith*.

ODM's bad faith suit against TACI also included a claim for \$50 million in punitive damages.

- (c) (2 points) Assess ODM's claim for this amount of punitive damages against TACI.

18. (4 points) Rating agencies use a variety of measures to determine how much capital an insurer needs to hold in order to achieve a certain rating grade. These measures include:

- Value-at-Risk (VaR) at a given probability of survival,
- Tail-Value-at-Risk (TVaR) at a given probability of survival, and
- Expected Policyholder Deficit (EPD) at a given level of capital.

Jed-Eye Insurance (JEI), a general insurance company, is being reviewed by a rating agency. The rating agency developed a stochastic model which assumes that JEI's present value of future loss payments follows an exponential distribution. This exponential distribution is defined by probability density function $f(x)$ and cumulative distribution function $F(x)$ where:

$$f(x) = \lambda e^{-\lambda x}, \quad F(x) = 1 - e^{-\lambda x}, \quad \lambda = 0.2 \text{ and}$$

x is measured in millions of currency units (CU) and $x > 0$.

$$\text{Note that } \int_A^\infty x \lambda e^{-\lambda x} dx = \left(\frac{1}{\lambda} + A \right) e^{-\lambda A}.$$

JEI carries reserves equal to 120% of the expected present value of future loss payments. The rating agency model assumes that JEI's risk of insolvency is only from future loss payments exceeding reserves and capital.

- (a) (1.5 points) Estimate the amount of capital that the company would be required to hold at the beginning of a year in order to remain solvent with a 99% probability, based upon the rating agency model.

Assume that JEI has 20 million of capital.

- (b) (2.5 points) Determine the following amounts for JEI based upon the rating agency model:
- (i) TVaR threshold relating to 20 million of held capital
 - (ii) EPD relating to 20 million of held capital

19. (5 points) The Appointed Actuary (AA) for a general insurance company in the U.S. produces the Actuarial Opinion Summary (AOS) in addition to the Statement of Actuarial Opinion (SAO).

- (a) (0.5 point) State what is required of a state insurance department regarding receipt of an insurer's AOS.
- (b) (0.5 points) Identify the timing of an insurer's filing of the AOS to a non-domiciliary state insurance department.

The AA may choose to report a point estimate, a range, or both for unpaid claim liabilities in the AOS.

- (c) (1.5 points) Provide a reason for and a reason against showing only a range in the AOS.

Consider a situation in which the AA produces a range of reasonable estimates for a portion of total claim liabilities and a point estimate for the remaining claim liabilities.

- (d) (1 point) Describe what is required of the AA in this situation when completing the AOS .

Standard presentation of information in the AOS is as follows:

		Net Reserves			Gross Reserves		
		Low	Point	High	Low	Point	High
A	Actuary's range of estimates						
B	Actuary's point estimate						
C	Company carried reserves						
D	Difference between company carried and actuary's estimate						

Consider a situation when the AA provides a qualified opinion in which a portion of business is excluded from the AA's unpaid claims estimates, and the AA provides only a point estimate for the amounts opined on.

- (e) (1.5 points) Describe what the AA is to report in the AOS in this situation.

- 20.** (4 points) W-Nat Insurance writes retrospectively rated U.S. workers compensation policies. The following tables include the rating parameters and loss data information for W-Nat's retrospectively rated policies, as of December 31, 2019:

Basic premium factor	BPF	0.26
Expected loss ratio	ELR	60%
Loss conversion factor	LCF	1.28
Tax multiplier	TM	1.04

Retrospective adjustment	Expected percentage of loss emerged (EPLE)	Loss capping ratio (LCR)
First	60%	75%
Second	35%	30%
Third	5%	0%

- (a) (1.5 points) Demonstrate that the premium development to loss development (PDL D) ratio for the first retrospective adjustment using the formula approach is 1.75.

W-Nat's empirical PDL D ratios for the first retro adjustment by policy effective quarter are as follows:

PDL D Ratios				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Year 2014	1.30	1.45	1.25	1.40
Year 2015	1.25	1.30	1.50	1.35
Year 2016	1.40	1.55	1.45	1.35
Year 2017	1.35	1.40	1.65	1.85

The average empirical PDL D ratio based on the table above is 1.425.

- (b) (0.5 points) Explain why one would choose the formula approach over the empirical data approach for selecting W-Nat's PDL D ratios.

No losses are reported after the third retro adjustment. You are given the following information for a retrospectively rated policy for the policy period subject to its first retrospective adjustment:

Expected future loss emergence	400 million
Premium booked prior to adjustment	440 million

- (c) (2 points) Calculate W-Nat's premium asset for this policy that is subject to the first retrospective adjustment.

21. (3 *points*) Loss experience may be used in determining general insurance premiums in both of the following rating methods:

1. Experience rating
2. Retrospective rating.

(a) (1 *point*) Compare how loss experience is used to determine premiums under these two rating methods.

Many state insurance regulators have rejected the typical method that actuaries use to account for profit and contingencies in premiums and prefer an alternative methodology.

(b) (0.5 *points*) Describe the typical method that actuaries use to account for profit and contingencies in premiums.

(c) (0.5 *points*) Describe the alternative methodology preferred by state insurance regulators.

(d) (1 *point*) Critique the practical application of this alternative methodology by an insurer.

22. (5 points) U.S. GAAP and U.S. Statutory Accounting define the risk transfer requirements of reinsurance contracts. In order for an insurer to receive reinsurance accounting, a reinsurance contract must satisfy at least one of two conditions.

(a) (1 point) State the two conditions.

Expected reinsurer deficit (ERD) and risk coverage ratio (RCR) are considered superior risk metrics for gauging risk transfer compared to a Value-at-Risk (VaR) metric.

(b) (1 point) List the two main features of ERD and RCR that distinguish them from VaR for risk transfer testing.

(c) (1 point) Describe the drawback of using probability of ruin for gauging risk transfer.

(d) (0.5 points) Define the 10-10 rule for measuring risk transfer.

(e) (0.5 points) Provide the formula for the 10-10 rule in terms of VaR, defining each element of the mathematical expression.

(f) (1 point) Provide the formula for the ERD risk metric in terms of Tail VaR (TVaR), defining each element of the mathematical expression.

****END OF EXAMINATION****

Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK