Advanced Topics in General Insurance Exam

Fall 2024

Important Exam Information:

Exam Registration	Candidates may register online or with an application.
Order Study Notes	There is no study note package for this examination.
Introductory Study Note	The Introductory Study Note has a complete listing of all readings as well as errata and other important information.
Case Study	There is no case study for this examination.
Past Exams	Past Exams from Fall 2020-present are available on SOA website.
Updates	Candidates should be sure to check for updates on the Exam Study page periodically for additional corrections or notices to the current syllabus.

Advanced Topics in General Insurance
FALL 2024

1. **Topic: Basic Stochastic Reserving**

Learning Objectives

The candidate will understand how to use basic loss development models to estimate the standard deviation of an estimator of unpaid claims.

Learning Outcomes

The candidate will be able to:

a) Identify the assumptions underlying the chain ladder estimation method.
b) Test for the validity of these assumptions.
c) Identify alternative models that should be considered depending on the results of the tests.
d) Estimate the standard deviation of a chain ladder estimator of unpaid claims.
e) Apply a parametric model of loss development.
f) Estimate the standard deviation of a parametric estimator of unpaid claims.

Resources

- Mack, T., "*Measuring the Variability of Chain Ladder Reserve Estimates*," Casualty Actuarial Society Forum, Spring 1994
  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
    - Browse research -> [Author Last Name = Mack, Year Published = 1994] -> Search
    - Measuring the Variability of Chain Ladder Reserve Estimates
    - Link https://www.casact.org/sites/default/files/database/forum_94spforum_94spf101.pdf

- Venter, G.G., "*Testing the Assumptions of Age-to-Age Factors*," PCAS LXXXV, 1998
  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
    - Browse research -> [Author Last Name = Venter, Year Published = 1998] -> Search
      - Testing the Assumptions of Age-To-Age Factors
      - Link https://www.casact.org/sites/default/files/database/proceed_proceed98_980807.pdf

- Clark, D.R., "*LDF Curve Fitting and Stochastic Reserving: A Maximum Likelihood Approach*," Casualty Actuarial Society Forum, Fall 2003
  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
    - Browse research -> [Author Last Name = Clark, Year Published = 2003] -> Search
      - LDF Curve-Fitting and Stochastic Reserving: A Maximum Likelihood Approach
      - Link https://www.casact.org/sites/default/files/database/forum_03fforum_03ff041.pdf

2. **Topic: Development Analysis for Excess Limits and Layers**
Learning Objectives
The candidate will understand the considerations in the development of losses for excess limits and layers.
Learning Outcomes
The candidate will be able to: a) Estimate ultimate claims for excess limits and layers. b) Understand the differences in development patterns and trends for excess limits and layers.
Resources
• *Fundamentals of General Insurance Actuarial Analysis*, J. Friedland, Second Edition, 2022 o Appendix G *[Candidates may also use the Appendix I of the 2019 supplement to the First Edition]*

3. **Topic: Risk Margins for Unpaid Claims**
Learning Objectives
The candidate will understand the considerations in selecting a risk margin for unpaid claims.
Learning Outcomes
The candidate will be able to: a) Describe a risk margin analysis framework. b) Identify the sources of uncertainty underlying an estimate of unpaid claims. c) Describe methods to assess this uncertainty.
Resources
• Marshall, K., Collings, S., Hodson, M., and O'Dowd, C., "*A Framework for Assessing Risk Margins*," Institute of Actuaries of Australia 16th General Insurance Seminar, 9-12 November 2008, Coolum, Australia http://www.actuaries.asn.au/Library/Framework%20for%20assessing%20risk%20margins.pdf

4. **Topic: Excess of Loss Coverages and Retrospective Rating**

Learning Objectives

The candidate will understand excess of loss coverages and retrospective rating.

Learning Outcomes

The candidate will be able to:

a) Explain the mathematics of excess of loss coverages in graphical terms.
b) Calculate the expected value premium for increased limits coverage and excess of loss coverage.
c) Explain and calculate the effect of economic and social inflationary trends on first dollar and excess of loss coverages.
d) Explain retrospective rating in graphical terms.
e) Explain Table M and Table L construction in graphical terms.
f) Explain the limiting case in retrospective rating.
g) Estimate the premium asset for retrospectively rated polices for financial reporting.

Resources

- Lee, Y., *"The Mathematics of Excess of Loss Coverages and Retrospective Rating–A Graphical Approach,"* PCASLXXV, 1988
  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
  - Browse research -> [Author Last Name = Lee, Year Published = 1988] -> Search
  - The Mathematics of Excess Loss Coverages and Retrospective Rating: A Graphical Approach
  - Link https://www.casact.org/sites/default/files/database/proceed_proceed88_88049.pdf

- Teng, M. and Perkins, M., *"Estimating the Premium Asset on Retrospectively Rated Policies,"* Casualty Actuarial Society, 1996 Proceedings, Vol. LXXXIII, pages 611-647, excluding Section 5
  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
  - Browse research -> [Author Last Name = Teng, Year Published = 1996] -> Search
  - Estimating the Premium on Retrospectively Rated Policies
  - Link https://www.casact.org/sites/default/files/database/proceed_proceed96_96611.pdf

- Feldblum, S., *"Discussion of paper published in PCAS Volume LXXXIII, Estimating the Premium Asset on Retrospectively Rated Policies, Meriam Perkins and Michael Teng ,"* Casualty Actuarial Society, 1998 Proceedings, Vol. LXXXV, pages 274-297 (ending before beginning of Section 3)
  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
  - Browse research -> [Author Last Name = Feldblum, Year Published = 1998] -> Search
  - Estimating the Premium Asset on Retrospectively Rated Policies [Discussion]
  - Link https://www.casact.org/sites/default/files/database/proceed_proceed98_980274.pdf

5. **Topic: Reinsurance**

Learning Objectives

The candidate will understand several aspects of reinsurance including the various types of reinsurance, the issues encountered when performing a reserve analysis on reinsurance, how to apply the fundamental techniques of reinsurance pricing and risk transfer testing of reinsurance contracts.

Learning Outcomes

The candidate will be able to:

a) Understand the types of reinsurance and key reinsurance terms.
b) Explain the principal functions of reinsurance.
c) Analyze and describe the various types of reinsurance.
d) Understand the issues encountered when applying loss development methods to reinsurance
e) Calculate the price for a proportional treaty.
f) Calculate the price for a property per risk excess treaty.
g) Calculate the price for a casualty per occurrence excess treaty.
h) Apply an aggregate distribution model to a reinsurance pricing scenario.
i) Describe considerations involved in pricing property catastrophe covers.
j) Understand the application of a reinstatement premium.
k) Test for risk transfer in reinsurance contracts.

Resources

- *Fundamentals of General Insurance Actuarial Analysis*, J. Friedland, Second Edition, 2022
  - Chapter 10: A Reinsurance Primer

  [Candidates may also use Appendix H of the 2019 Supplement to the First Edition, 2013]

- Reinsurance Sections from *Fundamentals of General Insurance Actuarial Analysis*

- Clark, D.R., "Basics of Reinsurance Pricing," Actuarial Study Note, 2014

- Brehm, P. and Ruhm, D., *"Risk Transfer Testing of Reinsurance Contracts,"* Variance, 2007, Volume 01, Issue 01, pages 9-17

  This article may be accessed at www.casact.org through the following navigation:
  - Publications & Research
  - Browse research -> [Author Last Name = Brehm, Year Published = 2007] -> Search
  - Risk Transfer Testing of Reinsurance Contracts: A Summary of the Report by the CAS Research Working Party on Risk Transfer Testing
  - Link https://www.casact.org/sites/default/files/2021-07/Risk-Transfer-Ruhm-Brehm.pdf

- Gurenko, E., Itigin, A. and Wiechert, R., *"Insurance Risk Transfer and Categorization of Reinsurance Contracts,"* World Bank Policy Research Working Paper No. 6299, December 2012, excluding Section IV and the Annexes

  https://documents1.worldbank.org/curated/en/685801468328580905/pdf/wps6299.pdf

6. **Topic: Specialized Ratemaking Topics**
Learning Objectives
The candidate will understand and apply specialized ratemaking techniques.
Learning Outcomes
The candidate will be able to: a) Price for deductible options and increased limits. b) Develop rates for claims made contracts. c) Understand and apply techniques for individual risk rating.
Resources
• *Fundamentals of General Insurance Actuarial Analysis*, J. Friedland, Second Edition, 2022 o Chapter 34: Actuarial Pricing for Deductibles and Increased Limits o Chapter 35: Claims-Made Ratemaking o Chapter 36: Individual Risk Rating and Funding Allocation for Self-Insurers (excluding section 36.7) *[Candidates may also use First Edition, 2013 (Chapters 33, 34 and 35 excluding section 35.6)]*

7. **Topic: Game Theory and Catastrophe Risk Loads**
Learning Objectives
The candidate will understand the application of game theory to the allocation of risk loads.
Learning Outcomes
The candidate will be able to: a) Allocate a risk load among different accounts.
Resources
• Mango, D.F., "*An Application of Game Theory: Property Catastrophe Risk Load*," PCAS LXXXV, 1998 This article may be accessed at www.casact.org through the following navigation: - Publications & Research - Browse research -> [Author Last Name = Mango, Year Published = 1998] -> Search - An Application of Game Theory: Property Catastrophe Risk Load - Link https://www.casact.org/sites/default/files/database/proceed_proceed98_980157.pdf