

2011 Exam 5

Basic Techniques for Ratemaking and Estimating Claim Liabilities

Before commencing study for this four-hour examination, candidates should read the “Introduction” to “Materials for Study” for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** constitute the 2011 CAS Exam 5 Study Kit that may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) or **W** (the 2011 Exam 5 Web Notes) are available at no charge and may be downloaded from links in the Complete Text References section below—or a printed version may be purchased from the CAS Online Store.

Please check the “Syllabus Updates” section of the CAS Web Site for any changes to the *Syllabus*.

For information on half exams that are part of the 2011 Exam 5 transition rules, please see the following sections of this *Syllabus*: “Notice to Candidates for 2011” or “Transition Programs” (pp. 22-23).

The CAS will test the candidate’s knowledge of topics that are presented in the learning objectives. Thus, the candidate should expect that each exam will cover a large proportion of the learning objectives and associated knowledge statements and syllabus readings, and that all of these will be tested at least once over the course of a few years—but each one may not be covered on a particular exam.

A. Basic Techniques for Ratemaking

Range of weight for Section A: 50-60 percent

This section introduces the general principles of ratemaking as well as specific details regarding data requirements, calculations, key assumptions, and implementation-related issues. Candidates require a thorough understanding of basic ratemaking so that they will be able to analyze data, select appropriate techniques, and develop solutions to problems. This section addresses the advantages and disadvantages of the various ratemaking techniques as they are applied to specific situations and different lines of business. Classification of insureds for the purpose of risk stratification and other important ratemaking topics, such as coinsurance and catastrophe provisions, are also examined in this section.

Candidates are also expected to be knowledgeable in the calculation of policy premiums using manual rate pages. Excerpts from the ISO Personal Automobile Manual will be provided with the examination. Candidates are not required to memorize the details, but will be expected to be able to use them during the examination. Since they will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Calculate a policy premium for a specified risk using the rate pages provided. Range of weight: 0-3 percent	a. How to read and use manual rate pages
READINGS	
ISO PAM Werner & Modlin, Chapter 2	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>2. Describe the information requirements for ratemaking related to exposures and demonstrate the use of exposures in ratemaking.</p> <p>Range of weight: 2-6 percent</p>	<p>a. Definition of exposure base</p> <p>b. Characteristics of exposure bases</p> <p>c. Relationship of exposures to coverage provisions</p> <p>d. Organization of data: calendar year, policy year, accident year</p> <p>e. Written exposure versus earned exposure versus in-force exposure</p> <p>f. Role of exposures in the ratemaking process</p> <p>g. Influence of changes in exposures</p> <p>h. Exposure drift</p>
READINGS	
Werner & Modlin, Chapters 1- 4	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>3. Describe the information requirements for ratemaking related to premiums and demonstrate the use of premiums in ratemaking.</p> <p>Range of weight: 4-8 percent</p>	<p>a. Organization of data: calendar year, policy year, accident year</p> <p>b. Written premium versus earned premium versus in-force premium</p> <p>c. Relationship between earned premium and earned exposure</p> <p>d. Policy terms</p> <p>e. Effect of law changes</p> <p>f. Effect of rate changes</p> <p>g. Determinations of and application of premium trend</p> <p>h. Adjustment for coverage and benefit level changes</p> <p>i. Distributional shifts and changes in volume (i.e., trend over time)</p> <p>j. Parallelogram method</p> <p>k. Extension of exposures</p>
READINGS	
ASOP 13 Werner & Modlin, Chapters 1-3, 5, and Appendices A-D	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>4. Describe the information requirements for ratemaking related to loss and loss adjustment expenses and demonstrate the use of loss and loss adjustment expenses in ratemaking.</p> <p>Range of weight: 8-12 percent</p>	<p>a. Organization of the data: calendar year, policy year, accident year, report year</p> <p>b. Policy provisions</p> <p>c. Occurrence coverage</p> <p>d. Claims-made coverage:</p> <ul style="list-style-type: none"> • report lag • coverage triggers • principles of claims-made policies • retroactive date • tail coverage <p>e. Reported losses versus paid losses</p> <p>f. Claim counts</p> <p>g. Loss adjustment expense (allocated and unallocated expenses)</p> <p>h. Loss development</p> <p>i. Frequency trend</p> <p>j. Severity trend</p> <p>k. Pure premium trend</p> <p>l. Approaches to determining trend (e.g., exponential and linear analyses)</p> <p>m. Relationship between trend and loss development</p> <p>n. Effect of law changes</p> <p>o. Effect of changes in mix of business</p> <p>p. Adjustment for coverage and benefit level changes</p> <p>q. Credibility criteria and formulae</p> <p>r. Large loss adjustment</p> <p>s. Reinsurance recoveries</p> <p>t. Reinsurance costs</p> <p>u. Catastrophe adjustment</p>
READINGS	
<p>ASOP 13 Werner & Modlin, Chapters 1, 3, 6, 12, 16, and Appendices A-D</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>5. Calculate the underwriting expense provisions underlying the overall rate level indication.</p> <p>Range of weight: 0-5 percent</p>	<p>a. Expense categories (e.g., commission, general, other acquisition, taxes, licenses, and fees)</p> <p>b. Sources of data and selection criteria</p> <p>c. Profit and contingency provisions</p> <p>d. Net cost of reinsurance</p> <p>e. Cost of capital</p> <p>f. Fixed expenses and variable expenses</p> <p>g. Differences in procedures for loss adjustment expenses versus underwriting expenses</p>
READINGS	
<p>Werner & Modlin, Chapters 1, 7, and Appendices A-D</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>6. Calculate the overall rate level indication using the pure premium and loss ratio methods.</p> <p>Range of weight: 3-6 percent</p>	<p>a. Statement of Principles, CAS</p> <p>b. Assumptions of each method</p> <p>c. Mechanics associated with each method (including organization of the data)</p> <p>d. When each method works and when it does not</p>
READINGS	
<p>CAS Principles 1</p> <p>Werner & Modlin, Chapters 1, 8, and Appendices A-D</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>7. Explain the considerations beyond the calculated cost-based estimate of the rate when selecting a final rate change to implement.</p> <p>Range of weight: 0-5 percent</p>	<p>a. Calculated cost-based rate</p> <p>b. Regulatory constraints</p> <p>c. Operational constraints</p> <p>d. Marketing constraints:</p> <ul style="list-style-type: none"> • Competitive comparisons • Close ratios • Retention ratios • Growth • Distributional analysis • Policyholder dislocation analysis <p>e. Lifetime value analysis</p> <p>f. Optimized pricing</p> <p>g. Underwriting cycles</p>
READINGS	
<p>Werner & Modlin, Chapter 13</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>8. Explain the purpose for segregating data into homogeneous groups and summarize the considerations for determining such groups.</p> <p>Range of weight: 0-5 percent</p>	<p>a. Risk Classification Statement of Principles, AAA</p> <p>b. Criteria for selection of classification grouping</p> <p>c. Credibility</p> <p>d. Adverse Selection</p> <p>e. Efficiency of class plan</p>
READINGS	
<p>AAA</p> <p>Werner & Modlin, Chapter 9</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
9. Calculate rating differentials for classification and territory and relativities for deductibles and increased limits. Range of weight: 8-12 percent	a. Formulae and process for each rating differential or relativity b. Credibility and complements of credibility c. Off balance d. Capping of change e. Loss elimination f. Basic limits versus total limits g. Layers of loss h. Expense adjustments i. Fundamentals of univariate and multivariate relativity analyses
READINGS	
Feldblum Werner & Modlin, Chapters 9-12, 15 and Appendices E-F	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
10. Describe the process for implementing rates to achieve an organization's goals. Range of weight: 0-3 percent	a. Rating algorithms b. Rating variables and differentials c. Fixed expenses, if applicable d. Expense fee calculation e. Calculation of final base rates f. Minimum premiums g. Non-pricing solutions
READINGS	
Werner & Modlin, Chapter 14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
11. Calculate premium for policies with coinsurance provisions. Range of weight: 0-5 percent	a. Definition of coinsurance b. Insurance to value c. Common policy provisions d. Layers of loss e. Coverage issues f. Guaranteed replacement cost g. Formula
READINGS	
Werner & Modlin, Chapter 11	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
12. Perform basic individual risk rating calculations. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Purpose of individual risk rating b. Schedule rating c. Manual rating d. Retrospective rating e. Experience modification f. Composite loss-rated risks g. Formulae h. Experience period i. Credibility j. Layers of loss
READINGS	
Werner & Modlin, Chapter 15	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
13. Explain the asset share and cash flow techniques for estimating costs. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Model characteristics and formulae b. Premium c. Loss characteristics (i.e., frequency, severity) d. Expenses e. Persistency rates f. Policy durations g. Termination rates
READINGS	
Feldblum	

B. Estimating Claim Liabilities

Range of weight for Section B: 40-50 percent

This section explores basic techniques that actuaries use to estimate unpaid claims for both insurance entities and also for non-insurance entities that retain risk. The CAS Principles and the American Academy of Actuaries' Standards of Practice related to the estimation of unpaid claims are also examined in this section.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the information requirements for estimating unpaid claims. Range of weight: 2-6 percent	<ul style="list-style-type: none"> a. Types of data and their sources b. Role of homogeneity and credibility of data in the process of estimating unpaid claims c. Fundamentals of different types of insurance (e.g., long tail versus short tail lines of business, low frequency versus high frequency lines) d. Organization of data: calendar year, accident year, policy year, underwriting year, report year e. Insurer's environment f. Importance of accurate estimates of unpaid claims
READINGS	
Friedland, Chapters 1, 3, and 4, and Appendices A and B	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>2. Build and analyze claim development triangles. Range of weight: 2-6 percent</p>	<p>a. Purposes of the development triangle b. Development triangle as a diagnostic tool c. Examples and uses of diagnostic development triangles:</p> <ul style="list-style-type: none"> • Claim and claim count • Ratio of premium to claims • Average values • Ratios of claims and counts
READINGS	
Friedland, Chapters 5 and 6	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>3. Calculate unpaid claims estimates using each of the following estimation techniques:</p> <ul style="list-style-type: none"> • Development technique, including case outstanding technique • Expected claim technique • Bornhuetter-Ferguson technique • Cape Cod technique • Frequency-Severity techniques <p>Range of weight: 12-16 percent</p>	<p>a. Standards of Practice, ASOP Nos. 9 and 43 b. Statement of Principles, CAS c. The claim process d. Assumptions of each estimation technique e. Mechanics associated with each technique (including organization of the data) f. Reporting and payment patterns g. When each techniques works and when it does not h. Key terms: case outstanding, paid claims, reported claims, incurred but not reported, ultimate claims, claims related expenses, reported and closed claim counts, claim counts closed with no payment, insurance recoverables, exposures, experience period, maturity or age, and components of unpaid claim estimates</p>
READINGS	
ASOP 9 ASOP 43 CAS Principles 2 Friedland, Chapters 1-12, 15, and Appendices A-C	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>4. Assess the influence of operating changes on the estimation of unpaid claims. Range of weight: 0-5 percent</p>	<p>a. How internal operating changes affect estimates of unpaid claims:</p> <ul style="list-style-type: none"> • Claims processing • Underwriting and policy provisions • Marketing • Coding of claim counts and/or claim related expenses • Treatment of recoveries such as policyholder deductibles and salvage and subrogation • Reinsurance
READINGS	
ASOP 9 Friedland, Part 3 (Chapters 6-15)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Adjust data and/or estimation techniques for changes in the: <ul style="list-style-type: none"> • Internal environment (e.g., claims processes that result in shift in the adequacy of case outstanding or shift in settlement rates, change in mix of business, change in rate level) • External environment (e.g., inflationary or legal environment) Range of weight: 3-7 percent	a. Effect on estimation techniques due to change in: rate levels, claim ratio, mix of business b. Use of trend factors and tort reform factors in estimation techniques c. Identification of changes in case outstanding adequacy d. Adjustment for changes in case outstanding adequacy e. Identification of changes in rate of claims settlement f. Adjustment for changes in rate of claims settlement
READINGS	
Friedland, Chapters 7 -14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Estimate recoveries. Range of weight: 0-5 percent	a. Salvage and subrogation b. Reinsurance c. Key assumptions of estimation techniques
READINGS	
Friedland, Chapter 14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Estimate unpaid claim adjustment expenses. Range of weight: 2-7 percent	a. Organization of the data b. Estimation of unpaid ALAE c. Estimation of unpaid ULAE d. Key assumptions of estimation techniques e. Strengths and weaknesses of the estimation techniques for claim related expenses
READINGS	
Friedland, Chapters 1, 3, 16, and 17	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Evaluate results of the estimation process for adequacy and reasonableness. Range of weight: 4-8 percent	a. Components of evaluation: <ul style="list-style-type: none"> • Multiple methods • Explanation of differences • Test statistics (e.g., claim ratios, severities, pure premiums, frequencies, indicated unpaid claims) b. Monitoring and interim valuations
READINGS	
Friedland, Chapter 15	

Complete Text References for Exam 5

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 9, Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations," Doc. No. 027, 1991. Excluding Appendices 1 and 3.	ASOP 9	B3, B4	W
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking."	ASOP 13	A3, A4	W
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 43, Property/Casualty Unpaid Claim Estimates," Doc. No. 106, June 2007.	ASOP 43	B3	W
American Academy of Actuaries Committee on Risk Classification, "Risk Classification Statement of Principles," June 1980. (Available at no charge from the American Academy of Actuaries at (202) 223-8196 or on the Academy's Web Site at www.actuary.org.	AAA	A8	W
Casualty Actuarial Society Committee on Ratemaking Principles, <i>Statement of Principles Regarding Property and Casualty Insurance Ratemaking</i> , Casualty Actuarial Society, May 1988.	CAS Principles 1	A6	W
Casualty Actuarial Society Committee on Ratemaking Principles, <i>Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves</i> , May 1988.	CAS Principles 2	B3	W
Feldblum, S., "Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty Insurance," <i>PCAS LXXXIII</i> , 1996, pp. 190-256 (excluding Sections 7-9).	Feldblum	A13	W
Friedland, J.F., <i>Estimating Unpaid Claims Using Basic Techniques</i> , Casualty Actuarial Society, Third Version, July 2010.	Friedland	B1-8	OP
Insurance Services Office, Inc., Personal Automobile Manual (Effective 6-98), General Rules 1-6 only. The entire manual is included for completeness.	ISO PAM	A1	SK
Werner, G, and Modlin, C., <i>Basic Ratemaking</i> , Casualty Actuarial Society, October 2010. [The Appendices are an integral part of the textbook and will be used for creating questions.]	Werner & Modlin	A1-A12	OP

Source Key

- L** May be borrowed from the CAS Library.
- OP** Represents an Online Publication that is available at no charge from the "Study Tools" section of the CAS Web Site. A printed version may be purchased from the CAS Online Store.
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Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

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