

RULES – INFORMATION

APRIL 17, 2019

COMMERCIAL MULTIPLE LINE

LI-ML-2019-007

MASSACHUSETTS COMMERCIAL PACKAGE POLICY PACKAGE MODIFICATION FACTOR ANALYSIS FURNISHED FOR INFORMATION; EXCEL WORKBOOK NEWLY INCLUDED

KEY MESSAGE

This analysis is provided for your information. We are NOT revising the current package modification factors based on this analysis.

BACKGROUND

In circular [LI-ML-2019-004](#), we provided you with information about the package modification factor review.

ISO ACTION

We are:

- NOT making a submission to the Insurance Department based on this analysis.
- NOT implementing any changes, at this time, to the current package modification factors for this jurisdiction.

COMPANY ACTION

You may wish to evaluate your package modification factor needs. The methods described in the attached analysis are based on the judgments of Insurance Services Office, Inc. You should evaluate and substitute your own judgments and procedures where appropriate, and consider your own loss experience when determining your package modification factor needs.

If you decide to independently file a package modification factor revision, you must comply with the applicable regulatory filing requirements.

REFERENCE(S)

[LI-ML-2019-004](#) (04/03/2019) Commercial Package Policy Experience Reviewed By Staff

ATTACHMENT(S)

- Informational Analysis
- Excel Workbook

FILES AVAILABLE FOR DOWNLOAD

To download all files associated with this circular, including attachments in the full circular PDF and/or any additional files not included in the PDF, search for the circular number on [ISOnet Circulars](#). Then click the Word/Excel link under the Full Circular column on the Search Results screen.

Please note that in some instances, not all files listed in the Attachment(s) block (if applicable) are included in the PDF.

COPYRIGHT EXPLANATION

The material distributed by Insurance Services Office, Inc. is copyrighted. All rights reserved. Possession of these pages does not confer the right to print, reprint, publish, copy, sell, file, or use same in any manner without the written permission of the copyright owner. Permission is hereby granted to members, subscribers, and service purchasers to reprint, copy, or otherwise use the enclosed material for purposes of their own business use relating to that territory or line or kind of insurance, or subdivision thereof, for which they participate, provided that:

- (A) Where ISO copyrighted material is reprinted, copied, or otherwise used **as a whole**, it must reflect the copyright notice actually shown on such material.
- (B) Where ISO copyrighted material is reprinted, copied, or otherwise used **in part**, the following credit legend must appear at the bottom of each page so used:
Includes copyrighted material of Insurance Services Office, Inc., with its permission.

ACKNOWLEDGMENT OF ACTUARIAL QUALIFICATIONS

The American Academy of Actuaries' "Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States" requires that an actuary issuing a Statement of Actuarial Opinion should include an acknowledgment with the opinion that he/she has met the qualification standards of the AAA. ISO considers this rule document a Statement of Actuarial Opinion; therefore we are including the following acknowledgment:

I, Rimma Maasbach, am an Actuarial Consultant in Actuarial Operations for ISO, and I, Bei Zhou, am an Actuarial Product Director for Commercial Property for ISO. We are jointly responsible for the content of this Statement of Actuarial Opinion. We are both members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

CONTACT INFORMATION

If you have any questions concerning:

- The actuarial content of this circular, please contact:

Yinglu Fan
Actuarial Operations
201-469-2134
Yinglu.Fan@verisk.com
propertyactuarial@verisk.com

- The non-actuarial content of this circular, please contact:
Agnes Edmilao
Production Operations, Compliance and Product Services
201-469-2848
productionoperations@verisk.com
- Other issues for this circular, please contact Customer Support:
E-mail: info@verisk.com
Phone: 800-888-4476

Callers outside the United States, Canada, and the Caribbean may contact us using our global toll-free number (International Access Code + 800 48977489). For information on all ISO products, visit us at www.verisk.com/iso. To keep abreast of the latest Insurance Lines Services updates, view www.verisk.com/ils.

MASSACHUSETTS

ADVISORY PACKAGE MODIFICATION FACTOR REVIEW

COMMERCIAL PACKAGE POLICY

EXECUTIVE SUMMARY

PURPOSE

This document:

- presents a review of advisory Package Modification Factors (PMFs). PMFs are relativity factors used to adjust monoline loss costs as appropriate for multiline risks.
 - provides the analyses used to derive these advisory PMFs.
-

PMF CHANGES

The proposed Commercial Package Policy (CPP) Package Modification Factor changes are:

<u>Type of Policy</u>	<u>Property</u>	<u>Liability</u>	<u>Prop. & Liab. Total</u>
Motel/Hotel	-3.2%	0.0%	-0.7%
Apartment	0.0%	0.0%	0.0%
Office	-4.5%	+2.0%	+1.6%
Mercantile	-4.2%	+3.2%	+1.2%
Institutional	+2.0%	0.0%	+1.5%
Services	-4.2%	0.0%	-1.9%
Indust./Proc.	-2.6%	+2.0%	+0.4%
Contractors	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>
Statewide	-1.5%	+1.2%	+0.3%

INDICATED VS. CAPPED

Indicated PMF changes are based on standard ISO methodology. Differences between indicated and capped PMF changes are caused by rounding each indicated PMF to the nearest one percent and applying an upper cap of 1.00, where necessary.

MASSACHUSETTS
ADVISORY PACKAGE MODIFICATION FACTOR REVIEW
COMMERCIAL PACKAGE POLICY

EXECUTIVE SUMMARY

HISTORICAL
SOURCE DATA

The data used in this review is from ISO reporting companies for:

- Basic Group I: five fiscal accident years ending 12/31/17.
 - Basic Group II: ten fiscal accident years ending 12/31/17.
 - Special Causes of Loss: five fiscal accident years ending 12/31/17.
 - Crime: calendar year ending 06/30/16.
 - Inland Marine: five calendar accident years ending 12/31/16.
 - Fidelity: policy year ending 12/31/15.
 - Owners, Landlords, and Tenants: five fiscal accident years ending 12/31/17.
 - Manufacturers and Contractors: five fiscal accident years ending 12/31/17.
 - Products: three calendar accident years ending 12/31/17.
 - Local Products and Completed Operations: three calendar accident years ending 12/31/17.
-

PRIOR ISO
REVISIONS

The latest revisions in this state are:

<u>Filing</u>	ML-18-RLA1	ML-16-RLA1	ML-13-RLA1
<u>Dates</u>			
Implemented	01/01/19	04/01/17	04/01/14
<u>Changes</u>			
Indicated	+2.9%	-1.3%	+3.7%
Filed	+2.9%	-1.3%	+3.7%
Implemented	+2.9%	-1.3%	+3.7%

MASSACHUSETTS
ADVISORY PACKAGE MODIFICATION FACTOR REVIEW
COMMERCIAL PACKAGE POLICY

EXECUTIVE SUMMARY

ADJUSTMENTS
TO REPORTED
EXPERIENCE

Standard actuarial procedures have been used in the reviews underlying the calculation of the PMFs, including adjusting the fire and liability losses to ultimate settlement level and, for all coverages, reflecting all loss adjustment expenses and trend. Specific procedures vary by subline.

TEN LARGEST
GROUPS IN
ISO DATA BASE

Insurers are listed in descending order based on the percent of statewide written premium volume from Annual Statement Page 15 for the year ending 12/31/17 for the Annual Statement Line of Business (ASLOB) indicated.

COMMERCIAL MULTI PERIL (ASLOB 51 & 52)

1. Travelers Indemnity Company
 2. Vermont Mutual Insurance Company
 3. Hanover Insurance Company
 4. Tokio Marine Companies
 5. Liberty Mutual Insurance Company
 6. Norfolk & Dedham Mutual Fire Insurance Company
 7. Admiral Insurance Company
 8. NGM Insurance Company
 9. Hartford Accident and Indemnity Company
 10. Continental Casualty Company
-

SIZE OF ISO
DATA BASE

The market share of ISO participating insurers as measured by Annual Statement Page 15 written premium for the year ending 12/31/17 is:

Commercial Multi Peril (ASLOB 51 & 52). 77.4%.

ADDITIONAL
SUPPORTING
MATERIAL

Additional supporting material underlying the calculation of the experience review indications used in this PMF analysis may be found in the respective monoline experience review documents for each line.

MASSACHUSETTS
ADVISORY PACKAGE MODIFICATION FACTOR REVIEW
COMMERCIAL PACKAGE POLICY

EXECUTIVE SUMMARY

COMPANY DECISION

We encourage each insurer to decide independently whether the judgments made and the procedures or data used by ISO in developing the PMFs contained herein are appropriate for your use. We have included within this document the information upon which ISO relied in order to enable companies to make such independent judgments. The data underlying the enclosed material comes from companies reporting to Insurance Services Office, Inc. Therefore, the ISO experience permits the establishment of a much broader statistical ratemaking base than could be employed by using any individual company's data. A broader data base enhances the validity of ratemaking analysis derived therefrom.

At the same time, however, an individual company may benefit from a comparison of its own experience to the aggregate ISO experience, and may reach valid conclusions with respect to the manner in which its own costs can be expected to differ from ISO's projection based on the aggregate data.

Some calculations included in this document involve areas of ISO staff judgment. Each company should carefully review and evaluate whether the ISO selected PMFs are appropriate for its use.

The material has been developed exclusively by the staff of Insurance Services Office, Inc.

COMMERCIAL PACKAGE POLICY

TABLE OF CONTENTS

SECTION A - SCOPE OF PMF REVISION

Methodology Overview	A-2
Summary of Package Modification Factor (PMF) Review (Table 1)	A-3
Calculation of Revised Package Modification Factors (Table 2)	A-4-12

SECTION B - CALCULATION OF PROPOSED CHANGES

PROPERTY COVERAGES

Commercial Fire & Allied Lines

Distribution of Advisory Loss Cost Level Change (Tables 3-7)	B-2-20
--	--------

Crime and Fidelity	B-21
--------------------------	------

Commercial Inland Marine

Revision of Implicit Package Modification Factor (Tables 8-9)	B-22
---	------

LIABILITY COVERAGES

Distribution of Advisory Loss Cost Level Change (Tables 10-18)	B-23-40
--	---------

COMMERCIAL PACKAGE POLICY

TABLE OF CONTENTS

SECTION A - SCOPE OF PMF REVISION

Methodology Overview	A-2
Summary of Package Modification Factor (PMF) Review (Table 1)	A-3
Calculation of Revised Package Modification Factors (Table 2)	A-4-12

COMMERCIAL PACKAGE POLICY METHODOLOGY OVERVIEW

OBJECTIVE

A Commercial Package Policy (CPP) is essentially a combination of monoline coverages. CPP pricing employs monoline loss costs modified by Package Modification Factors (PMFs). These factors vary by the eight CPP types of policy and are reviewed annually. Monoline and multiline experience are combined and reviewed via a monoline/multiline relativity analysis. The resulting indicated PMFs represent the loss cost for a CPP relative to that for monoline policies providing the same coverages.

STEP 1: THE RELATIVITY ANALYSES

Each line of insurance develops indicated changes to monoline and multiline aggregate loss costs based on an experience ratio relativity analysis for that coverage. The monoline indication represents the needed change to monoline loss costs. The multiline indication represents the needed change to multiline aggregate loss costs, which is implemented through changes to the PMFs. For this PMF analysis, multiline indications are developed for each line of insurance and Type of Policy. Relativity analyses are explained in Section B.

STEP 2: CALCULATION OF THE PMFs

The procedure described above generates indicated Implicit PMFs (IPMFs) which vary by the various lines of insurance and by type of policy. IPMFs represent what the PMF would be for the CPP risk if only a single coverage were written. For each Type of Policy, IPMFs are weighted by CPP aggregate loss costs to determine the indicated property and liability PMFs. These PMFs may be capped, or rounded to the nearest one percent, and certain component IPMFs appropriately adjusted for this change. These calculations are explained in the remainder of Section A.

MASSACHUSETTS

TABLE 1
COMMERCIAL PACKAGE POLICY
SUMMARY OF THIS REVIEW

The display below summarizes the review and shows the capped Package Modification Factors for Property and Liability. For each type of risk, the PMFs are determined to be those factors which when applied to the monoline loss costs produce the appropriate CPP aggregate loss cost level as determined by an analysis of the CPP experience.

TYPE OF POLICY	PROPERTY PMFS			LIABILITY PMFS			PROP. & LIAB. TOTAL
	CURRENT	CAPPED	% CHANGE	CURRENT	CAPPED	% CHANGE	% CHANGE
MOTEL/HOTEL (31)	0.95	0.92	-3.2%	1.00	1.00	0.0%	-0.7%
APARTMENT (32)	0.90	0.90	0.0%	1.00	1.00	0.0%	0.0%
OFFICE (33)	0.88	0.84	-4.5%	0.98	1.00	2.0%	1.6%
MERCANTILE (34)	0.72	0.69	-4.2%	0.93	0.96	3.2%	1.2%
INSTITUTION (35)	0.98	1.00	2.0%	1.00	1.00	0.0%	1.5%
SERVICES (36)	0.96	0.92	-4.2%	1.00	1.00	0.0%	-1.9%
IND/PROC (37)	0.76	0.74	-2.6%	0.98	1.00	2.0%	0.4%
CONTRACTORS (38)	1.00	1.00	0.0%	1.00	1.00	0.0%	0.0%
STATEWIDE			-1.5%			1.2%	0.3%

MASSACHUSETTS
TABLE 2
COMMERCIAL PACKAGE POLICY
CALCULATION OF REVISED CPP PACKAGE MODIFICATION FACTORS (PMF)

MOTEL/HOTEL (31) *****	(1) AGGREG- ATE LOSS COSTS	(2) CURRENT IMPLICIT PMF	(3) NET INDICATION	(4) INDIC. PMF	(5) CAPPED PMF
<u>COVERAGE</u>					
PROPERTY-					
BASIC GRP I	214,153	0.833	-3.0%	0.808	0.808
BASIC GRP II	138,366	0.961	-8.4	0.880	0.880
SP CAUSE/LOSS	158,734	1.150	1.0	1.162	1.162
*CRIME	2,723	0.910	0.0	0.910	0.910
*INL. MAR.	215	0.910	0.0	0.910	0.910
*FIDELITY	10,149	1.000	0.0	1.000	1.000
<u>TOTAL</u>	<u>524,340</u>	<u>0.95</u>	<u>-3.2%</u>	<u>0.919</u>	<u>0.92</u>
LIABILITY-					
OL&T	1,950,664	1.000	-3.9%	0.961	1.000
<u>TOTAL</u>	<u>1,950,664</u>	<u>1.00</u>	<u>-3.9%</u>	<u>0.961</u>	<u>1.00</u>
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	2,475,004		-3.8%		

APARTMENT (32) *****	(1) AGGREG- ATE LOSS COSTS	(2) CURRENT IMPLICIT PMF	(3) NET INDICATION	(4) INDIC. PMF	(5) CAPPED PMF
<u>COVERAGE</u>					
PROPERTY-					
BASIC GRP I	2,828,903	0.871	-9.8%	0.786	0.857
BASIC GRP II	953,218	0.553	-9.5	0.500	0.546
SP CAUSE/LOSS	2,189,029	1.313	-4.9	1.249	1.362
*CRIME	512	0.910	0.0	0.910	0.910
*INL. MAR.	111	0.910	0.0	0.910	0.910
*FIDELITY	11,564	1.000	0.0	1.000	1.000
<u>TOTAL</u>	<u>5,983,337</u>	<u>0.90</u>	<u>-8.0%</u>	<u>0.828</u>	<u>0.90</u>
LIABILITY-					
OL&T	7,687,032	1.000	6.5%	1.065	1.000
<u>TOTAL</u>	<u>7,687,032</u>	<u>1.00</u>	<u>6.5%</u>	<u>1.065</u>	<u>1.00</u>
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	13,670,369		0.2%		

* indicates coverage for which reviews are on a MULTISTATE basis.

MASSACHUSETTS
TABLE 2
COMMERCIAL PACKAGE POLICY
CALCULATION OF REVISED CPP PACKAGE MODIFICATION FACTORS (PMF)

OFFICE (33) *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE <u>LOSS COSTS</u>	CURRENT IMPLICIT <u>PMF</u>	NET <u>INDICATION</u>	INDIC. <u>PMF</u>	CAPPED <u>PMF</u>
COVERAGE					
PROPERTY-					
BASIC GRP I	350,551	1.053	-3.2%	1.019	1.019
BASIC GRP II	225,278	0.678	-11.8	0.598	0.598
SP CAUSE/LOSS	316,476	0.904	-2.1	0.885	0.885
*CRIME	1,516	0.910	0.0	0.910	0.910
*INL. MAR.	5,751	0.910	0.0	0.910	0.910
*FIDELITY	37,206	1.000	0.0	1.000	1.000
TOTAL	936,778	0.88	-4.4%	0.841	0.84
LIABILITY-					
OL&T	13,101,194	0.987	1.3%	1.000	1.005
M&C	578,682	0.852	4.8	0.893	0.898
TOTAL	13,679,876	0.98	1.5%	0.995	1.00
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	14,616,654		1.1%		
MERCANTILE (34) *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE <u>LOSS COSTS</u>	CURRENT IMPLICIT <u>PMF</u>	NET <u>INDICATION</u>	INDIC. <u>PMF</u>	CAPPED <u>PMF</u>
COVERAGE					
PROPERTY-					
BASIC GRP I	3,067,080	0.733	-2.3%	0.716	0.716
BASIC GRP II	1,541,103	0.541	-7.6	0.500	0.500
SP CAUSE/LOSS	2,406,690	0.864	-6.2	0.810	0.810
*CRIME	35,182	0.910	0.0	0.910	0.910
*INL. MAR.	108,422	0.910	0.0	0.910	0.910
*FIDELITY	254,684	1.000	0.0	1.000	1.000
TOTAL	7,413,161	0.72	-3.9%	0.692	0.69
LIABILITY-					
OL&T	14,412,408	0.860	-3.5%	0.830	0.893
M&C	2,965,812	1.407	-4.2	1.348	1.450
LOCAL PRODUCT	534,312	1.500	0.1	1.501	1.500
*MULTI PRODUCT	1,603,100	0.863	-1.2	0.853	0.853
TOTAL	19,515,632	0.93	-3.8%	0.895	0.96
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	26,928,793		-3.8%		

* indicates coverage for which reviews are on a MULTISTATE basis.

MASSACHUSETTS
TABLE 2
COMMERCIAL PACKAGE POLICY
CALCULATION OF REVISED CPP PACKAGE MODIFICATION FACTORS (PMF)

INSTITUTION (35) *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE	CURRENT	NET	INDIC.	CAPPED
COVERAGE	<u>LOSS COSTS</u>	<u>IMPLICIT</u>	<u>INDICATION</u>	<u>PMF</u>	<u>PMF</u>
PROPERTY-					
BASIC GRP I	5,231,219	1.367	-4.9%	1.300	1.300
BASIC GRP II	2,232,715	0.567	-4.6	0.541	0.541
SP CAUSE/LOSS	3,752,964	1.047	12.7	1.180	1.180
*CRIME	25,142	0.910	0.0	0.910	0.910
*INL. MAR.	12,479	0.910	0.0	0.910	0.910
*FIDELITY	390,718	1.000	0.0	1.000	1.000
TOTAL	11,645,237	0.98	1.9%	0.998	1.00
LIABILITY-					
OL&T	3,705,388	1.007	-2.6%	0.981	1.007
M&C	210,796	0.856	1.2	0.866	0.890
TOTAL	3,916,184	1.00	-2.6%	0.974	1.00
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	15,561,421		0.7%		
 SERVICES (36) *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE	CURRENT	NET	INDIC.	CAPPED
COVERAGE	<u>LOSS COSTS</u>	<u>IMPLICIT</u>	<u>INDICATION</u>	<u>PMF</u>	<u>PMF</u>
PROPERTY-					
BASIC GRP I	3,303,443	1.023	-3.0%	0.992	0.992
BASIC GRP II	2,527,898	0.896	-10.4	0.803	0.803
SP CAUSE/LOSS	2,328,564	0.958	0.5	0.963	0.963
*CRIME	19,701	0.910	0.0	0.910	0.910
*INL. MAR.	43,470	0.910	0.0	0.910	0.910
*FIDELITY	263,392	1.000	0.0	1.000	1.000
TOTAL	8,486,468	0.96	-3.8%	0.923	0.92
LIABILITY-					
OL&T	3,529,107	0.813	-2.9%	0.789	0.826
M&C	5,786,618	1.108	-5.1	1.051	1.100
LOCAL PRODUCT	718,662	1.482	1.6	1.506	1.500
*MULTI PRODUCT	77,969	0.914	0.2	0.916	0.916
TOTAL	10,112,356	1.00	-4.0%	0.960	1.00
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	18,598,824		-3.9%		

* indicates coverage for which reviews are on a MULTISTATE basis.

MASSACHUSETTS
TABLE 2
COMMERCIAL PACKAGE POLICY
CALCULATION OF REVISED CPP PACKAGE MODIFICATION FACTORS (PMF)

IND/PROC (37) *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE <u>LOSS COSTS</u>	CURRENT IMPLICIT <u>PMF</u>	NET <u>INDICATION</u>	INDIC. <u>PMF</u>	CAPPED <u>PMF</u>
COVERAGE					
PROPERTY-					
BASIC GRP I	1,700,279	0.685	-3.0%	0.664	0.716
BASIC GRP II	958,739	0.711	-19.3	0.574	0.618
SP CAUSE/LOSS	1,196,672	0.923	-8.6	0.844	0.909
*CRIME	3,680	0.910	0.0	0.910	0.910
*INL. MAR.	3,147	0.910	0.0	0.910	0.910
*FIDELITY	106,600	1.000	0.0	1.000	1.000
TOTAL	3,969,117	0.76	-8.9%	0.693	0.74
LIABILITY-					
M&C	4,968,388	1.045	7.8	1.127	1.072
LOCAL PRODUCT	199,616	0.943	2.1	0.963	0.916
*MULTI PRODUCT	2,027,770	0.859	0.5	0.863	0.863
TOTAL	7,195,774	0.98	5.8%	1.037	1.00
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	11,164,891		0.6%		
CONTRACTORS (38) *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE <u>LOSS COSTS</u>	CURRENT IMPLICIT <u>PMF</u>	NET <u>INDICATION</u>	INDIC. <u>PMF</u>	CAPPED <u>PMF</u>
COVERAGE					
PROPERTY-					
BASIC GRP I	585,886	1.278	-3.0%	1.240	1.284
BASIC GRP II	310,630	0.724	-11.5	0.641	0.664
SP CAUSE/LOSS	488,584	0.980	1.4	0.994	1.029
*CRIME	3,378	0.910	0.0	0.910	0.910
*INL. MAR.	2,343	0.910	0.0	0.910	0.910
*FIDELITY	82,816	1.000	0.0	1.000	1.000
TOTAL	1,473,637	1.00	-3.3%	0.967	1.00
LIABILITY-					
M&C	17,268,209	1.067	9.4	1.167	1.076
LOCAL PRODUCT	6,008,201	0.854	4.8	0.895	0.825
TOTAL	23,276,410	1.00	8.5%	1.085	1.00
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	24,750,047		7.8%		

* indicates coverage for which reviews are on a MULTISTATE basis.

MASSACHUSETTS
TABLE 2
COMMERCIAL PACKAGE POLICY
CALCULATION OF REVISED CPP PACKAGE MODIFICATION FACTORS (PMF)

STATEWIDE *****	(1)	(2)	(3)	(4)	(5)
	AGGREGATE	CURRENT	NET	INDIC.	CAPPED
COVERAGE	<u>LOSS COSTS</u>	<u>IMPLICIT</u>	<u>INDICATION</u>	<u>PMF</u>	<u>PMF</u>
PROPERTY-		<u>PMF</u>			
BASIC GRP I	17,281,514	0.959	-4.6%	0.915	0.936
BASIC GRP II	8,887,947	0.654	-9.4	0.593	0.604
SP CAUSE/LOSS	12,837,713	1.007	1.0	1.017	1.040
*CRIME	91,834	0.910	0.0	0.910	0.910
*INL. MAR.	175,938	0.910	0.0	0.910	0.910
*FIDELITY	1,157,129	1.000	0.0	1.000	1.000
TOTAL	40,432,075	0.881	-3.5%	0.850	0.868
LIABILITY-					
OL&T	44,385,793	0.931	-0.2%	0.928	0.949
M&C	31,778,505	1.089	5.1	1.144	1.101
LOCAL PRODUCT	7,460,791	0.922	4.1	0.960	0.898
*MULTI PRODUCT	3,708,839	0.862	-0.2	0.860	0.860
TOTAL	87,333,928	0.978	2.1%	0.998	0.989
-----	-----	-----	-----	-----	-----
PROP. & LIAB. TOTAL	127,766,003		0.3%		

* indicates coverage for which reviews are on a MULTISTATE basis.

MASSACHUSETTS

TABLE 2

COMMERCIAL PACKAGE POLICY

COMBINED PMFs

<u>TYPE OF POLICY</u>	<u>CURRENT COMBINED</u>	<u>INDICATED COMBINED</u>	<u>CAPPED COMBINED</u>
MOTEL/HOTEL (31)	0.99	0.952	0.98
APARTMENT (32)	0.95	0.955	0.96
OFFICE (33)	0.97	0.984	0.99
MERCANTILE (34)	0.86	0.829	0.87
INSTITUTION (35)	0.99	0.992	1.00
SERVICES (36)	0.98	0.943	0.96
IND/PROC (37)	0.89	0.893	0.89
CONTRACTORS (38)	1.00	1.078	1.00

NOTE: Combined PMFs are provided for informational purposes only.

EXPLANATORY NOTES TO TABLE 2

CALCULATION OF REVISED PACKAGE MODIFICATION FACTORS

OBJECTIVE	<p>Commercial package policies were introduced in the 1960's as a convenient tool for both insurer and insured to have the many types of insurance needed by commercial risks packaged under one cover. Thus fire, extended coverage, crime, liability insurance, etc. could be written using a single policy instead of several. Today, virtually any type of monoline coverage can also be purchased as part of a package policy such as the CPP.</p> <p>The types of insured which can be written under a CPP are generally categorized into the following Types of Policy:</p> <ul style="list-style-type: none">. Motels and Hotels (TOP 31). Apartments (TOP 32). Offices (TOP 33). Mercantile Operations (TOP 34). Institutions (TOP 35). Service Operations (TOP 36). Industrial and Processing Operations (TOP 37). Contractors (TOP 38)
PRICING OF POLICIES	<p>Since a CPP is essentially a combination of monoline coverages, CPP pricing employs monoline loss costs modified by PMFs (Package Modification Factors). These factors vary by the categories shown above and are reviewed annually.</p>
CPP PMF REVIEW PROCEDURE	<p>The CPP review of Package Modification Factors, which appears in Table 2 of this document, determines the appropriate PMF loss cost level for each of the eight CPP categories. This is done by combining the indications of the simultaneous reviews of monoline and multiline experience for the various lines (or coverages).</p> <p>A detailed explanation of the calculation of the revised PMFs follows.</p>

EXPLANATORY NOTES TO TABLE 2 (Cont'd)

LINES OF INSURANCE (COVERAGES) INCLUDED

The CPP review reflects the contribution from each significant coverage which can be written on a CPP. Included are:

Property Coverages

- . Basic Group I (BGI) - the predominant property coverage included.
- . Basic Group II (BGII) - both Basic Group I and Basic Group II must be purchased under a CPP contract.
- . Special Causes of Loss (SCL) - typically a type of insurance which is purchased in addition to Basic Group I and Basic Group II in order to provide "all risk" property coverage for the insured.
- . Crime (CRIME) - Crime insurance is a commonly purchased CPP coverage.
- . Inland Marine (INL. MAR.) - A highly specialized line of property insurance, Inland Marine coverages can be purchased as part of a package policy.
- . Fidelity (FIDELITY) - Certain forms of fidelity insurance can be part of the CPP package. Various forms of employee dishonesty coverage are available.

Liability Coverages

- . Owners, Landlords and Tenants (OL&T) Liability - this is the prevalent type of Premises/Operations liability for CPP insureds.
- . Manufacturers and Contractors Liability (M&C) - this is the type of Premises/Operations liability insurance for risks whose liability exposure is more heavily off-premises than on.
- . Products/Completed Operations Liability (PROD) - this type of insurance protects against claims for damages arising from products/completed operations in conjunction with an insured's business. For review purposes, this line of insurance is split into the following two categories:
 - Products: experience for this category is reviewed on a multistate basis.
 - Local Products/ Completed Operations: experience for this category reflects an exposure to loss which is local in nature; therefore, individual state experience is used.

EXPLANATORY NOTES TO TABLE 2 (Cont'd)

THE IMPLICIT PACKAGE MODIFICATION FACTOR

For each applicable coverage listed under each of the eight (8) CPP categories, a "current implicit PMF" is shown in column (2). The definition of this factor follows:

For a given CPP category (e.g., apartments) the published Package Modification Factor (PMF) represents the loss cost for a CPP relative to that for monoline policies providing the same coverages. Thus a property (liability) PMF of .80 represents a 20% lower aggregate loss cost for a CPP than for the comparable monoline policies. This PMF, however, represents the CPP "loss cost" for all property (liability) coverages combined. Based on CPP experience, it has been determined that this CPP "loss cost" can differ significantly if it is determined for each property (liability) coverage individually. The IPMF represents what the PMF would be for that CPP risk if only a single coverage were written. The use of the IPMF in monoline/multiline ratemaking and in the determination of revised CPP Package Modification Factors is significant in that it appropriately identifies how different the component parts of the multiline "loss cost" are.

THE MULTILINE INDICATION

Under the CPP ratemaking procedures, monoline and multiline experience are combined for each coverage. The results of these coverage analyses are indicated changes to monoline loss costs and also indicated CPP aggregate loss cost level changes. The CPP indications by coverage are then incorporated in the CPP PMF review. These indications (shown in column (3)) represent the needed adjustments to the IPMFs (shown in column (2)) described above.

The development of these indications is detailed in Section B.

THE INDICATED PMF

For each CPP category (and for property vs. liability), the indicated PMF is calculated as follows:

Each of the current IPMFs in column (2) is multiplied by the indicated percent change shown in column (3). A weighted average of the indicated IPMFs, using weights based on latest year aggregate loss costs at current ISO loss cost level (column (1) divided by column (2)), yields the indicated PMF at the bottom of column (4).

THE CAPPED PMF

The indicated PMF for each category (and for property vs. liability) shown at the bottom of column (4) is limited to a maximum of 1.00 in arriving at the proposed PMF (bottom of column (5)). All indicated PMFs which are below 1.00 are rounded to the nearest .01 in determining the proposed PMF. To the extent that any indicated PMFs are capped at 1.00, indicated PMFs below this value are adjusted in order to minimize any revenue changes which would result from capping.

In addition to the adjustments just described, the IPMFs (for property and liability) shown in column (4) are subject to minimum and maximum values and adjusted in column (5) so that they average to the proposed PMF shown at the bottom of column (5).

COMMERCIAL PACKAGE POLICY

TABLE OF CONTENTS

SECTION B - CALCULATION OF PROPOSED CHANGES

PROPERTY COVERAGES

Commercial Fire & Allied Lines

Distribution of Advisory Loss Cost Level Change (Tables 3-7)	B-2-20
--	--------

Crime and Fidelity	B-21
--------------------------	------

Commercial Inland Marine

Revision of Implicit Package Modification Factor (Tables 8-9)	B-22
---	------

LIABILITY COVERAGES

Distribution of Advisory Loss Cost Level Change (Tables 10-18).....	B-23-40
---	---------

MASSACHUSETTS

TABLE 3 - BASIC GROUP I RELATIVITY ANALYSIS

	(1)	(2)	(3)	(4)	(5)
	\$ LST SQ FORMULA RELATIVITY	CREDIBILITY Z	Z-WTD. RELATIVITY	BALANCED RELATIVITY	INDICATED CHANGE *
TOP					
10	1.624	0.072	1.036	1.044	
31	1.409	0.014	1.005	1.013	-3.0%
32	0.585	0.128	0.934	0.942	-9.8%
33	1.092	0.022	1.002	1.011	-3.2%
34	1.078	0.147	1.011	1.020	-2.3%
35	0.933	0.218	0.985	0.993	-4.9%
36	1.031	0.149	1.005	1.013	-3.0%
37	1.048	0.082	1.004	1.013	-3.0%
38	1.135	0.033	1.004	1.013	-3.0%
RATING GROUP					
01	1.502	0.191	1.081	1.087	
02	1.736	0.126	1.072	1.078	
03	0.966	0.121	0.996	1.002	
04	0.886	0.276	0.967	0.973	
05	0.915	0.025	0.998	1.004	
06	0.795	0.212	0.953	0.958	
07	0.963	0.163	0.994	1.000	
08	0.813	0.206	0.958	0.964	
09	0.856	0.152	0.977	0.983	
10	0.850	0.035	0.994	1.000	
11	1.139	0.053	1.007	1.013	
13	1.063	0.129	1.008	1.014	
14	0.917	0.104	0.991	0.997	
15	0.780	0.078	0.981	0.987	
17	0.773	0.022	0.994	1.000	
18	1.145	0.029	1.004	1.010	
19	0.785	0.013	0.997	1.003	
21	0.862	0.085	0.987	0.993	
22	0.816	0.089	0.982	0.988	
TERRITORY					
Boston	0.616	0.122	0.943	0.930	
Balance of State	1.031	0.629	1.019	1.006	

* INDICATED CHANGE =
(BALANCED RELATIVITY FOR TOP) / (BALANCED MONOLINE (TOP 10) RELATIVITY) -1

MASSACHUSETTS

TABLE 4 - SPECIAL CAUSES OF LOSS RELATIVITY ANALYSIS

	(1)	(2)	(3)	(4)	(5)
	\$ LST SQ FORMULA RELATIVITY	CREDIBILITY Z	Z-WTD. RELATIVITY	BALANCED RELATIVITY	INDICATED CHANGE *
TOP					
10	0.986	0.150	0.998	0.991	
31	1.434	0.022	1.008	1.001	+1.0%
32	0.784	0.220	0.948	0.942	-4.9%
33	0.627	0.052	0.976	0.970	-2.1%
34	0.777	0.260	0.937	0.930	-6.2%
35	1.405	0.346	1.125	1.117	+12.7%
36	1.009	0.247	1.002	0.996	+0.5%
37	0.538	0.149	0.912	0.906	-8.6%
38	1.178	0.068	1.011	1.005	+1.4%
CATEGORY					
01	1.022	0.747	1.016	1.029	
02	0.797	0.261	0.942	0.955	
03	0.529	0.107	0.934	0.946	
04	1.475	0.146	1.058	1.072	
05	0.661	0.181	0.928	0.940	
06	1.215	0.057	1.011	1.024	
07	0.283	0.027	0.966	0.979	
08	0.838	0.239	0.959	0.971	
09	0.629	0.287	0.875	0.887	
10	9.417	0.040	1.094	1.108	
11	0.887	0.154	0.982	0.994	
12	0.632	0.203	0.911	0.923	
13	2.081	0.086	1.065	1.079	
14	0.528	0.104	0.936	0.948	

* INDICATED CHANGE =
 (BALANCED RELATIVITY FOR TOP) / (BALANCED MONOLINE (TOP 10) RELATIVITY) -1

EXPLANATORY NOTES TO TABLES 3 AND 4

BASIC GROUP I AND SPECIAL CAUSES OF LOSS RELATIVITY ANALYSIS

OBJECTIVE

The explanations which follow clarify Tables 3 and 4, the Basic Group I Relativity Analysis and the Special Causes of Loss Relativity Analysis, respectively. The purpose of these analyses is to:

- (1) determine monoline classification and territorial loss cost level needs for Basic Group I;
- (2) determine monoline category loss cost level need for Special Causes of Loss;
- (3) determine indicated changes to the eight property CPP Package Modification Factors based on Basic Group I/Special Causes of Loss experience.

COLUMN (1)

LEAST SQUARES FORMULA RELATIVITIES

The Least Squares Formula Relativities are the marginal relativities which result from the application of the simultaneous review procedure to the raw experience (where marginal refers to the relativities for a given rating variable, e.g. type of policy, across all subsets of any other rating variables, i.e. rating group and territory for Basic Group I, and category for Special Causes of Loss).

The purpose of such a simultaneous review procedure is to arrive at a set of type of policy relativities (which will serve to price CPP policies relative to monoline policies via the PMF); a set of rating group/territory relativities for Basic Group I; and a set of category relativities for Special Causes of Loss that best represent the experience. This procedure is in contrast to a review of each rating variable's experience separately. Such one-way types of review do not take into account differing percentages of monoline and multiline experience in each rating variable, or differing percentages of a particular rating variable's experience in the monoline and multiline types of policy. The simultaneous relativity procedure accounts for these different distributions in generating relativities for the various rating variables.

EXPLANATORY NOTES TO TABLES 3 AND 4 (Cont'd)

COLUMN (1)
(Cont'd)

The procedure uses an iterative technique to determine a set of marginal relativities by rating variable that is a best fit to the individual cell relativities, with each cell being defined as the cross-section of specific values of each rating variable. The process uses the relativity of the five year experience ratios by rating cell to the overall statewide experience ratio and the latest year aggregate loss costs for each rating cell. (This experience is shown in Table 5 for Basic Group I and Table 6 for Special Causes of Loss). Specifically, the iteration procedure uses the following formulas:

BASIC GROUP I:

$$TOP_i = \frac{\sum_{j=1}^n \sum_{k=1}^t W_{ijk}^2 R_{ijk} RG_j TER_k}{\sum_{j=1}^n \sum_{k=1}^t W_{ijk}^2 RG_j^2 TER_k^2}, \text{ where } 1 \leq i \leq m;$$

$$RG_j = \frac{\sum_{k=1}^t \sum_{i=1}^m W_{ijk}^2 R_{ijk} TOP_i TER_k}{\sum_{k=1}^t \sum_{i=1}^m W_{ijk}^2 TOP_i^2 TER_k^2}, \text{ where } 1 \leq j \leq n$$

$$TER_k = \frac{\sum_{j=1}^n \sum_{i=1}^m W_{ijk}^2 R_{ijk} TOP_i RG_j}{\sum_{j=1}^n \sum_{i=1}^m W_{ijk}^2 TOP_i^2 RG_j^2}, \text{ where } 1 \leq k \leq t$$

EXPLANATORY NOTES TO TABLES 3 AND 4 (Cont'd)

COLUMN (1)
(Cont'd)

SPECIAL CAUSES OF LOSS:

$$TOP_i = \frac{\sum_{j=1}^n W_{ij}^2 R_{ij} CAT_j}{\sum_{j=1}^n W_{ij}^2 CAT_j^2}, \text{ where } 1 \leq i \leq m;$$

$$CAT_j = \frac{\sum_{i=1}^m W_{ij}^2 R_{ij} TOP_i}{\sum_{i=1}^m W_{ij}^2 TOP_i^2}, \text{ where } 1 \leq j \leq n$$

- TOP_i is the relativity for the i th Type of Policy;
- RG_j is the relativity for the j th Rating Group;
- CAT_j is the relativity for the j th Category;
- TER_k is the relativity for the k th Territory;
- W_{ijk} is the loss cost volume at current level for the i th Type of Policy, j th Rating Group or Category and k th Territory;
- R_{ijk} is the experience ratio relativity for the i th Type of Policy, j th Rating Group or Category and k th Territory;
- R_{ij} is the experience ratio relativity for the i th Type of Policy, j th Rating Group or Category;

EXPLANATORY NOTES TO TABLES 3 AND 4 (Cont'd)

COLUMN (1) (Cont'd)

- m is the number of Types of Policy in the analysis;
- n is the number of Rating Groups or Categories in the analysis;
- t is the number of Territories in the analysis.

The procedure determines m Type of Policy relativities using the above formulas. Then, using those results, a set of n Rating Group and t Territory relativities are determined. These steps form an iterative process which continues until there is no appreciable difference in results from one iteration to the next.

COLUMN (2)

CREDIBILITY

The credibility of the experience for each rating variable is determined from the formula:

$$Z = \frac{P}{P + K}$$

where P is the 5-year adjusted aggregate loss costs for a given rating variable, and K is a constant value. For Basic Group I, K equals an aggregate loss cost volume of \$55,000,000 for territory, \$40,000,000 for rating group, and \$100,000,000 for type of policy. For Special Causes of Loss, K equals an aggregate loss cost volume of \$15,000,000.

COLUMN (3)

CREDIBILITY-WEIGHTED RELATIVITIES

Credibility-weighted relativities are calculated based on the formula

$$W = R^Z$$

where Z is the credibility, R is the least squares formula relativity and W is the credibility-weighted relativity for a given rating variable.

This formula implicitly assigns the complement of credibility to a relativity of unity.

EXPLANATORY NOTES TO TABLES 3 AND 4 (Cont'd)

COLUMN (4)

BALANCED RELATIVITIES

The credibility-weighted relativities are balanced to assure that the average relativity across all rating variables remains at unity.

MULTILINE
CONSIDERATIONS

The type of policy (TOP) relativities are used to generate multiline indications which apply to the current Implicit Package Modification Factors (IPMFs). The indicated IPMFs are calculated as follows:

$$\text{TOP y indicated IPMF} = \frac{(\text{TOP y current IPMF}) \times (\text{TOP y relativity})}{\text{monoline relativity}}$$

For each CPP Type of Policy the indicated IPMF is subject to a minimum value of 0.50 and a maximum value of 1.50. If an indicated IPMF falls outside one of those limits, it is capped at that amount, the aggregate loss costs for that Type of Policy are adjusted to the capped IPMF level, and the entire relativity review as described above is re-performed to take this into account. If an IPMF has been capped it is so noted at the bottom of Table 3 and Table 4.

Loss cost changes for each TOP are calculated as described on Tables 3 and 4.

ENTIRE STATE

MASSACHUSETTS

BASIC GROUP I RELATIVITY ANALYSIS

TABLE 5 - SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

TYPE OF POLICY	CATEGORY	(1) ACCIDENT YEAR ENDING 12/31/17 AGGREGATE LOSS COSTS	(2) 5 - YEAR AGGREGATE LOSS COSTS	(3) 5 - YEAR EXPERIENCE RATIO	(4) Z-WEIGHTED EXPERIENCE RATIO	(5) Z-WEIGHTED RELATIVITY

10 MONOLINE	01 APARTMENTS	22,400	133,487	4.444	2.033	2.188
	02 OTHER HABITATIONAL	33,171	264,852	13.489	3.448	3.711
	03 RESTAURANTS & BARS	135,644	414,743	0.002	1.345	1.448
	04 OTHER MERCANTILE RS	259,724	1,471,697	0.727	1.399	1.506
	05 PUBLIC BUILDINGS	22,353	219,347	0.000	1.338	1.440
	06 CHURCHES	11,075	88,376	0.000	1.266	1.362
	07 SCHOOLS	83,270	730,305	0.742	1.464	1.576
	08 OFFICES AND BANKS	169,607	978,487	0.092	1.267	1.364
	09 REC. FACILITIES	137,847	681,689	0.120	1.300	1.399
	10 HOTELS AND MOTELS	10,343	28,142	0.000	1.359	1.463
	11 HOSPITALS/NURS HOME	91,099	356,075	0.309	1.398	1.505
	13 MOTOR VEHICLE RISKS	63,003	421,707	0.045	1.341	1.444
	14 OTHER NON-MANUF.	103,350	567,818	1.049	1.485	1.599
	15 STORAGE	89,695	463,165	5.290	2.133	2.296
	17 FOOD MANUFACTURING	7,268	21,909	0.000	1.285	1.383
	18 WOOD MANUFACTURING	17,418	76,451	0.000	1.326	1.427
	19 WEARING APPAREL	761	18,962	142.178	23.779	25.596
	21 METAL MANUFACTURING	96,318	475,381	0.015	1.356	1.460
	22 OTHER MANUFACTURING	92,814	347,054	0.572	1.449	1.560
	TOTAL*	1,447,160	7,759,647	1.110	1.487	1.601
31 MULTILINE	10 HOTELS AND MOTELS	214,153	1,412,141	2.342	1.129	1.216
MOTEL/HOTEL	TOTAL*	214,153	1,412,141	2.342	1.129	1.216
32 MULTILINE	01 APARTMENTS	1,764,119	9,318,521	0.793	0.825	0.888
APARTMENT	02 OTHER HABITATIONAL	1,064,784	5,315,014	1.262	0.955	1.027
	TOTAL*	2,828,903	14,633,535	0.970	0.874	0.941
33 MULTILINE	08 OFFICES AND BANKS	350,551	2,285,564	0.784	0.860	0.926
OFFICE	TOTAL*	350,551	2,285,564	0.784	0.860	0.926
34 MULTILINE	03 RESTAURANTS & BARS	732,912	4,422,552	1.577	1.027	1.105
MERCANTILE	04 OTHER MERCANTILE RS	1,677,324	9,461,555	1.027	0.917	0.987
	08 OFFICES AND BANKS	116,955	599,410	1.755	1.041	1.121
	13 MOTOR VEHICLE RISKS	139,164	625,301	1.411	0.980	1.054
	14 OTHER NON-MANUF.	47,419	267,498	0.042	0.739	0.795
	15 STORAGE	353,306	1,880,762	0.140	0.749	0.806
	TOTAL*	3,067,080	17,257,078	1.086	0.929	1.000

ENTIRE STATE

MASSACHUSETTS

BASIC GROUP I RELATIVITY ANALYSIS

TABLE 5 - SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

TYPE OF POLICY	CATEGORY	(1) ACCIDENT YEAR ENDING 12/31/17 AGGREGATE LOSS COSTS	(2) 5 - YEAR AGGREGATE LOSS COSTS	(3) 5 - YEAR EXPERIENCE RATIO	(4) Z-WEIGHTED EXPERIENCE RATIO	(5) Z-WEIGHTED RELATIVITY
35 MULTILINE INSTITUTIONAL	02 OTHER HABITATIONAL	41,738	188,103	0.366	0.744	0.800
	05 PUBLIC BUILDINGS	154,537	809,751	0.617	0.838	0.902
	06 CHURCHES	1,615,719	10,702,977	0.360	0.717	0.772
	07 SCHOOLS	1,359,218	7,068,428	0.933	0.890	0.958
	08 OFFICES AND BANKS	933,292	3,872,310	0.155	0.690	0.743
	09 REC. FACILITIES	318,076	1,539,487	0.615	0.836	0.901
	11 HOSPITALS/NURS HOME	432,920	1,901,316	1.831	1.046	1.126
	13 MOTOR VEHICLE RISKS	12,828	77,844	0.065	0.760	0.818
	14 OTHER NON-MANUF.	362,891	1,653,669	0.402	0.775	0.834
	TOTAL*	5,231,219	27,813,885	0.619	0.799	0.861
36 MULTILINE SERVICES	03 RESTAURANTS & BARS	80,078	679,368	0.670	0.891	0.960
	04 OTHER MERCANTILE RS	252,551	1,481,354	0.218	0.809	0.871
	08 OFFICES AND BANKS	328,064	1,886,988	0.510	0.857	0.922
	09 REC. FACILITIES	1,144,346	4,974,986	0.816	0.896	0.964
	13 MOTOR VEHICLE RISKS	822,977	4,739,957	1.603	1.093	1.177
	14 OTHER NON-MANUF.	307,976	1,823,952	1.249	0.988	1.064
	15 STORAGE	195,331	1,016,118	0.047	0.790	0.850
	21 METAL MANUFACTURING	35,646	171,555	0.000	0.801	0.862
	22 OTHER MANUFACTURING	136,474	688,125	0.071	0.800	0.861
	TOTAL*	3,303,443	17,462,403	0.888	0.932	1.003
37 MULTILINE INDUST/PROCESS	04 OTHER MERCANTILE RS	41,336	229,717	0.584	0.882	0.950
	08 OFFICES AND BANKS	19,394	116,856	0.000	0.802	0.863
	13 MOTOR VEHICLE RISKS	395	43,563	0.000	0.804	0.865
	14 OTHER NON-MANUF.	13,573	90,719	0.000	0.802	0.863
	15 STORAGE	207	4,538	0.000	0.779	0.839
	17 FOOD MANUFACTURING	162,741	874,023	0.157	0.809	0.872
	18 WOOD MANUFACTURING	190,186	1,133,142	2.526	1.192	1.283
	19 WEARING APPAREL	85,027	514,264	0.187	0.821	0.883
	21 METAL MANUFACTURING	567,842	3,047,357	0.807	0.906	0.975
	22 OTHER MANUFACTURING	619,578	2,891,049	0.563	0.856	0.921
	TOTAL*	1,700,279	8,945,228	0.796	0.904	0.972
38 MULTILINE CONTRACTORS	04 OTHER MERCANTILE RS	448,433	2,605,231	1.277	0.999	1.076
	08 OFFICES AND BANKS	92,941	613,854	2.067	1.103	1.188
	14 OTHER NON-MANUF.	44,512	239,664	0.000	0.799	0.860
	TOTAL*	585,886	3,458,749	1.305	1.001	1.077

ENTIRE STATE

MASSACHUSETTS

BASIC GROUP I RELATIVITY ANALYSIS

TABLE 5 - SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

TYPE OF POLICY	CATEGORY	(1) ACCIDENT YEAR ENDING 12/31/17 AGGREGATE LOSS COSTS	(2) 5 - YEAR AGGREGATE LOSS COSTS	(3) 5 - YEAR EXPERIENCE RATIO	(4) Z-WEIGHTED EXPERIENCE RATIO	(5) Z-WEIGHTED RELATIVITY

TOTAL ALL TOPS*	01 APARTMENTS	1,786,519	9,452,008	0.839	0.840	0.904
	02 OTHER HABITATIONAL	1,139,693	5,767,969	1.585	1.019	1.097
	03 RESTAURANTS & BARS	948,634	5,516,663	1.276	1.061	1.142
	04 OTHER MERCANTILE RS	2,679,368	15,249,554	0.957	0.967	1.041
	05 PUBLIC BUILDINGS	176,890	1,029,098	0.539	0.901	0.970
	06 CHURCHES	1,626,794	10,791,353	0.357	0.721	0.776
	07 SCHOOLS	1,442,488	7,798,733	0.922	0.923	0.994
	08 OFFICES AND BANKS	2,010,804	10,353,469	0.497	0.836	0.900
	09 REC. FACILITIES	1,600,269	7,196,162	0.716	0.919	0.989
	10 HOTELS AND MOTELS	224,496	1,440,283	2.234	1.140	1.227
	11 HOSPITALS/NURS HOME	524,019	2,257,391	1.566	1.107	1.192
	13 MOTOR VEHICLE RISKS	1,038,367	5,908,372	1.463	1.088	1.172
	14 OTHER NON-MANUF.	879,721	4,643,320	0.729	0.933	1.004
	15 STORAGE	638,539	3,364,583	0.835	0.956	1.029
	17 FOOD MANUFACTURING	170,009	895,932	0.150	0.830	0.894
	18 WOOD MANUFACTURING	207,604	1,209,593	2.314	1.203	1.295
	19 WEARING APPAREL	85,788	533,226	1.445	1.024	1.102
	21 METAL MANUFACTURING	699,806	3,694,293	0.657	0.963	1.036
	22 OTHER MANUFACTURING	848,866	3,926,228	0.485	0.912	0.981
	TOTAL*	18,728,674	101,028,230	0.894	0.929	1.000

* TOTALS IN COLUMNS (3), (4) & (5) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

MASSACHUSETTS

SPECIAL CAUSES OF LOSS RELATIVITY ANALYSIS
TABLE 6 - SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

TYPE OF POLICY	CATEGORY	(1) ACCIDENT YEAR ENDING 12/31/17 AGGREGATE LOSS COSTS	(2) 5 - YEAR AGGREGATE LOSS COSTS	(3) 5 - YEAR EXPERIENCE RATIO	(4) RELATIVITY
<hr/>					
10 MONOLINE	01 BUILDINGS	614,646	3,821,274	1.149	1.151
	02 RES. APTS. AND COND	23,770	138,755	0.067	0.067
	03 OFFICES	131,892	759,322	0.366	0.367
	04 MERCANTILE - HIGH	92,086	538,342	0.444	0.445
	05 MERCANTILE - MEDIUM	42,373	207,258	0.066	0.066
	06 MERCANTILE - LOW	17,135	91,936	0.462	0.463
	07 MOTELS AND HOTELS	3,377	13,898	0.463	0.464
	08 INSTITUTIONAL - HIG	49,561	347,098	0.088	0.088
	09 INSTITUTIONAL - LOW	72,162	353,891	0.387	0.388
	10 INDUST-PROC - HIGH	6,455	29,299	0.000	0.000
	11 INDUST-PROC - LOW	52,932	275,381	0.049	0.049
	12 SERVICE - HIGH	34,632	204,795	0.066	0.066
	13 SERVICE - LOW	38,347	227,756	0.945	0.947
	14 CONTRACTORS	5,743	34,389	0.281	0.282
	TOTAL*	1,185,111	7,043,394	0.746	0.747
31 MULTILINE	01 BUILDINGS	95,740	514,398	1.558	1.561
MOTEL/HOTEL	07 MOTELS AND HOTELS	62,994	398,163	0.431	0.432
	TOTAL*	158,734	912,561	1.111	1.113
32 MULTILINE	01 BUILDINGS	1,144,627	6,131,106	0.852	0.854
APARTMENT	02 RES. APTS. AND COND	1,044,402	5,166,553	0.665	0.666
	TOTAL*	2,189,029	11,297,659	0.763	0.765
33 MULTILINE	01 BUILDINGS	182,099	1,262,329	0.601	0.602
OFFICE	03 OFFICES	129,487	899,020	0.662	0.663
	04 MERCANTILE - HIGH	13	13	0.000	0.000
	08 INSTITUTIONAL - HIG	4,052	23,527	0.000	0.000
	12 SERVICE - HIGH	0	16	0.000	0.000
	14 CONTRACTORS	825	3,602	0.000	0.000
	TOTAL*	316,476	2,188,507	0.617	0.618

MASSACHUSETTS

SPECIAL CAUSES OF LOSS RELATIVITY ANALYSIS
TABLE 6 - SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

TYPE OF POLICY	CATEGORY	(1) ACCIDENT YEAR ENDING 12/31/17 AGGREGATE LOSS COSTS	(2) 5 - YEAR AGGREGATE LOSS COSTS	(3) 5 - YEAR EXPERIENCE RATIO	(4) RELATIVITY
34 MULTILINE MERCANTILE	01 BUILDINGS	1,455,218	8,065,964	0.835	0.837
	03 OFFICES	3,776	16,726	0.257	0.258
	04 MERCANTILE - HIGH	314,303	1,921,933	1.345	1.348
	05 MERCANTILE - MEDIUM	482,665	3,077,400	0.552	0.553
	06 MERCANTILE - LOW	117,206	781,570	1.028	1.030
	08 INSTITUTIONAL - HIG	441	13,395	0.000	0.000
	11 INDUST-PROC - LOW	197	306	0.000	0.000
	12 SERVICE - HIGH	10,727	48,576	0.866	0.868
	13 SERVICE - LOW	10,386	29,657	0.000	0.000
	14 CONTRACTORS	11,771	65,089	0.000	0.000
	TOTAL*	2,406,690	14,020,616	0.846	0.848
35 MULTILINE INSTITUTIONAL	01 BUILDINGS	2,108,539	11,646,497	1.526	1.529
	03 OFFICES	462	5,006	0.000	0.000
	04 MERCANTILE - HIGH	2	2	0.000	0.000
	06 MERCANTILE - LOW	63	63	0.000	0.000
	08 INSTITUTIONAL - HIG	817,184	4,089,315	1.256	1.259
	09 INSTITUTIONAL - LOW	820,875	5,407,459	0.943	0.945
	12 SERVICE - HIGH	1,593	10,903	0.000	0.000
	13 SERVICE - LOW	1,077	1,086	0.000	0.000
	14 CONTRACTORS	3,169	14,267	0.000	0.000
	TOTAL*	3,752,964	21,174,598	1.337	1.340
36 MULTILINE SERVICES	01 BUILDINGS	1,406,300	7,720,965	1.096	1.098
	03 OFFICES	10,006	45,778	0.305	0.306
	04 MERCANTILE - HIGH	17,590	99,887	0.060	0.060
	05 MERCANTILE - MEDIUM	3,128	20,189	0.000	0.000
	06 MERCANTILE - LOW	4,250	13,073	0.118	0.118
	08 INSTITUTIONAL - HIG	43,368	221,717	0.000	0.000
	09 INSTITUTIONAL - LOW	54,166	271,674	0.000	0.000
	10 INDUST-PROC - HIGH	125	674	0.000	0.000
	11 INDUST-PROC - LOW	1,496	5,676	2.633	2.638
	12 SERVICE - HIGH	524,714	3,555,962	0.681	0.682
	13 SERVICE - LOW	255,881	1,147,716	2.262	2.267
	14 CONTRACTORS	7,540	30,932	0.000	0.000
	TOTAL*	2,328,564	13,134,243	1.068	1.070

MASSACHUSETTS

SPECIAL CAUSES OF LOSS RELATIVITY ANALYSIS
TABLE 6 - SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

TYPE OF POLICY	CATEGORY	(1) ACCIDENT YEAR ENDING 12/31/17 AGGREGATE LOSS COSTS	(2) 5 - YEAR AGGREGATE LOSS COSTS	(3) 5 - YEAR EXPERIENCE RATIO	(4) RELATIVITY
37 MULTILINE INDUST/PROC	01 BUILDINGS	685,751	3,929,657	0.562	0.563
	03 OFFICES	534	5,761	0.000	0.000
	04 MERCANTILE - HIGH	1,069	5,095	0.000	0.000
	06 MERCANTILE - LOW	333	12,278	0.000	0.000
	08 INSTITUTIONAL - HIGH	183	183	0.000	0.000
	10 INDUST-PROC - HIGH	82,291	587,893	5.504	5.515
	11 INDUST-PROC - LOW	425,403	2,441,298	0.533	0.534
	12 SERVICE - HIGH	0	577	0.000	0.000
	13 SERVICE - LOW	307	1,437	0.000	0.000
	14 CONTRACTORS	801	10,672	0.000	0.000
	TOTAL*	1,196,672	6,994,851	0.890	0.892
38 MULTILINE CONTRACTORS	01 BUILDINGS	206,373	1,251,592	1.279	1.282
	03 OFFICES	2,628	58,851	1.851	1.855
	04 MERCANTILE - HIGH	489	2,724	0.000	0.000
	05 MERCANTILE - MEDIUM	1,333	4,393	0.000	0.000
	06 MERCANTILE - LOW	800	5,971	0.000	0.000
	08 INSTITUTIONAL - HIGH	1,451	4,589	0.000	0.000
	11 INDUST-PROC - LOW	138	602	0.000	0.000
	12 SERVICE - HIGH	672	1,146	0.000	0.000
	13 SERVICE - LOW	299	727	39.244	39.323
	14 CONTRACTORS	274,401	1,587,949	0.663	0.664
	TOTAL*	488,584	2,918,544	0.946	0.948
TOTAL ALL TOPS*	01 BUILDINGS	7,899,293	44,343,782	1.084	1.086
	02 RES. APTS. AND COND	1,068,172	5,305,308	0.652	0.653
	03 OFFICES	278,785	1,790,464	0.513	0.514
	04 MERCANTILE - HIGH	425,552	2,567,996	1.092	1.094
	05 MERCANTILE - MEDIUM	529,499	3,309,240	0.508	0.509
	06 MERCANTILE - LOW	139,787	904,891	0.922	0.924
	07 MOTELS AND HOTELS	66,371	412,061	0.433	0.434
	08 INSTITUTIONAL - HIGH	916,240	4,699,824	1.125	1.127
	09 INSTITUTIONAL - LOW	947,203	6,033,024	0.847	0.849
	10 INDUST-PROC - HIGH	88,871	617,866	5.097	5.107
	11 INDUST-PROC - LOW	480,166	2,723,263	0.486	0.487
	12 SERVICE - HIGH	572,338	3,821,975	0.645	0.646
	13 SERVICE - LOW	306,297	1,408,379	2.046	2.050
	14 CONTRACTORS	304,250	1,746,900	0.603	0.604
	TOTAL*	14,022,824	79,684,973	0.998	1.000

* TOTALS IN COLUMNS (3) & (4) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

EXPLANATORY NOTES TO TABLES 5 AND 6

BASIC GROUP I/SPECIAL CAUSES OF LOSS RELATIVITY ANALYSIS SUMMARY OF EXPERIENCE USED IN SIMULTANEOUS REVIEW

INTRODUCTION The experience used in the relativity analysis and displayed in Tables 5 and 6 is the latest five years of accident year data as reported under the Commercial Statistical Plan. As in the overall review, loss costs have been adjusted to current ISO loss cost and prospective amount of insurance levels (with multiline aggregate loss costs adjusted additionally by the current implicit package modification factors). Incurred losses are adjusted to prospective cost levels, and are further adjusted by the Basic Group I large loss procedure and the Special Causes of Loss excess procedure. Losses have also been developed to their ultimate settlement value by application of loss development factors.

COLUMN (1) AGGREGATE LOSS COSTS

The latest year adjusted aggregate loss costs (adjusted as described above) are used as weights both in the calculation of any totals shown in this table and in the iterative formulae used in the simultaneous review procedure.

COLUMN (2) 5 - YEAR AGGREGATE LOSS COSTS

The combined five-year adjusted aggregate loss costs (adjusted as described above) are used to calculate the experience ratios in column (3).

COLUMN (3) FIVE-YEAR EXPERIENCE RATIOS

These are the ratio of the combined five-year adjusted incurred losses (adjusted as described above) to the combined five-year adjusted aggregate loss costs as shown in Column (2). Any totals which are shown are weighted averages using the adjusted aggregate loss costs in Column (1).

COLUMN (4) CREDIBILITY (Z) WEIGHTED EXPERIENCE RATIO

A credibility procedure is applied to the initial experience ratios in column (3) on a cell-by-cell basis prior to the simultaneous review procedure. The credibility values are calculated using an empirical Bayesian credibility procedure. In the following discussion, cell refers to an individual combination of TOP, rating group or category, and territory (where applicable).

EXPLANATORY NOTES TO TABLES 5 AND 6 (Cont'd)

COLUMN (4) (Cont'd)

The important concept underlying empirical Bayesian credibility is that the credibility should depend both on the overall variation of the group of which the cell is a member, in addition to the variation of the yearly experience ratios for each cell. Therefore, if a cell's data is itself very stable then we would assign a relatively high credibility value, and vice versa.

The empirical Bayesian credibility formula for individual cell credibility is $Z = ((C-3)/C) (P/(P+K)) + (3/C)$. P equals the cell's five-year adjusted aggregate loss costs and C equals the number of unique combinations of rating variables (Territory, TOP and Rating Group/Category) within a class group. The K value is estimated from the underlying data using the empirical Bayes method and varies by TOP group and by territory where applicable. The three TOP groups used in this analysis are: Monoline (TOP 10), Premises (TOP's 31-35), and Operations (TOP's 36-38). The 3/C term corrects for the statistical bias associated with the credibility process. The minimum credibility that is possible is 3/C.

The calculated credibility (Z) is then applied to the five-year experience ratio with the complement of credibility applied to the credibility-weighted average of the individual experience ratios of the group, where group refers to the specified TOP/territory group. In a non-territory state, K values would be determined for the three TOP groups on an entire state basis.

COLUMN (5)

WEIGHTED RELATIVITIES

The relativities are the ratios of the five-year credibility-weighted experience ratios shown in column (4) to the average five-year credibility-weighted experience ratio for all TOP's, rating groups and territories (where applicable) combined. These relativities represent how much better or worse than average the experience for a given cell is. They are used along with the aggregate loss costs in column (1) as input for the simultaneous review procedure.

MASSACHUSETTS

TABLE 7 - BASIC GROUP II RELATIVITY ANALYSIS

	(1) ACCIDENT YR ENDING 12/31/17	(2) ACCIDENT YRS 2008-2017 NON-HURR. EXPER. RATIO AT CURRENT PMF A	(3) FORMULA RELATIVITY (2) / 0.639	(4) CREDI- BILITY Z C	(5) Z WEIGHTED RELA- TIVITY D	(6) BALANCED FORMULA RELA- TIVITY E	(7) NORMALIZED FORMULA RELA- TIVITY F	(8) INDICATED CHANGE G
MONOLINE	1,371,514	0.712	1.114	0.517	1.059	1.059	1.0882	
MULTILINE	8,887,947	0.595	0.931	0.638	0.956	0.960	0.9863	
COVERAGE	10,259,461	0.639	1.000			0.9732	B	0.9999
MULTILINE TOP								
31 MOTEL/HOTEL	138,366	0.736	1.152	0.047	1.007	0.970	0.9967	-8.4%
32 APARTMENT	953,218	*****	*****	*****	*****	0.958	0.9844	-9.5%
33 OFFICE	225,278	0.398	0.623	0.082	0.969	0.934	0.9597	-11.8%
34 MERCANTILE	1,541,103	*****	*****	*****	*****	0.979	1.0060	-7.6%
35 INSTITUTIONAL	2,232,715	0.722	1.130	0.367	1.048	1.010	1.0378	-4.6%
36 SERVICES	2,527,898	0.614	0.961	0.395	0.985	0.949	0.9751	-10.4%
37 INDUST/PROCESS	958,739	0.333	0.521	0.235	0.887	0.855	0.8785	-19.3%
38 CONTRACTORS	310,630	0.409	0.640	0.079	0.972	0.937	0.9628	-11.5%
	8,887,947	0.595 B	0.931		0.992 B	0.960 B	0.9863 B	

A - TOP 32 IMPLICIT PMF CAPPED AT 0.500.

TOP 34 IMPLICIT PMF CAPPED AT 0.500.

FOR COLUMNS (2) THROUGH (5), MONOLINE INCLUDES TOPS 32 34 AT THESE CAPPED LEVELS AND MULTILINE EXCLUDES TOPS 32 34

B - AVERAGE WEIGHTED BY COLUMN (1)

C - CREDIBILITY = $P / (P + K)$ WHERE P REPRESENTS THE TOTAL 10 YEAR ADJUSTED LOSS COSTS AND K = 45,000,000

D - $(5) = (3) * (4) + (1.000 - (4))$

E - FOR UNCAPPED MULTILINE TOPS: $(6) = (5) * (0.956 / 0.992)$

FOR CAPPED MULTILINE TOPS: $(6) = (1 + (8)) * (1.059) / (1.004 * 1.0882)$

F - $(7) = (6) / 0.9732$

G - $(8) = (\text{NORMALIZED RELATIVITY FOR TOP}) / (\text{NORMALIZED MONOLINE RELATIVITY (TOP 10)}) - 1$

EXPLANATORY NOTES TO TABLE 7

BASIC GROUP II RELATIVITY ANALYSIS

OBJECTIVE

The explanations which follow clarify Table 7, the Basic Group II (BG II) relativity analysis. The purpose of this analysis is to:

- (1) determine the monoline loss cost level need:
- (2) determine indicated changes to the eight property Commercial Package Policy (CPP) Package Modification Factors (PMFs) based on Basic Group II experience.

The BG II relativity analysis is based on non-hurricane loss experience only, as it is assumed that type of policy relativities are the same for both non-hurricane and hurricane perils. The resulting relativities apply to the total (hurricane plus non-hurricane) BG II loss costs.

COLUMN (1)

AGGREGATE LOSS COSTS

The latest fiscal year adjusted aggregate loss costs (adjusted in the same manner as in the overall review, i.e. to current manual loss cost and prospective amount of insurance levels, with multiline aggregate loss costs further adjusted to current IPMF level) are used as weights in the calculation of any totals shown in this table.

COLUMN (2)

10 - YEAR NON-HURRICANE EXPERIENCE RATIO

These experience ratios are the ratio of the combined ten year CSP adjusted incurred non-hurricane losses (adjusted to current deductible and prospective cost levels and also adjusted to reflect the BGII excess loss procedure) to the combined ten year CSP adjusted aggregate loss costs. Any totals which are shown are weighted averages using the aggregate loss costs in Column (1). When a dash is displayed in the column, it indicates that the indicated IPMF which resulted from this procedure was capped. The procedure which follows when capping occurs is described below.

EXPLANATORY NOTES TO TABLE 7 (Cont'd)

COLUMN (3)

FORMULA RELATIVITY

The formula relativities are the ratios of the ten year non-hurricane experience ratios for the type of policy (either monoline vs. multiline or individual multiline programs) to the average ten year non-hurricane experience ratio for monoline and multiline combined. These relativities represent how much better or worse than average the experience for a given type of policy is. Again, any totals which are shown are weighted averages and the display of a dash indicates that the resulting IPMF was capped. Unlike the BGI and SCL relativity analyses, the BGII analysis does not employ a simultaneous review procedure since a one way review is involved. That is, the overall loss cost change is only distributed across type of policy; no other rating variables are considered.

COLUMN (4)

CREDIBILITY

The credibility of the experience for each type of policy is determined from the formula:

$$Z = \frac{P}{P + K}$$

where P is the ten year adjusted aggregate loss costs for a given type of policy, and K is a constant loss cost volume of \$45,000,000.

COLUMN (5)

Z - WEIGHTED RELATIVITY

The weighted relativity is a weighted average of the individual TOP formula relativity and overall (coverage) formula relativity using credibility and its complement as the respective weights. Therefore, to the extent that the indication for a type of policy is not fully credible, the complement of credibility is assigned to the statewide coverage level change.

EXPLANATORY NOTES TO TABLE 7 (Cont'd)

COLUMN (6)

BALANCED FORMULA RELATIVITY

The individual multiline weighted relativities are balanced to the multiline weighted relativity level by applying a factor equal to the overall multiline relativity (i.e. the weighted relativity for all multiline combined which is shown on the top of the exhibit directly under the corresponding monoline relativity) divided by the average multiline relativity (i.e. the weighted average of the individual multiline weighted relativities which is shown on the bottom of the exhibit). When the indicated IPMF for a type of policy is capped, the balanced relativity is set equal to the product of the capped IPMF and the monoline balanced formula relativity, divided by the current IPMF.

COLUMN (7)

NORMALIZED FORMULA RELATIVITY

The normalized relativity is equal to the balanced formula relativity divided by the average monoline/multiline combined relativity. This balances the average monoline/multiline relativity to unity.

COLUMN (8)

INDICATED LOSS COST CHANGES

The indicated multiline (by TOP) changes are calculated by taking the ratio of the TOP relativity (Column 7) to the monoline relativity.

For each type of policy the indicated IPMF is subject to a minimum value of 0.50 and a maximum value of 1.50. If an indicated IPMF falls outside one of those limits, it is capped at that amount, the aggregate loss costs for that type of policy are adjusted to the capped IPMF level, and the entire relativity review as described above is redone to take this into account. If an IPMF has been capped it is so noted in footnote A.

CRIME AND FIDELITY

The reviews for Burglary and Theft and for Fidelity are done on a multistate basis, combining both multiline and monoline experience. However, unlike other coverages included in a Commercial Package Policy, there is no simultaneous review procedure for either Burglary and Theft or for Fidelity in which separate loss cost level changes can be determined for multiline and monoline experience. In the absence of a simultaneous review procedure, we are unable to determine Type of Policy relativities with which to price CPP policies relative to monoline policies and therefore have assumed a multiline change of 0.0% and thus no change to the historic Crime or Fidelity IPMFs.

TABLES 8 AND 9

Tables 8 and 9 are not applicable this year. Commercial Inland Marine relativities are not being reviewed in 2019.

TABLE 10
MASSACHUSETTS
OWNERS, LANDLORDS AND TENANTS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

	(1) BAILEY FORMULA RELATIV.	(2) CREDIBILITY Z	(3) Z-WTD RELATIV.	(4) BALANCED RELATIV.	(5) INDICATED CHANGE *
TOP					
10	1.009	0.309	1.003	1.003	
31	0.742	0.122	0.964	0.964	-3.9%
32	1.406	0.192	1.068	1.068	+6.5%
33	1.061	0.262	1.016	1.016	+1.3%
34	0.887	0.270	0.968	0.968	-3.5%
35	0.855	0.149	0.977	0.977	-2.6%
36	0.854	0.165	0.974	0.974	-2.9%
CLASS GROUP					
01	0.765	0.101	0.973	0.976	
02	0.934	0.227	0.985	0.987	
03	0.994	0.127	0.999	1.001	
04	1.257	0.033	1.008	1.010	
05	0.823	0.054	0.990	0.992	
06	0.523	0.078	0.951	0.953	
07	1.345	0.147	1.045	1.047	
08	1.566	0.071	1.032	1.035	
09	1.099	0.172	1.016	1.019	
10	1.492	0.145	1.060	1.062	
11	0.677	0.172	0.935	0.937	
12	1.011	0.369	1.004	1.006	
13	1.136	0.071	1.009	1.011	
16	1.418	0.036	1.013	1.015	
TERRITORY					
6	1.030	0.084	1.003	1.004	
7	0.937	0.074	0.995	0.996	
8	1.018	0.133	1.002	1.003	
9	1.094	0.098	1.009	1.010	
10	0.663	0.058	0.976	0.977	
14	1.079	0.252	1.019	1.020	
15	1.047	0.119	1.006	1.007	
16	0.957	0.324	0.986	0.987	
17	0.996	0.334	0.999	1.000	

* INDICATED CHANGE = (BALANCED RELATIVITY FOR TOP) / (MONOLINE RELATIVITY (TOP 10)) - 1

TABLE 11
MASSACHUSETTS
MANUFACTURERS AND CONTRACTORS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

TOP	(1) BAILEY FORMULA RELATIV.	(2) CREDIBILITY Z	(3) Z-WTD RELATIV.	(4) BALANCED RELATIV.	(5) INDICATED CHANGE *
10	0.895	0.246	0.973	0.971	
33	1.489	0.050	1.020	1.018	+4.8%
34	0.539	0.113	0.932	0.930	-4.2%
35	0.513	0.023	0.985	0.983	+1.2%
36	0.605	0.159	0.923	0.921	-5.1%
37	1.630	0.099	1.050	1.047	+7.8%
38	1.222	0.313	1.065	1.062	+9.4%
CLASS GROUP					
30	1.046	0.129	1.006	1.001	
31	1.206	0.205	1.039	1.034	
32	0.999	0.284	1.000	0.995	
33	0.627	0.122	0.945	0.940	
34	1.458	0.173	1.067	1.062	
35	0.478	0.038	0.972	0.967	
36	0.626	0.088	0.960	0.955	
37	0.548	0.040	0.976	0.971	
38	1.587	0.119	1.056	1.051	

* INDICATED CHANGE = (BALANCED RELATIVITY FOR TOP) / (MONOLINE RELATIVITY (TOP 10)) - 1

TABLE 12
MASSACHUSETTS
OWNERS, LANDLORDS AND TENANTS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TERRITORY	ALL	(1)	(2)	(3)	(4)	(5)	(6)
		CALENDAR A.Y.E. 12/31/2017 AGGREGATE	CALENDAR A.Y.E. 2013 - 2017	FIVE YEAR EXPERIENCE	RELATIV.	NUMBER OF OCCURRENCES	BAL CELL RELATIV.
TYPE OF POLICY	CLASS GROUP	LOSS COSTS AT CURRENT LEVEL	AGG LOSS COST CURRENT LEVEL	RATIO			
10 MONOLINE	01 FOOD&BEV. (RETAIL)	\$203,224	\$775,258	1.135		26	
	02 RESTAURANTS	746,126	3,905,296	0.755		180	
	03 STORES	284,829	1,818,170	0.916		114	
	04 VENDING & RENTAL	6,748	37,502	0.000		0	
	05 FOOD & BEV. DIST.	205,293	885,775	0.266		9	
	06 NON-FOOD&BEV.DIST	296,690	1,617,926	0.420		51	
	07 CLUBS, AMSMT&SPRTS	722,346	2,694,594	1.865		146	
	08 HEALTH CARE FACIL	141,643	696,952	1.190		28	
	09 HOTELS AND MOTELS	935,993	4,058,853	1.139		257	
	10 SCHLS & CHURCHES	400,312	1,936,829	1.650		71	
	11 APARTMENTS	1,432,763	5,093,902	0.659		143	
	12 BUILDINGS&OFFICES	3,980,931	19,951,841	1.036		663	
	13 MISC. PREMISES	102,440	470,435	0.455		31	
	TOTAL *	\$9,459,338	\$43,943,333	1.014		1,719	
31 MULT MOTEL/HOTEL	09 HOTELS AND MOTELS	\$1,146,101	\$5,876,989	0.831		268	
	TOTAL *	\$1,146,101	\$5,876,989	0.831		268	
32 MULT APARTMENT	11 APARTMENTS	\$2,706,839	\$13,380,307	0.997		395	
	12 BUILDINGS&OFFICES	1,809,631	7,334,274	1.384		271	
	TOTAL *	\$4,516,470	\$20,714,581	1.152		666	
33 MULT OFFICE	12 BUILDINGS&OFFICES	\$7,679,081	\$38,717,302	1.080		1,229	
	13 MISC. PREMISES	18,448	97,653	0.844		8	
	TOTAL *	\$7,697,529	\$38,814,955	1.079		1,237	
34 MULT MERCANTILE	01 FOOD&BEV. (RETAIL)	\$928,161	\$4,548,074	0.597		161	
	02 RESTAURANTS	4,804,244	22,928,987	0.874		753	
	03 STORES	731,114	3,276,154	0.657		112	
	04 VENDING & RENTAL	17,622	76,941	0.759		2	
	05 FOOD & BEV. DIST.	345,191	1,829,090	1.076		45	
	06 NON-FOOD&BEV.DIST	612,907	3,159,822	0.511		59	
	12 BUILDINGS&OFFICES	1,028,686	5,374,361	0.843		185	
	TOTAL *	\$8,467,925	\$41,193,429	0.803		1,317	

TABLE 12
MASSACHUSETTS
OWNERS, LANDLORDS AND TENANTS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TERRITORY	ALL	(1)	(2)	(3)	(4)	(5)	(6)
		CALENDAR A.Y.E. 12/31/2017 AGGREGATE	CALENDAR A.Y.E. 2013 - 2017	FIVE YEAR EXPERIENCE	RELATIV.	NUMBER OF OCCURRENCES	BAL CELL RELATIV.
TYPE OF POLICY	CLASS GROUP	LOSS COSTS AT CURRENT LEVEL	AGG LOSS COST CURRENT LEVEL	RATIO			
35 MULT INSTITUT.	07 CLUBS, AMSMT&SPRTS	\$66,634	\$186,304	0.833		7	
	08 HEALTH CARE FACIL	660,112	2,966,911	1.441		64	
	10 SCHLS & CHURCHES	1,350,795	7,063,349	1.260		302	
	12 BUILDINGS&OFFICES	30,666	163,721	0.964		5	
	13 MISC. PREMISES	1,415	7,328	0.000		0	
	16 GOVT SUBDIVISIONS	67,457	297,744	1.201		24	
	TOTAL *	\$2,177,079	\$10,685,357	1.295		402	
36 MULT SERVICES	03 STORES	\$183,859	\$1,053,563	1.905		66	
	04 VENDING & RENTAL	106,766	534,204	1.206		18	
	07 CLUBS, AMSMT&SPRTS	1,223,469	5,275,023	0.860		238	
	08 HEALTH CARE FACIL	2,226	17,187	0.000		0	
	09 HOTELS AND MOTELS	50,080	299,956	0.805		8	
	10 SCHLS & CHURCHES	37,822	207,818	1.098		7	
	12 BUILDINGS&OFFICES	322,276	1,699,231	1.100		102	
	13 MISC. PREMISES	147,008	962,927	1.555		52	
	TOTAL *	\$2,073,506	\$10,049,909	1.059		491	
TOTAL ALL	TOP						
	01 FOOD&BEV. (RETAIL)	\$1,131,385	\$5,323,332	0.694		187	
	02 RESTAURANTS	5,550,370	26,834,283	0.858		933	
	03 STORES	1,199,802	6,147,887	0.910		292	
	04 VENDING & RENTAL	131,136	648,647	1.084		20	
	05 FOOD & BEV. DIST.	550,484	2,714,865	0.774		54	
	06 NON-FOOD&BEV.DIST	909,597	4,777,748	0.481		110	
	07 CLUBS, AMSMT&SPRTS	2,012,449	8,155,921	1.220		391	
	08 HEALTH CARE FACIL	803,981	3,681,050	1.393		92	
	09 HOTELS AND MOTELS	2,132,174	10,235,798	0.965		533	
	10 SCHLS & CHURCHES	1,788,929	9,207,996	1.344		380	
	11 APARTMENTS	4,139,602	18,474,209	0.880		538	
	12 BUILDINGS&OFFICES	14,851,271	73,240,730	1.089		2,455	
	13 MISC. PREMISES	269,311	1,538,343	1.079		91	
	16 GOVT SUBDIVISIONS	67,457	297,744	1.201		24	
	TOTAL *	\$35,537,948	\$171,278,553	1.009		6,100	

* TOTALS IN COLUMN (3) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

TABLE 13
MASSACHUSETTS
MANUFACTURERS AND CONTRACTORS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TYPE OF POLICY	CLASS GROUP	(1) CALENDAR A.Y.E. 12/31/2017 AGGREGATE LOSS COSTS AT CURRENT LEVEL	(2) CALENDAR A.Y.E. 2013 - 2017 AGG LOSS COST CURRENT LEVEL	(3) FIVE YEAR EXPERIENCE RATIO	(4) RELATIV.	(5) NUMBER OF OCCURRENCES	(6) BAL CELL RELATIV.
10 MONOLINE	30 SERVICE	\$1,243,760	\$3,863,228	0.685	0.700	42	0.972
	31 LIGHT CONTRACTING	617,914	3,084,582	1.181	1.207	92	1.004
	32 MEDIUM CONTRCTING	6,706,128	30,851,979	0.904	0.924	692	0.966
	33 HEAVY CONTRACTING	1,884,308	8,917,736	0.544	0.556	83	0.913
	34 DEALER OR DISTRIB	297,745	1,473,351	1.498	1.531	48	1.031
	35 LGT. MANUFACTURER	136,692	864,652	0.814	0.832	5	0.939
	36 MED. MANUFACTURER	922,935	4,040,347	0.753	0.770	51	0.927
	37 HVY. MANUFACTURER	268,094	1,002,400	0.349	0.357	5	0.943
	38 MISC. OPERATION	805,281	3,111,997	1.086	1.109	80	1.021
	TOTAL *	\$12,882,857	\$57,210,272	0.845		1,098	
33 MULT OFFICE	31 LIGHT CONTRACTING	\$5,638	\$103,081	0.147	0.150	1	1.052
	32 MEDIUM CONTRCTING	14,629	49,326	0.000	0.000	0	1.013
	33 HEAVY CONTRACTING	88,120	391,187	0.748	0.764	7	0.957
	38 MISC. OPERATION	231,614	1,156,705	2.506	2.561	37	1.070
	TOTAL *	\$340,001	\$1,700,299	1.903		45	
34 MULT MERCANTILE	30 SERVICE	\$73,014	\$385,903	0.717	0.733	10	0.931
	32 MEDIUM CONTRCTING	119,774	438,074	0.072	0.073	4	0.926
	34 DEALER OR DISTRIB	1,444,952	7,838,251	0.809	0.827	192	0.988
	38 MISC. OPERATION	104,805	512,573	0.679	0.694	25	0.978
	TOTAL *	\$1,742,545	\$9,174,801	0.747		231	
35 MULT INSTITUT.	31 LIGHT CONTRACTING	\$17,244	\$89,527	1.956	1.999	2	1.016
	32 MEDIUM CONTRCTING	106,608	474,224	0.283	0.290	8	0.978
	TOTAL *	\$123,852	\$563,751	0.516		10	
36 MULT SERVICES	30 SERVICE	\$47,800	\$341,794	1.966	2.009	12	0.922
	31 LIGHT CONTRACTING	142,034	884,830	0.727	0.743	29	0.952
	32 MEDIUM CONTRCTING	144,326	783,406	1.158	1.184	16	0.916
	33 HEAVY CONTRACTING	67,938	683,873	0.485	0.496	6	0.866
	34 DEALER OR DISTRIB	2,354,624	10,061,323	0.891	0.910	286	0.978
	36 MED. MANUFACTURER	24,307	183,168	0.012	0.013	1	0.880
	38 MISC. OPERATION	618,864	3,644,110	0.597	0.610	109	0.968
	TOTAL *	\$3,399,893	\$16,582,504	0.842		459	

TABLE 13
MASSACHUSETTS
MANUFACTURERS AND CONTRACTORS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TYPE OF POLICY	CLASS GROUP	(1) CALENDAR A.Y.E. 12/31/2017 AGGREGATE LOSS COSTS AT CURRENT LEVEL	(2) CALENDAR A.Y.E. 2013 - 2017 AGG LOSS COST CURRENT LEVEL	(3) FIVE YEAR EXPERIENCE RATIO	(4) RELATIV.	(5) NUMBER OF OCCURRENCES	(6) BAL CELL RELATIV.
37 MULT INDUST/PROC.	31 LIGHT CONTRACTING	\$1,271	\$7,937	0.000	0.000	0	1.083
	32 MEDIUM CONTRCTING	201,174	1,062,308	0.733	0.749	20	1.042
	33 HEAVY CONTRACTING	114,238	545,305	1.636	1.672	4	0.984
	34 DEALER OR DISTRIB	130,310	574,053	0.877	0.896	17	1.112
	35 LGT. MANUFACTURER	415,403	1,580,398	0.632	0.646	21	1.013
	36 MED. MANUFACTURER	1,376,713	7,062,226	0.867	0.886	90	1.000
	37 HVY. MANUFACTURER	602,971	3,058,425	0.933	0.953	24	1.017
	38 MISC. OPERATION	77,067	345,623	8.900	9.096	2	1.101
	TOTAL *	\$2,919,147	\$14,236,275	1.080		178	
38 MULT CONTRACTORS	30 SERVICE	\$1,212,329	\$6,146,410	1.425	1.456	237	1.063
	31 LIGHT CONTRACTING	2,182,032	10,911,489	1.400	1.430	636	1.098
	32 MEDIUM CONTRCTING	4,921,017	24,914,701	1.195	1.221	722	1.057
	33 HEAVY CONTRACTING	1,794,500	9,016,760	0.717	0.733	168	0.998
	38 MISC. OPERATION	35,956	312,492	0.160	0.163	4	1.117
	TOTAL *	\$10,145,834	\$51,301,852	1.178		1,767	
TOTAL ALL TOP	30 SERVICE	\$2,576,903	\$10,737,335	1.058		301	
	31 LIGHT CONTRACTING	2,966,133	15,081,446	1.322		760	
	32 MEDIUM CONTRCTING	12,213,656	58,574,018	1.007		1,462	
	33 HEAVY CONTRACTING	3,949,104	19,554,861	0.658		268	
	34 DEALER OR DISTRIB	4,227,631	19,946,978	0.905		543	
	35 LGT. MANUFACTURER	552,095	2,445,050	0.677		26	
	36 MED. MANUFACTURER	2,323,955	11,285,741	0.813		142	
	37 HVY. MANUFACTURER	871,065	4,060,825	0.753		29	
	38 MISC. OPERATION	1,873,587	9,083,500	1.381		257	
	TOTAL *	\$31,554,129	\$150,769,754	0.978		3,788	

* TOTALS IN COLUMN (3) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

TABLE 14
MASSACHUSETTS
PRODUCTS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

TOP	(1) BAILEY FORMULA RELATIV.	(2) CREDIBILITY Z	(3) Z-WTD RELATIV.	(4) BALANCED RELATIV.	(5) INDICATED CHANGE *
10	0.988	0.372	0.995	0.996	
34	1.036	0.371	1.013	1.014	+ 1.8%
36	1.005	0.187	1.001	1.002	+ 0.6%
37	0.988	0.507	0.994	0.994	- 0.2%
CLASS GROUP					
3	0.924	0.500	0.961	0.965	
4	1.048	0.406	1.019	1.024	
5	1.107	0.132	1.014	1.018	
6	1.007	0.320	1.002	1.006	
7	1.006	0.182	1.001	1.005	

* INDICATED CHANGE =
(BALANCED RELATIVITY FOR TOP) / (BALANCED MONOLINE (TOP 10) RELATIVITY) - 1

NOTE: THE INDICATED CHANGES BY TOP WERE FURTHER ADJUSTED BY THE FOLLOWING
DIFFERENTIALS: TOP 34: 0.971
 TOP 36: 0.996
 TOP 37: 1.007

TABLE 15
MULTISTATE
PRODUCTS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TYPE OF POLICY	CLASS GROUP	(1) CALENDAR A.Y.E. 12/31/2017 AGGREGATE LOSS COSTS AT CURRENT LEVEL	(2) CALENDAR A.Y.E. 2013 - 2017 AGG LOSS COST CURRENT LEVEL	(3) FIVE YEAR EXPERIENCE RATIO	(4) RELATIV.	(5) NUMBER OF OCCURRENCES	(6) BAL CELL RELATIV.
10 MONOLINE	03 MAN,DLR,DSTFD/DRG	\$18,227,491	\$79,500,211	0.856	0.869	1,461	0.961
	04 DLR,DST-NOTFD/DRG	9,616,743	42,155,667	1.119	1.136	640	1.019
	05 MAN.NTFD/DRG (LOW)	1,605,615	6,748,634	1.039	1.055	84	1.014
	06 MAN.NTFD/DRG (MED)	9,640,686	42,498,903	0.958	0.972	466	1.002
	07 MAN.NTFD/DRG (HGH)	2,568,561	11,286,663	1.018	1.033	129	1.001
	TOTAL *	\$41,659,096	\$182,190,078	0.957		2,780	
34 MULT MERCANTILE	03 MAN,DLR,DSTFD/DRG	\$5,166,155	\$25,851,441	1.131	1.148	791	0.979
	04 DLR,DST-NOTFD/DRG	29,011,611	140,165,685	1.037	1.052	1,972	1.038
	06 MAN.NTFD/DRG (MED)	7,625	57,567	0.000	0.000	0	1.020
	TOTAL *	\$34,185,391	\$166,074,693	1.051		2,763	
36 MULT SERVICES	04 DLR,DST-NOTFD/DRG	\$3,197,904	\$14,609,890	1.041	1.057	699	1.025
	06 MAN.NTFD/DRG (MED)	54,898	258,512	0.781	0.793	1	1.008
	TOTAL *	\$3,252,802	\$14,868,402	1.037		700	
37 MULT INDUST/PROC.	03 MAN,DLR,DSTFD/DRG	\$16,474,514	\$81,117,947	0.888	0.901	2,761	0.960
	05 MAN.NTFD/DRG (LOW)	4,070,679	20,897,437	1.092	1.108	269	1.012
	06 MAN.NTFD/DRG (MED)	28,248,516	131,744,418	0.987	1.002	1,582	1.001
	07 MAN.NTFD/DRG (HGH)	7,346,721	36,933,393	0.965	0.980	537	1.000
	TOTAL *	\$56,140,430	\$270,693,195	0.963		5,149	
TOTAL ALL TOP	03 MAN,DLR,DSTFD/DRG	\$39,868,160	\$186,469,599	0.905		5,013	
	04 DLR,DST-NOTFD/DRG	41,826,258	196,931,242	1.056		3,311	
	05 MAN.NTFD/DRG (LOW)	5,676,294	27,646,071	1.077		353	
	06 MAN.NTFD/DRG (MED)	37,951,725	174,559,400	0.979		2,049	
	07 MAN.NTFD/DRG (HGH)	9,915,282	48,220,056	0.979		666	
	TOTAL *	\$135,237,719	\$633,826,368	0.985		11,392	

* TOTALS IN COLUMN (3) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

TABLE 16
MASSACHUSETTS
LOCAL PRODUCTS/COMPLETED OPERATIONS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

	(1) BAILEY FORMULA RELATIV.	(2) CREDIBILITY Z	(3) Z-WTD RELATIV.	(4) BALANCED RELATIV.	(5) INDICATED CHANGE *
TOP					
10	0.969	0.752	0.977	0.973	
34	0.959	0.541	0.978	0.974	+ 0.1%
36	0.986	0.516	0.993	0.989	+ 1.6%
37	0.972	0.138	0.996	0.993	+ 2.1%
38	1.025	0.962	1.024	1.020	+ 4.8%
CLASS GROUP					
1	0.918	0.550	0.954	0.948	
2	1.037	0.495	1.018	1.012	
11	1.095	0.352	1.032	1.026	
12	1.016	1.000	1.016	1.010	
13	0.785	0.266	0.938	0.932	

* INDICATED CHANGE =
(BALANCED RELATIVITY FOR TOP) / (BALANCED MONOLINE (TOP 10) RELATIVITY) - 1

TABLE 16C
MULTISTATE
LOCAL PRODUCTS/COMPLETED OPERATIONS
BASIC LIMIT RELATIVE CHANGE ANALYSIS *

	(1)	(2)	(3)	(4)
	BAILEY			
STATE	FORMULA	CREDIBILITY	Z-WTD	BALANCED
	RELATIV	Z	RELATIV	RELATIV.
Massachusetts	1.418	0.386	1.144	1.144
	1.202	0.623	1.122	1.121
	1.425	0.229	1.085	1.084
	1.144	0.427	1.059	1.059
	1.413	0.160	1.057	1.057
	1.437	0.153	1.057	1.057
	1.197	0.263	1.049	1.048
	1.096	0.505	1.048	1.047
	1.135	0.345	1.045	1.044
	1.122	0.368	1.043	1.043
	1.191	0.231	1.041	1.041
	1.128	0.326	1.040	1.040
	1.173	0.239	1.039	1.039
	1.148	0.224	1.031	1.031
	1.059	0.435	1.025	1.025
	1.052	0.453	1.023	1.023
	1.257	0.100	1.023	1.023
	1.083	0.227	1.018	1.018
	1.101	0.187	1.018	1.018
	1.090	0.192	1.017	1.016
	1.045	0.369	1.016	1.016
	1.037	0.307	1.011	1.011
	1.019	0.449	1.008	1.008
	1.027	0.143	1.004	1.003
	1.002	0.494	1.001	1.000
	1.002	0.131	1.000	1.000
	0.994	0.097	0.999	0.999
	0.992	0.402	0.997	0.997
	0.989	0.377	0.996	0.995
	0.975	0.190	0.995	0.995
	0.965	0.458	0.984	0.983
	0.924	0.241	0.981	0.981
	0.933	0.349	0.976	0.976
	0.895	0.260	0.972	0.971
	0.892	0.285	0.968	0.968
	0.788	0.160	0.963	0.962
	0.693	0.104	0.963	0.962
	0.889	0.364	0.958	0.958
	0.759	0.154	0.958	0.958
	0.843	0.288	0.952	0.952
	0.720	0.158	0.949	0.949
	0.765	0.195	0.949	0.949
	0.906	0.547	0.948	0.947
	0.793	0.238	0.946	0.946
	0.512	0.084	0.945	0.945
	0.639	0.136	0.941	0.941
	0.813	0.308	0.938	0.938
	0.889	0.581	0.934	0.933
	0.846	0.470	0.924	0.924
	0.756	0.321	0.914	0.914
	0.602	0.179	0.913	0.913
	0.804	0.575	0.882	0.882

* Sorted by balanced relative change.

TABLE 17
MASSACHUSETTS
LOCAL PRODUCTS/COMPLETED OPERATIONS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TYPE OF POLICY	CLASS GROUP	(1) CALENDAR A.Y.E. 12/31/2017 AGGREGATE LOSS COSTS AT CURRENT LEVEL	(2) CALENDAR A.Y.E. 2013 - 2017 AGG LOSS COST CURRENT LEVEL	(3) FIVE YEAR EXPERIENCE RATIO	(4) RELATIV.	(5) NUMBER OF OCCURRENCES	(6) BAL CELL RELATIV.
10 MONOLINE	01 RET.STRS-FOOD/DRG	\$13,466	\$59,203	1.556	1.436	5	0.964
	02 RET.STRS-NTFD/DRG	17,675	72,129	0.241	0.222	5	1.029
	11 COMP. OPS. (LOW)	42,123	424,383	1.006	0.928	6	1.043
	12 COMP. OPS. (MED)	1,433,591	6,455,709	0.781	0.721	74	1.027
	13 COMP. OPS. (HGH)	136,672	803,683	0.184	0.170	5	0.947
	TOTAL *	\$1,643,527	\$7,815,107	0.738		95	
34 MULT MERCANTILE	01 RET.STRS-FOOD/DRG	\$162,216	\$744,752	1.678	1.548	107	0.965
	02 RET.STRS-NTFD/DRG	94,992	472,878	1.962	1.810	27	1.030
	12 COMP. OPS. (MED)	60,835	251,095	1.390	1.282	6	1.028
	TOTAL *	\$318,043	\$1,468,725	1.708		140	
36 MULT SERVICES	01 RET.STRS-FOOD/DRG	\$19,505	\$86,105	0.379	0.350	7	0.980
	02 RET.STRS-NTFD/DRG	272,994	1,158,885	1.528	1.409	80	1.046
	11 COMP. OPS. (LOW)	51,764	276,733	1.040	0.959	7	1.060
	12 COMP. OPS. (MED)	59,456	315,049	0.106	0.097	3	1.043
	13 COMP. OPS. (HGH)	24,056	147,087	0.048	0.044	0	0.963
	TOTAL *	\$427,775	\$1,983,859	1.135		97	
37 MULT INDUST/PROC.	01 RET.STRS-FOOD/DRG	\$140	\$637	0.000	0.000	0	0.983
	11 COMP. OPS. (LOW)	1,404	8,815	0.318	0.293	1	1.064
	12 COMP. OPS. (MED)	117,275	535,328	0.035	0.033	1	1.047
	TOTAL *	\$118,819	\$544,780	0.039		2	
38 MULT CONTRACTORS	11 COMP. OPS. (LOW)	\$201,491	\$1,023,145	1.001	0.924	14	1.094
	12 COMP. OPS. (MED)	3,160,246	14,993,838	1.432	1.321	286	1.076
	13 COMP. OPS. (HGH)	214,573	1,049,674	2.629	2.425	21	0.993
	TOTAL *	\$3,576,310	\$17,066,657	1.479		321	
TOTAL ALL TOP	01 RET.STRS-FOOD/DRG	\$195,327	\$890,697	1.539		119	
	02 RET.STRS-NTFD/DRG	385,661	1,703,892	1.576		112	
	11 COMP. OPS. (LOW)	296,782	1,733,076	1.005		28	
	12 COMP. OPS. (MED)	4,831,403	22,551,019	1.188		370	
	13 COMP. OPS. (HGH)	375,301	2,000,444	1.573		26	
	TOTAL *	\$6,084,474	\$28,879,128	1.239		655	

* TOTALS IN COLUMN (3) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

TABLE 18
MULTISTATE
LOCAL PRODUCTS/COMPLETED OPERATIONS
BASIC LIMIT RELATIVE CHANGE ANALYSIS

SUMMARY OF EXPERIENCE USED IN RELATIVE CHANGE ANALYSIS

TYPE OF POLICY	CLASS GROUP	(1) CALENDAR A.Y.E. 12/31/2017 AGGREGATE LOSS COSTS AT CURRENT LEVEL	(2) CALENDAR A.Y.E. 2013 - 2017 AGG LOSS COST CURRENT LEVEL	(3) FIVE YEAR EXPERIENCE RATIO	(4) RELATIV.	(5) NUMBER OF OCCURRENCES	(6) BAL CELL RELATIV.
10 MONOLINE	01 RET. STRS-FOOD/DRG	\$2,570,942	\$11,000,189	0.978		762	
	02 RET. STRS-NTFD/DRG	2,629,603	11,663,817	1.219		494	
	11 COMP. OPS. (LOW)	4,024,036	18,069,271	1.329		705	
	12 COMP. OPS. (MED)	82,107,926	364,826,722	1.080		6,242	
	13 COMP. OPS. (HGH)	7,801,373	39,341,081	0.703		282	
	TOTAL *	\$99,133,880	\$444,901,080	1.062		8,485	
34 MULT MERCANTILE	01 RET. STRS-FOOD/DRG	\$8,002,266	\$37,342,335	0.940		3,591	
	02 RET. STRS-NTFD/DRG	5,186,195	23,434,483	1.012		665	
	12 COMP. OPS. (MED)	2,043,786	10,139,349	1.186		140	
	TOTAL *	\$15,232,247	\$70,916,167	0.997		4,396	
36 MULT SERVICES	01 RET. STRS-FOOD/DRG	\$729,961	\$3,439,653	1.065		197	
	02 RET. STRS-NTFD/DRG	12,256,900	48,452,562	1.088		2,518	
	11 COMP. OPS. (LOW)	3,094,937	14,012,389	1.111		510	
	12 COMP. OPS. (MED)	4,447,208	21,021,492	0.941		694	
	13 COMP. OPS. (HGH)	989,332	5,061,195	1.199		87	
	TOTAL *	\$21,518,338	\$91,987,291	1.065		4,006	
37 MULT INDUST/PROC.	01 RET. STRS-FOOD/DRG	\$26,867	\$90,627	2.388		1	
	11 COMP. OPS. (LOW)	114,535	530,208	1.229		19	
	12 COMP. OPS. (MED)	3,550,014	17,334,430	1.039		268	
	13 COMP. OPS. (HGH)	40,532	307,938	0.580		0	
	TOTAL *	\$3,731,948	\$18,263,203	1.050		288	
38 MULT CONTRACTORS	11 COMP. OPS. (LOW)	\$8,122,432	\$37,446,153	1.157		634	
	12 COMP. OPS. (MED)	143,209,202	677,397,379	1.125		12,565	
	13 COMP. OPS. (HGH)	14,631,915	67,788,410	0.919		693	
	TOTAL *	\$165,963,549	\$782,631,942	1.108		13,892	
TOTAL ALL TOP	01 RET. STRS-FOOD/DRG	\$11,330,036	\$51,872,804	0.960		4,551	
	02 RET. STRS-NTFD/DRG	20,072,698	83,550,862	1.086		3,677	
	11 COMP. OPS. (LOW)	15,355,940	70,058,021	1.193		1,868	
	12 COMP. OPS. (MED)	235,358,136	1,090,719,372	1.105		19,909	
	13 COMP. OPS. (HGH)	23,463,152	112,498,624	0.858		1,062	
	TOTAL *	\$305,579,962	\$1,408,699,683	1.084		31,067	

* TOTALS IN COLUMN (3) ARE AVERAGES USING COLUMN (1) AS WEIGHTS.

EXPLANATORY NOTES TO GENERAL LIABILITY
RELATIVITY ANALYSIS - TABLES 10 THROUGH 18.

OBJECTIVES

The objectives of this procedure are to:

- 1) determine monoline loss cost level needs for the appropriate rating variables;
- 2) determine indicated changes to the eight liability Commercial Package Policy (CPP) Package Modification Factors (PMFs) based on Premises/Operations and Products/Completed Operations data.

EXPERIENCE
BASE

The experience used in this relativity analysis is the latest five (5) years of accident year data, as reported under the Commercial Statistical Plan with aggregate loss costs adjusted to current loss cost level (multiline aggregate loss costs adjusted additionally by the current Implicit Package Modification Factors). Losses have been trended and developed in the Relativity Analysis. ALCCCL have been trended.

SIMULTANEOUS
DETERMINATION
OF RATING
VARIABLE
RELATIVITIES

Once the aggregate loss costs at current level and incurred losses used in the analysis have been appropriately adjusted, the 5-year experience ratios are calculated for each combination of the appropriate rating variables. From these ratios, relativities to the statewide 5-year experience ratio are calculated. These relativities are then used in a minimum bias iterative review procedure, which simultaneously determines the relativities for each rating variable.

The purpose of a simultaneous review procedure is to arrive at a set of relativities for each rating variable that best represent the experience. For example, the type of policy relativities will serve to derive the relationship of CPP policies relative to monoline policies, via the PMF, while the class group and territory (if applicable) relativities will serve to derive the relationship of the various classification and territories relative to one another. An iterative technique is used to derive relativities for each rating variable. This procedure is in contrast to a one-way type of review, wherein relativities for each rating variable would each be reviewed separately.

Such one-way types of review do not take into account differing percentages of experience of each rating variable within the other rating variables. The simultaneous review procedure accounts for these different distributions in generating relativities for each rating variable.

RATING
VARIABLES
USED

For Premises/Operations and Products/Completed Operations, the rating variables used in the relativity analysis are as follows:

Manufacturers and Contractors -	type of policy and class group
Owners, Landlords and Tenants -	type of policy, territory and class group
Products -	type of policy and class group
Local Products/Completed Operations-	type of policy, state and class group

EXPLANATORY NOTES TO GENERAL LIABILITY
RELATIVITY ANALYSIS - TABLES 10 THROUGH 18.

ITERATIVE
PROCEDURE

The iterative technique referred to in the previous paragraph solves for a set of relativities for each rating variable based on the experience for the cells; that is, based on the experience ratio and latest year adjusted aggregate loss cost volume for each combination of rating variables relative to the experience ratio and adjusted aggregate loss cost volume for all combinations of rating variables combined. Specifically, the iterative procedure uses the following formulas:

For Owners, Landlords and Tenants:

$$TOP_i = \frac{\sum_j \sum_k W_{ijk} r_{ijk}}{\sum_j \sum_k W_{ijk} CG_j TER_k} \quad \text{where } 1 \leq i \leq m$$

$$CG_j = \frac{\sum_i \sum_k W_{ijk} r_{ijk}}{\sum_i \sum_k W_{ijk} TOP_i TER_k} \quad \text{where } 1 \leq j \leq n$$

$$TER_k = \frac{\sum_i \sum_j W_{ijk} r_{ijk}}{\sum_i \sum_j W_{ijk} TOP_i CG_j} \quad \text{where } 1 \leq k \leq p$$

TOP_i is the relative change for the i^{th} type of policy;

CG_j is the relative change for the j^{th} class group;

TER_k is the relative change for the k^{th} territory;

W_{ijk} is the aggregate loss costs at current level for the i^{th}

type of policy, j^{th} class group and k^{th} territory;

r_{ijk} is the relative change for the i^{th} type of policy,

j^{th} class group and k^{th} territory;

m is the number of types of policy in the analysis;

n is the number of class groups in the analysis;

p is the number of territories in the analysis;

EXPLANATORY NOTES TO GENERAL LIABILITY
RELATIVITY ANALYSIS - TABLES 10 THROUGH 18.

For Manufacturers and Contractors, and Products:

$$TOP_i = \frac{\sum_j W_{ij} r_{ij}}{\sum_j W_{ij} CG_j} \quad \text{where } 1 \leq i \leq m$$
$$CG_j = \frac{\sum_i W_{ij} r_{ij}}{\sum_i W_{ij} TOP_i} \quad \text{where } 1 \leq j \leq n$$

TOP_i is the relative change for the i^{th} type of policy;

CG_j is the relative change for the j^{th} class group;

W_{ij} is the aggregate loss costs at current level for the i^{th}

type of policy and j^{th} class group;

r_{ij} is the relative change for the i^{th} type of policy

and j^{th} class group;

m is the number of types of policy in the analysis;

n is the number of class groups in the analysis;

EXPLANATORY NOTES TO GENERAL LIABILITY
RELATIVITY ANALYSIS - TABLES 10 THROUGH 18.

For Local Products/Completed Operations:

$$TOP_i = \frac{\sum_j \sum_k W_{ijk} r_{ijk}}{\sum_j \sum_k W_{ijk} CG_j ST_k} \quad \text{where } 1 \leq i \leq m$$

$$CG_j = \frac{\sum_i \sum_k W_{ijk} r_{ijk}}{\sum_i \sum_k W_{ijk} TOP_i ST_k} \quad \text{where } 1 \leq j \leq n$$

$$ST_k = \frac{\sum_i \sum_j W_{ijk} r_{ijk}}{\sum_i \sum_j W_{ijk} TOP_i CG_j} \quad \text{where } 1 \leq k \leq p$$

TOP_i is the relative change for the i^{th} type of policy;

CG_j is the relative change for the j^{th} class group;

ST_k is the relative change for the k^{th} state;

W_{ijk} is the aggregate loss costs at current level for the i^{th}

type of policy, j^{th} class group and k^{th} state;

r_{ijk} is the relative change for the i^{th} type of policy,

j^{th} class group and k^{th} state;

m is the number of types of policy in the analysis;

n is the number of class groups in the analysis;

p is the number of states in the analysis;

EXPLANATORY NOTES TO GENERAL LIABILITY
RELATIVITY ANALYSIS - TABLES 10 THROUGH 18.

ITERATIVE
PROCEDURE
(Cont'd)

For example, for Owners, Landlords and Tenants, the procedure starts by inserting the actual relativities for type of policy and class group into the third formula to get a territory relativity. This result is then used with the class group relativity in the first formula to get a new type of policy relativity, which in turn is substituted along with the territory relativity into the second formula to get a new class group relativity. The process continues on in that fashion until there is no appreciable difference from one iteration to the next.

APPLICATION OF
CREDIBILITY

Consideration is then given to the credibility of the experience for each rating variable. The credibility of each of these categories is based on the formula $Z = \sqrt{P/18,000}$ for Owners, Landlords and Tenants, $Z = \sqrt{P/18,000}$ for Manufacturers and Contractors and $Z = \sqrt{P/20,000}$ for Products, where P is the 5 year occurrence total for a given class group, territory or type of policy. For Local Products/Completed Operations, separate formulas are used to calculate the credibility of the experience for each type of policy and class group versus the credibility of the experience for each state, namely $Z = \sqrt{P/15,000}$ for type of policy and class group, and $Z = \sqrt{P/5,500}$ for state (in this case, P is the 5 year occurrence total for a given state). Credibility-weighted relativities are then calculated as follows:

$$W = R^Z \quad \text{where:}$$

Z is the class group, territory, state or type of policy credibility;

R is the class group, territory, state or type of policy relativity;

W is the credibility-weighted relativity.

The resulting credibility-weighted relativities are then balanced to assure that the average relativity remains at unity.

EXPLANATORY NOTES TO GENERAL LIABILITY
RELATIVITY ANALYSIS - TABLES 10 THROUGH 18.

MULTILINE
CONSIDERATIONS

The monoline relativities and the class group, territory (if applicable) and state relativities which result from the aforementioned procedures are then used to generate indicated monoline classification loss cost changes. The multiline relativities are used to generate multiline indications that apply to the current Implicit Package Modification Factors. The indicated IPMFs are calculated as follows:

$$\text{TOP y indicated IPMF} = \frac{(\text{TOP y current IPMF}) \times (\text{TOP y relativity})}{(\text{monoline relativity})}$$

For each CPP Type of Policy the indicated IPMF is subject to a minimum value of 0.50 and a maximum value of 1.50. If an indicated IPMF falls outside one of those limits, it is capped at that amount, the aggregate loss costs for that Type of Policy are adjusted to the capped IPMF level, and the entire relativity review as described above is re-performed to take this into account.
