NCRB-NCRF-NCIGA

north carolina
RATE BUREAU
REINSURANCE FACILITY
INSURANCE GUARANTY ASSOCIATION

September 1, 2017

The Honorable Mike Causey
Commissioner
North Carolina Dept. of Insurance
1201 Mail Service Center
Raleigh, NC 27699-1201

Re: Workers Compensation Insurance
2017 Residual Market Rate Filing

Dear Commissioner Causey:

Pursuant to the provisions of Article 36, Chapter 58 of the General Statutes of North Carolina, enclosed is the filing for residual market workers compensation insurance rates, rating values and miscellaneous values to become effective in accordance with the following rule of application:

> Revised residual market rates shall become effective as of April 1, 2018 and shall be applied to all residual market policies as of the first normal anniversary rating date which is on or after April 1, 2018, but shall not otherwise be available to outstanding policies. No policy may be canceled and rewritten to take advantage of or to avoid application of this rule.

The enclosed memoranda, exhibits, testimony and other supporting data explain the calculations supporting the loss cost multiplier; this filing makes reference to the September 1, 2017 Loss Cost Filing for the voluntary market to support the change in loss costs. Combined, the two filings support an average decrease in the overall premium for residual market workers compensation insurance of 12.5%.

This premium level change includes an 11.3% decrease in loss costs detailed in the 2016 loss cost filing and a 1.3% decrease in the loss cost multiplier detailed in this filing.

By industry group, the changes are: Manufacturing, 12.5% decrease; Contracting, 11.4% decrease; Office and Clerical, 12.8% decrease; Goods & Services, 12.6% decrease; and Miscellaneous, 13.2% decrease. Within each industry group the change will vary from the average by classification depending upon the volume and character of the particular classification experience.

The residual market rates for classifications which contemplate exposure under the United States Longshore and Harbor Workers' Compensation Act ("F" classifications) are also

included. This filing proposes a decrease of 8.8% to the overall residual market premium level of the "F" classifications.

The filing proposes no change in the maximum minimum premium of $1,500, the minimum premium multiplier of 200, or the expense constant of $160. The filing proposes decreasing the terrorism provision from .02 per $100 of payroll to .01 per $100 of payroll.

Information and statistical data required pursuant to NCGS §58-36-15 and 11 NCAC 10.1111 are submitted. Additionally, the pre-filed testimony of (a) Raymond F. Evans, Jr., CPCU, General Manager - North Carolina Rate Bureau, (b) Sean O. Cooper, FCAS, MAAA - National Council on Compensation Insurance, Inc. (c) Mark Mulvaney, FCAS, MAAA - Milliman, Inc., (d) Dr. James H. Vander Weide – Financial Strategy Associates and (e) Dr. David Appel – Milliman, Inc. and exhibits referenced therein are enclosed.

Sincerely,

Raymond F. Evans, Jr., CPCU
General Manager

RFE:ko

Enclosures

NORTH CAROLINA - ASSIGNED RISK

SUMMARY

Proposed Effective Date April 1, 2018

I. Industrial Classifications

Overall Proposed Change in Rate Level

- New and Renewal Policies -12.5%

By Industry Group

Manufacturing	-12.5%
Contracting	-11.4%
Office and Clerical	-12.8%
Goods and Services	-12.6%
Miscellaneous	-13.2%
Overall	-12.5%

II. Federal Classifications

Overall Proposed Change in Rate Level

- New and Renewal Policies -8.8%

II. Summary of Miscellaneous Changes	Current	Proposed
A. Terrorism Rate Provision	$ 0.02	$ 0.01
B. Safety Factor for Calculating Premium Reduction Percentages	0.70	0.95

NORTH CAROLINA – ASSIGNED RISK

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*Sections incorporated by reference to the Loss Cost Filing

NORTH CAROLINA

EXHIBIT I

Determination of Indicated Loss Cost Level Change

Section A - Policy Year 2015 Experience

Premium:

(1)	Standard Earned Premium Developed to Ultimate (Appendix A-II)	$1,137,870,161
(2)	Premium On-level Factor (Appendix A-I)	0.725
(3)	Premium Available for Benefit Costs = (1) x (2)	$824,955,867

Indemnity Benefit Cost:

(4)	Limited Indemnity Losses Developed to Ultimate (Appendix A-II)	$347,965,899
(5)	Indemnity Loss On-level Factor (Appendix A-I)	1.003
(6)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.175
(7)	Composite Adjustment Factor = (5) x (6)	1.179
(8)	Adjusted Limited Indemnity Losses = (4) x (7)	$410,251,795
(9)	Adjusted Limited Indemnity Cost Ratio excluding Trend and Benefits = (8) / (3)	0.497
(10)	Factor to Reflect Indemnity Trend (Appendix A-III)	0.904
(11)	Projected Limited Indemnity Cost Ratio = (9) x (10)	0.449
(12)	Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis (Appendix A-II)	1.010
(13)	Projected Indemnity Cost Ratio = (11) x (12)	0.453
(14)	Factor to Reflect Proposed Changes in Indemnity Benefits (Appendix C)	1.003
(15)	Projected Indemnity Cost Ratio including Benefit Changes = (13) x (14)	0.454

Medical Benefit Cost:

(16)	Limited Medical Losses Developed to Ultimate (Appendix A-II)	$303,766,963
(17)	Medical Loss On-level Factor (Appendix A-I)	0.991
(18)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.175
(19)	Composite Adjustment Factor = (17) x (18)	1.164
(20)	Adjusted Limited Medical Losses = (16) x (19)	$353,584,745
(21)	Adjusted Limited Medical Cost Ratio excluding Trend and Benefits = (20) / (3)	0.429
(22)	Factor to Reflect Medical Trend (Appendix A-III)	0.951
(23)	Projected Limited Medical Cost Ratio = (21) x (22)	0.408
(24)	Factor to Adjust Medical Cost Ratio to an Unlimited Basis (Appendix A-II)	1.010
(25)	Projected Medical Cost Ratio = (23) x (24)	0.412
(26)	Factor to Reflect Proposed Changes in Medical Benefits (Appendix C)	1.006
(27)	Projected Medical Cost Ratio including Benefit Changes = (25) x (26)	0.414

Total Benefit Cost:

(28)	Indicated Change Based on Experience, Trend and Benefits = (15) + (27)	0.868

NORTH CAROLINA

EXHIBIT I

Determination of Indicated Loss Cost Level Change

Section B - Policy Year 2014 Experience

Premium:

(1)	Standard Earned Premium Developed to Ultimate (Appendix A-II)	$1,093,657,227
(2)	Premium On-level Factor (Appendix A-I)	0.710
(3)	Premium Available for Benefit Costs = (1) x (2)	$776,496,631

Indemnity Benefit Cost:

(4)	Limited Indemnity Losses Developed to Ultimate (Appendix A-II)	$344,168,792
(5)	Indemnity Loss On-level Factor (Appendix A-I)	1.007
(6)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.175
(7)	Composite Adjustment Factor = (5) x (6)	1.183
(8)	Adjusted Limited Indemnity Losses = (4) x (7)	$407,151,681
(9)	Adjusted Limited Indemnity Cost Ratio excluding Trend and Benefits = (8) / (3)	0.524
(10)	Factor to Reflect Indemnity Trend (Appendix A-III)	0.877
(11)	Projected Limited Indemnity Cost Ratio = (9) x (10)	0.460
(12)	Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis (Appendix A-II)	1.010
(13)	Projected Indemnity Cost Ratio = (11) x (12)	0.465
(14)	Factor to Reflect Proposed Changes in Indemnity Benefits (Appendix C)	1.003
(15)	Projected Indemnity Cost Ratio including Benefit Changes = (13) x (14)	0.466

Medical Benefit Cost:

(16)	Limited Medical Losses Developed to Ultimate (Appendix A-II)	$316,800,256
(17)	Medical Loss On-level Factor (Appendix A-I)	0.964
(18)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.175
(19)	Composite Adjustment Factor = (17) x (18)	1.133
(20)	Adjusted Limited Medical Losses = (16) x (19)	$358,934,690
(21)	Adjusted Limited Medical Cost Ratio excluding Trend and Benefits = (20) / (3)	0.462
(22)	Factor to Reflect Medical Trend (Appendix A-III)	0.937
(23)	Projected Limited Medical Cost Ratio = (21) x (22)	0.433
(24)	Factor to Adjust Medical Cost Ratio to an Unlimited Basis (Appendix A-II)	1.010
(25)	Projected Medical Cost Ratio = (23) x (24)	0.437
(26)	Factor to Reflect Proposed Changes in Medical Benefits (Appendix C)	1.006
(27)	Projected Medical Cost Ratio including Benefit Changes = (25) x (26)	0.440

Total Benefit Cost:

(28)	Indicated Change Based on Experience, Trend and Benefits = (15) + (27)	0.906

NORTH CAROLINA

EXHIBIT I

Determination of Indicated Rate Level Change

Section C - Indicated Change Based on Experience, Trend, and Benefits

(1) Policy Year 2015 Indicated Change Based on Experience, Trend, and Benefits	0.868	(-13.2%)
(2) Policy Year 2014 Indicated Change Based on Experience, Trend, and Benefits	0.906	(-9.4%)
(3) Indicated Change Based on Experience, Trend, and Benefits = [(1)+(2)] / 2	0.887	(-11.3%)

Section D - Application of the Proposed Change in the Loss Cost Multiplier

(1) Indicated Loss Cost Level Change	0.887	(-11.3%)
(2) Proposed Change in the Assigned Risk Loss Cost Multiplier = [Exhibit I-A, Sheet 1, Line (9) / Exhibit I-A, Sheet 2, Line (9)]	0.987	(-1.3%)
(3) Indicated Assigned Risk Rate Level Change = (1) x (2)	0.875	(-12.5%)

Section E - Distribution of Overall Rate Level Change to Industry Groups

Industry Group Differentials (Appendix A-V):

Manufacturing	1.000
Contracting	1.012
Office & Clerical	0.996
Goods & Services	0.999
Miscellaneous	0.992

Applying these industry group differentials to the final overall rate level change produces the changes in rate level proposed for each group as shown:

Industry Group	(1) Final Overall Rate Level Change	(2) Industry Group Differential	(3) = (1) x (2) Final Rate Level Change by Industry Group	
Manufacturing	0.875	1.000	0.875	(-12.5%)
Contracting	0.875	1.012	0.886	(-11.4%)
Office & Clerical	0.875	0.996	0.872	(-12.8%)
Goods & Services	0.875	0.999	0.874	(-12.6%)
Miscellaneous	0.875	0.992	0.868	(-13.2%)
Overall	0.875	1.000	0.875	(-12.5%)

North Carolina Department of Insurance

Summary of Supporting Information Form
Calculation of INDICATED Assigned Risk Loss Cost Multiplier
Effective April 1, 2018

1.	Does this filing apply uniformly to all workers compensation classes? (If no, identify exception and provide justification for variations.)	Yes	
2.	Loss Cost Modification:		
	A. The insurer hereby files to adopt the prospective loss costs in the North Carolina Rate Bureau reference filing (Check one):		
	☐ Without modification (factor = 1.000)		
	☒ With the following modification(s): 1.684 (see attached) Cite the nature and percent modification. Attach supporting data and/or rationale for the modification(s).		
	B. Loss Cost Modification Factor:	1.684	See Exhibit I-A, Sheet 3
	Example (i): If your loss cost modification is -10%, the factor is .90 (1.00 - .10). Example (ii): If your loss cost modification is +15%, the factor is 1.15 (1.00 + .15).		
3.	Selected Expenses: (Attach Expense Provisions Exhibit)		See Exhibit II
	A. Commission and Brokerage	5.0%	
	B. Other Acquisition	20.7%	
	C. General Expenses	Incl. in B	
	D. Taxes, Licenses, Fees & Loss Based Assessments	2.66%	
	E. Profit, Contingencies and Investment Income	9.0%	
	F. Uncollectible Premium Provision	6.8%	
	G. Total (A + B + C + D + E + F)	44.2%	
4.	Development of Expected Loss & Loss Adjustment Expense* (Target Cost) Ratio: (Expressed in decimal form: 1.000 - 3G)	0.558	
5.	Overall impact of expense constant & minimum premiums: (Expressed in decimal form: i.e., 1.2% overall impact would be 1.012)	1.120	See Exhibit II
6.	Overall impact of size-of-risk discounts plus expense gradation recognition in retrospective rating: (Expressed in decimal form: i.e., 8.6% average discount would be 0.914)	1.000	
7.	Provision for loss based assessments	0.000	
8.	Formula Loss Cost Multiplier : 2B x (1.0 - 7) / ((6 - 3G) x 5)	2.695	
9.	Selected Loss Cost Multiplier: (Explain any differences between 8 and 9, other than rounding)	2.695	
10.	Rate Level Changes for the Coverages to which this page applies	-12.5%	
11.	Are you amending:		
	the minimum premium formula?	No	
	the expense constant(s) ?	No	See Exhibit II-D
	the premium discount schedules?	No	
	If yes, attach documentation showing (i) premium level impact and (ii) current and proposed minimum premium formula, minimum premium multipliers, maximum minimum premiums, expense constants and/or premium discount schedules.		

* The ratio displayed on line 4 does not include any provision for loss adjustment expense.

North Carolina Department of Insurance

Summary of Supporting Information Form
Calculation of CURRENT Assigned Risk Loss Cost Multiplier
Effective April 1, 2017

1. Does this filing apply uniformly to all workers compensation classes?
   (If no, identify exception and provide justification for variations.)

2. Loss Cost Modification:

   A. The insurer hereby files to adopt the prospective loss costs in the North Carolina Rate Bureau reference filing (Check one):

   ☐ Without modification (factor = 1.000)

   ☒ With the following modification(s): 1.621
   Cite the nature and percent modification. Attach supporting data and/or rationale for the modification(s).

   B. Loss Cost Modification Factor: 1.621

   Example (i): If your loss cost modification is -10%, the factor is .90 (1.00 - .10).
   Example (ii): If your loss cost modification is +15%, the factor is 1.15 (1.00 + .15).

3. Selected Expenses: (Attach Expense Provisions Exhibit)

   A. Commission and Brokerage 5.0%

   B. Other Acquisition 22.8%

   C. General Expenses Incl. in B

   D. Taxes, Licenses, Fees & Loss Based Assessments 2.66%

   E. Profit, Contingencies and Investment Income 10.0%

   F. Uncollectible Premium Provision 10.0%

   G. Total (A + B + C + D + E + F) 50.5%

4. Development of Expected Loss & Loss Adjustment Expense (Target Cost) Ratio: 0.495
   (Expressed in decimal form: 1.000 - 3G)

5. Overall impact of expense constant & minimum premiums: 1.199
   (Expressed in decimal form: i.e., 1.2% overall impact would be 1.012)

6. Overall impact of size-of-risk discounts plus expense gradation recognition in retrospective rating: 1.000
   (Expressed in decimal form: i.e., 8.6% average discount would be 0.914)

7. Provision for premium taxes, licenses, fees and loss based assessments 0.000

8. Formula Loss Cost Multiplier : 2B x (1.0 - 7) / ((6 - 3G) x 5) 2.731

9. Selected Lost Cost Multiplier 2.731

North Carolina - Assigned Risk

Calculation of Loss Cost Modification Factor

1.	Current Assigned Risk Differential	1.905
2.	Proposed Change in Assigned Risk Differential (See Exh. II-E, Sheet 1)	1.039
3.	Proposed Assigned Risk Differential (1) x (2)	1.979
4.	Selected loss adjustment expense provision (See Exhibit II-A, Sheet 1)	1.175
5.	Factor to Adjust Loss Costs to Avoid Double Counting Servicing Carrier LAE 1 / (4)	0.851
6.	Loss Cost Modification Factor (3) x (5)	1.684

North Carolina - Assigned Risk

Summary of Expense Provisions

1. Standard Assigned Risk Commission and Brokerage (Res. Mkt. Plan Admin Rules)		5.0%
2. Loss Adjustment Expense (included in Loss Costs) (See Exhibit II-A, Sheet 1)		17.5%
Factor to adjust loss costs to avoid double counting Servicing Carrier LAE (See Exhibit I-A, Sheet 3)	0.851	
3. Other Acquisition, General Expense * and LAE (See Exhibit II-B)		20.7%
4. Uncollectible Premium Provision (See Exhibit II-F)		9.0%
5. Underwriting Profit and Contingencies		9.0%
a. Underwriting Profit (See Exhibits RB-11 and RB-13)	9.0%	
b. Contingencies	--	
6. Taxes, Licenses, and Fees		
TLF Including Regulatory Surcharge (2.5% x 1.065)		2.66%
Miscellaneous Tax (judgmentally selected)		0.0%
Total Including Miscellaneous Tax		2.66%
7. Effect of Expense Constant and Minimum Premiums (See Exhibit II-D) (Expense Constant of $160)		12.0%

* Excludes commission and brokerage, taxes, licenses and fees.

North Carolina

Derivation of Loss Adjustment Expense Provision

	COUNTRYWIDE			**NORTH CAROLINA**		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year	Accident Year Developed LAE Ratio+	Accident Year Developed DCCE Ratio+	Accident Year Developed AOE Ratio+	Accident Year DCCE Ratio Adjusted to NC Relativity (3) x 0.767^	Accident Year LAE Ratio Adjusted to NC Relativity (4) + (5)	Calendar Year
2012	20.0%	13.1%	6.9%	10.0%	16.9%	16.4%
2013	20.6%	13.2%	7.4%	10.1%	17.5%	17.5%
2014	21.0%	13.6%	7.4%	10.4%	17.8%	19.7%
2015	20.5%	13.2%	7.3%	10.1%	17.4%	19.6%
2016	20.5%	13.2%	7.3%	10.1%	17.4%	21.9%

Current North Carolina Loss Adjustment Expense Provision 17.5%

Selected North Carolina Loss Adjustment Expense Provision 17.5%

\+ Source: NCCI Call for Loss Adjustment Expense (See Exhibit RB-4).
^ Exhibit II-A, Sheet 2.

North Carolina

Derivation of North Carolina DCCE relativity

	(1) Calendar Years 2015 and 2016 Paid Losses* ('000s)	(2) Calendar Years 2015 and 2016 Paid DCCE* ('000s)	(3) DCCE Ratio (2)/(1)
(a) North Carolina	$1,419,399	$140,310	9.9%
(b) Countrywide	46,571,543	6,007,900	12.9%

North Carolina DCCE relativity (3a) / (3b)	0.767
Selected DCCE relativity	0.767

* Source: Annual Statement Statutory Page 14 data, excluding state funds, collected and aggregated by NCCI, Inc.

North Carolina - Assigned Risk

Expense Provision
Other Acquisition, General Expense and LAE

1.	Weighted-Average of 1/1/2017 Three-Year Servicing Carrier Allowances* (Includes LAE)	19.02%
2.	Pool Administration Expenses (See Exhibit II-C)	1.7%
3.	Expense provision, excluding taxes, licenses and fees and loss-based assessments and including servicing carrier LAE (1) + (2)	20.7%

* Source: North Carolina Rate Bureau. Excludes commission and brokerage, taxes, licenses and fees.

North Carolina - Assigned Risk

Pool Expense Provision*

Data Valued as of 12/31/2016

Calendar Year	Gross Written Premium^	Administrative & Separately Reimbursable Expense	Expenses as a % of GWP
2007	$119,906,732	$1,578,985	1.3%
2008	92,833,564	1,487,546	1.6%
2009	49,439,377	1,526,566	3.1%
2010	41,408,584	1,391,888	3.4%
2011	40,318,050	1,101,386	2.7%
2012	53,131,693	1,033,100	1.9%
2013	71,745,849	1,041,196	1.5%
2014	82,035,932	998,280	1.2%
2015	84,398,595	1,163,942	1.4%
2016	82,281,086	1,069,973	1.3%
		Weighted Average	1.7%

* Source: Data collected by NCCI, Inc.
^ Includes premium for both servicing carriers and direct assignment carriers.

Exhibit II-D

North Carolina - Assigned Risk

Effect of Expense Constant and Minimum Premiums

Based on Assigned Risk Market Data

Minimum Premium Program Parameters		**Current**		**Proposed**
(1) Minimum Premium Multiplier (MPM)		200		200
(2) Maximum Minimum Premium (MMP)	$	1,500	$	1,500
(3) Standard Premium Generated by MPM and MMP *	$	3,351,643	$	3,351,643
(4) Standard Premium Including Additional Premium Generated by MPM and MMP *	$	56,777,629	$	56,777,629
(5) Impact of MPM and MMP = (3) / (4)		0.059		0.059
(6) Expense Constant		160		160
(7) Standard Premium Including Expense Constant Premium and Balance to Minimum Premium **	$	73,682,625	$	73,682,625
(8) Standard Premium Excluding Expense Constant Premium and Balance to Minimum Premium **	$	65,796,588	$	65,796,588
(9) Premium Generated from Expense Constant and Balance to Minimum Premium = (7) - (8)	$	7,886,037	$	7,886,037
(10) Effect of Expense Constant and Minimum Premiums = (9) / (8)				0.120

* Source: Unit Statistical Data for policy years 2006 through 2013.
** Source: Policy Data collected by the NCRB for policy years 2014 through 2016.

North Carolina - Assigned Risk
Indicated Change in the Assigned Risk Differential
Based on Paid Losses

Policy Year	(1) Standard Pure Premium *	(2) Paid Losses **	(3) = (2) / (1) Ratio of Losses to Premium	(4) Indicated Assigned Risk Pure Prem. Diff.^ (Std Basis)
I. Residual Market Experience Valued as of 12/31/2016				
2006	$41,012,654	$78,246,108	1.908	
2007	34,616,862	65,943,974	1.905	
2008	22,133,411	37,923,061	1.713	
2009	15,407,087	22,396,071	1.454	
2010	12,384,817	18,501,831	1.494	
2011	11,761,997	28,146,216	2.393	
2012	16,274,538	33,595,805	2.064	
2013	21,137,312	44,703,161	2.115	
2014	22,099,406	44,109,541	1.996	
2015	23,482,082	50,192,422	2.137	
II. Statewide Experience Valued as of 12/31/2016				
2006	$682,478,378	$747,956,049	1.096	1.741
2007	739,433,253	836,016,262	1.131	1.684
2008	689,633,354	750,852,712	1.089	1.573
2009	642,701,055	692,057,761	1.077	1.350
2010	665,754,807	716,648,840	1.076	1.388
2011	694,382,101	731,778,574	1.054	2.270
2012	704,812,731	678,327,188	0.962	2.146
2013	736,808,434	663,222,505	0.900	2.350
2014	777,083,420	667,119,618	0.858	2.326
2015	824,835,491	659,328,837	0.799	2.675
			Average Differential ^	1.950

(a)	Indicated Differential in Standard Pure Premium Based on Experience	1.950
(b)	Current Impact of Standard Pure Premium Programs@	1.939
(c)	Indicated Change in Assigned Risk Pure Premium Differential Based on Paid Losses = (a) / (b)	1.006
(d)	Indicated Change in Assigned Risk Pure Premium Differential Based on Paid+Case Losses [See Exhibit II-E, Sheet 4, Item (c)]	1.072
(e)	Selected Change in Assigned Risk Pure Premium Differential (Proposed Assigned Risk Pure Premium Differential = 1.979)	1.039

* Developed to fifth report and brought to the 4/1/2017 pure premium level.
** Developed to ultimate and brought to the 1/1/2017 benefit level.
^ This is the indicated pure premium differential based on loss experience, calculated by comparing the ratio of assigned risk losses to premium to the ratio of statewide losses to premium.
@ This is composed of an ARAP impact equal to 1.8% and a differential of 1.905. ARAP impact from Exhibit II-E, Sheet 9.

North Carolina - Assigned Risk

(Residual Market)

Policy Year	(1) Standard Premium*	(2) On-level Factor^	(3) Effect of Current Standard Premium Programs#	(4) = (1) x ((2) / (3)) Stand. Pure Prem. at Current Level
2006	$120,981,280	0.672	1.983	$41,012,654
2007	110,597,004	0.613	1.960	34,616,862
2008	74,523,271	0.575	1.937	22,133,411
2009	51,875,715	0.575	1.939	15,407,087
2010	41,420,794	0.578	1.935	12,384,817
2011	40,419,233	0.567	1.951	11,761,997
2012	55,544,497	0.573	1.953	16,274,538
2013	72,887,282	0.570	1.966	21,137,312
2014	79,209,342	0.547	1.960	22,099,406
2015	82,393,271	0.557	1.955	23,482,082

Policy Year	(5) Ind. Losses Paid	(6) Development Factor	(7) On-level Factor^	(8) = ((5) x (6)) x (7) Adjusted Ind. Losses
2006	$35,649,602	1.069	1.020	$38,871,614
2007	30,600,402	1.079	1.014	33,480,084
2008	17,302,759	1.092	1.010	19,083,559
2009	10,468,803	1.108	1.004	11,645,832
2010	9,885,344	1.135	1.002	11,242,305
2011	10,502,821	1.178	1.015	12,557,908
2012	12,549,273	1.244	1.015	15,845,465
2013	16,055,201	1.375	1.011	22,318,736
2014	13,493,716	1.767	1.007	24,010,300
2015	7,446,611	3.493	1.003	26,089,045

Policy Year	(9) Med. Losses Paid	(10) Development Factor	(11) On-level Factor^	(12) = ((9) x (10)) x (11) Adjusted Med. Losses
2006	$36,672,194	1.162	0.924	$39,374,494
2007	29,901,345	1.175	0.924	32,463,890
2008	17,176,976	1.187	0.924	18,839,502
2009	9,647,146	1.206	0.924	10,750,239
2010	6,390,990	1.228	0.925	7,259,526
2011	13,313,441	1.259	0.930	15,588,308
2012	14,549,602	1.309	0.932	17,750,340
2013	17,246,489	1.372	0.946	22,384,425
2014	13,753,189	1.516	0.964	20,099,241
2015	12,155,061	2.001	0.991	24,103,377

* Developed to a fifth report. See Exhibit II-E, Sheet 7.
^ See Appendix A-I for the derivation of the factors for policy years 2014 and 2015. Factors for the remaining years are calculated in a similar manner.
# This is composed of a differential of 1.905 and year-specific ARAP impacts which are displayed on Exhibit II-E, Sheet 9.

North Carolina - Assigned Risk

(Statewide Market)

Policy Year	(1) Voluntary Standard Premium*	(2) Assigned Risk Standard Premium**	(3) = (1) + (2) Standard Pure Premum On-level
2006	$641,465,724	$41,012,654	$682,478,378
2007	704,816,391	34,616,862	739,433,253
2008	667,499,943	22,133,411	689,633,354
2009	627,293,968	15,407,087	642,701,055
2010	653,369,990	12,384,817	665,754,807
2011	682,620,104	11,761,997	694,382,101
2012	688,538,193	16,274,538	704,812,731
2013	715,671,122	21,137,312	736,808,434
2014	754,984,014	22,099,406	777,083,420
2015	801,353,409	23,482,082	824,835,491

Policy Year	(4) Ind. Losses Paid	(5) Development Factor	(6) On-level Factor^	(7) = ((4) x (5)) x (6) Adjusted Ind. Losses
2006	$380,223,669	1.069	1.020	$414,588,284
2007	419,933,611	1.079	1.014	459,451,883
2008	375,268,212	1.092	1.010	413,890,817
2009	342,101,710	1.108	1.004	380,564,890
2010	338,665,196	1.135	1.002	385,153,767
2011	318,818,022	1.178	1.015	381,201,144
2012	276,649,835	1.244	1.015	349,314,681
2013	252,943,959	1.375	1.011	351,623,721
2014	200,155,379	1.767	1.007	356,150,277
2015	102,303,489	3.493	1.003	358,418,125

Policy Year	(8) Med. Losses Paid	(9) Development Factor	(10) On-level Factor^	(11) = ((8) x (9)) x (10) Adjusted Med. Losses
2006	$310,488,489	1.162	0.924	$333,367,765
2007	346,840,176	1.175	0.924	376,564,379
2008	307,226,095	1.187	0.924	336,961,895
2009	279,530,263	1.206	0.924	311,492,871
2010	291,834,733	1.228	0.925	331,495,073
2011	299,416,187	1.259	0.930	350,577,430
2012	269,685,035	1.309	0.932	329,012,507
2013	240,076,973	1.372	0.946	311,598,784
2014	212,785,161	1.516	0.964	310,969,341
2015	151,745,879	2.001	0.991	300,910,712

* Developed to a fifth report and on current premium level. See Exhibit II-E, Sheet 8.
** Developed to a fifth report and on current premium level. See Exhibit II-E, Sheet 2.
^ See Appendix A-I for the derivation of the factors for policy years 2014 and 2015.
Factors for the remaining years are calculated in a similar manner.

North Carolina - Assigned Risk
Indicated Change in the Assigned Risk Differential
Based on Paid+Case Losses

Policy Year	(1) Standard Pure Premium *	(2) Paid+Case Losses **	(3) = (2) / (1) Ratio of Losses to Premium	(4) Indicated Assigned Risk Pure Prem. Diff.^ (Std Basis)
I. Residual Market Experience Valued as of 12/31/2016				
2006	$41,012,654	$77,345,822	1.886	
2007	34,616,862	71,645,052	2.070	
2008	22,133,411	36,361,376	1.643	
2009	15,407,087	24,649,407	1.600	
2010	12,384,817	17,099,567	1.381	
2011	11,761,997	26,487,388	2.252	
2012	16,274,538	35,862,178	2.204	
2013	21,137,312	53,924,537	2.551	
2014	22,099,406	41,471,277	1.877	
2015	23,482,082	53,136,947	2.263	
II. Statewide Experience Valued as of 12/31/2016				
2006	$682,478,378	$730,165,137	1.070	1.763
2007	739,433,253	825,670,796	1.117	1.853
2008	689,633,354	730,352,603	1.059	1.551
2009	642,701,055	679,950,784	1.058	1.512
2010	665,754,807	708,000,963	1.063	1.299
2011	694,382,101	700,472,340	1.009	2.232
2012	704,812,731	654,650,974	0.929	2.372
2013	736,808,434	626,051,892	0.850	3.001
2014	777,083,420	636,827,221	0.820	2.289
2015	824,835,491	640,756,876	0.777	2.912
			Average Differential ^	2.078

(a)	Indicated Differential in Standard Pure Premium Based on Experience	2.078
(b)	Current Impact of Standard Pure Premium Programs@	1.939
(c)	Indicated Change in Assigned Risk Pure Premium Differential = (a)/(b)	1.072

* Developed to fifth report and brought to the 4/1/2017 pure premium level.
** Developed to ultimate and brought to the 1/1/2017 benefit level.
^ This is the indicated pure premium differential based on loss experience, calculated by comparing the ratio of assigned risk losses to premium to the ratio of statewide losses to premium.
@ This is composed of an ARAP impact equal to 1.8% and a differential of 1.905. ARAP impact from Exhibit II-E, Sheet 9.

North Carolina - Assigned Risk

(Residual Market)

Policy Year	(1) Standard Premium*	(2) On-level Factor^	(3) Effect of Current Standard Premium Programs#	(4) = (1) x ((2) / (3)) Stand. Pure Prem. at Current Level
2006	$120,981,280	0.672	1.983	$41,012,654
2007	110,597,004	0.613	1.960	34,616,862
2008	74,523,271	0.575	1.937	22,133,411
2009	51,875,715	0.575	1.939	15,407,087
2010	41,420,794	0.578	1.935	12,384,817
2011	40,419,233	0.567	1.951	11,761,997
2012	55,544,497	0.573	1.953	16,274,538
2013	72,887,282	0.570	1.966	21,137,312
2014	79,209,342	0.547	1.960	22,099,406
2015	82,393,271	0.557	1.955	23,482,082

Policy Year	(5) Ind. Losses Paid+Case	(6) Development Factor	(7) On-level Factor^	(8) = ((5) x (6)) x (7) Adjusted Ind. Losses
2006	$36,100,513	1.031	1.020	$37,964,022
2007	31,441,095	1.033	1.014	32,933,352
2008	18,043,995	1.036	1.010	18,880,515
2009	11,346,360	1.043	1.004	11,881,590
2010	10,044,386	1.056	1.002	10,628,086
2011	11,553,432	1.075	1.015	12,606,238
2012	13,849,995	1.101	1.015	15,477,577
2013	19,930,610	1.155	1.011	23,273,073
2014	17,770,454	1.281	1.007	22,923,300
2015	15,039,981	1.708	1.003	25,765,353

Policy Year	(9) Med. Losses Paid+Case	(10) Development Factor	(11) On-level Factor^	(12) = ((9) x (10)) x (11) Adjusted Med. Losses
2006	$39,758,392	1.072	0.924	$39,381,800
2007	38,936,598	1.076	0.924	38,711,700
2008	17,549,797	1.078	0.924	17,480,861
2009	12,758,988	1.083	0.924	12,767,817
2010	6,400,911	1.093	0.925	6,471,481
2011	13,544,436	1.102	0.930	13,881,150
2012	19,668,966	1.112	0.932	20,384,601
2013	28,622,902	1.132	0.946	30,651,464
2014	16,601,070	1.159	0.964	18,547,977
2015	23,327,851	1.184	0.991	27,371,594

* Developed to a fifth report. See Exhibit II-E, Sheet 7.
^ See Appendix A-I for the derivation of the factors for policy years 2014 and 2015. Factors for the remaining years are calculated in a similar manner.
# This is composed of a differential of 1.905 and year-specific ARAP impacts which are displayed on Exhibit II-E, Sheet 9.

North Carolina - Assigned Risk

(Statewide Market)

Policy Year	(1) Voluntary Standard Premium*	(2) Assigned Risk Standard Premium**	(3) = (1) + (2) Standard Pure Premium On-level
2006	$641,465,724	$41,012,654	$682,478,378
2007	704,816,391	34,616,862	739,433,253
2008	667,499,943	22,133,411	689,633,354
2009	627,293,968	15,407,087	642,701,055
2010	653,369,990	12,384,817	665,754,807
2011	682,620,104	11,761,997	694,382,101
2012	688,538,193	16,274,538	704,812,731
2013	715,671,122	21,137,312	736,808,434
2014	754,984,014	22,099,406	777,083,420
2015	801,353,409	23,482,082	824,835,491

Policy Year	(4) Ind. Losses Paid+Case	(5) Development Factor	(6) On-level Factor^	(7) = ((4) x (5)) x (6) Adjusted Ind. Losses
2006	$388,923,045	1.031	1.020	$408,999,252
2007	430,494,428	1.033	1.014	450,926,554
2008	389,663,026	1.036	1.010	407,727,804
2009	357,300,809	1.043	1.004	374,155,403
2010	358,697,766	1.056	1.002	379,542,411
2011	336,244,595	1.075	1.015	366,884,884
2012	299,585,273	1.101	1.015	334,791,037
2013	286,745,116	1.155	1.011	334,833,706
2014	261,251,388	1.281	1.007	337,005,669
2015	198,235,194	1.708	1.003	339,601,468

Policy Year	(8) Med. Losses Paid+Case	(9) Development Factor	(10) On-level Factor^	(11) = ((8) x (9)) x (10) Adjusted Med. Losses
2006	$324,237,059	1.072	0.924	$321,165,885
2007	376,921,340	1.076	0.924	374,744,242
2008	323,897,067	1.078	0.924	322,624,799
2009	305,583,917	1.083	0.924	305,795,381
2010	324,876,785	1.093	0.925	328,458,552
2011	325,495,634	1.102	0.930	333,587,456
2012	308,630,717	1.112	0.932	319,859,937
2013	271,944,906	1.132	0.946	291,218,186
2014	268,350,481	1.159	0.964	299,821,552
2015	256,664,208	1.184	0.991	301,155,408

* Developed to a fifth report and on current premium level. See Exhibit II-E, Sheet 8.
** Developed to a fifth report and on current premium level. See Exhibit II-E, Sheet 5.
^ See Appendix A-I for the derivation of the factors for policy years 2014 and 2015.
Factors for the remaining years are calculated in a similar manner.

North Carolina - Assigned Risk
(Residual Market)

Section A - Assigned Risk Premium Development Factors

Policy Year	Standard Premium for Matching Companies		Development Factor
	1st Report	2nd Report	
2012	54,153,884	55,600,837	1.027
2013	71,426,840	72,164,317	1.010
2014	79,232,498	78,893,767	0.996
Average			1.011
	2nd Report	3rd Report	
2011	40,297,146	40,387,367	1.002
2012	55,600,837	55,647,940	1.001
2013	72,164,317	72,887,282	1.010
Average			1.004
	3rd Report	4th Report	
2010	41,293,589	41,395,985	1.002
2011	40,387,367	40,425,626	1.001
2012	55,647,940	55,544,497	0.998
Average			1.000
	4th Report	5th Report	
2009	51,846,292	51,874,260	1.001
2010	41,395,985	41,410,566	1.000
2011	40,425,626	40,419,233	1.000
Average			1.000

Three-year average premium development factors

1st/5th	2nd/5th	3rd/5th	4th/5th
1.015	1.004	1.000	1.000

Section B - Calculation of Developed Assigned Risk Standard Premium

Policy Year	Standard Premium	Development Factor	Developed Premium
2006	120,981,280	1.000	120,981,280
2007	110,597,004	1.000	110,597,004
2008	74,523,271	1.000	74,523,271
2009	51,875,715	1.000	51,875,715
2010	41,420,794	1.000	41,420,794
2011	40,419,233	1.000	40,419,233
2012	55,544,497	1.000	55,544,497
2013	72,887,282	1.000	72,887,282
2014	78,893,767	1.004	79,209,342
2015	81,175,636	1.015	82,393,271

North Carolina - Assigned Risk
(Statewide Market)

Section A - Voluntary Premium Development Factors

Policy Year	Standard Premium for Matching Companies		Development Factor
	1st Report	2nd Report	
2012	925,994,089	934,716,487	1.009
2013	952,983,797	963,648,312	1.011
2014	1,000,624,572	1,014,606,699	1.014
Average			1.011
	2nd Report	3rd Report	
2011	922,858,241	922,700,524	1.000
2012	938,795,253	938,409,077	1.000
2013	963,514,566	963,084,452	1.000
Average			1.000
	3rd Report	4th Report	
2010	907,163,369	907,110,381	1.000
2011	922,500,057	922,539,666	1.000
2012	937,132,860	936,786,716	1.000
Average			1.000
	4th Report	5th Report	
2009	946,315,133	946,027,224	1.000
2010	911,949,932	912,278,615	1.000
2011	920,094,215	920,049,211	1.000
Average			1.000

Three-year average premium development factors

1st/5th	2nd/5th	3rd/5th	4th/5th
1.011	1.000	1.000	1.000

Section B - Calculation of Developed and On-leveled Voluntary Standard Premiu

Policy Year	Standard Premium	Development Factor	Voluntary On-level Factor*	Voluntary Prem Dev't & On-level
2006	895,901,849	1.000	0.716	641,465,724
2007	1,063,071,479	1.000	0.663	704,816,391
2008	1,039,719,537	1.000	0.642	667,499,943
2009	951,887,660	1.000	0.659	627,293,968
2010	915,084,019	1.000	0.714	653,369,990
2011	927,472,967	1.000	0.736	682,620,104
2012	938,062,933	1.000	0.734	688,538,193
2013	963,218,199	1.000	0.743	715,671,122
2014	1,014,763,460	1.000	0.744	754,984,014
2015	1,044,314,137	1.011	0.759	801,353,409

* See Appendix A-I for the derivation of the figures for policy years 2014 and 2015.

North Carolina - Assigned Risk

Impact of the Assigned Risk Adjustment Program*

Based on Assigned Risk Data for Policies with Effective Dates in 2016

Type of Risk	(1) Experience Modified Premium	(2) ARAP Premium	(3) ARAP Impact (2) / (1)
Risks with Credit Mods	$6,896,542	$6,896,542	1.000
Risks with Debit Mods	5,534,468	6,903,287	1.247
Risks with Mods of 1.00	29,296	29,296	1.000
Risks with No Mods	62,968,236	62,968,236	1.000
Totals	$75,428,542	$76,797,361	1.018

Historical Impacts of the Assigned Risk Adjustment Program

Policy Year	ARAP Impact
2006	1.041
2007	1.029
2008	1.017
2009	1.018
2010	1.016
2011	1.024
2012	1.025
2013	1.032
2014	1.029
2015	1.026

* Source: North Carolina Rate Bureau

North Carolina - Assigned Risk

Uncollectible Premium Provision

Section 1 - Gross Premium as of 12/31/2016 - Traumatic Only (000s)

Policy Year	1st	2nd	3rd	4th	5th	6th	7th	8th	Ultimate Gross
2005						98,901	98,892	98,883	98,883
2006					86,384	86,384	86,379	86,381	86,381
2007				81,916	81,963	81,968	81,979	81,978	81,978
2008			55,473	55,456	55,431	55,456	55,470	55,484	55,484
2009		37,700	37,324	37,363	37,388	37,391	37,393		37,393
2010	27,467	27,292	27,350	27,460	27,486	27,487			27,487
2011	30,406	29,958	29,964	29,962	29,960				29,960
2012	44,773	45,425	45,592	45,469					45,514
2013	61,228	62,178	63,011						63,074
2014	58,723	58,063							58,237
2015	62,522								62,647

Policy Year	1 / 2	2 / 3	3 / 4	4 / 5	5 / 6	6 / 7	7 / 8	8 / Ult
2005						1.000	1.000	
2006					1.000	1.000	1.000	
2007				1.001	1.000	1.000	1.000	
2008			1.000	1.000	1.000	1.000	1.000	
2009		0.990	1.001	1.001	1.000	1.000		
2010	0.994	1.002	1.004	1.001	1.000			
2011	0.985	1.000	1.000	1.000				
2012	1.015	1.004	0.997					
2013	1.016	1.013						
2014	0.989							
5-Yr Avg x H/L	0.999	1.002	1.000	1.001	1.000	1.000	1.000	
Selected	0.999	1.002	1.000	1.001	1.000	1.000	1.000	1.000
Ultimate	1.002	1.003	1.001	1.001	1.000	1.000	1.000	1.000

Section 2 - Collected Premium as of 12/31/2016 - Traumatic Only (000s)

Policy Year	1st	2nd	3rd	4th	5th	6th	7th	8th	Ultimate Collected	Uncollected/ Gross
2005						91,310	91,232	91,288	91,288	7.7%
2006					77,192	77,078	77,165	77,197	77,197	10.6%
2007				67,337	67,522	67,589	67,634	67,692	67,692	17.4%
2008			48,126	48,373	48,444	48,492	48,530	48,540	48,540	12.5%
2009		33,352	33,304	33,482	33,537	33,585	33,581		33,614	10.1%
2010	25,817	24,884	25,078	25,124	25,242	25,230			25,280	8.0%
2011	28,976	27,566	26,525	26,706	26,727				26,808	10.5%
2012	42,451	40,444	41,616	41,757					41,965	7.8%
2013	58,222	56,917	58,070						58,593	7.1%
2014	56,754	55,302							56,297	3.3%
2015	59,850								58,712	6.3%

Policy Year	1 / 2	2 / 3	3 / 4	4 / 5	5 / 6	6 / 7	7 / 8	8 / Ult
2005						0.999	1.001	
2006					0.999	1.001	1.000	
2007				1.003	1.001	1.001	1.001	
2008			1.005	1.001	1.001	1.001	1.000	
2009		0.999	1.005	1.002	1.001	1.000		
2010	0.964	1.008	1.002	1.005	1.000			
2011	0.951	0.962	1.007	1.001				
2012	0.953	1.029	1.003					
2013	0.978	1.020						
2014	0.974							
5-Yr Avg x H/L	0.964	1.009	1.004	1.002	1.001	1.001	1.001	
Selected	0.964	1.009	1.004	1.002	1.001	1.001	1.001	1.000
Ultimate	0.981	1.018	1.009	1.005	1.003	1.002	1.001	1.000

3-Yr Avg	5.6%
5-Yr Avg	7.0%
10-Yr Avg	9.4%
Selected	9.0%

Source: Residual Market data reported to NCCI by Pool servicing carriers.

North Carolina - Assigned Risk

Uncollectible Premium Provision

1. Selected Uncollectible Premium Provision	9.0%
2. Expense Components Calculated as a Percentage of Collected Premium	
A. Commission and Brokerage	5.0%
B. Servicing Carrier Allowance	19.02%
C. Total (A + B)	24.02%
3. Uncollectible Premium Provision Adjustment Factor (1.000 - 2C)	0.760
4. Adjusted Uncollectible Premium Provision (1 x 3)	6.8%

North Carolina - Assigned Risk

Factor to Convert Loss Costs to Assigned Risk Rates

For all classification codes, the proposed loss cost multiplier of 2.695 is applied to the advisory loss costs (contained in the Rate Bureau's Loss Costs Reference Filing proposed effective April 1, 2018) in order to convert to assigned risk rates. Please refer to Exhibit I-A, Sheet 1 for more information on the development of this factor.

Effective April 1, 2018

APPLICABLE TO ASSIGNED RISK POLICIES ONLY

CLASS CODE	RATE	MIN PREM	ELR	D RATIO	CLASS CODE	RATE	MIN PREM	ELR	D RATIO	CLASS CODE	RATE	MIN PREM	ELR	D RATIO
0005	6.01	1362	1.39	0.31	2003	6.23	1406	1.43	0.31	2705X*	127.96	1500	26.04	0.25
0008	5.07	1174	1.11	0.28	2014	9.78	1500	2.00	0.25	2709	16.82	1500	3.42	0.25
0016	13.72	1500	2.82	0.25	2016	4.47	1054	1.07	0.35	2710	15.98	1500	3.08	0.22
0034	7.06	1500	1.63	0.31	2021	3.45	850	0.75	0.28	2714	7.79	1500	1.87	0.35
0035	4.12	984	0.99	0.35	2039	3.85	930	0.92	0.35	2727X	17.41	1500	3.55	0.25
0036	8.68	1500	2.00	0.31	2041	4.55	1070	1.09	0.35	2731	7.47	1500	1.53	0.25
0037	7.36	1500	1.62	0.28	2065	5.07	1174	1.17	0.31	2735	7.25	1500	1.74	0.35
0042	9.68	1500	2.13	0.28	2070	8.84	1500	2.04	0.31	2759	10.13	1500	2.43	0.35
0050	9.94	1500	2.29	0.31	2081	4.99	1158	1.15	0.31	2790	3.10	780	0.74	0.35
0059D	0.70	–	0.06	0.20	2089	4.42	1044	1.01	0.31	2791	–	–	1.67	0.35
0065D	0.16	–	0.02	0.25	2095	6.33	1426	1.46	0.31	2797	9.78	1500	2.26	0.31
0066D	0.16	–	0.02	0.25	2105	6.87	1500	1.65	0.35	2799	12.94	1500	2.84	0.28
0067D	0.16	–	0.02	0.25	2110	3.93	946	0.94	0.35	2802	9.62	1500	2.12	0.28
0079	6.04	1368	1.23	0.25	2111	5.39	1238	1.29	0.35	2835	4.69	1098	1.20	0.38
0083	6.95	1500	1.61	0.31	2112	6.17	1394	1.48	0.35	2836	3.50	860	0.89	0.38
0106	30.64	1500	5.90	0.22	2114	4.90	1140	1.18	0.35	2841	6.95	1500	1.67	0.35
0113	9.08	1500	2.10	0.31	2121	2.53	666	0.59	0.31	2881	7.38	1500	1.89	0.38
0170	4.93	1146	1.14	0.31	2130	3.67	894	0.85	0.31	2883	7.30	1500	1.68	0.31
0251	7.03	1500	1.62	0.31	2131	4.72	1104	1.09	0.31	2913	–	–	1.68	0.31
0400	–	–	0.91	0.28	2143	3.93	946	0.95	0.35	2915	4.72	1104	1.03	0.28
0401	18.97	A	3.66	0.22	2157	6.63	1486	1.52	0.31	2916	6.93	1500	1.33	0.22
0771N	0.73	–	–	–	2172	2.80	720	0.61	0.28	2923	4.20	1000	1.01	0.35
0908P	270.00	430	62.37	0.31	2174	5.63	1286	1.35	0.35	2942	–	–	0.48	0.38
0913P	1304.00	1464	301.40	0.31	2211	14.61	1500	2.98	0.25	2960	7.01	1500	1.61	0.31
0917	9.16	1500	2.20	0.35	2220	3.83	926	0.88	0.31	3004	2.48	656	0.51	0.25
1005	11.62	1500	2.00	0.20	2286	2.75	710	0.66	0.35	3018	7.55	1500	1.54	0.25
1164	10.46	1500	1.80	0.20	2288	8.25	1500	1.98	0.35	3022	11.62	1500	2.78	0.35
1165XD	4.98	1156	0.95	0.22	2300	–	–	0.94	0.31	3027	4.23	1006	0.86	0.25
1320	3.88	936	0.75	0.22	2302	3.18	796	0.73	0.31	3028	4.66	1092	1.08	0.31
1322	17.19	1500	3.30	0.22	2305	4.53	1066	0.99	0.28	3030	10.97	1500	2.24	0.25
1430	9.51	1500	1.94	0.25	2361	3.88	936	0.90	0.31	3040	11.29	1500	2.30	0.25
1438	7.14	1500	1.37	0.22	2362	3.53	866	0.82	0.31	3041	7.63	1500	1.76	0.31
1452	4.31	1022	0.88	0.25	2380	3.96	952	0.92	0.31	3042	5.58	1276	1.22	0.28
1463	13.83	1500	2.66	0.22	2386	–	–	0.94	0.31	3064	8.76	1500	2.03	0.31
1470	–	–	0.82	0.22	2388	3.05	770	0.73	0.35	3069	–	–	1.17	0.31
1472	4.26	1012	0.82	0.22	2402	6.82	1500	1.40	0.25	3076	5.07	1174	1.17	0.31
1473	–	–	0.82	0.22	2413	5.07	1174	1.17	0.31	3081D	6.92	1500	1.39	0.25
1474	–	–	0.82	0.22	2416	3.96	952	0.91	0.31	3082D	7.17	1500	1.45	0.25
1624D	6.63	1486	1.26	0.22	2417	2.37	634	0.54	0.31	3085D	7.14	1500	1.43	0.25
1642	4.47	1054	0.91	0.25	2501	4.10	980	0.94	0.31	3110	7.38	1500	1.70	0.31
1654	27.95	1500	5.66	0.26	2503	2.37	634	0.57	0.35	3111	5.17	1194	1.19	0.31
1655	–	–	0.91	0.25	2534	–	–	0.94	0.31	3113	3.37	834	0.77	0.31
1699	6.12	1384	1.25	0.25	2570	6.55	1470	1.56	0.35	3114	4.02	964	0.93	0.31
1701	6.87	1500	1.40	0.25	2585	6.74	1500	1.61	0.35	3118	3.88	936	0.93	0.35
1710	13.15	1500	2.69	0.25	2586	5.26	1212	1.21	0.31	3119	1.35	430	0.34	0.38
1741DX	7.14	1500	1.07	0.20	2587	4.10	980	0.98	0.35	3122	3.64	888	0.88	0.35
1747	3.31	822	0.68	0.25	2589	4.31	1022	1.00	0.31	3126	3.13	786	0.72	0.31
1748	7.87	1500	1.61	0.25	2600	7.06	1500	1.69	0.35	3131	3.15	790	0.73	0.31
1803D	13.83	1500	2.44	0.22	2623	12.50	1500	2.74	0.28	3132	4.77	1114	1.10	0.31
1852	–	–	0.59	0.20	2651	2.45	650	0.59	0.35	3145	3.10	780	0.71	0.31
1853X	4.34	1028	0.95	0.28	2660	3.75	910	0.90	0.35	3146	4.26	1012	0.99	0.31
1860	–	–	0.94	0.31	2670	2.72	704	0.69	0.38	3169	5.01	1162	1.16	0.31
1924	5.34	1228	1.28	0.35	2683	2.86	732	0.69	0.35	3175	–	–	1.16	0.31
1925	5.66	1292	1.24	0.28	2688	5.71	1302	1.37	0.35	3179	2.96	752	0.71	0.35
2002	4.07	974	0.97	0.35	2702	36.87	1500	6.38	0.20	3180	4.23	1006	1.02	0.35

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3188	3.23	806	0.78	0.35	3865	4.02	964	1.04	0.38	4558	2.40	640	0.55	0.31
3220	3.42	844	0.78	0.31	3881	7.11	1500	1.64	0.31	4568	3.83	926	0.78	0.25
3223	–	–	1.02	0.35	4000	7.71	1500	1.48	0.22	4581	1.40	440	0.27	0.22
3224	5.50	1260	1.31	0.35	4021	9.78	1500	2.00	0.25	4583	9.76	1500	1.88	0.22
3227	5.90	1340	1.41	0.35	4024D	4.60	1080	0.93	0.25	4611	1.13	386	0.27	0.35
3240	6.41	1442	1.54	0.35	4034	10.35	1500	2.12	0.25	4635	5.17	1194	0.89	0.20
3241	6.95	1500	1.60	0.31	4036	5.71	1302	1.17	0.25	4653	3.29	818	0.79	0.35
3255	4.47	1054	1.14	0.38	4038	5.34	1228	1.36	0.38	4665	10.97	1500	2.24	0.25
3257	5.90	1340	1.36	0.31	4053X	4.55	1070	1.05	0.31	4670	12.15	1500	2.48	0.25
3270	4.23	1006	0.98	0.31	4061X	4.39	1038	1.06	0.35	4683	6.58	1476	1.51	0.31
3300	6.06	1372	1.40	0.31	4062	5.09	1178	1.18	0.31	4686	3.37	834	0.68	0.25
3303	5.47	1254	1.31	0.35	4101	5.31	1222	1.17	0.28	4692	1.29	418	0.31	0.35
3307	6.74	1500	1.56	0.31	4109	0.84	328	0.20	0.35	4693	1.89	538	0.44	0.31
3315	7.36	1500	1.76	0.35	4110	1.46	452	0.34	0.31	4703	3.07	774	0.70	0.31
3334	5.74	1308	1.32	0.31	4111	2.13	586	0.51	0.35	4717	3.64	888	0.93	0.38
3336	4.53	1066	0.92	0.25	4113	–	–	0.51	0.35	4720	2.80	720	0.64	0.31
3365	10.67	1500	2.18	0.25	4114	5.90	1340	1.35	0.31	4740	5.28	1216	1.08	0.25
3372	5.85	1330	1.28	0.28	4130	6.39	1438	1.48	0.31	4741	4.96	1152	1.14	0.31
3373	7.17	1500	1.65	0.31	4131	9.94	1500	2.40	0.35	4751	3.42	844	0.70	0.25
3383	2.43	646	0.58	0.35	4133	3.05	770	0.73	0.35	4771N	4.10	1126	0.71	0.20
3385	1.48	456	0.36	0.35	4149	1.46	452	0.37	0.38	4777	5.93	1346	1.02	0.20
3400	5.58	1276	1.22	0.28	4206	4.26	1012	0.98	0.31	4825	1.86	532	0.38	0.25
3507	3.75	910	0.86	0.31	4207	4.20	1000	0.85	0.26	4828	3.26	812	0.72	0.28
3515	4.07	974	0.94	0.31	4239	4.26	1012	0.87	0.25	4829	2.32	624	0.44	0.22
3516	–	–	0.94	0.31	4240	5.36	1232	1.29	0.35	4902	5.52	1264	1.32	0.35
3548	2.37	634	0.55	0.31	4243	3.26	812	0.75	0.31	4923	1.51	462	0.35	0.31
3559	3.72	904	0.86	0.31	4244	3.53	866	0.81	0.31	5020	14.12	1500	2.88	0.25
3574	1.35	430	0.32	0.35	4250	3.75	910	0.86	0.31	5022	15.28	1500	2.94	0.22
3581	1.67	494	0.40	0.35	4251	4.12	984	0.95	0.31	5037	28.00	1500	4.83	0.20
3612	3.05	770	0.66	0.28	4263	5.52	1264	1.28	0.31	5040	12.91	1500	2.23	0.20
3620	8.54	1500	1.75	0.25	4273	4.99	1158	1.15	0.31	5057	11.40	1500	1.97	0.20
3629	3.26	812	0.78	0.35	4279	4.07	974	0.94	0.31	5059	44.20	1500	7.65	0.20
3632	5.15	1190	1.13	0.28	4282	–	–	0.94	0.31	5069	–	–	7.65	0.20
3634	2.83	726	0.68	0.35	4283	2.48	656	0.57	0.31	5102	10.54	1500	2.03	0.22
3635	4.42	1044	1.02	0.31	4299	2.94	748	0.71	0.35	5146	9.68	1500	1.97	0.25
3638	2.70	700	0.64	0.35	4301	–	–	0.94	0.31	5160	4.66	1092	0.90	0.22
3642	2.45	650	0.57	0.31	4304	8.38	1500	1.84	0.28	5183	7.38	1500	1.50	0.25
3643	2.72	704	0.63	0.31	4307	3.13	786	0.80	0.38	5188	9.57	1500	1.95	0.25
3647	3.18	796	0.70	0.28	4351	2.59	678	0.59	0.31	5190	7.73	1500	1.57	0.25
3648	2.16	592	0.52	0.35	4352	2.67	694	0.64	0.35	5191	1.48	456	0.34	0.31
3681	1.48	456	0.36	0.35	4360	2.75	710	0.66	0.35	5192	6.33	1426	1.46	0.31
3685	2.05	570	0.49	0.35	4361	1.91	542	0.46	0.35	5213	16.01	1500	3.08	0.22
3719	2.40	640	0.41	0.20	4410	6.12	1384	1.41	0.31	5215	10.16	1500	2.22	0.28
3724	5.85	1330	1.13	0.22	4417	–	–	1.41	0.31	5221	9.00	1500	1.84	0.25
3726	9.92	1500	1.71	0.20	4420	13.31	1500	2.55	0.22	5222	14.63	1500	2.81	0.22
3803	3.15	790	0.73	0.31	4431	2.67	694	0.68	0.38	5223	13.56	1500	2.77	0.25
3807	3.64	888	0.87	0.35	4432	1.86	532	0.48	0.38	5348	8.89	1500	1.81	0.25
3808	8.52	1500	1.86	0.28	4439	–	–	0.55	0.31	5402	8.49	1500	2.04	0.35
3821	13.48	1500	2.97	0.28	4452	4.45	1050	1.02	0.31	5403	13.26	1500	2.55	0.22
3822X	5.47	1254	1.20	0.28	4459	4.69	1098	1.08	0.31	5437	10.19	1500	2.07	0.25
3824X	6.52	1464	1.43	0.28	4470	3.72	904	0.85	0.31	5443	7.71	1500	1.78	0.31
3826	1.35	430	0.31	0.31	4484	4.37	1034	1.01	0.31	5445	19.59	1500	3.77	0.22
3827	2.83	726	0.62	0.28	4493	4.26	1012	0.98	0.31	5462	12.83	1500	2.60	0.25
3830	2.10	580	0.46	0.28	4511	0.94	348	0.20	0.28	5472	12.59	1500	2.17	0.20
3851	4.90	1140	1.17	0.35	4557	4.02	964	0.97	0.35	5473	24.77	1500	4.28	0.20

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5474	13.74	1500	2.65	0.22	6872F	24.17	1500	3.76	0.17	7529X	33.69	1500	5.81	0.20
5478	6.28	1416	1.27	0.25	6874F	38.43	1500	5.93	0.18	7538	18.08	1500	3.12	0.20
5479	13.93	1500	3.06	0.28	6882	7.36	1500	1.27	0.20	7539	3.37	834	0.65	0.22
5480	11.13	1500	2.14	0.22	6884	9.08	1500	1.56	0.20	7540	9.46	1500	1.64	0.20
5491	4.99	1158	0.96	0.22	7016M	7.30	1500	1.26	0.20	7580	6.17	1394	1.26	0.25
5506	14.18	1500	2.45	0.20	7024M	8.11	1500	1.40	0.20	7590	7.17	1500	1.57	0.28
5507	7.71	1500	1.48	0.22	7038M	10.03	1500	1.75	0.19	7600	10.32	1500	2.11	0.25
5508	18.70	1500	3.79	0.26	7046M	12.99	1500	2.24	0.20	7601	–	–	2.11	0.25
5535	13.29	1500	2.71	0.25	7047M	13.91	1500	2.28	0.20	7605	4.88	1136	0.99	0.25
5537	10.56	1500	2.15	0.25	7050M	19.08	1500	3.16	0.19	7610	1.24	408	0.27	0.28
5551	38.75	1500	6.71	0.20	7090M	11.13	1500	1.94	0.19	7611	–	–	2.11	0.25
5606	2.34	628	0.45	0.22	7098M	14.45	1500	2.49	0.20	7612	–	–	2.11	0.25
5610	13.72	1500	3.16	0.31	7099M	24.77	1500	4.06	0.20	7613	–	–	2.11	0.25
5645	32.99	1500	6.36	0.22	7133	6.93	1500	1.34	0.22	7705	13.34	1500	2.92	0.28
5651	–	–	6.36	0.22	7151M	8.41	1500	1.62	0.22	7710	7.09	1500	1.36	0.22
5703	27.70	1500	5.66	0.25	7152M	16.04	1500	2.95	0.22	7711	7.09	1500	1.36	0.22
5705	68.72	1500	14.09	0.25	7153M	9.35	1500	1.81	0.22	7720X	4.39	1038	0.89	0.25
5951	0.62	284	0.15	0.35	7219	17.19	1500	3.30	0.22	7723X	5.04	1168	0.87	0.20
6003	17.14	1500	3.48	0.25	7222X	14.39	1500	2.92	0.25	7855	6.74	1500	1.37	0.25
6005	13.23	1500	2.69	0.25	7225	14.66	1500	2.98	0.25	8001	4.50	1060	1.08	0.35
6017	–	–	3.08	0.22	7228	–	–	3.30	0.22	8002	3.80	920	0.88	0.31
6018	5.85	1330	1.18	0.26	7229	–	–	3.30	0.22	8006	5.31	1222	1.23	0.31
6045	10.08	1500	2.04	0.26	7230X	20.75	1500	4.53	0.28	8008	2.43	646	0.58	0.35
6204	19.59	1500	3.77	0.22	7231	15.74	1500	3.43	0.28	8010	2.94	748	0.71	0.35
6206	6.17	1394	1.06	0.20	7232X	18.95	1500	3.63	0.22	8013	0.78	316	0.18	0.31
6213	3.93	946	0.75	0.22	7309F	25.60	1500	3.97	0.17	8015	2.08	576	0.48	0.31
6214	4.39	1038	0.76	0.20	7313F	8.68	1500	1.35	0.18	8017	2.94	748	0.71	0.35
6216	12.40	1500	2.13	0.20	7317F	24.71	1500	3.79	0.18	8018	4.53	1066	1.09	0.35
6217	11.43	1500	2.20	0.22	7323	–	–	1.67	0.18	8021	4.29	1018	0.99	0.31
6229	11.78	1500	2.28	0.22	7327F	37.57	1500	5.88	0.17	8031	6.44	1448	1.49	0.31
6233	4.42	1044	0.85	0.22	7333M	6.20	1400	1.06	0.20	8032	3.83	926	0.92	0.35
6235	10.70	1500	1.84	0.20	7335M	6.90	1500	1.18	0.20	8033	2.91	742	0.67	0.31
6236	16.14	1500	3.29	0.25	7337M	11.83	1500	1.92	0.20	8037	4.99	1158	1.19	0.35
6237	3.69	898	0.75	0.25	7350F	28.73	1500	4.84	0.20	8039	3.05	770	0.73	0.35
6251D	10.59	1500	2.01	0.22	7360	9.24	1500	1.88	0.25	8044	6.44	1448	1.41	0.28
6252D	8.89	1500	1.52	0.20	7370	9.94	1500	2.29	0.31	8045	1.29	418	0.31	0.35
6260	–	–	2.01	0.22	7380	10.00	1500	2.18	0.28	8046	4.23	1006	0.98	0.31
6306	10.29	1500	1.98	0.22	7382	9.54	1500	2.20	0.31	8047	2.02	564	0.48	0.35
6319	9.54	1500	1.84	0.22	7390	8.54	1500	1.96	0.31	8058	5.36	1232	1.24	0.31
6325	10.51	1500	2.02	0.22	7394M	6.17	1394	1.06	0.20	8072	1.70	500	0.41	0.35
6400	11.53	1500	2.53	0.28	7395M	6.85	1500	1.18	0.20	8102	3.05	770	0.73	0.35
6503	3.50	860	0.84	0.35	7398M	11.72	1500	1.92	0.20	8103	4.15	990	0.91	0.28
6504	5.04	1168	1.21	0.35	7402	0.24	208	0.06	0.31	8105	–	–	1.09	0.35
6702M*	8.19	1500	1.67	0.25	7403	9.54	1500	1.95	0.25	8106	8.00	1500	1.63	0.25
6703M*	15.60	1500	3.01	0.25	7405N	5.15	1500	1.05	0.25	8107	6.33	1426	1.29	0.25
6704M*	9.11	1500	1.85	0.25	7420	17.33	1500	2.96	0.20	8111	3.96	952	0.91	0.31
6801F	6.14	1388	1.08	0.23	7421	1.35	430	0.26	0.22	8116	4.82	1124	1.11	0.31
6811	11.13	1500	2.26	0.25	7422	3.37	834	0.58	0.20	8203	11.99	1500	2.77	0.31
6824F	21.37	1500	3.63	0.20	7425	4.58	1076	0.78	0.20	8204	8.73	1500	1.78	0.25
6826F	9.03	1500	1.57	0.24	7431N	2.26	762	0.39	0.20	8209	6.04	1368	1.39	0.31
6834	5.82	1324	1.27	0.28	7445N	1.72	–	–	–	8215	6.12	1384	1.25	0.25
6836	7.25	1500	1.48	0.25	7453N	0.75	–	–	–	8227	9.03	1500	1.56	0.20
6843F	17.76	1500	2.76	0.17	7502	4.82	1124	0.98	0.25	8232	8.09	1500	1.65	0.25
6845F	16.41	1500	2.55	0.17	7515	1.97	554	0.34	0.20	8233	5.58	1276	1.13	0.26
6854	10.00	1500	1.72	0.20	7520	5.98	1356	1.38	0.31	8235	8.49	1500	1.96	0.31

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8236X	11.48	1500	2.34	0.25	8856	0.57	274	0.13	0.31					
8263	13.31	1500	2.93	0.28	8864X	2.32	624	0.53	0.31					
8264	8.62	1500	1.76	0.25	8868	1.00	360	0.24	0.35					
8265	14.07	1500	2.71	0.22	8869	2.21	602	0.53	0.35					
8279	15.66	1500	3.04	0.21	8871	0.16	192	0.04	0.35					
8288	11.78	1500	2.41	0.25	8901	0.35	230	0.08	0.28					
8291X	7.90	1500	1.74	0.28	9012	1.91	542	0.42	0.28					
8292X	7.28	1500	1.67	0.31	9014	5.66	1292	1.31	0.31					
8293X	19.16	1500	3.90	0.25	9015	5.69	1298	1.31	0.31					
8304	10.24	1500	2.09	0.25	9016	4.88	1136	1.13	0.31					
8350	13.02	1500	2.50	0.22	9019	3.31	822	0.68	0.25					
8380	4.82	1124	1.05	0.28	9033	3.91	942	0.90	0.31					
8381	3.64	888	0.80	0.28	9040	6.28	1416	1.51	0.35					
8385	3.99	958	0.81	0.25	9044	2.59	678	0.62	0.35					
8392	4.47	1054	1.04	0.31	9052	3.72	904	0.89	0.35					
8393	2.96	752	0.68	0.31	9058	2.80	720	0.72	0.38					
8500	10.00	1500	2.04	0.25	9060	2.32	624	0.56	0.35					
8601	0.70	300	0.15	0.28	9061	1.83	526	0.47	0.38					
8602	2.86	732	0.63	0.28	9062	2.48	656	0.63	0.38					
8603	0.11	182	0.03	0.31	9063	1.72	504	0.42	0.35					
8606	4.18	996	0.80	0.22	9077F	4.82	1124	0.91	0.30					
8709F	10.70	1500	1.66	0.17	9082	2.37	634	0.60	0.38					
8710	–	–	0.78	0.26	9083	2.45	650	0.63	0.38					
8719	5.01	1162	0.86	0.20	9084	2.80	720	0.65	0.31					
8720	2.51	662	0.51	0.25	9089	2.40	640	0.58	0.35					
8721	0.65	290	0.13	0.25	9093	2.70	700	0.65	0.35					
8723	0.32	224	0.08	0.31	9101	6.04	1368	1.45	0.35					
8725	4.90	1140	1.00	0.25	9102	5.98	1356	1.38	0.31					
8726F	5.42	1244	0.95	0.24	9154	3.34	828	0.77	0.31					
8734M	0.86	332	0.18	0.25	9156	3.96	952	0.87	0.28					
8737M	0.78	316	0.16	0.25	9170	15.85	1500	2.74	0.20					
8738M	1.51	462	0.29	0.25	9178	12.67	1500	3.25	0.38					
8742	0.65	290	0.13	0.25	9179	21.02	1500	5.04	0.35					
8745	9.11	1500	2.01	0.28	9180	8.30	1500	1.71	0.25					
8748	1.16	392	0.26	0.28	9182	3.26	812	0.75	0.31					
8755	0.57	274	0.12	0.25	9186	35.68	1500	6.94	0.21					
8799	0.97	354	0.22	0.31	9220	10.91	1500	2.40	0.28					
8800	2.51	662	0.64	0.38	9402	8.62	1500	1.75	0.25					
8803	0.19	198	0.04	0.25	9403	15.12	1500	2.91	0.22					
8805M	0.32	224	0.08	0.31	9410	5.50	1260	1.27	0.31					
8810	0.24	208	0.06	0.31	9501	6.41	1442	1.41	0.28					
8814M	0.30	220	0.07	0.31	9505	10.51	1500	2.30	0.28					
8815M	0.57	274	0.13	0.31	9516	7.87	1500	1.60	0.25					
8820	0.24	208	0.05	0.28	9519	7.82	1500	1.59	0.25					
8824	5.96	1352	1.43	0.35	9521	8.87	1500	1.81	0.25					
8825	3.10	780	0.80	0.38	9522	3.23	806	0.75	0.31					
8826	5.17	1194	1.19	0.31	9534	11.00	1500	2.11	0.22					
8831	2.37	634	0.55	0.31	9554	22.50	1500	4.34	0.22					
8832	0.70	300	0.16	0.31	9586	0.94	348	0.24	0.38					
8833	2.40	640	0.55	0.31	9600	4.02	964	0.96	0.35					
8835	5.50	1260	1.27	0.31	9620	2.21	602	0.48	0.28					
8842X	4.04	968	0.93	0.31										
8848X	5.96	1352	1.37	0.31										
8849X	5.15	1190	1.19	0.31										
8855	0.27	214	0.06	0.31										

* Refer to the Footnotes Page for additional information on this class code.

Effective April 1, 2018
APPLICABLE TO ASSIGNED RISK POLICIES ONLY

FOOTNOTES

A Minimum Premium $100 per ginning location for policy minimum premium computation.

D Rate for classification already includes the specific disease loading shown in the table below. See ***Basic Manual*** Rule 3-A-7.

Code No.	Disease Loading	Symbol	Code No.	Disease Loading	Symbol	Code No.	Disease Loading	Symbol
0059D	0.70	S	1624D	0.05	S	3085D	0.13	S
0065D	0.16	S	1741DX	0.97	S	4024D	0.05	S
0066D	0.16	S	1803D	1.16	S	6251D	0.05	S
0067D	0.16	S	3081D	0.13	S	6252D	0.08	S
1165XD	0.05	S	3082D	0.11	S			

S=Silica

F Rate provides for coverage under the United States Longshore and Harbor Workers Compensation Act and its extensions. Rate includes a provision for USL&HW Assessment.

M Risks are subject to Admiralty Law or Federal Employers Liability Act (FELA). However, the published rate is for risks that voluntarily purchase standard workers compensation and employers liability coverage. A provision for the USL&HW Assessment is included for those classifications under Program II USL Act. The listed codes of 6702, 6703, 6704, 7151, 7152, 7153, 8734, 8737, 8738, 8805, 8814, and 8815 under the Federal Employers' Liability Act (FELA) for employees of interstate railroads are not applicable in the residual market.

N This code is part of a ratable / non-ratable group shown below. The statistical non-ratable code and corresponding rate are applied in addition to the basic classification when determining premium.

Class Code	Non-Ratable Element Code
4771	0771
7405	7445
7431	7453

P Classification is computed on a per capita basis.

X Refer to special classification phraseology in these pages which is applicable in this state.

*** Class Codes with Specific Footnotes**

2705 An upset payroll of $4.00 per cord shall be used for premium computation purposes in all instances.

6702 Rate and rating values only appropriate for laying or relaying of tracks or maintenance of way - no work on elevated railroads. Otherwise, assign appropriate construction or erection code rate and elr each x 1.215.

6703 Rate and rating values only appropriate for laying or relaying of tracks or maintenance of way - no work on elevated railroads. Otherwise, assign appropriate construction or erection class rate x 2.314 and elr x 2.199.

6704 Rate and rating values only appropriate for laying or relaying of tracks or maintenance of way - no work on elevated railroads. Otherwise, assign appropriate construction or erection class rate and elr each x 1.35.

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APPLICABLE TO ASSIGNED RISK POLICIES ONLY

MISCELLANEOUS VALUES

Basis of premium applicable in accordance with ***Basic Manual*** footnote instructions for Code 7370 -- "Taxicab Co.":

Employee operated vehicle	$69,300
Leased or rented vehicle	$46,200

Catastrophe (other than Certified Acts of Terrorism) - (Assigned Risk) $0.01

Expense Constant applicable in accordance with ***Basic Manual*** Rule 3-A-10 $160

Loss Sensitive Rating Plan (LSRP) - The factors which are used in the calculation of the LSRP are as follows:

Basic Premium Factor	0.40
Minimum Premium Factor	0.75
Maximum Premium Factor	1.75
Loss Conversion Factor	1.175
Tax Multiplier	1.027

Loss Development Factors	
1st Adjustment	0.20
2nd Adjustment	0.14
3rd Adjustment	0.10
4th Adjustment	0.07

Maximum Weekly Payroll applicable in accordance with ***Basic Manual*** Rule 2-E-1 -- "Executive Officers" and the ***Basic Manual*** footnote instructions for Code 9178 -- "Athletic Sports or Park: Non-Contact Sports," and Code 9179 -- "Athletic Sports or Park: Contact Sports" $1,800

Minimum Weekly Payroll applicable in accordance with ***Basic Manual*** Rule 2-E-1 -- "Executive Officers" $900

Premium Determination for Partners and Sole Proprietors in accordance with ***Basic Manual*** Rule 2-E-3 (Annual Payroll) $46,200

Premium Reduction Percentages - The following percentages are applicable by deductible amount and hazard group for total losses on a per claim basis:

	Total Losses						
Deductible	**HAZARD GROUP**						
Amount	**A**	**B**	**C**	**D**	**E**	**F**	**G**
$100	0.8%	0.6%	0.5%	0.3%	0.2%	0.2%	0.1%
$200	1.4%	1.1%	0.9%	0.7%	0.5%	0.3%	0.3%
$300	2.0%	1.6%	1.3%	0.9%	0.7%	0.4%	0.4%
$400	2.5%	2.0%	1.6%	1.2%	0.8%	0.6%	0.5%
$500	2.9%	2.3%	1.9%	1.4%	1.0%	0.7%	0.6%
$1,000	4.7%	3.7%	3.1%	2.3%	1.7%	1.2%	1.0%
$1,500	5.9%	4.7%	4.0%	3.0%	2.3%	1.6%	1.4%
$2,000	7.0%	5.6%	4.8%	3.6%	2.8%	2.0%	1.8%
$2,500	7.9%	6.3%	5.4%	4.2%	3.3%	2.4%	2.1%
$5,000	11.4%	9.2%	8.1%	6.5%	5.2%	4.0%	3.4%

Terrorism - (Assigned Risk) $0.01

Effective April 1, 2018
APPLICABLE TO ASSIGNED RISK POLICIES ONLY

MISCELLANEOUS VALUES (cont.)

United States Longshore and Harbor Workers' Compensation Coverage Percentage applicable only in connection with ***Basic Manual*** Rule 3-A-4…… 92%

(Multiply a Non-F classification rate by a factor of 1.92 to adjust for differences in benefits and loss-based expenses. This factor is the product of the adjustment for differences in benefits (1.81) and the adjustment for differences in loss-based expenses (1.06).)

Experience Rating Eligibility

A risk is eligible for experience rating when the payrolls or other exposures developed in the last year or last two years of the experience period produced a premium of at least $10,000. If more than two years, an average annual premium of at least $5,000 is required. These amounts are applicable for ratings effective date April 1, 2016 and subsequent. The ***Experience Rating Plan Manual*** should be referenced for the latest approved eligibility amounts by state.

Effective April 1, 2018

TABLE OF WEIGHTING VALUES APPLICABLE TO ALL POLICIES

Experience Rating Program - ERA

Expected Losses			Weighting Values	Expected Losses			Weighting Values
0	--	2,513	0.04	1,417,068	--	1,495,232	0.44
2,514	--	10,158	0.05	1,495,233	--	1,577,923	0.45
10,159	--	17,967	0.06	1,577,924	--	1,665,545	0.46
17,968	--	25,945	0.07	1,665,546	--	1,758,553	0.47
25,946	--	34,098	0.08	1,758,554	--	1,857,461	0.48
34,099	--	57,032	0.09	1,857,462	--	1,962,850	0.49
57,033	--	84,894	0.10	1,962,851	--	2,075,379	0.50
84,895	--	109,678	0.11	2,075,380	--	2,195,800	0.51
109,679	--	133,808	0.12	2,195,801	--	2,324,974	0.52
133,809	--	157,943	0.13	2,324,975	--	2,463,893	0.53
157,944	--	182,374	0.14	2,463,894	--	2,613,703	0.54
182,375	--	207,268	0.15	2,613,704	--	2,775,738	0.55
207,269	--	232,737	0.16	2,775,739	--	2,951,560	0.56
232,738	--	258,866	0.17	2,951,561	--	3,143,005	0.57
258,867	--	285,725	0.18	3,143,006	--	3,352,255	0.58
285,726	--	313,378	0.19	3,352,256	--	3,581,916	0.59
313,379	--	341,884	0.20	3,581,917	--	3,835,128	0.60
341,885	--	371,302	0.21	3,835,129	--	4,115,710	0.61
371,303	--	401,691	0.22	4,115,711	--	4,428,355	0.62
401,692	--	433,112	0.23	4,428,356	--	4,778,892	0.63
433,113	--	465,628	0.24	4,778,893	--	5,174,655	0.64
465,629	--	499,304	0.25	5,174,656	--	5,625,002	0.65
499,305	--	534,210	0.26	5,625,003	--	6,142,063	0.66
534,211	--	570,422	0.27	6,142,064	--	6,741,849	0.67
570,423	--	608,017	0.28	6,741,850	--	7,445,941	0.68
608,018	--	647,081	0.29	7,445,942	--	8,284,141	0.69
647,082	--	687,706	0.30	8,284,142	--	9,298,800	0.70
687,707	--	729,991	0.31	9,298,801	--	10,552,196	0.71
729,992	--	774,041	0.32	10,552,197	--	12,139,826	0.72
774,042	--	819,972	0.33	12,139,827	--	14,215,951	0.73
819,973	--	867,910	0.34	14,215,952	--	17,047,023	0.74
867,911	--	917,991	0.35	17,047,024	--	21,136,340	0.75
917,992	--	970,365	0.36	21,136,341	--	27,562,400	0.76
970,366	--	1,025,193	0.37	27,562,401	--	39,129,295	0.77
1,025,194	--	1,082,655	0.38	39,129,296	--	66,118,693	0.78
1,082,656	--	1,142,946	0.39	66,118,694	--	201,065,617	0.79
1,142,947	--	1,206,282	0.40	201,065,618		AND OVER	0.80
1,206,283	--	1,272,900	0.41				
1,272,901	--	1,343,065	0.42				
1,343,066	--	1,417,067	0.43				

(a) G	12.00
(b) State Per Claim Accident Limitation	$300,000
(c) State Multiple Claim Accident Limitation	$600,000
(d) USL&HW Per Claim Accident Limitation	$831,500
(e) USL&HW Multiple Claim Accident Limitation	$1,663,000
(f) Employers Liability Accident Limitation	$55,000
(g) Primary/Excess Loss Split Point	$16,500
(h) USL&HW Act -- Expected Loss Factor -- Non-F Classes	1.81

(Multiply a Non-F classification ELR by the USL&HW Act - Expected Loss Factor of 1.81.)

Effective April 1, 2018

TABLE OF BALLAST VALUES
APPLICABLE TO ALL POLICIES

Experience Rating Plan - ERA

Expected Losses			Ballast Values	Expected Losses			Ballast Values	Expected Losses			Ballast Values
0	--	64,546	30,000	2,071,212	--	2,131,177	240,000	4,170,604	--	4,230,594	450,000
64,547	--	111,089	36,000	2,131,178	--	2,191,145	246,000	4,230,595	--	4,290,586	456,000
111,090	--	164,569	42,000	2,191,146	--	2,251,115	252,000	4,290,587	--	4,350,578	462,000
164,570	--	220,985	48,000	2,251,116	--	2,311,086	258,000	4,350,579	--	4,410,570	468,000
220,986	--	278,775	54,000	2,311,087	--	2,371,059	264,000	4,410,571	--	4,470,562	474,000
278,776	--	337,289	60,000	2,371,060	--	2,431,033	270,000	4,470,563	--	4,530,555	480,000
337,290	--	396,227	66,000	2,431,034	--	2,491,008	276,000	4,530,556	--	4,590,547	486,000
396,228	--	455,432	72,000	2,491,009	--	2,550,984	282,000	4,590,548	--	4,650,540	492,000
455,433	--	514,816	78,000	2,550,985	--	2,610,962	288,000	4,650,541	--	4,710,534	498,000
514,817	--	574,324	84,000	2,610,963	--	2,670,940	294,000	4,710,535	--	4,770,527	504,000
574,325	--	633,923	90,000	2,670,941	--	2,730,919	300,000	4,770,528	--	4,830,520	510,000
633,924	--	693,589	96,000	2,730,920	--	2,790,900	306,000	4,830,521	--	4,890,514	516,000
693,590	--	753,308	102,000	2,790,901	--	2,850,881	312,000	4,890,515	--	4,950,508	522,000
753,309	--	813,067	108,000	2,850,882	--	2,910,863	318,000	4,950,509	--	5,010,502	528,000
813,068	--	872,859	114,000	2,910,864	--	2,970,845	324,000	5,010,503	--	5,070,496	534,000
872,860	--	932,677	120,000	2,970,846	--	3,030,829	330,000	5,070,497	--	5,130,490	540,000
932,678	--	992,517	126,000	3,030,830	--	3,090,813	336,000	5,130,491	--	5,190,484	546,000
992,518	--	1,052,375	132,000	3,090,814	--	3,150,797	342,000	5,190,485	--	5,250,479	552,000
1,052,376	--	1,112,248	138,000	3,150,798	--	3,210,782	348,000	5,250,480	--	5,310,473	558,000
1,112,249	--	1,172,134	144,000	3,210,783	--	3,270,768	354,000	5,310,474	--	5,370,468	564,000
1,172,135	--	1,232,031	150,000	3,270,769	--	3,330,754	360,000	5,370,469	--	5,430,463	570,000
1,232,032	--	1,291,937	156,000	3,330,755	--	3,390,741	366,000	5,430,464	--	5,490,458	576,000
1,291,938	--	1,351,852	162,000	3,390,742	--	3,450,728	372,000	5,490,459	--	5,550,453	582,000
1,351,853	--	1,411,774	168,000	3,450,729	--	3,510,716	378,000	5,550,454	--	5,610,448	588,000
1,411,775	--	1,471,702	174,000	3,510,717	--	3,570,704	384,000	5,610,449	--	5,670,443	594,000
1,471,703	--	1,531,636	180,000	3,570,705	--	3,630,692	390,000	5,670,444	--	5,730,000	600,000
1,531,637	--	1,591,575	186,000	3,630,693	--	3,690,681	396,000				
1,591,576	--	1,651,518	192,000	3,690,682	--	3,750,670	402,000				
1,651,519	--	1,711,465	198,000	3,750,671	--	3,810,659	408,000				
1,711,466	--	1,771,415	204,000	3,810,660	--	3,870,649	414,000				
1,771,416	--	1,831,369	210,000	3,870,650	--	3,930,639	420,000				
1,831,370	--	1,891,326	216,000	3,930,640	--	3,990,630	426,000				
1,891,327	--	1,951,285	222,000	3,990,631	--	4,050,620	432,000				
1,951,286	--	2,011,247	228,000	4,050,621	--	4,110,611	438,000				
2,011,248	--	2,071,211	234,000	4,110,612	--	4,170,603	444,000				

For Expected Losses greater than $5,730,000, the Ballast Value can be calculated using the following formula (rounded to the nearest 1):

Ballast = (0.10)(Expected Losses) + 2500(Expected Losses)(12.00) / (Expected Losses + (700)(12.00))

G = 12.00

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
0005	7.13	6.01	-15.7%
0008	5.35	5.07	-5.2%
0016	12.21	13.72	12.4%
0034	8.25	7.06	-14.4%
0035	4.53	4.12	-9.1%
0036	8.98	8.68	-3.3%
0037	8.06	7.36	-8.7%
0042	10.60	9.68	-8.7%
0050	11.83	9.94	-16.0%
0059	0.79	0.70	-11.4%
0065	0.19	0.16	-15.8%
0066	0.19	0.16	-15.8%
0067	0.19	0.16	-15.8%
0079	7.65	6.04	-21.0%
0083	7.46	6.95	-6.8%
0106	41.62	30.64	-26.4%
0113	11.03	9.08	-17.7%
0170	5.93	4.93	-16.9%
0251	8.36	7.03	-15.9%
0401	21.38	18.97	-11.3%
0771	0.87	0.73	-16.1%
0908	314.00	270.00	-14.0%
0913	1461.00	1304.00	-10.7%
0917	10.46	9.16	-12.4%
1005	13.05	11.62	-11.0%
1164	12.97	10.46	-19.4%
1165	5.79	4.98	-14.0%
1320	4.48	3.88	-13.4%
1322	19.58	17.19	-12.2%
1430	12.07	9.51	-21.2%
1438	6.77	7.14	5.5%
1452	5.13	4.31	-16.0%
1463	17.64	13.83	-21.6%
1472	5.57	4.26	-23.5%
1624	6.55	6.63	1.2%
1642	4.86	4.47	-8.0%
1654	42.58	27.95	-34.4%
1699	7.29	6.12	-16.0%
1701	11.44	6.87	-39.9%
1710	12.86	13.15	2.3%
1741	7.51	7.14	-4.9%
1747	3.88	3.31	-14.7%
1748	8.98	7.87	-12.4%
1803	17.53	13.83	-21.1%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
1853	2.89	4.34	50.2%
1924	5.19	5.34	2.9%
1925	6.20	5.66	-8.7%
2002	4.45	4.07	-8.5%
2003	7.81	6.23	-20.2%
2014	9.50	9.78	2.9%
2016	4.64	4.47	-3.7%
2021	4.21	3.45	-18.1%
2039	4.31	3.85	-10.7%
2041	4.89	4.55	-7.0%
2065	6.06	5.07	-16.3%
2070	9.70	8.84	-8.9%
2081	5.49	4.99	-9.1%
2089	5.33	4.42	-17.1%
2095	8.30	6.33	-23.7%
2105	7.62	6.87	-9.8%
2110	4.51	3.93	-12.9%
2111	6.42	5.39	-16.0%
2112	6.83	6.17	-9.7%
2114	5.63	4.90	-13.0%
2121	3.14	2.53	-19.4%
2130	4.31	3.67	-14.8%
2131	5.95	4.72	-20.7%
2143	4.53	3.93	-13.2%
2157	7.81	6.63	-15.1%
2172	3.22	2.80	-13.0%
2174	6.69	5.63	-15.8%
2211	18.16	14.61	-19.5%
2220	5.03	3.83	-23.9%
2286	2.89	2.75	-4.8%
2288	10.13	8.25	-18.6%
2302	3.80	3.18	-16.3%
2305	5.27	4.53	-14.0%
2361	4.18	3.88	-7.2%
2362	3.41	3.53	3.5%
2380	4.67	3.96	-15.2%
2388	3.60	3.05	-15.3%
2402	6.69	6.82	1.9%
2413	5.49	5.07	-7.7%
2416	4.62	3.96	-14.3%
2417	2.81	2.37	-15.7%
2501	4.56	4.10	-10.1%
2503	2.18	2.37	8.7%
2570	7.18	6.55	-8.8%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
2585	7.46	6.74	-9.7%
2586	4.89	5.26	7.6%
2587	5.54	4.10	-26.0%
2589	5.00	4.31	-13.8%
2600	6.39	7.06	10.5%
2623	13.44	12.50	-7.0%
2651	2.87	2.45	-14.6%
2660	4.59	3.75	-18.3%
2670	3.22	2.72	-15.5%
2683	2.54	2.86	12.6%
2688	6.64	5.71	-14.0%
2702	41.73	36.87	-11.6%
2705	152.58	127.96	-16.1%
2709	18.60	16.82	-9.6%
2710	16.60	15.98	-3.7%
2714	8.63	7.79	-9.7%
2727	18.11	17.41	-3.9%
2731	7.67	7.47	-2.6%
2735	9.04	7.25	-19.8%
2759	11.63	10.13	-12.9%
2790	3.33	3.10	-6.9%
2797	9.86	9.78	-0.8%
2799	11.42	12.94	13.3%
2802	10.65	9.62	-9.7%
2835	4.94	4.69	-5.1%
2836	3.77	3.50	-7.2%
2841	7.51	6.95	-7.5%
2881	7.92	7.38	-6.8%
2883	8.14	7.30	-10.3%
2915	4.97	4.72	-5.0%
2916	7.87	6.93	-11.9%
2923	4.72	4.20	-11.0%
2960	8.08	7.01	-13.2%
3004	3.00	2.48	-17.3%
3018	8.11	7.55	-6.9%
3022	16.28	11.62	-28.6%
3027	4.81	4.23	-12.1%
3028	5.38	4.66	-13.4%
3030	11.14	10.97	-1.5%
3040	12.51	11.29	-9.8%
3041	10.05	7.63	-24.1%
3042	6.66	5.58	-16.2%
3064	10.79	8.76	-18.8%
3076	5.65	5.07	-10.3%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
3081	8.95	6.92	-22.7%
3082	7.37	7.17	-2.7%
3085	8.27	7.14	-13.7%
3110	9.67	7.38	-23.7%
3111	5.33	5.17	-3.0%
3113	3.74	3.37	-9.9%
3114	4.34	4.02	-7.4%
3118	4.40	3.88	-11.8%
3119	1.67	1.35	-19.2%
3122	3.85	3.64	-5.5%
3126	4.51	3.13	-30.6%
3131	3.41	3.15	-7.6%
3132	5.52	4.77	-13.6%
3145	3.52	3.10	-11.9%
3146	4.75	4.26	-10.3%
3169	6.20	5.01	-19.2%
3179	3.36	2.96	-11.9%
3180	4.23	4.23	0.0%
3188	3.20	3.23	0.9%
3220	3.39	3.42	0.9%
3224	6.47	5.50	-15.0%
3227	6.53	5.90	-9.6%
3240	5.93	6.41	8.1%
3241	6.66	6.95	4.4%
3255	5.08	4.47	-12.0%
3257	6.47	5.90	-8.8%
3270	5.03	4.23	-15.9%
3300	6.36	6.06	-4.7%
3303	7.78	5.47	-29.7%
3307	6.58	6.74	2.4%
3315	9.07	7.36	-18.9%
3334	7.24	5.74	-20.7%
3336	5.13	4.53	-11.7%
3365	12.48	10.67	-14.5%
3372	6.72	5.85	-12.9%
3373	8.44	7.17	-15.0%
3383	2.65	2.43	-8.3%
3385	1.75	1.48	-15.4%
3400	6.25	5.58	-10.7%
3507	4.53	3.75	-17.2%
3515	4.34	4.07	-6.2%
3548	2.57	2.37	-7.8%
3559	4.21	3.72	-11.6%
3574	1.42	1.35	-4.9%

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Assigned Risk Rates Comparison

Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
3581	1.94	1.67	-13.9%
3612	3.88	3.05	-21.4%
3620	10.60	8.54	-19.4%
3629	3.71	3.26	-12.1%
3632	5.84	5.15	-11.8%
3634	3.25	2.83	-12.9%
3635	5.43	4.42	-18.6%
3638	2.89	2.70	-6.6%
3642	2.70	2.45	-9.3%
3643	3.52	2.72	-22.7%
3647	3.39	3.18	-6.2%
3648	2.59	2.16	-16.6%
3681	1.69	1.48	-12.4%
3685	2.24	2.05	-8.5%
3719	2.92	2.40	-17.8%
3724	6.77	5.85	-13.6%
3726	10.30	9.92	-3.7%
3803	3.80	3.15	-17.1%
3807	4.40	3.64	-17.3%
3808	9.83	8.52	-13.3%
3821	14.67	13.48	-8.1%
3822	7.40	5.47	-26.1%
3824	7.18	6.52	-9.2%
3826	1.42	1.35	-4.9%
3827	3.39	2.83	-16.5%
3830	2.38	2.10	-11.8%
3851	6.64	4.90	-26.2%
3865	4.48	4.02	-10.3%
3881	8.47	7.11	-16.1%
4000	8.88	7.71	-13.2%
4021	11.22	9.78	-12.8%
4024	5.29	4.60	-13.0%
4034	12.78	10.35	-19.0%
4036	5.87	5.71	-2.7%
4038	6.55	5.34	-18.5%
4053	4.07	4.55	11.8%
4061	4.34	4.39	1.2%
4062	5.52	5.09	-7.8%
4101	5.63	5.31	-5.7%
4109	0.85	0.84	-1.2%
4110	1.69	1.46	-13.6%
4111	2.65	2.13	-19.6%
4114	7.13	5.90	-17.3%
4130	7.54	6.39	-15.3%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
4131	9.42	9.94	5.5%
4133	3.52	3.05	-13.4%
4149	1.50	1.46	-2.7%
4206	4.45	4.26	-4.3%
4207	4.42	4.20	-5.0%
4239	5.52	4.26	-22.8%
4240	4.78	5.36	12.1%
4243	3.80	3.26	-14.2%
4244	4.31	3.53	-18.1%
4250	4.04	3.75	-7.2%
4251	4.56	4.12	-9.6%
4263	7.21	5.52	-23.4%
4273	5.46	4.99	-8.6%
4279	4.48	4.07	-9.2%
4283	3.20	2.48	-22.5%
4299	3.60	2.94	-18.3%
4304	9.75	8.38	-14.1%
4307	3.50	3.13	-10.6%
4351	2.32	2.59	11.6%
4352	2.89	2.67	-7.6%
4360	2.92	2.75	-5.8%
4361	2.29	1.91	-16.6%
4410	7.10	6.12	-13.8%
4420	15.27	13.31	-12.8%
4431	3.06	2.67	-12.7%
4432	2.27	1.86	-18.1%
4452	5.19	4.45	-14.3%
4459	5.38	4.69	-12.8%
4470	3.91	3.72	-4.9%
4484	4.64	4.37	-5.8%
4493	4.59	4.26	-7.2%
4511	0.93	0.94	1.1%
4557	4.94	4.02	-18.6%
4558	2.54	2.40	-5.5%
4568	4.40	3.83	-13.0%
4581	1.42	1.40	-1.4%
4583	12.13	9.76	-19.5%
4611	1.26	1.13	-10.3%
4635	5.57	5.17	-7.2%
4653	3.99	3.29	-17.5%
4665	13.33	10.97	-17.7%
4670	14.50	12.15	-16.2%
4683	10.38	6.58	-36.6%
4686	4.04	3.37	-16.6%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
4692	1.47	1.29	-12.2%
4693	2.21	1.89	-14.5%
4703	3.80	3.07	-19.2%
4717	4.51	3.64	-19.3%
4720	3.28	2.80	-14.6%
4740	6.50	5.28	-18.8%
4741	5.03	4.96	-1.4%
4751	4.62	3.42	-26.0%
4771	5.00	4.10	-18.0%
4777	7.35	5.93	-19.3%
4825	2.16	1.86	-13.9%
4828	3.55	3.26	-8.2%
4829	2.70	2.32	-14.1%
4902	6.58	5.52	-16.1%
4923	1.94	1.51	-22.2%
5020	16.33	14.12	-13.5%
5022	17.61	15.28	-13.2%
5037	33.21	28.00	-15.7%
5040	14.34	12.91	-10.0%
5057	12.81	11.40	-11.0%
5059	48.01	44.20	-7.9%
5102	11.39	10.54	-7.5%
5146	11.36	9.68	-14.8%
5160	5.35	4.66	-12.9%
5183	8.60	7.38	-14.2%
5188	11.77	9.57	-18.7%
5190	9.53	7.73	-18.9%
5191	1.58	1.48	-6.3%
5192	6.83	6.33	-7.3%
5213	17.70	16.01	-9.5%
5215	10.57	10.16	-3.9%
5221	9.72	9.00	-7.4%
5222	16.82	14.63	-13.0%
5223	13.08	13.56	3.7%
5348	9.45	8.89	-5.9%
5402	10.68	8.49	-20.5%
5403	14.34	13.26	-7.5%
5437	12.18	10.19	-16.3%
5443	9.15	7.71	-15.7%
5445	22.69	19.59	-13.7%
5462	14.01	12.83	-8.4%
5472	11.52	12.59	9.3%
5473	27.23	24.77	-9.0%
5474	16.36	13.74	-16.0%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
5478	7.43	6.28	-15.5%
5479	14.83	13.93	-6.1%
5480	12.29	11.13	-9.4%
5491	5.68	4.99	-12.1%
5506	15.05	14.18	-5.8%
5507	9.15	7.71	-15.7%
5508	24.69	18.70	-24.3%
5535	15.79	13.29	-15.8%
5537	11.83	10.56	-10.7%
5551	40.34	38.75	-3.9%
5606	2.92	2.34	-19.9%
5610	15.51	13.72	-11.5%
5645	34.06	32.99	-3.1%
5703	29.82	27.70	-7.1%
5705	60.57	68.72	13.5%
5951	0.71	0.62	-12.7%
6003	21.27	17.14	-19.4%
6005	13.63	13.23	-2.9%
6018	7.32	5.85	-20.1%
6045	11.12	10.08	-9.4%
6204	21.77	19.59	-10.0%
6206	7.95	6.17	-22.4%
6213	5.08	3.93	-22.6%
6214	5.54	4.39	-20.8%
6216	14.15	12.40	-12.4%
6217	12.92	11.43	-11.5%
6229	11.72	11.78	0.5%
6233	5.84	4.42	-24.3%
6235	13.03	10.70	-17.9%
6236	23.27	16.14	-30.6%
6237	4.29	3.69	-14.0%
6251	13.43	10.59	-21.1%
6252	9.58	8.89	-7.2%
6306	11.91	10.29	-13.6%
6319	11.17	9.54	-14.6%
6325	12.37	10.51	-15.0%
6400	13.90	11.53	-17.1%
6503	3.69	3.50	-5.1%
6504	5.46	5.04	-7.7%
6702	8.17	8.19	0.2%
6703	15.68	15.60	-0.5%
6704	9.07	9.11	0.4%
6801	6.53	6.14	-6.0%
6811	13.87	11.13	-19.8%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
6824	24.20	21.37	-11.7%
6826	9.78	9.03	-7.7%
6834	6.09	5.82	-4.4%
6836	8.41	7.25	-13.8%
6843	21.17	17.76	-16.1%
6845	19.12	16.41	-14.2%
6854	10.54	10.00	-5.1%
6872	22.20	24.17	8.9%
6874	38.48	38.43	-0.1%
6882	9.01	7.36	-18.3%
6884	11.42	9.08	-20.5%
7016	8.60	7.30	-15.1%
7024	9.56	8.11	-15.2%
7038	10.90	10.03	-8.0%
7046	15.43	12.99	-15.8%
7047	16.52	13.91	-15.8%
7050	20.92	19.08	-8.8%
7090	12.10	11.13	-8.0%
7098	17.15	14.45	-15.7%
7099	29.66	24.77	-16.5%
7133	8.49	6.93	-18.4%
7151	10.32	8.41	-18.5%
7152	19.83	16.04	-19.1%
7153	11.47	9.35	-18.5%
7219	na	17.19	na
7222	16.36	14.39	-12.0%
7225	na	14.66	na
7230	21.41	20.75	-3.1%
7231	17.53	15.74	-10.2%
7232	20.24	18.95	-6.4%
7309	29.17	25.60	-12.2%
7313	7.65	8.68	13.5%
7317	26.85	24.71	-8.0%
7327	37.11	37.57	1.2%
7333	8.17	6.20	-24.1%
7335	9.07	6.90	-23.9%
7337	15.68	11.83	-24.6%
7350	29.96	28.73	-4.1%
7360	10.65	9.24	-13.2%
7370	13.38	9.94	-25.7%
7380	10.95	10.00	-8.7%
7382	11.39	9.54	-16.2%
7390	10.38	8.54	-17.7%
7394	7.73	6.17	-20.2%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
7395	8.58	6.85	-20.2%
7398	14.83	11.72	-21.0%
7402	0.27	0.24	-11.1%
7403	10.81	9.54	-11.7%
7405	4.70	5.15	9.6%
7420	23.19	17.33	-25.3%
7421	1.50	1.35	-10.0%
7422	4.31	3.37	-21.8%
7425	6.04	4.58	-24.2%
7431	2.79	2.26	-19.0%
7445	1.56	1.72	10.3%
7453	0.93	0.75	-19.4%
7502	5.71	4.82	-15.6%
7515	2.29	1.97	-14.0%
7520	6.64	5.98	-9.9%
7529	40.58	33.69	-17.0%
7538	20.21	18.08	-10.5%
7539	4.23	3.37	-20.3%
7540	11.14	9.46	-15.1%
7580	5.98	6.17	3.2%
7590	8.77	7.17	-18.2%
7600	11.39	10.32	-9.4%
7605	5.16	4.88	-5.4%
7610	1.28	1.24	-3.1%
7705	17.01	13.34	-21.6%
7710	9.12	7.09	-22.3%
7711	9.12	7.09	-22.3%
7720	4.92	4.39	-10.8%
7723	7.13	5.04	-29.3%
7855	6.72	6.74	0.3%
8001	4.56	4.50	-1.3%
8002	4.07	3.80	-6.6%
8006	6.42	5.31	-17.3%
8008	2.87	2.43	-15.3%
8010	3.03	2.94	-3.0%
8013	0.79	0.78	-1.3%
8015	1.99	2.08	4.5%
8017	3.55	2.94	-17.2%
8018	4.56	4.53	-0.7%
8021	4.78	4.29	-10.3%
8031	6.96	6.44	-7.5%
8032	4.18	3.83	-8.4%
8033	3.58	2.91	-18.7%
8037	5.35	4.99	-6.7%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
8039	3.74	3.05	-18.4%
8044	7.48	6.44	-13.9%
8045	1.39	1.29	-7.2%
8046	4.89	4.23	-13.5%
8047	2.10	2.02	-3.8%
8058	5.90	5.36	-9.2%
8072	1.83	1.70	-7.1%
8102	3.41	3.05	-10.6%
8103	4.75	4.15	-12.6%
8106	8.66	8.00	-7.6%
8107	7.07	6.33	-10.5%
8111	4.70	3.96	-15.7%
8116	6.17	4.82	-21.9%
8203	13.68	11.99	-12.4%
8204	9.09	8.73	-4.0%
8209	6.58	6.04	-8.2%
8215	7.35	6.12	-16.7%
8227	10.24	9.03	-11.8%
8232	10.73	8.09	-24.6%
8233	6.20	5.58	-10.0%
8235	9.37	8.49	-9.4%
8236	13.85	11.48	-17.1%
8263	12.45	13.31	6.9%
8264	9.56	8.62	-9.8%
8265	15.68	14.07	-10.3%
8279	16.99	15.66	-7.8%
8288	15.95	11.78	-26.1%
8291	9.20	7.90	-14.1%
8292	7.78	7.28	-6.4%
8293	23.16	19.16	-17.3%
8304	11.17	10.24	-8.3%
8350	14.75	13.02	-11.7%
8380	5.63	4.82	-14.4%
8381	4.10	3.64	-11.2%
8385	4.92	3.99	-18.9%
8392	5.16	4.47	-13.4%
8393	3.91	2.96	-24.3%
8500	11.25	10.00	-11.1%
8601	0.90	0.70	-22.2%
8602	2.68	2.86	6.7%
8603	0.16	0.11	-31.3%
8606	5.79	4.18	-27.8%
8709	11.06	10.70	-3.3%
8719	6.36	5.01	-21.2%

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Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
8720	3.63	2.51	-30.9%
8721	0.63	0.65	3.2%
8723	0.36	0.32	-11.1%
8725	5.60	4.90	-12.5%
8726	6.14	5.42	-11.7%
8734	1.07	0.86	-19.6%
8737	0.96	0.78	-18.8%
8738	1.86	1.51	-18.8%
8742	0.79	0.65	-17.7%
8745	10.35	9.11	-12.0%
8748	1.37	1.16	-15.3%
8755	0.85	0.57	-32.9%
8799	1.15	0.97	-15.7%
8800	2.76	2.51	-9.1%
8803	0.19	0.19	0.0%
8805	0.38	0.32	-15.8%
8810	0.27	0.24	-11.1%
8814	0.33	0.30	-9.1%
8815	0.63	0.57	-9.5%
8820	0.27	0.24	-11.1%
8824	6.83	5.96	-12.7%
8825	3.50	3.10	-11.4%
8826	5.90	5.17	-12.4%
8831	2.76	2.37	-14.1%
8832	0.82	0.70	-14.6%
8833	2.98	2.40	-19.5%
8835	5.87	5.50	-6.3%
8842	4.42	4.04	-8.6%
8848	6.25	5.96	-4.6%
8849	5.95	5.15	-13.4%
8855	0.25	0.27	8.0%
8856	0.52	0.57	9.6%
8864	2.79	2.32	-16.8%
8868	1.09	1.00	-8.3%
8869	2.49	2.21	-11.2%
8871	0.22	0.16	-27.3%
8901	0.44	0.35	-20.5%
9012	2.16	1.91	-11.6%
9014	6.14	5.66	-7.8%
9015	6.34	5.69	-10.3%
9016	6.01	4.88	-18.8%
9019	4.12	3.31	-19.7%
9033	4.29	3.91	-8.9%
9040	7.56	6.28	-16.9%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/17	Proposed 04/01/18	Percent Change
9044	3.25	2.59	-20.3%
9052	4.34	3.72	-14.3%
9058	3.30	2.80	-15.2%
9060	2.54	2.32	-8.7%
9061	1.99	1.83	-8.0%
9062	2.84	2.48	-12.7%
9063	2.08	1.72	-17.3%
9077	4.86	4.82	-0.8%
9082	2.62	2.37	-9.5%
9083	2.84	2.45	-13.7%
9084	3.09	2.80	-9.4%
9089	3.06	2.40	-21.6%
9093	2.95	2.70	-8.5%
9101	6.53	6.04	-7.5%
9102	6.55	5.98	-8.7%
9154	3.63	3.34	-8.0%
9156	4.45	3.96	-11.0%
9170	17.31	15.85	-8.4%
9178	14.75	12.67	-14.1%
9179	24.58	21.02	-14.5%
9180	9.29	8.30	-10.7%
9182	4.34	3.26	-24.9%
9186	32.47	35.68	9.9%
9220	11.12	10.91	-1.9%
9402	9.56	8.62	-9.8%
9403	17.34	15.12	-12.8%
9410	6.50	5.50	-15.4%
9501	7.40	6.41	-13.4%
9505	9.80	10.51	7.2%
9516	11.42	7.87	-31.1%
9519	8.77	7.82	-10.8%
9521	9.45	8.87	-6.1%
9522	3.88	3.23	-16.8%
9534	13.85	11.00	-20.6%
9554	27.58	22.50	-18.4%
9586	1.15	0.94	-18.3%
9600	4.45	4.02	-9.7%
9620	2.38	2.21	-7.1%

NORTH CAROLINA – ASSIGNED RISK

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Supplemental Material

North Carolina G.S. 58-36-15(h) specifies that the following information must be included in all policy form, rule and rate filings filed under Article 36. 11 NCAC 10.1111 specifies that additional detail be provided under each of these items.

* Sections incorporated by reference to the Loss Cost Filing

11 NCAC 10.1111 - WORKERS COMPENSATION

Item

8 For assigned risk rate filings, the filer shall include support for a reasonable margin for underwriting profit and contingencies and investment income, including realized capital gains.

Response

See the prefiled testimony and exhibits of J. Vander Weide and D. Appel (Exhibits RB-6 through RB-13).

11 NCAC 10.1111 - WORKERS COMPENSATION

Item

9 For assigned risk rate filings, the filer shall provide investment earnings on capital and surplus. Given the selected underwriting profit and contingencies provision contained in the filing, the filer shall indicate the resulting rates of return (including consideration of investment income) on equity capital, on statutory surplus, and on total assets. The filer shall show the derivation of all factors used in producing these calculations and justify the fairness and reasonableness of these rates of return.

Response

As respects this filing, after-tax investment earnings on capital and surplus (including an adjustment for prepaid expenses) are expected to be 3.05% of premium. Given the 9.0% underwriting profit provision and the other expenses shown in the filing, the pro forma return on net worth (equity capital), including underwriting profit and investment income on reserves and surplus, is shown in the prefiled testimony and exhibits of D. Appel (Exhibits RB-11 through RB-13). Also shown therein is the ratio of net worth to surplus of 1.16. Accordingly, the corresponding return on statutory surplus would be 12.34%. Based on data from A.M. Best's Aggregates & Averages, the 5-year average ratio of net worth to assets is .403. Accordingly, the corresponding return on assets would be 4.27%. If 9.0% is not in fact earned as underwriting profit, the resulting returns would be correspondingly lower.

See also the pre-filed testimony of D. Appel (Exhibit RB-11) and J. Vander Weide (Exhibit RB-6).

EXHIBIT RB-2

PRE-FILED TESTIMONY
OF
RAYMOND F. EVANS

NORTH CAROLINA WORKERS COMPENSATION INSURANCE
2017 RESIDUAL MARKET RATE FILING
BY THE NORTH CAROLINA RATE BUREAU

Q. Would you state your full name and business address?

A. Raymond F. Evans, Jr. CPCU, 2910 Sumner Boulevard, Raleigh, North Carolina.

Q. Are you employed by the North Carolina Rate Bureau ("Bureau")?

A. Yes.

Q. In what capacity?

A. I am the General Manager.

Q. How long have you been employed by the Bureau?

A. Since September 2000.

Q. Would you summarize your educational background?

A. I graduated from Ohio State University with a Bachelor of Science Degree in Accounting. I also have the designation of Chartered Property Casualty Underwriter.

Q. What was your work experience after graduation and prior to your employment by the Bureau?

A. From March 1966 to July 2000, I was employed by the State Auto Insurance Companies, Columbus, Ohio in various capacities, including the position of Executive Vice President of a subsidiary.

Q. Can you identify Exhibits RB-1 through RB-13?

A. Yes. Exhibit RB-1 is an exhibit setting forth the filed final rates for the workers compensation insurance residual market in North Carolina, as well as the data and calculations underlying those rates. RB-1 also includes the 11 NCAC 10.1111 data and exhibits required. Exhibits RB-2 through RB-13 contain the required accompanying pre-filed testimony and exhibits. Together, these materials constitute a filing (the "Filing") that is dated September 1, 2017 submitted by the Bureau to the Honorable Mike Causey, Commissioner of Insurance, with respect to workers compensation insurance assigned risk rates in North Carolina.

Q. Does the Bureau have actuaries on its staff?

A. Yes, the Bureau has an actuary on its staff. However, the Bureau continues to obtain actuarial expertise for preparation of the Filing from the Workers Compensation Committee, the National Council on Compensation Insurance, Inc. and from Milliman, Inc.

Q. Would you describe briefly the workers compensation insurance residual market mechanism for North Carolina?

A. Yes. North Carolina General Statute 58-36-1(5) requires every insurer that writes workers compensation insurance in North Carolina to insure and accept any eligible workers compensation insurance risk that has been certified to be "difficult to place" by a licensed fire and casualty insurance agent. The Commissioner of Insurance has approved the North Carolina Workers Compensation Insurance Plan which describes the rules and procedures for assigning applicant employers to an insurance company. The designated insurer must issue the standard Workers Compensation and Employers Liability Insurance Policy for each assigned employer and provide the usual and customary service to their insureds.

Q. Do all insurance companies receive assignments?

A. No. Many insurance companies have opted to meet their residual market participation requirements by becoming a member of the National Workers Compensation Reinsurance Association ("National Pool"). Under the pool arrangement all assignments for those members of the National Pool are made to insurers designated as "servicing carriers" of the pool. Insurers who do not elect to participate in the National Pool are designated as direct assignment carriers for North Carolina and applicant employers are assigned to the direct assignment carriers on the basis of their voluntary workers compensation insurance premium writings in North Carolina.

Q. How many servicing carriers are there and how are they selected?

A. There are currently three servicing carriers who were selected through a competitive bid process.

Q. How many direct assignment carriers are there?

A. At this time there are eight companies or company groups that have been approved as direct assignment carriers.

Q. What will be the residual market quota shares of the direct assignment carriers compared to the servicing carriers?

A. On the basis of 2016 premium writings, the direct assignment carriers will receive approximately 27% of the assigned risk premium during 2017 and the servicing carriers will be assigned approximately 73% of the premium.

Q. How many insurance companies were licensed to write workers compensation insurance in North Carolina during 2017?

A. Five hundred thirty-seven (537) insurance companies.

Q. How many insurance companies were actually writing workers compensation insurance in North Carolina during 2016?

A. Three hundred nineteen (319) insurance companies

Q. Does the Filing submitted to the Commissioner include, to the extent available, the information to be furnished in connection with filings under Article 36 of Chapter 58 of the General Statutes?

A. Yes. Those data that were available have been submitted to the Commissioner as part of the Filing. As shown and explained in that submission, some data were not collected or, if collected, were not retrievable from the statistical data in the form requested. The individual circumstances with respect to such data are explained in the submission.

Q. Does that conclude your pre-filed testimony?

A. Yes.

EXHIBIT RB-3

PREFILED TESTIMONY
OF
SEAN O. COOPER

2017 NORTH CAROLINA WORKERS COMPENSATION
LOSS COST AND ASSIGNED RISK RATE FILINGS
PROPOSED TO BE EFFECTIVE ON APRIL 1, 2018

Q. *Please state your name, title, employer, and position you hold.*

A. My name is Sean Cooper, and I am a Director and Senior Actuary for the National Council on Compensation Insurance, Inc. ("NCCI") in Boca Raton, Florida. My current responsibilities include oversight of the actuarial function, including the preparation of rate filings and presentation of actuarial testimony, for four jurisdictions (including North Carolina).

Q. *Would you outline your academic and professional training?*

A. I have a Bachelor of Science degree in Actuarial Science, from Florida A&M University, in Tallahassee, Florida. I am a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries and am in good standing with both of those organizations.

Q. *How long have you been employed by NCCI?*

A. I worked for NCCI between June of 1992 and May of 1996. Between May of 1996 and June of 2002, I was continuously employed as an actuary, working for USAA Insurance Company, Insurance Services Office, and AmCOMP Insurance Company. In June of 2002, I returned to NCCI and have been employed by NCCI since that time.

Q. *Would you briefly describe the principal functions of NCCI?*

A. NCCI is the major data collector of workers compensation statistics, and is recognized as the expert organization in workers compensation data collection, ratemaking, and research. NCCI's principal functions are to collect and process statistical data, inspect and administer a detailed classification system and develop prices for workers compensation

insurance that are not excessive, inadequate or unfairly discriminatory. It prepares manual loss costs, manual rates, rating plans and policy forms for use by its members and subscribers and files same with various supervisory authorities on their behalf.

Q. *Who belongs to NCCI?*

A. NCCI is an organization of some 600 members and subscribers who are insurance companies and self-insured funds writing workers compensation insurance. These loss cost and rate filings are based on the data submitted to NCCI and the North Carolina Rate Bureau (NCRB) by insurance companies writing workers compensation business in North Carolina.

Q. *Are you familiar with the filings for revised workers compensation loss costs and assigned risk rates by the North Carolina Rate Bureau (the "Filings") of which this testimony is a part?*

A. Yes, I am.

Q. *Did you supervise the production of the Filings?*

A. Yes, I did. NCCI has contracted with the North Carolina Rate Bureau as an actuarial services vendor in connection with these Filings.

Q. *What is the purpose and scope of your testimony?*

A. I will provide testimony on the key actuarial issues and components in the Filings. Specifically, my testimony will discuss the (i) development of the overall average loss cost level indication, (ii) assigned risk differential analysis, and (iii) various expense components contained in the voluntary loss costs and assigned risk rates.

Q. *Could you briefly describe the purpose of the Filings that have been submitted to the North Carolina Department of Insurance?*

A. Yes. One of the Filings proposes revised loss costs and rating values for the voluntary market. The other Filing proposes revised rates and rating values for the Workers Compensation Insurance Plan, which is the assigned risk market.

Q. *What is the voluntary market and what is the assigned risk market?*

A. When insurers elect to provide employers workers compensation coverage in North Carolina's competitive marketplace, incorporating their own underwriting guidelines and expense needs, the group of policies issued to those employers constitutes the "voluntary market."

An employer unable to secure workers compensation insurance in the voluntary market obtains coverage through the Workers Compensation Insurance Plan, which is also called the "assigned risk" market. This "market of last resort" provides a method for those employers not written voluntarily to obtain coverage.

Q. *For the voluntary market, you mentioned a revision to the current loss costs has been filed. What is the difference between a loss cost and a rate?*

A. The term loss cost is used because, in general, it represents only that portion of the full rate that provides for loss and loss adjustment expenses. The North Carolina loss costs are not final rates because they do not include provisions for any of the remaining expenses (including production expenses, profit, contingencies, etc.) of an insurer.

In the North Carolina voluntary market, each carrier is responsible for considering its individual expense needs, developing a loss cost multiplier (LCM), and determining its final rates. The carrier-specific LCM is the expense loading (providing for all carrier expenses other than loss adjustment expense) an insurer applies to a set of loss costs to build its final rates. In this process, a carrier may elect to base its final rates on the loss costs in the Loss Cost filing.

Q. *If this loss cost revision were approved as filed, would all employers insured in the voluntary market receive a loss cost change equal to the overall average proposed change?*

A. No. The proposed loss cost indication represents the overall average change for the voluntary market. The actual percentage loss cost change

will vary between individual classification codes—some above and others below this average.

The proposed overall average change is equitably distributed to the various industry groups and then to the more than 600 individual classification codes during the ratemaking process. The final premium charged to a particular employer not only depends on the specific class codes in which the employer conducts business, but also on the individual insurer issuing the policy. Since in the voluntary market each insurer is responsible for determining its final rates, after reviewing its own expense needs, underwriting guidelines, etc., the final premium charged to any particular employer may vary among insurers.

Q. *Please give us an overview of the process used to develop the Filings.*

A. The latest available premium and loss data is collected by NCCI and NCRB from insurance companies and verified. Using this data, the expected costs associated with writing workers compensation insurance in North Carolina during the period April 1, 2018 through March 31, 2019 are determined. In this process, expenses are analyzed and provisions for these components are included. The expected future costs determine the extent to which the currently approved overall loss cost and rate levels should change.

Q. *Do the Filings include data for all companies writing workers compensation business in North Carolina?*

A. No. There are several reasons that would prevent a carrier's data from being included in a filing, including (i) data that was not reported prior to the filing and (ii) quality issues that exist with the reported data. While it would clearly be preferable to include all carriers' data in the filing, it is critical that the data be of the highest quality possible. Carriers with a premium market share greater than 0.1% and whose data is not contained in the Filings' experience period are listed in Appendix A-IV.

NCCI has the following processes in place to provide all carriers the incentive to submit aggregate data in a timely and accurate manner:

(i) Aggregate Data Quality Incentive Program (ADQIP): In response to carriers reporting late and/or inaccurate data, they are subject to financial assessments levied by NCCI.

(ii) Financial Data Escalation Process: During the data collection and validation process, data issues are discussed with insurance carrier personnel at progressively increasing levels of authority until the issues are resolved.

The data goes through a series of three validation procedures implemented by NCCI: (i) arithmetic checks, (ii) reasonableness checks, and (iii) a reconciliation report.

The first check, the arithmetic check, is used to make sure that the data submitted to NCCI in the various rows and columns of the aggregate financial data reports sum to the correct totals as stated by the carriers in those submissions.

The second check, the reasonableness check, is used to make sure that all unusual fluctuations in a carrier's data are explained. For example, a company reporting $100,000 in premium in 2015 and then $10 million in 2016 would be questioned about the large change in premium amounts.

The third test is reconciliation. The North Carolina data submitted to NCCI is reconciled with the NAIC Annual Statement data submitted by companies to the North Carolina Department of Insurance.

Q. *Are the data used in the Filings reasonable and reliable for determining voluntary loss costs and assigned risk rates in North Carolina?*

A. Yes, in my opinion, the data as collected and validated provides an actuarially appropriate, reasonable, and credible dataset on which to base the Loss Cost and Assigned Risk rate Filings.

Q. *What overall average change does the Loss Cost filing propose?*

A. The Loss Cost filing seeks an overall average decrease of 11.3% from the current loss cost level for the industrial classifications.

Q. *What overall average rate level change does the Assigned Risk filing propose?*

A. The Assigned Risk rate filing seeks an overall average rate level decrease of 12.5% for the industrial classifications.

Q. *What is the proposed effective date for the Filings?*

A. The Loss Cost and Assigned Risk rate Filings are both proposed to apply to new and renewal policies becoming effective on or after April 1, 2018. The actual use of the loss costs is subject to individual company actions to adopt the filed loss costs.

Q. *Would you please briefly describe the method used in the Filings to determine the overall average changes?*

A. Yes. In very general terms, the overall changes are determined by taking the latest available financial data experience and adjusting it to reflect conditions that are expected to exist for policies becoming effective during the period April 1, 2018 through March 31, 2019. The result indicates the adequacy of the current loss costs for policies to be written during that period. This process requires the application of actuarial judgment and projections simply because ratemaking is prospective in nature and future outcomes are unknown.

As presented in Exhibit I of the Filings, the process begins with two blocks of historical North Carolina aggregate financial data. The first block reflects the experience from all policies with effective dates during 2015 and is commonly referred to as "policy year 2015" data. The second block of data reflects the experience from all policies with effective dates during 2014 and is referred to as "policy year 2014" data. This data consists of earned premiums and losses during these periods reported to NCCI by those companies writing workers compensation insurance in North Carolina. "Losses" is simply another term for the benefits carriers provide to or on behalf of injured workers. They can be in the form of medical

services or indemnity (lost wage) payments. While several years of data were reviewed in connection with this year's actuarial analysis, data for policy years 2014 and 2015 serve as the selected experience period in the Filings.

Loss cost level indications were determined based on an average of (i) paid losses and (ii) paid losses plus case reserves for each of policy years 2015 (Exhibit I, Section A) and 2014 (Exhibit I, Section B). An average of the separate policy year 2014 and 2015 loss cost level indications (Exhibit I, Section C) serves as the basis for the Rate Bureau's filed overall average voluntary loss cost level change.

In calculating the overall loss cost level change, the premium from these two policy years is the first focus. The premiums that have been collected must be "developed" to reflect future payroll audits (line 1 of Exhibit I, Sections A and B). Since the final premium totals for the recent policy years will not be known until all payroll audits have been completed, the application of premium development factors provides a projection of the amount by which the currently-reported premium totals will change when the final results are known.

Additionally, the premiums are brought to the current loss cost level and the portion that covers expenses is removed (line 2). These adjustments are necessary because we are trying to determine how much premium will be available for benefits, and the historical premium data still reflects old rates and includes the portion covering expenses. Since the current loss costs are being analyzed and updated, the reported historical premium is adjusted to this current loss cost level. Once the historical premium has been adjusted to the latest approved loss cost level, one may opine on the adequacy of the current set of loss costs in terms of providing for future losses.

Q. *Would you now describe the adjustments to the policy year indemnity and medical losses?*

A. Yes. The losses from these two blocks of data are reviewed. Indemnity and medical losses are analyzed separately. Initially, losses are limited to mitigate the impact of individual large workers compensation claims. Medical reserves for example can extend into the multi-million dollar range on extremely severe cases. At this stage, limiting such claims is appropriate in determining future loss costs and rates.

Next, the limited losses must be developed to their ultimate level (lines 4 and 16). This is especially necessary for workers compensation insurance because it takes many years before some losses are finally paid. For example, depending on the nature and seriousness of a work-related injury, indemnity payments may extend many years into the future. Further, since even the conditions giving rise to some of these losses may take many years to manifest themselves, several years may pass before some claims are even known to the insurer, let alone settled. Asbestosis claims are an example of this type of loss.

Next, since we are trying to estimate future losses and the data reflects historical benefit levels, the reported losses are adjusted to reflect the impact of any subsequent changes in the level of workers compensation benefits. This is accomplished in two steps (lines 5, 14, 17, and 26). The losses are then increased by 17.5% so that the final loss costs will include a provision for loss adjustment expense (lines 6 and 18).

The resulting loss figures (lines 9 and 21) are compared to the total estimated premium (line 3) that would be available to fund these losses. Next, the indemnity and medical cost ratios data must be trended to account for inflationary pressures between the time period of the historical data and the period when the loss costs will be in effect (lines 10 and 22). Trend adjusts the historical data to account for the differential impact of inflation on losses and premiums. If losses were changing at the same rate as payrolls, trend would not be needed since the change in losses would be exactly matched by a corresponding change in payrolls and, therefore, premiums. On the other hand, if losses have been changing at a

different rate than payroll, trend is necessary if historical data is to be used as a predictor of future losses.

The trend factors selected by the Rate Bureau and applied in these Filings are -3.0% per year for indemnity losses and -1.5% per year for medical losses.

The final step is to adjust the developed and limited cost ratios to an unlimited basis. This is accomplished in lines 12 and 24. The employed methodology involves replacing the amount of actual reported individual claim losses in excess of a North Carolina-specific dollar threshold with an excess loss provision. The excess provision represents the expected volume of losses in excess of the threshold. This procedure serves to smooth out the impact of large losses.

Q. *What are the final steps in determining the overall average voluntary loss cost level change?*

A. Indicated loss cost level changes for each of policy years 2014 and 2015 are calculated by summing the respective indemnity and medical cost ratios (line 28). These individual-year changes are then averaged, resulting in an indicated overall average decrease of 11.3% to the current voluntary loss cost level (Exhibit I, Section C).

Q. *What loss development methodologies were analyzed and utilized in connection with the Filings?*

A. The financial data were analyzed in order to select the most actuarially sound loss development projection methodology to be used in determining experience indications. This analysis involves identifying changes in the level of reserve adequacy and trends in development that could skew the results of one or more of the loss development projection methods. In addition, the base to which the loss development factors will be applied is analyzed in conjunction with the factors themselves.

The loss development projection methods examined in this year's analysis were based on (i) paid losses and (ii) paid losses plus case reserves.

Results based on an average of these two loss development methodologies were chosen as being most appropriate for this year's Filings.

Q. *After identifying the most appropriate loss development methodology, what is the next step in the process to compute the actual loss development factors?*

A. After identifying the most appropriate loss development methodology, prior years' losses are examined to determine how they evolve from the time they are first reported to the time they are finally settled.

For inclusion in the Filings, (i) final paid loss development factors were derived based on an average of the two most recent historical factors at each age-to-age interval and (ii) final paid plus case loss development factors were derived based on an average of the five most recent historical factors at each age-to-age interval. Statewide loss development (tail) factors were used to develop losses from a nineteenth report to an ultimate basis. The tail factors used in the Filings are based on an average of the most recent ten historical factors at a nineteenth report.

Q. *Please explain the tail factor methodology included in the Filings.*

A. In workers compensation, payments and loss reserve changes persist for extended periods of time. The ultimate losses of a policy year are determined by multiplying the current reported losses by the expected loss development factor. This expected loss development factor is calculated as the product of individual age-to-age development factors (link ratios). However, due to data constraints, it is not possible to calculate all of the required individual link ratios. Therefore, it is necessary to aggregate all loss development that occurs after a nineteenth report into a single (tail) factor. Tail factors are calculated separately for indemnity and medical losses by comparing the changes in the volume of policy year paid plus case losses after a nineteenth report to the volume of policy year paid plus case losses as of a nineteenth report, along with the application of a growth adjustment factor.

Q. *Will you please describe how the final indemnity and medical annual trend factors were determined for the Filings?*

A. Yes. The final trend factors were judgmentally selected by the NCRB after reviewing the results of several different trend estimates, including (i) a North Carolina frequency/severity trend analysis and (ii) indicated annual loss ratio trend factors.

A North Carolina-specific frequency/severity analysis was performed to separately examine changes in the frequency of workers compensation claims being filed and changes in their average cost per case. Indicated loss ratio trend factors based on both paid and paid plus case losses were also examined in order to review trend estimates that are independent of possible fluctuations in carrier-reported claim counts from year to year.

Q. *Please explain how the loss adjustment expense provision was determined.*

A. Both historical North Carolina-specific and countrywide loss adjustment expense information was reviewed as part of this year's rate filing analysis (See Exhibit II-A, Sheet 1). Based on that information, the NCRB judgmentally selected a 17.5% loss adjustment expense provision for use in the Filings.

Q. *Please explain the update to the terrorism provision in the Filings.*

A. These updates are based on NCCI's most recent analysis, where NCCI worked with expert catastrophe loss modeling firms to assess the impact of terrorism risk on workers compensation insurance losses and develop estimated average terrorism workers compensation loss dollar amounts per worker under TRIPRA 2015 parameters and provisions. These amounts were converted to a loss cost per $100 of payroll using average weekly wage information and currently approved loss-based expense provisions, by state.

The result for North Carolina is that the proposed terrorism loss cost per $100 of payroll decreased from $0.01 to $0.005, and the proposed

terrorism assigned risk rate per $100 of payroll decreased from $0.02 to $0.01.

Q. *Please explain how the Wilkes v. City of Greenville court opinion was considered in the Filings.*

A. The Wilkes decision was issued in June 2017 just as the loss cost and rate review was being performed. Two aspects of the decision were considered in terms of potentially impacting workers compensation costs. First, the decision expanded the presumption regarding additional medical treatment being causally related to a compensable injury. This portion of the decision was directly addressed by legislation in July 2017 (House Bill 26), obviating the need for any adjustment in the Filings.

The second aspect of the Wilkes decision impacted the manner of proving disability, with the court ruling that in certain circumstances lay testimony could be sufficient for that purpose. This aspect of the decision could result over time in an increase in overall workers compensation system costs in North Carolina. However, due to the lack of data or studies at this time, the Rate Bureau decided to make no adjustment for this item in the Filings and to monitor the application of the Wilkes decision in the future.

Q. *Did you review the process used to allocate the overall average loss cost level change to the five industry groups and to the individual classification codes?*

A. Yes.

Q. *Do the Filings contain a description of the manner in which the overall change is distributed to the individual classifications?*

A. Yes. Appendices A-V, and B-I through B-V of the Loss Cost filing provide extensive descriptions and documentation of the methods that are used to distribute the overall change among the various classifications.

Q. *How was the overall average change for the Assigned Risk filing determined?*

A. The assigned risk filing begins with the loss costs resulting from the analyses just described. Then two additional analyses were performed. The first of these compares the assigned risk market experience to the statewide market experience. This analysis supported the proposed change to the current assigned risk loss cost differential. The second analysis involves the assigned risk expense need. Both of these analyses are documented in Exhibit II of the Assigned Risk filing.

The results of these two analyses are incorporated in the formula Loss Cost Multiplier (Exhibit I-A, Sheet 1 of the Assigned Risk filing). After combining the indicated change in the loss cost level and the proposed change in the Loss Cost Multiplier, the final Assigned Risk rate level decrease of 12.5% results (Exhibit I, Section D of the Assigned Risk filing).

Q. *Please explain the purpose and concept of the assigned risk differential.*

A. The primary purpose of the differential is to ensure equity between the assigned risk and voluntary markets. In order to help ensure a self-funded assigned risk market—one that does not require subsidization by participants in the voluntary market—the adequacy of the assigned risk differential is reviewed.

In North Carolina, as is usually the case, the combined experience for those employers in the assigned risk market is worse than the combined experience for those in the voluntary market. Therefore, during the assigned risk ratemaking process, the assigned risk differential is applied to recognize this disparity.

Q. *Please explain how this year's proposed change in the assigned risk differential was determined.*

A. As documented in Exhibit II-E of the assigned risk filing, ten years of indicated loss cost differentials based on each of (i) paid and (ii) paid plus case data were reviewed. The selected change to the current loss cost differential is based on an average of the changes indicated by both the paid and paid plus case experience (Exhibit II-E, Sheet 1, line (e)).

Q. *Please briefly describe the provisions for the various assigned risk expense components contained in the Assigned Risk filing.*

A. The underlying detail and supporting calculations in connection with the various expense provisions contained in this year's proposed assigned risk rates are fully documented in Exhibit II of the assigned risk filing. As a summary, a brief description of each expense component is as follows:

(i) Commission and brokerage – The 5.0% provision is the commission payable on assigned risk business, as required by the Workers Compensation Insurance Plan.

(ii) Loss adjustment expense (LAE) – The selection of this component was discussed earlier in connection with the proposed voluntary loss cost level change.

(iii) Other acquisition and general expense – This category includes provisions for various carrier expense items such as premium collection, underwriting, policy processing, advertising, and company operational and administrative expenses.

(iv) Uncollectible Premium Provision – This provision recognizes the fact that not all premium earned by the carriers is collected (Exhibit II-F).

(v) Underwriting profit – The underwriting profit analysis was conducted by Dr. Vander Weide and Dr. Appel.

(vi) Taxes, licenses, and fees – This includes a 2.66% provision for the premium tax, including the regulatory surcharge (equal to 6.5% of the premium tax).

(vii) Effect of expense constant and minimum premiums – It is expected that a $160 expense constant, a minimum premium multiplier of 200, and a maximum minimum premium of $1,500 will generate 12% of premium in the assigned risk market (Exhibit II-D).

Q. *Please describe the change to the Uncollectible Provision contained in the Assigned Risk filing, as well as the rationale for this change.*

A. The Uncollectible Provision was adjusted in this year's filing to reflect the fact that for the portion of premium that is not collected, (1) commissions are not paid to agents and (2) the servicing carrier allowance is normally not paid to the servicing carriers.

Q. *Please explain the change to the safety factor in the Assigned Risk filing.*

A. The Deductible Credit Safety Factor ("safety factor") is applied to the Loss Elimination Ratio in the deductible credit formula so that the credit is appropriate for the insured population that selects a small deductible. The factor reflects components for adverse selection, credit default, loss of investment income, and increased variance.

This filing proposes to increase the safety factor currently in effect in this jurisdiction's assigned risk market from the currently approved value of 0.70 to 0.95. This change will result in larger premium credits for employers that select a deductible under the small deductible program. The overall impact to statewide premium is estimated to be negligible (less than 0.1%).

Q. Are there any additional changes in miscellaneous rating values contained in the Filings?

A. Yes. The pages summarizing the Filings by component identify additional changes, as do the miscellaneous values and retrospective rating plan sections of Exhibit III. The Table of Weighting Values and the Table of Ballast Values in Exhibit III were also updated.

Q. *Please describe what is meant by the term "F-classifications."*

A. The "F" or "Federal" classifications are those operations conducted on or about navigable waters for which benefit levels and related costs are determined by the United States Longshore and Harbor Workers' Compensation Act, rather than individual state laws. Typical F-classifications include those covering ship builders and stevedores.

Q. *What changes are proposed for the Federal classifications ("F-classes")?*

A. Based on the latest available North Carolina F-class experience (contained in Appendix B-V of the Loss Cost filing), the loss cost filing proposes an overall average change of -7.5% from the current loss cost level. The assigned risk filing proposes an overall average rate level change of -8.8% from the current assigned risk rate level.

Q. *What is your opinion as to whether the proposed loss cost changes for the voluntary market will result in loss costs that are not excessive, inadequate, or unfairly discriminatory?*

A. Based on my analysis, I believe the methodologies employed, the provisions used, and the resulting filed loss cost changes are actuarially sound and reasonable for the time period during which they are proposed to be in effect and will result in loss costs that are not excessive, inadequate, or unfairly discriminatory.

Q. *What is your opinion as to whether the proposed rate changes for the assigned risk market will result in rates that are not excessive, inadequate, or unfairly discriminatory?*

A. Based on my analysis and assuming the profit produced by the proposed rates is reasonable, I believe the methodologies employed, the provisions used, and the resulting filed assigned risk rate changes are actuarially sound and reasonable for the time period during which they are proposed to be in effect and will result in assigned risk market rates that are not excessive, inadequate, or unfairly discriminatory.

Q. *Does this conclude your testimony?*

A. Yes, it does.

NATIONAL COUNCIL ON COMPENSATION INSURANCE

2017 COUNTRYWIDE ANNUAL LOSS ADJUSTMENT EXPENSE REVIEW—EVALUATED AS OF 12/31/2016

LOSS ADJUSTMENT EXPENSE SUMMARY
Analysis Based on Private Carrier Data

Year	(1) Call #19 DCCE Ratio (Avg. of Paid and Incurred Indications)	(2) Call #19 AOE Ratio (Avg. of Paid and Incurred Indications) [1]	(3)=(1)+(2) Call #19 LAE Ratio	(4) Calendar Year Incurred DCCE Ratio From IEE [2]	(5) Calendar Year Incurred AOE Ratio From IEE [1,2]	(6)=(4)+(5) Incurred LAE Ratio From IEE [2]	(7)=(3)-(6) Difference
2007	10.5%	7.5%	18.0%	10.1%	7.3%	17.4%	0.6%
2008	11.0%	6.8%	17.8%	11.9%	7.1%	19.0%	-1.2%
2009	11.2%	7.2%	18.4%	11.3%	7.3%	18.6%	-0.2%
2010	11.7%	6.9%	18.6%	11.9%	7.2%	19.1%	-0.5%
2011	12.3%	6.5%	18.8%	11.4%	6.7%	18.1%	0.7%
2012	13.1%	6.9%	20.0%	12.2%	6.2%	18.4%	1.6%
2013	13.2%	7.4%	20.6%	12.1%	7.0%	19.1%	1.5%
2014	13.6%	7.4%	21.0%	13.0%	6.7%	19.7%	1.3%
2015	13.2%	7.3%	20.5%	13.9%	6.9%	20.8%	-0.3%
2016	13.2%	7.3%	20.5%	14.4%	7.4%	21.8%	-1.3%

Notes:

Loss adjustment expense indications are displayed as a percentage of loss.

[1] Adjusted for the impact of large deductible polices.

[2] The IEE data is direct of reinsurance, excludes state funds and is from the NCCI Compiled IEE Validated Summary.

NATIONAL COUNCIL ON COMPENSATION INSURANCE

2017 COUNTRYWIDE ANNUAL LOSS ADJUSTMENT EXPENSE REVIEW—EVALUATED AS OF 12/31/2016

Analysis Based on Private Carrier Data

DCCE—PAID ANALYSIS—Excluding Large Deductible Policies

	(1)	(2)	(3)=(1)x(2)	(4)	(5)	(6)=(4)x(5)	(7)=(3)/(6)x10th/Ult.
		Cumulative Paid DCCE Development	Estimated Paid DCCE Developed to a		Cumulative Paid Loss Development	Estimated Paid Losses Developed to a	Estimated Ultimate DCCE
AY	Paid DCCE	Factors	10th Report	Paid Losses	Factors	10th Report	Ratio
2007	1,881,181,786	NA	1,881,181,786	17,662,422,762	NA	17,662,422,762	10.5%
2008	2,064,254,940	1.016	2,097,283,019	18,248,904,450	1.016	18,540,886,921	11.1%
2009	1,898,202,219	1.036	1,966,537,499	16,513,000,880	1.035	17,090,955,911	11.3%
2010	1,964,735,315	1.063	2,088,513,640	16,746,673,513	1.061	17,768,220,597	11.6%
2011	2,038,465,183	1.104	2,250,465,562	16,448,120,559	1.098	18,060,036,374	12.3%
2012	1,944,635,913	1.166	2,267,445,475	15,072,028,610	1.153	17,378,048,987	12.8%
2013	1,827,533,958	1.273	2,326,450,729	14,101,043,615	1.244	17,541,698,257	13.1%
2014	1,630,593,061	1.483	2,418,169,509	12,487,609,129	1.417	17,694,942,136	13.5%
2015	1,199,780,543	2.036	2,442,753,186	9,783,797,894	1.842	18,021,755,721	13.4%
2016	442,925,783	5.444	2,411,287,963	4,478,499,705	4.082	18,281,235,796	13.0%

NATIONAL COUNCIL ON COMPENSATION INSURANCE

2017 COUNTRYWIDE ANNUAL LOSS ADJUSTMENT EXPENSE REVIEW—EVALUATED AS OF 12/31/2016

Analysis Based on Private Carrier Data

DCCE—INCURRED ANALYSIS—Excluding Large Deductible Policies

AY	(1) Incurred DCCE	(2) Cumulative Incurred DCCE Development Factors	(3)=(1)x(2) Estimated Incurred DCCE Developed to a 10th Report	(4) Incurred Losses	(5) Cumulative Incurred Loss Development Factors	(6)=(4)x(5) Estimated Incurred Losses Developed to a 10th Report	(7)=(3)/(6)x10th/Ult. Estimated Ultimate DCCE Ratio
2007	2,137,185,988	NA	2,137,185,988	20,351,923,443	NA	20,351,923,443	10.5%
2008	2,325,934,983	1.000	2,325,934,983	21,365,391,185	1.000	21,365,391,185	10.9%
2009	2,192,380,758	1.003	2,198,957,900	19,770,777,458	1.000	19,770,777,458	11.1%
2010	2,367,621,046	1.007	2,384,194,393	20,439,750,084	1.001	20,460,189,834	11.7%
2011	2,498,832,217	1.016	2,538,813,532	20,827,937,605	1.002	20,869,593,480	12.2%
2012	2,635,140,108	1.024	2,698,383,471	20,293,145,472	1.002	20,333,731,763	13.3%
2013	2,742,891,398	1.017	2,789,520,552	21,070,991,517	0.993	20,923,494,576	13.3%
2014	2,883,982,913	1.023	2,950,314,520	21,654,497,637	0.993	21,502,916,154	13.7%
2015	2,853,262,822	1.028	2,933,154,181	22,869,244,078	0.984	22,503,336,173	13.0%
2016	2,992,899,865	1.037	3,103,637,160	24,045,162,146	0.970	23,323,807,282	13.3%

NATIONAL COUNCIL ON COMPENSATION INSURANCE

2017 COUNTRYWIDE ANNUAL LOSS ADJUSTMENT EXPENSE REVIEW—EVALUATED AS OF 12/31/2016

Analysis Based on Private Carrier Data

AOE—PAID ANALYSIS—Including Large Deductible Policies

AY	(1) Paid AOE	(2) Cumulative Paid AOE Development Factors	(3)=(1)x(2) Estimated Paid AOE Developed to a 10th Report	(4) Paid Losses	(5) Cumulative Paid Loss Development Factors	(6) Estimated Paid Losses Developed to a 10th Report	(7)=(3)/(6)x10th/Ult. Estimated Ultimate AOE Ratio	
2007	2,099,506,820	NA	2,099,506,820	18,255,378,123	NA	18,255,378,123	7.6%	(a)
2008	1,961,061,042	1.016	1,992,438,019	18,886,201,677	1.018	19,226,153,307	6.9%	(b)
2009	1,858,138,372	1.035	1,923,173,215	16,947,276,313	1.040	17,625,167,366	7.3%	(c)
2010	1,795,767,568	1.059	1,901,717,855	17,088,127,274	1.068	18,250,119,929	7.0%	(d)
2011	1,684,755,682	1.094	1,843,122,716	16,822,645,347	1.109	18,656,313,690	6.6%	(e)
2012	1,652,054,152	1.141	1,884,993,787	15,395,923,519	1.168	17,982,438,670	7.1%	(f)
2013	1,706,789,078	1.203	2,053,267,261	14,383,390,900	1.265	18,194,989,489	7.5%	(g)
2014	1,587,618,703	1.306	2,073,430,026	12,692,684,506	1.448	18,379,007,165	7.6%	(h)
2015	1,369,479,588	1.508	2,065,175,219	9,910,456,203	1.887	18,701,030,855	7.4%	(i)
2016	938,187,289	2.300	2,157,830,765	4,533,629,765	4.229	19,172,720,276	7.5%	(j)

Adjusted for Impact of Large Deductibles

(a) (Col.3/Col.6 x (10th/Ult.) + 0.009) x 0.67
(b) (Col.3/Col.6 x (10th/Ult.) + 0.008) x 0.67
(c) (Col.3/Col.6 x (10th/Ult.) + 0.008) x 0.68
(d) (Col.3/Col.6 x (10th/Ult.) + 0.007) x 0.69
(e) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.69
(f) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.70
(g) (Col.3/Col.6 x (10th/Ult.) + 0.004) x 0.70
(h) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.70
(i) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.70
(j) (Col.3/Col.6 x (10th/Ult.) + 0.004) x 0.70

NATIONAL COUNCIL ON COMPENSATION INSURANCE

2017 COUNTRYWIDE ANNUAL LOSS ADJUSTMENT EXPENSE REVIEW—EVALUATED AS OF 12/31/2016

Analysis Based on Private Carrier Only Data

AOE—INCURRED ANALYSIS—Including Large Deductible Policies

AY	(1) Incurred AOE	(2) Cumulative Incurred AOE Development Factors	(3)=(1)x(2) Estimated Incurred AOE Developed to a 10th Report	(4) Incurred Losses	(5) Cumulative Incurred Loss Development Factors	(6) Estimated Incurred Losses Developed to a 10th Report	(7)=(3)/(6)x10th/Ult. Estimated Ultimate AOE Ratio	
2007	2,197,468,116	NA	2,197,468,116	21,865,617,237	NA	21,865,617,237	7.3%	(a)
2008	2,067,551,618	1.006	2,079,956,928	23,077,939,073	1.000	23,077,939,073	6.6%	(b)
2009	1,985,178,820	1.015	2,014,956,502	21,169,378,974	1.000	21,169,378,974	7.0%	(c)
2010	1,953,409,609	1.024	2,000,291,440	21,847,458,843	1.003	21,913,001,220	6.8%	(d)
2011	1,917,119,757	1.033	1,980,384,709	22,408,465,789	1.005	22,520,508,118	6.4%	(e)
2012	1,920,404,411	1.043	2,002,981,801	21,965,451,992	1.005	22,075,279,252	6.7%	(f)
2013	2,189,913,805	1.040	2,277,510,357	23,034,699,123	0.993	22,873,456,229	7.3%	(g)
2014	2,206,890,440	1.045	2,306,200,510	23,653,028,027	0.992	23,463,803,803	7.2%	(h)
2015	2,273,440,596	1.028	2,337,096,933	24,949,770,275	0.980	24,450,774,870	7.1%	(i)
2016	2,522,504,276	0.975	2,459,441,669	26,379,240,434	0.959	25,297,691,576	7.1%	(j)

Adjusted for Impact of Large Deductibles

(a) (Col.3/Col.6 x (10th/Ult.) + 0.009) x 0.67
(b) (Col.3/Col.6 x (10th/Ult.) + 0.008) x 0.67
(c) (Col.3/Col.6 x (10th/Ult.) + 0.008) x 0.68
(d) (Col.3/Col.6 x (10th/Ult.) + 0.007) x 0.69
(e) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.69
(f) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.70
(g) (Col.3/Col.6 x (10th/Ult.) + 0.004) x 0.70
(h) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.70
(i) (Col.3/Col.6 x (10th/Ult.) + 0.005) x 0.70
(j) (Col.3/Col.6 x (10th/Ult.) + 0.004) x 0.70

PRE-FILED TESTIMONY

OF

MARK MULVANEY

2017 NORTH CAROLINA WORKERS COMPENSATION

ASSIGNED RISK RATE FILING

Q. Please state your name and business address.

A. My name is Mark Mulvaney, my business address is Milliman, Inc., 1400 Wewatta Street, Suite 300, Denver, Colorado, 80202.

Q. Are you an actuary?

A. Yes, I am a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries and am a member in good standing of both organizations.

Q. Please describe your educational and professional background.

A. I graduated with a bachelor of science degree in Mathematics from Georgetown University in 1978. I spent the first 10 years of my career with the National Council on Compensation Insurance. My experience there included the management of the legislative evaluation unit, a division of the National Council responsible for the review and estimation of the cost impact of workers compensation legislation countrywide, management of the "F" classification ratemaking unit, and as regional actuary.

I joined Milliman over 29 years ago, and have remained focused on workers compensation issues, but have broadened my client base to include casualty actuarial consulting services to insurance companies, reinsurers, rating bureaus, insurance regulators, state funds, self-insurance groups and pools, and to individual public and private self-insured employers. Activities include ratemaking, reserving, company formation, merger and acquisition valuation, financial analysis and company modeling, software development, expert testimony, research, and special project work.

Q. What is Milliman?

A. Milliman is among the world's largest independent actuarial and consulting firms. Milliman was founded in Seattle in 1947 as Milliman & Robertson and today has offices in principal cities worldwide, covering markets in North America, Latin America, Europe, Asia and the Pacific, and the Middle East. Milliman employs more than 3,400 people, including specialists ranging from clinicians to economists. The firm has consulting practices in healthcare, employee benefits, property and casualty insurance, life insurance, and financial services. Milliman serves the full spectrum of business, financial, government, union, education, and nonprofit organizations.

Q. Were you engaged to provide actuarial services to the North Carolina Rate Bureau (the "Rate Bureau") in connection with its 2017 workers compensation insurance Assigned Risk Rate Filing (the "Filing")?

A. Yes I was.

Q. What was the scope of that engagement?

A. Milliman was engaged for two aspects of this filing. Dr. David Appel of Milliman's New York Office was engaged to review the Underwriting Profit factor to include in the Assigned Risk Rate Filing. For this year's filing, the Rate Bureau also engaged NCCI to provide the preliminary analysis of the loss data, including preliminary analysis of loss development, trends, and expense levels. My role was to conduct an independent review and work with NCCI to present the data to the Rate Bureau. The scope includes assisting the Rate Bureau in explaining the Filing to regulators, and providing expert testimony concerning the Filing.

Q. Are you providing expert testimony concerning the Underwriting Profit provision?

A. No, I am relying on the work and opinion of Dr. David Appel and Dr. James Vander Weide as to the Underwriting Profit factor. The scope of my analysis and testimony will concern the other aspects of the Filing.

Q. Did you or your firm physically prepare the filing documents for the Rate Bureau?

A. No, NCCI prepared the filing documents based on the directions of the Rate Bureau; my role was one of input and review.

Q. Is your firm being compensated for this engagement?

A. Yes.

Q. Is that compensation in any way contingent on the provision of favorable testimony in support of the Filing?

A. No it is not.

Q. Have you completed your review of the Filing?

A. Yes I have.

Q. Were there any constraints placed on your review, such as limited or delayed access to data or limited time that may have impeded your complete review?

A. No, I was provided all the information that was necessary and had adequate time for a complete review. My review was not limited in any way.

Q. What are assigned risks?

A. Assigned risks refer to those North Carolina employers that cannot find an insurance company in the voluntary market willing to provide a policy of insurance. These employers may apply to the Rate Bureau and, if eligible, have an insurance company designated to provide a policy through the Workers Compensation Insurance Plan. All licensed workers compensation insurers must participate in this plan, either as direct assignment carriers or as members of a pool. A direct assignment carrier accepts a policy assigned to it on a direct basis, and writes and services it just as they would any other business, except that they must use the filed Assigned Risk rates and rating plans, and pay the agent a commission as designated in the Workers Compensation Insurance Plan. For pool members, one or more servicing carriers will write the policy on a direct basis, again using the same filed Assigned Risk rates and rating plans and paying the same agent commission as the direct assignment carriers. The pool members have a reinsurance arrangement with the servicing carriers and each other whereby all members of the pool will share proportionately in the experience of the pool.

Q. Explain the difference between a Loss Cost Filing and a Rate Filing.

A. By definition, insurance rates (along with the associated rating plans) are to include provisions for all costs associated with the transfer of risk. These costs include losses, expenses, taxes, licenses and fees, and profit and contingencies. Since 1995 in North Carolina, the voluntary market workers compensation filings by the Rate Bureau have included provisions for losses, loss adjustment expenses, and loss based assessments only. These are called loss costs. They exclude provision for production expenses, general expenses, dividends, taxes, licenses and fees (since 1999), and profit and contingencies.

For the voluntary market, individual insurance companies will analyze their own books of business along with the approved loss costs, and then make filings with the Insurance Department for loadings that represent an anticipated difference in loss costs (if any), along with their production and general expense, taxes, licenses and fees, and profit and contingency provisions.

For the assigned risk market, the Rate Bureau is responsible for analyzing the experience of the Assigned Risk market and filing for rates that include all costs: losses, expenses, and profit and contingencies.

Q. Does the Rate Bureau's Assigned Risk Rate Filing depend upon the Rate Bureau's voluntary market loss cost filing with the same effective date?

A. Yes, the starting point of the Rate Bureau's Assigned Risk rate analysis is the voluntary market loss cost filing it makes on the same date. This Assigned Risk Rate Filing calculates a factor to apply to the voluntary market loss costs to adjust them to the loss cost level of the Assigned Risk market, and to incorporate loadings for production and general expense, taxes, licenses and fees, uncollectible premiums, and profit and contingency provisions. This approach is consistent with the way rates are developed for individual companies in the voluntary market.

Q. Have you reviewed the loss cost filing upon which this Assigned Risk Rate Filing depends?

A. Yes I have. I provided my opinions on the loss cost filing in my pre-filed testimony included as Exhibit RB-5 in that filing. Rather than repeat that pre-filed testimony here, I will simply incorporate it in its entirety herein by reference.

Q. What were your conclusions concerning the Rate Bureau's loss cost filing?

A. My opinion was that the overall level of the loss costs as filed by the Rate Bureau reasonably reflects the expected level of loss costs for workers compensation insurance in North Carolina, and the loss costs by classification as contained in that filing are actuarially sound.

Q. What is the overall change in Assigned Risk rates the Rate Bureau is seeking in this filing?

A. The Rate Bureau is seeking a 12.5% decrease in rate level for the industrial classifications, and an 8.8% decrease in rate level for the Federal ("F") classifications.

Q. Is the change in rates the same for each class code?

A. No, the change in rates arises from the change in the voluntary market loss costs which varies by class code, and the change in the selected loss cost multiplier, which does not. Although the overall rate level change is a 12.5% decrease for the industrial classifications and an 8.8% decrease for the F classifications, different class codes will change by different amounts. The industrial classifications are further organized by industry group and the average changes are as follows:

Manufacturing 12.5% decrease
Contracting 11.4% decrease
Office and Clerical 12.8% decrease
Goods and Services 12.6% decrease
Miscellaneous 13.2% decrease

Q. What is the proposed effective date of the filed Assigned Risk rates?

A. April 1, 2018.

Q. When did the current Assigned Risk rates take effect in North Carolina?

A. The current Assigned Risk rates became effective April 1, 2017.

Q. Can you briefly explain the overall theory underpinning the rate filing?

A. Yes, the first underlying assumption is that the loss costs filed with the voluntary market filing are adequate for the average North Carolina employer. The second assumption is that the collection of direct assignment carriers and servicing carriers is effectively the same as a single aggregate insurance company with a cost structure that is representative of their average. The Assigned Risk rate filing is then equivalent to a rate filing of this single aggregate company underwriting a book of business consisting of Assigned Risk employers.

Q. What is the advantage of looking at the Assigned Risk filing in this manner?

A. It results in considerable simplification. Instead of building each rate from the ground-up, all that is necessary is for the Rate Bureau to calculate a loss cost modification factor that adjusts for differences in loss costs for the Assigned Risk market as compared to the voluntary market, as well as loadings for production and general expenses, taxes, licenses and fees, uncollectible premiums, and profit and contingencies in the exact same manner that insurance companies do for their voluntary books. The combined impact of these provisions results in a loss cost multiplier that is applied to the voluntary loss costs to produce the Assigned Risk rates.

Q. What are the specific steps involved in the calculation of the loss cost multiplier?

A. There are seven steps:

1. Calculate a Loss Cost Modification factor;
2. Determine the provision for Commission and Brokerage;
3. Determine the provision for Other Acquisition, Field Supervision and General Expenses combined;
4. Determine the provision for Taxes, Licenses and Fees;
5. Determine the provision for Underwriting Profit and Contingencies;
6. Determine the provision for Uncollectible Premiums; and
7. Determine the impact of the Expense Constant and Minimum Premiums.

Q. How is the Assigned Risk loss cost multiplier calculated?

A. The actual formula is somewhat complex, but the seven provisions above are entered into a formula provided by the North Carolina Insurance Department for use in determining loss cost multipliers. In essence, the loss cost multiplier is the loss cost modification factor (1) divided by the complement of the expense and profit and contingencies ratio (sum of (2) through (6)), with an offset for premium provided by the expense constant and minimum premiums (7). The Assigned Risk plan does not provide for premium discounts by size of insured and North Carolina state act losses do not have loss based assessments, so those parts of the Insurance Department's formula are not used.

Q. Is the Insurance Department's formula commonly accepted?

A. Yes, it has been used by voluntary market insurance companies in North Carolina for many years and functionally equivalent formulas exist in almost all the other states that have a similar loss cost rating law.

Q. Is this the same formula used in the current filing?

A. Yes it is.

Q. Let's now take the Insurance Department's formula components one at a time. What is a loss cost modification factor and how is it calculated?

A. Assigned Risk employers usually experience a level of losses that is higher, on average, than the market as a whole. This makes sense in that insurance underwriters will decline to write an insurance policy where they view the potential losses as higher than the level at which their individual rates would compensate them. The fact that Assigned Risk loss experience is higher simply means that insurance company underwriters in the exercise of their independent judgment are successful in identifying high cost employers. The loss cost modification factor represents the amount by which the Assigned Risk loss cost level is expected to exceed the average as represented by the filed loss costs.

It is calculated using the concept of differentials. A differential is usually expressed as a ratio of ratios. The Rate Bureau first calculates a numerator ratio that is based solely on the experience of the Assigned Risk market. That numerator ratio is itself comprised of a numerator of losses developed to ultimate and adjusted to the current benefit level and a denominator consisting of the pure premiums developed to ultimate and adjusted to the 4/1/17 voluntary loss cost level. Essentially, the numerator ratio is the loss ratio that would have resulted if the Assigned Risks were not charged a fully loaded rate, but were instead charged the voluntary market loss costs. The numerator ratio thus represents as a factor the percentage by which Assigned Risk losses either exceed or are short of the voluntary market pure premiums at the 4/1/17 level.

The denominator ratio is comprised of the same elements as the numerator ratio, but is based on the experience of the entire market (both assigned risk and voluntary). This denominator ratio represents as a factor the percentage by which the total market losses either exceed or are short of the voluntary market pure premiums at the 4/1/17 level.

When taking the ratio of the ratios, the measurement unit in the denominator of each is common, both representing pure premiums at the 4/1/17 level. They therefore cancel and we are left with a scaled factor representing the relative percentage amount that Assigned Risk losses either exceed or are short of the total market losses. As mentioned earlier, the differentials are expected to exceed 1.000, since Assigned Risk loss costs are anticipated to be higher than the average of all North Carolina employers.

The Rate Bureau calculates a differential as described above for each of the most recent complete ten policy years, 2006 through 2015. Additionally, differentials are calculated using the paid loss development method and the case-incurred loss development method. The ten-year average differential for each method is divided by the current impact of assigned risk pricing programs (the current differential of 1.905 and the impact of ARAP of 1.018) to determine an indicated change for each method. The Rate Bureau gives equal weight to the indicated changes for each method. The average indicated change (1.039) multiplied by the current assigned risk differential results in an indicated assigned risk differential of 1.979.

An adjustment is made to prevent a double counting of the loss adjustment provision included

within the servicing carrier allowance. Voluntary market loss costs include a provision for loss adjustment expenses. Loss adjustment expense is also provided to servicing carriers through their servicing carrier allowance, and the servicing carrier allowance is included in the Assigned Risk rates in a different part of the formula (in the provision for Other Acquisition, Field Supervision and General Expenses). Additionally, it is also assumed that the servicing carrier allowance is applicable to direct assignment carriers as well. Therefore, an adjustment needs to be made to the Loss Cost Modification factor to exclude the loss adjustment expenses that are provided through the servicing carrier allowance. This second adjustment is a factor of .851 and is the inverse of the loss adjustment expense factor. The indicated differential of 1.979 multiplied by the adjustment factor of .851 results in the proposed Loss Cost Modification factor of 1.684 and is shown on Exhibit I-A, Sheet 3 of the filing.

Q. Is this the same procedure used in last year's filing?

A. Yes it is.

Q. In your opinion is the loss cost modification factor of 1.684 reasonable?

A. Yes.

Q. How is the provision for Commission and Brokerage determined?

A. The Workers Compensation Insurance Plan provides for a flat commission of 5% of premium to be used for all Assigned Risks, regardless of whether they are written by direct assignment carriers or servicing carriers.

Q. How is the provision for Other Acquisition, Field Supervision, and General Expenses determined?

A. It is based on the average servicing carrier allowance (which includes loss adjustment expenses) and is assumed to be applicable to both servicing carriers as well as direct assignment carriers.

The provision is the weighted average of the January 1, 2017 three year servicing carrier allowances (which include loss adjustment expenses), plus a provision for Assigned Risk Pool administrative expenses. The Assigned Risk Pool administrative expense provision consists of the average over the most recent ten calendar years of the ratio of Pool administrative and separately reimbursable expenses to the gross written premium of servicing carriers and direct assignment carriers combined.

Q. Is this the same procedure used in last year's filing?

A. Yes it is.

Q. In your opinion, is the provision for Other Acquisition, Field Supervision, and General Expenses reasonable?

A. Yes.

Q. How is the provision for Taxes, Licenses and Fees determined?

A. The provision for taxes, licenses and fees is based on the North Carolina premium tax rate of 2.5% multiplied by the regulatory surcharge factor (1.065), producing a total of 2.66%. These values are shown on Exhibit II of the filing.

Q. In your opinion, is the provision for Taxes, Licenses and Fees reasonable?

A. Yes.

Q. How is the provision for Underwriting Profit determined?

A. The Underwriting Profit provision was selected by the Rate Bureau based on a cost of capital analysis provided by Dr. James Vander Weide and a rate of return model provided by Dr. David Appel of Milliman. I have not reviewed nor have I been asked to provide an opinion concerning the Underwriting Profit provision. I am relying on these other experts and the Rate Bureau as to the reasonableness of this value.

Q. Is a Contingency provision included in the filing?

A. No, the Rate Bureau considered a Contingency provision, but elected not to include one in this filing.

Q. How is the provision for Uncollectible Premiums determined?

A. The provision for Uncollectible Premium is calculated in Exhibit II-F. It is selected based on a review of the previous eleven year uncollectible premium ratios after development. There is also an adjustment to reflect the savings resulting from commissions and the servicing carrier allowance that are not paid on uncollectible premiums.

Q. Is this the same procedure used in the current filing?

A. The same procedure is used to select the uncollectible premium ratio. However, the adjustment to the selected ratio to reflect the savings due to commissions and the servicing carrier allowance is an

enhancement added this year. The effect of this enhancement is to reduce the uncollectible premium provision used in the rate calculation from 9% to 6.8%.

Q. In your opinion, is the provision for Uncollectible Premium the Rate Bureau has included reasonable?

A. Yes it is.

Q. How is the impact of the Expense Constant and Minimum Premiums determined?

A. Expense constant and minimum premiums provide additional premium revenues apart from those produced by the rates. This additional revenue therefore reduces the rate need, and consequently the loss cost multiplier that would otherwise apply. The Rate Bureau calculates the impact of the expense constant and minimum premiums in Exhibit II-D. The impact of the expense constant is based on the Assigned Risk premiums for policy years 2014 through 2016. The impact of minimum premiums is based on Unit Statistical Data for policy years 2006 to 2013. The combined impact of the expense constant and minimum premiums is 12.0% of assigned risk premium excluding these items. This impact is expressed as a factor (1.120) and used as a divisor in the loss cost multiplier formula to reduce the rates to account for these alternate premium sources.

Q. Has the Rate Bureau changed the formula to determine the impact of the Expense Constant and Minimum Premiums from the prior Assigned Risk rate filing?

A. No it is the same formula used in the prior Assigned Risk rate filing.

Q. In your opinion, is the impact of the Expense Constant and Minimum Premiums that the Rate Bureau has calculated reasonable?

A. Yes it is.

Q. In your opinion, is the formula provided by the Insurance Department a reasonable method to determine the Assigned Risk loss cost multiplier?

A. Yes it is.

Q. What is the Assigned Risk loss cost multiplier filed by the Rate Bureau?

A. It is 2.695 as shown on Exhibit I-A, Sheet 1.

Q. How are the Assigned Risk rates calculated?

A. The filed loss cost multiplier (above) is multiplied by the loss costs by classification code as contained in the voluntary market loss cost filing.

Q. How is the overall change in Assigned Risk rate level calculated?

A. For the industrial classifications, it is derived from the product of the change in the voluntary market loss costs expressed as a factor and the change in the Assigned Risk loss cost multiplier. Since the change in the loss cost multiplier is a constant for each and every industrial class code, this will hold for each class code and each industry group in addition to the average overall change. The same approach is used to calculate the overall rate level change for the F classifications.

Q. I understand that you are not providing an opinion concerning the Underwriting Profit provision. If I ask you to assume that the Underwriting Profit provision is reasonable and actuarially sound, is the Assigned Risk loss cost multiplier as filed by the Rate Bureau reasonable in your opinion?

A. Yes, if I assume that the Underwriting Profit provision is reasonable, in my opinion, the Assigned Risk loss cost multiplier filed by the Rate Bureau also is reasonable and actuarially sound.

Q. Again, assuming the Underwriting Profit provision is reasonable, do you have an opinion whether the filed Assigned Risk Rates are actuarially sound and reasonably reflect the needed level to cover all costs for Assigned Risk workers compensation insurance in North Carolina?

A. Yes, if I assume that the Underwriting Profit provision is reasonable, it is my opinion that the overall level of the Assigned Risk Rates as filed by the Rate Bureau reasonably reflects the expected level of all costs for workers compensation Assigned Risk insurance in North Carolina, and the rates by classification as contained in that filing are actuarially sound.

Q. Assuming that the Underwriting Profit provision is reasonable, in your opinion are the Assigned Risk Rates included in the filing not excessive, inadequate, or unfairly discriminatory?

A. Yes, if I assume that the Underwriting Profit provision is reasonable, it is my opinion that the Assigned Risk Rates included in the filing are not excessive, inadequate, or unfairly discriminatory.

Q. Does this conclude your testimony?

A. Yes it does.

PREFILED TESTIMONY
OF
JAMES H. VANDER WEIDE

2017 WORKERS COMPENSATION INSURANCE
ASSIGNED RISK RATE FILING
BY THE NORTH CAROLINA RATE BUREAU

Q. WHAT IS YOUR NAME, OCCUPATION, AND BUSINESS ADDRESS?

A. My name is James H. Vander Weide. I am President of Financial Strategy Associates, a firm that provides strategic and financial consulting services to corporate clients. My business address is 3606 Stoneybrook Drive, Durham, North Carolina 27705.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PRIOR ACADEMIC EXPERIENCE.

A. I graduated from Cornell University with a Bachelor's Degree in Economics and then attended Northwestern University where I earned a Ph.D. in Finance. I joined the faculty of the School of Business at Duke University where I was subsequently named Assistant Professor, Associate Professor, Professor, and Research Professor. I have published research in the areas of finance and economics and taught courses in these fields at Duke for more than thirty-five years. I am now retired from my teaching duties at Duke.

I have taught courses in corporate finance, investment management, and management of financial institutions. I also taught a graduate seminar on the theory of public utility pricing and lectured in executive development seminars on the cost of capital, financial analysis, capital budgeting, mergers and acquisitions, cash management, short-run financial planning, and competitive strategy.

I have served as Program Director and taught in numerous executive education programs at Duke, including the Duke Advanced Management Program, the Duke Management Challenge, the Duke Executive Program in Telecommunications, Competitive Strategies in Telecommunications, and the Duke Program for Manager Development for managers from the former Soviet Union. I have also taught in tailored programs developed for corporations such as ABB, Accenture, Allstate, AT&T, Progress Energy, GlaxoSmithKline, Lafarge, MidAmerican Energy, Norfolk Southern, The Rank Group, Siemens, TRW, and Wolseley PLC.

In addition to my teaching and executive education activities, I have written research papers on such topics as portfolio management, the cost of capital, capital budgeting, the effect of regulation on the performance of

public utilities, and cash management. My articles have been published in *American Economic Review, Financial Management, International Journal of Industrial Organization, Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Bank Research, Journal of Accounting Research, Journal of Cash Management, Management Science, The Journal of Portfolio Management, Atlantic Economic Journal, Journal of Economics and Business,* and *Computers and Operations Research.* I have written a book titled *Managing Corporate Liquidity: an Introduction to Working Capital Management*, a chapter for *The Handbook of Modern Finance*, "Financial Management in the Short Run," and a chapter for the book, *The Handbook of Portfolio Construction: Contemporary Applications of Markowitz Techniques,* "Principles for Lifetime Portfolio Selection: Lessons from Portfolio Theory."

Q. HAVE YOU PREVIOUSLY PRESENTED EVIDENCE ON THE COST OF CAPITAL AND OTHER REGULATORY ISSUES?

A. Yes. As an expert on financial and economic theory and practice, I have participated in more than five hundred regulatory and legal proceedings before the U.S. Congress, the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Telecommunications and Information Administration,

the Federal Energy Regulatory Commission, the National Energy Board (Canada), the public utility commissions of forty-five states and four Canadian provinces, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, I have prepared expert testimony in proceedings before the U.S. Tax Court, the U.S. District Court for the District of Nebraska; the U.S. District Court for the District of New Hampshire; the U.S. District Court for the District of Northern Illinois; the U.S. District Court for the Eastern District of North Carolina; the Montana Second Judicial District Court, Silver Bow County; the U.S. District Court for the Northern District of California; the Superior Court, North Carolina; the U.S. Bankruptcy Court for the Southern District of West Virginia; the U. S. District Court for the Eastern District of Michigan; and the Supreme Court of the State of New York.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I have been asked by the North Carolina Rate Bureau to make an independent appraisal of the aggregate cost of equity capital for the companies writing workers compensation insurance in North Carolina and to recommend a rate of return on equity that is fair, that allows those companies

in the aggregate to attract and retain capital on reasonable terms, that is commensurate with returns on investments of comparable risk, and that maintains the financial integrity of those companies in the aggregate.

Q. WHAT DO YOU MEAN BY THE PHRASE “COST OF EQUITY CAPITAL?”

A. A firm’s cost of equity capital is the rate of return expectation that is required in the marketplace on equity investments of comparable risk. If an investor does not expect to earn a return on an equity investment in a firm that is at least as large as the return the investor could expect to earn on other investments of comparable risk, then the investor will not invest in that firm’s shares. Thus, a firm’s cost of equity capital is also the rate of return expectation that is required in the marketplace in order to induce equity investors to purchase shares in that firm.

Q. IS THE COST OF EQUITY CAPITAL THE SAME AS THE RETURN ON EQUITY?

A. No. The cost of equity capital is a market-based concept that reflects investors’ future expectations, while the return on equity is an accounting concept that measures results of past performance. The return on equity is equal

to income available for common equity divided by the book value of common equity.

Q. HAVE YOU FORMED AN OPINION REGARDING THE COST OF EQUITY CAPITAL FOR THE AVERAGE COMPANY WRITING WORKERS COMPENSATION INSURANCE IN NORTH CAROLINA?

A. Yes.

Q. WHAT IS YOUR OPINION IN THAT REGARD?

A. The cost of equity capital for such a company is in the range 8.8 percent to 12.1 percent.

Q. WHAT ECONOMIC PRINCIPLES DID YOU CONSIDER IN ARRIVING AT THAT OPINION?

A. There are two primary economic principles relevant to my appraisal of the cost of equity capital. The first, relating to the demand for capital, states that a firm should continue to invest in its business only so long as the return on its investment is greater than or equal to its cost of capital. In the context of a regulated firm, this principle suggests that the regulatory agency should establish revenue levels which will offer the firm an opportunity to earn a return on its investment that is at least equal to its cost of capital.

The second principle, relating to the supply of capital, states that rational investors are maximizing their total return on capital only if the returns they expect to receive on investments of comparable risk are equal. If these returns are not equal, rational investors will reduce or completely eliminate investments in those activities yielding lower expected returns for a given level of risk and will increase investments in those activities yielding higher expected returns. The second principle implies that regulated firms will be unable to obtain the capital required to expand service on reasonable terms unless they are able to provide investors returns equal to those expected on investments of comparable risk.

Q. DO THESE ECONOMIC PRINCIPLES APPLY TO THE SETTING OF INSURANCE RATES?

A. Yes. These are general economic principles that apply to investing in any business activity, including insurance.

Q. HOW DID YOU GO ABOUT DETERMINING THE COST OF EQUITY CAPITAL FOR THE AVERAGE COMPANY WRITING WORKERS COMPENSATION INSURANCE IN NORTH CAROLINA?

A. I used two generally accepted methods to estimate the cost of equity: (1) the Discounted Cash Flow (DCF) Model, and (2) the Risk Premium Approach.

Q. PLEASE DESCRIBE THE DCF MODEL.

A. The DCF Model suggests that investors value an asset on the basis of the future cash flows they expect to receive from owning the asset. Thus, investors value an investment in a bond because they expect to receive a sequence of semi-annual coupon payments over the life of the bond and a terminal payment equal to the bond's face value at the time the bond matures. Likewise, investors value an investment in a firm's stock because they expect to receive a sequence of dividend payments and, perhaps, expect to sell the stock at a higher price sometime in the future.

A second fundamental principle of the DCF approach is that investors value a dollar received in the future less than a dollar received today. This is because, if they had the dollar today, they could invest it in an interest earning account and increase their wealth. This principle is called the time value of money.

Applying the two fundamental DCF principles noted above to an investment in a bond suggests that investors should value their investment in the bond on the basis of the present value of the bond's future cash flows. Thus, the price of the bond should be equal to:

Equation 1

$$P_B = \frac{C}{(1 + i)} + \frac{C}{(1 + i)^2} + \ldots + \frac{C + F}{(1 + i)^n}$$

where:

P_B	=	Bond price;
C	=	Cash value of the coupon payment (assumed for notational convenience to occur annually rather than semi-annually);
F	=	Face value of the bond;
i	=	The rate of interest the investor could earn by investing his money in an alternative bond of equal risk; and
n	=	The number of periods before the bond matures.

Applying these same principles to an investment in a firm's stock suggests that the price of the stock should be equal to:

Equation 2

$$P_S = \frac{D_1}{(1 + k)} + \frac{D_2}{(1 + k)^2} + \ldots + \frac{D_n + P_n}{(1 + k)^n}$$

where:

P_S	=	Current price of the firm's stock;
$D_1, D_2 \ldots D_n$	=	Expected annual dividend per share on the firm's stock;
P_n	=	Price per share of stock at the time the investor expects to sell the stock; and
k	=	Return the investor expects to earn on alternative investments of the same risk, i.e., the investor's required rate of return.

Equation (2) is frequently called the Annual Discounted Cash Flow (DCF) Model of stock valuation.

Q. HOW DO YOU USE THE DCF MODEL TO DETERMINE THE COST OF EQUITY CAPITAL?

A. The “k” in the equation is the cost of equity capital. We make certain simplifying assumptions regarding the other factors in the equation and then mathematically solve for “k.”

Q. WHAT ARE THE ASSUMPTIONS YOU MAKE?

A. Most analysts make three simplifying assumptions. First, they assume that dividends are expected to grow at the constant rate (“g”) into the indefinite future. Second, they assume that the stock price at time “n” is simply the present value of all dividends expected in periods subsequent to “n.” Third, they assume that the investors’ required rate of return, “k,” exceeds the expected dividend growth rate, “g.”

Q. DOES THE ANNUAL DCF MODEL OF STOCK VALUATION PRODUCE APPROPRIATE ESTIMATES OF A FIRM’S COST OF EQUITY CAPITAL?

A. No. The Annual DCF Model of stock valuation produces appropriate estimates of a firm’s cost of equity capital only if the firm pays dividends just once a year. Since

most firms pay dividends quarterly, the Annual DCF Model produces downwardly biased estimates of the cost of equity. Investors can expect to earn a higher annual effective return on an investment in a firm that pays quarterly dividends than in one which pays the same amount of dollar dividends once at the end of each year. A complete analysis of the implications of the quarterly payment of dividends on the DCF Model is provided in Exhibit RB-9. For the reasons cited there, I employed the Quarterly DCF Model throughout my calculations.

Q. PLEASE DESCRIBE THE QUARTERLY DCF MODEL YOU USED.

A. The Quarterly DCF Model I used is described by Equation 10 on page 11 in Exhibit RB-9. This equation shows that the cost of equity is: the sum of the dividend yield and the growth rate, where the dividend in the dividend yield is the equivalent dividend at the end of the year, and the growth rate is the expected growth in dividends or earnings per share.

Q. HOW DO YOU APPLY THE DCF APPROACH TO OBTAIN THE COST OF EQUITY CAPITAL FOR THE COMPANIES WRITING WORKERS COMPENSATION INSURANCE IN NORTH CAROLINA?

A. I apply the DCF approach to two groups of companies: Value Line's group of property/casualty insurance companies and the S&P 500.

Q. WHY DO YOU APPLY THE DCF APPROACH TO THE S&P 500 AS WELL AS TO VALUE LINE'S PROPERTY/CASUALTY INSURANCE COMPANIES?

A. As I noted previously, the cost of equity is defined as the rate of return investors expect to earn on investments in other companies of comparable risk. I apply the DCF approach to the S&P 500 because they are a large group of companies that, on average, are typically viewed as being comparable in risk to the property/casualty insurance industry. The use of a larger set of comparable risk companies should provide an accurate estimate of the cost of equity for the companies writing workers compensation insurance in North Carolina.

Q. DO YOU INCLUDE ALL THE VALUE LINE PROPERTY/CASUALTY INSURANCE COMPANIES?

A. No. Among the Value Line property/casualty insurance companies, I only include companies which pay a quarterly dividend, have not lowered their dividends, and have a positive five-year earnings growth forecast available from I/B/E/S (formerly known as the Institutional Brokers Estimate System, now part of Thomson Reuters). The Value

Line property/casualty companies I use are shown in Exhibit RB-7.

Q. WHAT CRITERIA DO YOU USE TO SELECT COMPANIES IN THE S&P 500?

A. I include those firms which pay dividends and which have at least three five-year earnings forecasts available from I/B/E/S. I exclude the insurance companies in the S&P 500, as identified by I/B/E/S Thomson Reuters, because I have already calculated DCF results for the Value Line property/casualty insurance companies. The S&P 500 companies I use are shown in Exhibit RB-8.

Q. WHY DO YOU ELIMINATE ANY COMPANY WHICH HAD RECENTLY LOWERED ITS DIVIDEND OR WHICH FAILS TO PAY DIVIDENDS?

A. I eliminate those companies because it is difficult to make a reliable estimate of the future dividend growth rate for companies that have recently lowered their dividends or do not pay dividends. If a company has recently lowered its dividend, investors do not know whether the company will again lower its dividend in the future, or whether the company will attempt to increase its dividend back toward its previous level. If a company does not pay a dividend, one cannot mathematically apply the DCF approach.

Q. HOW DO YOU ESTIMATE THE GROWTH COMPONENT OF THE QUARTERLY DCF MODEL?

A. I use the average of analysts' estimates of future earnings per share (EPS) growth reported by I/B/E/S. As part of their research, financial analysts working at Wall Street firms periodically estimate EPS growth for each firm they follow. The EPS forecasts for each firm are then published. The forecasts are used by investors who are contemplating purchasing or selling shares in individual companies.

Q. WHAT IS I/B/E/S?

A. I/B/E/S is a collection of analysts' forecasts for a broad group of companies expressed in terms of a mean forecast and a standard deviation of forecast for each firm. The mean forecast is used by investors as an estimate of future firm performance.

Q. WHY DO YOU USE THE I/B/E/S GROWTH ESTIMATES?

A. The I/B/E/S growth rates (1) are widely circulated in the financial community, (2) include the projections of reputable financial analysts who develop estimates of future growth, (3) are reported on a timely basis to investors, and (4) are widely used by institutional and other investors. For these reasons, I believe these estimates represent unbiased estimates of investors'

expectations of each firm's long-term growth prospects and, accordingly, are incorporated by investors into their return requirements. Consequently, in my opinion, they provide the best available estimate of investors' long-term growth expectations.

Q. WHY DO YOU RELY EXCLUSIVELY ON ANALYSTS' PROJECTIONS OF FUTURE EPS GROWTH IN ESTIMATING THE INVESTORS' EXPECTED GROWTH RATE RATHER THAN LOOKING AT PAST HISTORICAL GROWTH RATES?

A. There is considerable empirical evidence that analysts' forecasts are more highly correlated with stock prices than are firms' historical growth rates, and, thus, that investors actually use these forecasts.

Q. HAVE YOU PERFORMED ANY STUDIES CONCERNING THE USE OF ANALYSTS' FORECASTS AS THE BEST ESTIMATE OF INVESTORS' EXPECTED GROWTH RATE, G?

A. Yes, I prepared a study with Willard T. Carleton, Professor of Finance Emeritus at the University of Arizona, on why analysts' forecasts provide the best estimate of investors' expectations of future long-term growth. This study is described in a paper entitled "Investor Growth Expectations: Analysts vs. History," published in *The Journal of Portfolio Management*.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR STUDY.

A. First, we performed a correlation analysis to identify the historically-oriented growth rates which best described a firm's stock price. Then we did a regression study comparing the historical growth rates with the consensus analysts' forecasts. In every case, the regression equations containing the average of analysts' forecasts statistically outperformed the regression equations containing the historical growth estimates. These results are consistent with those found by Cragg and Malkiel, the early major research in this area. These results are also consistent with the hypothesis that investors use analysts' forecasts, rather than historically-oriented growth calculations, in making buy and sell decisions. They provide overwhelming evidence that the analysts' forecasts of future growth are superior to historically-oriented growth measures in predicting a firm's stock price.

Q. WHAT PRICE DO YOU USE IN YOUR DCF MODEL?

A. I use a simple average of the monthly high and low stock prices for each firm for the three-month period, March, April, and May 2017. These high and low stock prices are obtained from Thomson Reuters.

Q. WHY DO YOU USE THE THREE-MONTH AVERAGE STOCK PRICE, P_0, IN APPLYING THE DCF METHOD?

A. I use a three-month average stock price in applying the DCF method because stock prices fluctuate daily, while financial analysts' forecasts for a given company are generally changed less frequently, often on a quarterly basis. Thus, to match the stock price with an earnings forecast, it is appropriate to average stock prices over a three-month period.

Q. PLEASE EXPLAIN YOUR INCLUSION OF FLOTATION COSTS.

A. All firms that have sold securities in the capital markets have incurred some level of flotation costs, including underwriters' commissions, legal fees, printing expense, etc. These costs are paid from the proceeds of the stock sale and must be recovered over the life of the equity issue. Costs vary depending upon the size of the issue, the type of registration method used and other factors, but in general these costs range between four percent and five percent of the proceeds from the issue. In addition to these costs, the underwriter's offer price is set below the most recent closing price before the public offering in order to reduce the risk that the underwriters will be unable to sell the entire offering at the offer price. The difference between the offer price and the recent closing

price is generally in the range two percent to three percent. Thus, the total flotation cost, including both issuance expense and underwriter discount, could range anywhere from five percent to eight percent of the proceeds of an equity issue. These cost ranges have been developed and confirmed in a number of generally accepted studies. I believe a combined five percent allowance for flotation costs is a conservative estimate that should be used in applying the DCF model in this proceeding.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR APPLICATION OF THE DCF METHOD TO THE PROPERTY/CASUALTY INSURANCE COMPANIES AND THE S&P 500.

A. As shown in Exhibits RB-7 and RB-8, the average DCF cost of equity capital for my group of Value Line property/casualty companies is 12.1 percent; and for the S&P 500 companies, 12.0 percent.

Q. WHAT CONCLUSION DO YOU REACH FROM YOUR DCF ANALYSIS ABOUT THE COST OF EQUITY CAPITAL FOR COMPANIES WRITING WORKERS COMPENSATION INSURANCE IN NORTH CAROLINA?

A. On the basis of my DCF analysis, I would conclude that for companies writing workers compensation insurance in North Carolina the cost of equity is approximately 12.0 percent.

Q. YOU NOTE THAT THE SECOND METHOD YOU USE TO ESTIMATE THE COST OF EQUITY CAPITAL FOR COMPANIES WRITING WORKERS COMPENSATION INSURANCE IN NORTH CAROLINA IS A RISK PREMIUM APPROACH. PLEASE DESCRIBE THAT APPROACH.

A. I perform a study of the comparable returns received by bond and stock investors over the last ninety-one years. I estimate the returns on stock and bond portfolios, using stock price and dividend yield data on the S&P 500 stock portfolio and bond yield data on Moody's A–rated utility bonds.

My study consists of analyzing the historically achieved returns on broadly based stock and bond portfolios going back to 1926. For stocks, I use the S&P 500 stock portfolio; and for bonds, I use Moody's A-rated utility bonds. The resulting annual returns on the stock and bond portfolios purchased in each year from 1926 through 2016 are shown on Exhibit RB-10. The difference between the stock return and the bond return over that period of time on an arithmetic average basis is 4.66 percentage points.

Q. WHAT CONCLUSIONS DO YOU DRAW FROM YOUR RISK PREMIUM ANALYSES?

A. My own studies, combined with my analysis of other studies, provide strong evidence for the belief that investors today

require an equity return of at least 4.66 percentage points above the expected yield on A-rated long-term debt issues.

Interest rates on Moody's seasoned A-rated utility bonds during the three months March through May 2017 range from 4.1 percent to 4.2 percent. On the basis of this information and my knowledge of bond market conditions, I conclude that the long-term yield on A-rated utility bonds is approximately 4.16 percent. Adding a 4.66 percentage point risk premium to the 4.16 percent expected yield on A-rated utility bonds, I obtain an expected return on equity of 8.8 percent.

Q. ARE THERE REASONS TO BELIEVE THAT THE RESULT OF YOUR EX POST RISK PREMIUM ANALYSIS MAY UNDERESTIMATE THE COST OF EQUITY AT THIS TIME?

A. Yes. The ex post risk premium model may produce an unrealistically low result because the model result is highly sensitive to the estimate of the bond yield. At this time, bond yields are unusually low, reflecting policy decisions of the U.S. government and the U.S. Federal Reserve Bank to keep interest rates low in order to stimulate the economy. Since the ex post risk premium cost of equity result is the sum of the risk premium and the bond yield, the use of an unusually low bond yield in the

model may cause the ex post risk premium model result to underestimate the cost of equity. Because the cost of equity is a forward-looking concept, it would be reasonable to apply the ex post risk premium model using a forecast of the expected bond yield, rather than a recent bond yield. Because bond yields are expected to increase over the next several years, the use of a forecasted bond yield would produce a significantly higher ex post risk premium estimate of the cost of equity. Thus, I consider my ex post risk premium model result to be conservative.

Q. BASED ON YOUR ANALYSES, WHAT IS YOUR OPINION AS TO THE COST OF CAPITAL FOR THE AVERAGE INSURANCE COMPANY WRITING WORKERS COMPENSATION INSURANCE IN NORTH CAROLINA?

A. Based on my review and studies, I believe that a conservative estimate of the cost of common equity capital for the average insurance company writing workers compensation insurance in North Carolina is in the range 8.8 percent to 12.1 percent.

SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS FOR PROPERTY/CASUALTY INSURANCE COMPANIES

	COMPANY	MOST RECENT QUARTERLY DIVIDEND (d_0)	STOCK PRICE (P_0)	FORECAST OF FUTURE EARNINGS GROWTH	DCF MODEL RESULT
1	Allstate Corp.	0.370	82.096	15.47%	17.7%
2	Amer. Financial Group	0.313	96.342	8.00%	9.4%
3	AmTrust Financial Svcs.	0.170	17.442	10.25%	14.9%
4	Chubb Ltd.	0.690	138.406	4.82%	7.1%
5	CNA Fin'l	0.250	44.399	6.55%	9.2%
6	Erie Indemnity	0.783	121.032	10.00%	13.0%
7	Old Republic	0.190	20.258	10.00%	14.5%
8	RLI Corp.	0.200	56.801	9.80%	11.5%
9	Selective Ins. Group	0.160	48.792	10.00%	11.6%
10	Average				12.1%

Note:[1]

d_0	=	Latest quarterly dividend.
d_1, d_2, d_3, d_4,	=	Expected next four quarterly dividends, calculated by multiplying the last four quarterly dividends per Value Line, by the factor (1 + g).
P_0	=	Average of the monthly high and low stock prices during the three months ending May 2017 per Thomson Reuters.
FC	=	Flotation costs.
g	=	I/B/E/S forecast of future earnings growth May 2017.
k	=	Cost of equity using the quarterly version of the DCF Model and a five percent allowance for flotation costs as shown by the formula below:

$$k = \frac{d_1(1+k)^{.75} + d_2(1+k)^{.50} + d_3(1+k)^{.25} + d_4}{P_0(1 - FC)} + g$$

[1] At May 2017, because of the wide range of DCF model results for property/casualty insurance companies, I have conservatively eliminated DCF model results that were greater or less than the mean result by one standard deviation. If I were to have included all available DCF model results, the average would have been 13.2 percent.

SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS FOR
S&P 500 COMPANIES

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
1	3M	194.21	4.70	9.33%	12.1%
2	ABBOTT LABORATORIES	44.28	1.06	11.22%	14.0%
3	ABBVIE	65.23	2.56	14.45%	19.3%
4	ACCENTURE CLASS A	120.84	2.42	9.42%	11.7%
5	ACTIVISION BLIZZARD	51.45	0.30	18.22%	18.9%
6	ADV.AUTO PARTS	145.87	0.24	12.24%	12.4%
7	AETNA	134.03	2.00	11.97%	13.7%
8	AFFILIATED MANAGERS	160.93	0.80	14.08%	14.7%
9	AFLAC	73.52	1.72	7.07%	9.7%
10	AGILENT TECHS.	54.94	0.53	10.43%	11.6%
11	ALLERGAN	237.35	2.80	12.38%	13.8%
12	ALLIANCE DATA SYSTEMS	247.48	2.08	12.29%	13.3%
13	ALTRIA GROUP	72.79	2.44	7.87%	11.7%
14	AMER.ELEC.PWR.	67.81	2.36	2.38%	6.2%
15	AMERICAN EXPRESS	78.53	1.28	7.29%	9.1%
16	AMERICAN WATER WORKS	77.74	1.66	7.70%	10.1%
17	AMERIPRISE FINL.	127.36	3.32	14.87%	18.1%
18	AMERISOURCEBERGEN	86.59	1.46	8.84%	10.8%
19	AMETEK	56.10	0.36	10.83%	11.6%
20	AMGEN	164.96	4.60	5.45%	8.6%
21	ANTHEM	172.96	2.60	11.42%	13.2%
22	AON CLASS A	120.73	1.44	6.81%	8.2%
23	APPLE	144.67	2.52	11.07%	13.1%
24	ARTHUR J GALLAGHER	56.28	1.56	11.01%	14.3%
25	AT&T	40.40	1.96	7.90%	13.5%
26	AUTOMATIC DATA PROC.	102.11	2.28	11.39%	14.0%
27	AVERY DENNISON	81.71	1.80	11.11%	13.7%
28	BALL	37.89	0.20	11.16%	11.8%
29	BANK OF AMERICA	23.50	0.30	10.48%	12.0%
30	BAXTER INTL.	54.31	0.64	12.97%	14.4%
31	BB&T	44.32	1.20	5.58%	8.6%
32	BECTON DICKINSON	182.90	2.92	9.90%	11.8%
33	BED BATH & BEYOND	38.32	0.60	6.33%	8.1%
34	BEST BUY	50.60	1.36	11.38%	14.6%
35	BLACKROCK	387.00	10.00	12.60%	15.7%
36	BOEING	180.60	5.68	16.04%	19.9%
37	BORGWARNER	41.35	0.56	8.05%	9.6%
38	BRISTOL MYERS SQUIBB	55.28	1.56	9.19%	12.5%
39	C R BARD	277.74	1.04	11.46%	11.9%
40	CAMPBELL SOUP	57.33	1.40	4.55%	7.3%
41	CAPITAL ONE FINL.	84.05	1.60	8.32%	10.5%
42	CARDINAL HEALTH	77.53	1.85	4.90%	7.6%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
43	CARNIVAL	59.87	1.60	13.46%	16.7%
44	CBS 'B'	66.31	0.72	16.51%	17.8%
45	CENTERPOINT EN.	27.83	1.07	5.89%	10.2%
46	CH ROBINSON WWD.	74.64	1.80	6.85%	9.6%
47	CHARLES SCHWAB	39.64	0.32	19.49%	20.5%
48	CHURCH & DWIGHT CO.	50.12	0.76	8.24%	10.0%
49	CIGNA	154.11	0.04	13.32%	13.4%
50	CISCO SYSTEMS	33.28	1.16	10.29%	14.4%
51	CITIGROUP	59.88	0.64	6.83%	8.0%
52	CITIZENS FINANCIAL GROUP	35.77	0.56	16.72%	18.7%
53	CLOROX	134.53	3.36	6.93%	9.8%
54	CMS ENERGY	45.30	1.33	7.52%	10.9%
55	COACH	40.78	1.35	10.94%	14.9%
56	COCA COLA	43.22	1.48	4.83%	8.7%
57	COGNIZANT TECH.SLTN.'A'	60.43	0.60	12.80%	14.0%
58	COLGATE-PALM.	73.27	1.60	8.57%	11.1%
59	COMCAST 'A'	38.65	0.63	11.95%	13.9%
60	CONSOLIDATED EDISON	78.83	2.76	3.97%	7.9%
61	CONSTELLATION BRANDS 'A'	169.14	2.08	15.96%	17.5%
62	CORNING	28.10	0.62	9.36%	11.9%
63	COSTCO WHOLESALE	173.24	2.00	9.98%	11.3%
64	CSX	49.44	0.80	14.48%	16.4%
65	CUMMINS	152.28	4.10	10.48%	13.6%
66	CVS HEALTH	79.62	2.00	7.89%	10.8%
67	D R HORTON	33.18	0.40	11.17%	12.6%
68	DANAHER	84.77	0.56	8.70%	9.5%
69	DARDEN RESTAURANTS	83.41	2.24	11.72%	14.9%
70	DELPHI AUTOMOTIVE	79.94	1.16	12.73%	14.5%
71	DENTSPLY SIRONA	63.12	0.35	8.19%	8.8%
72	DISCOVER FINANCIAL SVS.	64.95	1.20	8.43%	10.6%
73	DOLLAR GENERAL	71.47	1.04	6.77%	8.4%
74	DOMINION ENERGY	77.73	3.02	3.96%	8.3%
75	DOVER	79.92	1.76	12.77%	15.4%
76	DOW CHEMICAL	62.61	1.84	6.96%	10.3%
77	DR PEPPER SNAPPLE GROUP	94.22	2.32	8.73%	11.6%
78	DTE ENERGY	103.73	3.30	4.58%	8.1%
79	DUKE ENERGY	82.68	3.42	2.55%	7.1%
80	E I DU PONT DE NEMOURS	79.50	1.52	8.06%	10.3%
81	EATON	75.16	2.40	10.36%	14.1%
82	ECOLAB	126.79	1.48	11.91%	13.3%
83	EDISON INTL.	79.70	2.17	4.11%	7.1%
84	ELI LILLY	82.35	2.08	12.33%	15.3%
85	EMERSON ELECTRIC	59.25	1.92	8.10%	11.8%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
86	EQUIFAX	135.53	1.56	11.00%	12.4%
87	ESTEE LAUDER COS.'A'	87.11	1.36	9.66%	11.5%
88	EVERSOURCE ENERGY	59.45	1.90	5.99%	9.6%
89	EXELON	35.45	1.31	2.40%	6.4%
90	FEDEX	191.15	1.60	11.72%	12.7%
91	FIDELITY NAT.INFO.SVS.	82.25	1.16	12.48%	14.2%
92	FMC	70.33	0.66	13.10%	14.2%
93	FOOT LOCKER	72.33	1.24	8.88%	10.9%
94	FORTIVE	61.06	0.28	8.47%	9.0%
95	GAP	24.34	0.92	6.71%	11.0%
96	GENERAL DYNAMICS	192.32	3.36	7.59%	9.6%
97	GENERAL ELECTRIC	29.26	0.96	12.28%	16.2%
98	GENERAL MILLS	117.36	1.92	6.21%	8.1%
99	GLOBAL PAYMENTS	81.81	0.05	17.59%	17.7%
100	GOLDMAN SACHS GP.	226.76	3.00	12.24%	13.8%
101	HANESBRANDS	21.04	0.60	10.27%	13.6%
102	HARLEY-DAVIDSON	58.04	1.46	9.23%	12.2%
103	HERSHEY	109.34	2.47	8.22%	10.8%
104	HOME DEPOT	152.03	3.56	11.75%	14.5%
105	HONEYWELL INTL.	128.52	2.66	7.42%	9.8%
106	HORMEL FOODS	34.56	0.68	9.88%	12.2%
107	HP	18.15	0.53	5.21%	8.5%
108	HUMANA	218.13	1.60	12.98%	13.9%
109	HUNT JB TRANSPORT SVS.	90.80	0.92	12.15%	13.4%
110	HUNTINGTON BCSH.	13.12	0.32	10.56%	13.4%
111	ILLINOIS TOOL WORKS	135.60	2.60	9.11%	11.3%
112	INGERSOLL-RAND	84.38	1.60	10.64%	12.9%
113	INTEL	35.98	1.09	8.36%	11.9%
114	INTERCONTINENTAL EX.	59.81	0.80	12.98%	14.6%
115	INTERNATIONAL BUS.MCHS.	166.80	6.00	2.56%	6.5%
116	INTERNATIONAL PAPER	52.31	1.85	10.72%	14.9%
117	INTL.FLAVORS & FRAG.	133.28	2.56	7.36%	9.5%
118	INVESCO	31.61	1.16	10.36%	14.7%
119	J M SMUCKER	130.56	3.00	4.91%	7.5%
120	JACOBS ENGR.	54.33	0.60	8.10%	9.4%
121	JOHNSON & JOHNSON	124.88	3.36	6.45%	9.5%
122	JOHNSON CONTROLS INTL.	41.90	1.00	13.43%	16.3%
123	JP MORGAN CHASE & CO.	87.07	2.00	6.76%	9.4%
124	JUNIPER NETWORKS	29.01	0.40	12.12%	13.8%
125	KANSAS CITY SOUTHERN	89.04	1.32	11.65%	13.4%
126	KELLOGG	72.26	2.08	5.67%	8.9%
127	KEYCORP	18.07	0.38	10.32%	12.8%
128	KIMBERLY-CLARK	130.82	3.88	6.07%	9.4%
129	KOHL'S	39.36	2.20	5.33%	11.7%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
130	KRAFT HEINZ	91.18	2.40	13.20%	16.4%
131	KROGER	29.93	0.48	6.12%	7.9%
132	L BRANDS	49.60	2.40	5.81%	11.3%
133	L3 TECHNOLOGIES	167.86	3.00	6.50%	8.5%
134	LENNAR 'A'	51.41	0.16	8.21%	8.6%
135	LINCOLN NATIONAL	66.24	1.16	8.62%	10.6%
136	LOCKHEED MARTIN	271.93	7.28	5.79%	8.8%
137	LOWE'S COMPANIES	82.57	1.64	15.60%	18.0%
138	M&T BANK	158.23	3.00	8.13%	10.3%
139	MARATHON PETROLEUM	50.52	1.44	12.93%	16.4%
140	MARRIOTT INTL.'A'	95.00	1.32	13.77%	15.4%
141	MARSH & MCLENNAN	74.30	1.50	10.23%	12.6%
142	MASCO	35.38	0.40	16.17%	17.6%
143	MASTERCARD	115.09	0.88	15.01%	15.9%
144	MCCORMICK & COMPANY NV.	100.32	1.88	8.50%	10.7%
145	MCDONALDS	136.66	3.76	9.16%	12.4%
146	MEDTRONIC	82.50	1.72	7.37%	9.7%
147	MERCK & COMPANY	63.87	1.88	6.02%	9.3%
148	METLIFE	52.08	1.60	10.61%	14.2%
149	MICROSOFT	66.95	1.56	9.35%	12.1%
150	MONDELEZ INTERNATIONAL CL.A	44.51	0.76	10.11%	12.1%
151	MOODY'S	114.49	1.52	10.31%	11.9%
152	MORGAN STANLEY	42.87	1.40	14.16%	18.1%
153	NASDAQ	69.18	1.52	9.37%	11.9%
154	NETAPP	41.00	0.80	16.64%	19.1%
155	NEWELL BRANDS	48.41	0.92	10.45%	12.7%
156	NEXTERA ENERGY	132.85	3.93	6.70%	10.1%
157	NIELSEN	40.96	1.36	7.95%	11.8%
158	NIKE 'B'	55.04	0.72	11.07%	12.6%
159	NISOURCE	24.22	0.70	8.36%	11.7%
160	NORFOLK SOUTHERN	116.87	2.44	12.14%	14.6%
161	NORTHROP GRUMMAN	244.97	4.00	7.42%	9.3%
162	NVIDIA	109.94	0.56	12.19%	12.8%
163	OMNICOM GROUP	84.10	2.20	7.85%	10.9%
164	ORACLE	44.57	0.76	8.57%	10.5%
165	PARKER-HANNIFIN	157.73	2.64	13.11%	15.1%
166	PATTERSON COMPANIES	44.32	1.04	7.23%	9.9%
167	PAYCHEX	59.24	1.84	8.22%	11.8%
168	PEPSICO	112.83	3.22	6.41%	9.6%
169	PERKINELMER	58.52	0.28	9.87%	10.4%
170	PFIZER	33.74	1.28	5.64%	9.9%
171	PG&E	66.76	2.12	4.20%	7.7%
172	PHILIP MORRIS INTL.	113.10	4.16	10.98%	15.3%
173	PINNACLE WEST CAP.	84.46	2.62	6.05%	9.6%
174	PNC FINL.SVS.GP.	120.94	2.20	8.58%	10.7%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
175	PPG INDUSTRIES	107.98	1.60	9.54%	11.3%
176	PPL	37.75	1.58	2.44%	7.0%
177	PRAXAIR	122.66	3.15	7.13%	10.1%
178	PRINCIPAL FINL.GP.	62.97	1.84	8.43%	11.8%
179	PROCTER & GAMBLE	88.96	2.76	5.97%	9.5%
180	PVH	100.30	0.15	6.92%	7.1%
181	QUEST DIAGNOSTICS	102.42	1.80	8.17%	10.2%
182	RAYTHEON 'B'	155.48	3.19	9.02%	11.4%
183	REPUBLIC SVS.'A'	62.74	1.28	10.40%	12.8%
184	REYNOLDS AMERICAN	63.80	2.04	9.97%	13.7%
185	ROBERT HALF INTL.	47.21	0.96	8.20%	10.5%
186	ROCKWELL AUTOMATION	155.34	3.04	8.87%	11.1%
187	ROCKWELL COLLINS	101.57	1.32	10.60%	12.1%
188	ROSS STORES	64.64	0.64	10.69%	11.8%
189	S&P GLOBAL	133.63	1.64	12.35%	13.8%
190	SCRIPPS NETWORKS INTACT. 'A'	75.36	1.20	11.13%	13.0%
191	SEMPRA EN.	111.64	3.29	9.90%	13.3%
192	SHERWIN-WILLIAMS	322.16	3.40	10.97%	12.2%
193	SKYWORKS SOLUTIONS	100.01	1.12	16.47%	17.8%
194	SOUTHERN	50.06	2.32	3.84%	9.0%
195	SOUTHWEST AIRLINES	56.48	0.50	11.47%	12.5%
196	STARBUCKS	59.09	1.00	15.33%	17.4%
197	STRYKER	134.07	1.70	9.70%	11.2%
198	SUNTRUST BANKS	56.21	1.04	4.37%	6.4%
199	SYNCHRONY FINANCIAL	31.12	0.52	8.80%	10.7%
200	SYSCO	53.07	1.32	12.16%	15.1%
201	T ROWE PRICE GROUP	70.02	2.28	9.36%	13.2%
202	TEXAS INSTRUMENTS	80.25	2.00	10.13%	13.0%
203	TEXTRON	47.13	0.08	7.92%	8.1%
204	THERMO FISHER SCIENTIFIC	162.48	0.60	10.65%	11.1%
205	TIFFANY & CO	91.63	2.00	7.62%	10.1%
206	TIME WARNER	98.46	1.61	11.11%	13.0%
207	TJX	77.71	1.25	10.76%	12.6%
208	TORCHMARK	76.52	0.60	7.09%	8.0%
209	TOTAL SYSTEM SERVICES	55.61	0.40	11.61%	12.5%
210	TRACTOR SUPPLY	64.91	1.08	13.46%	15.5%
211	TWENTY-FIRST CENTURY FOX CL.A	30.44	0.36	11.74%	13.1%
212	TWENTY-FIRST CENTURY FOX CL.B	30.44	0.36	11.74%	13.1%
213	UNION PACIFIC	108.42	2.42	12.31%	15.0%
214	UNITED PARCEL SER.'B'	105.92	3.32	8.35%	12.0%
215	UNITED TECHNOLOGIES	115.52	2.64	6.62%	9.2%
216	UNITEDHEALTH GROUP	170.12	3.00	14.87%	17.0%
217	UNIVERSAL HEALTH SVS.'B'	121.44	0.40	8.64%	9.0%
218	UNUM GROUP	46.44	0.80	6.97%	8.9%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
219	US BANCORP	52.12	1.12	5.27%	7.7%
220	V F	54.51	1.68	8.32%	11.9%
221	VERIZON COMMUNICATIONS	47.69	2.31	2.46%	7.8%
222	VIACOM 'B'	42.52	0.80	6.78%	8.9%
223	VISA 'A'	91.25	0.66	17.03%	17.9%
224	WAL MART STORES	73.91	2.04	5.50%	8.6%
225	WALT DISNEY	112.12	1.56	9.41%	11.0%
226	WASTE MANAGEMENT	72.60	1.70	10.41%	13.2%
227	WEC ENERGY GROUP	60.60	2.08	5.61%	9.5%
228	WELLS FARGO & CO	54.69	1.52	8.24%	11.4%
229	WESTERN UNION	19.79	0.70	5.68%	9.7%
230	WILLIS TOWERS WATSON	132.86	2.12	10.71%	12.6%
231	WW GRAINGER	211.97	5.12	6.20%	8.9%
232	XCEL ENERGY	44.99	1.44	5.32%	8.9%
233	XILINX	61.30	1.40	8.54%	11.2%
234	XYLEM	50.23	0.72	14.48%	16.2%
235	ZIMMER BIOMET HDG.	119.78	0.96	9.72%	10.6%
236	ZOETIS	55.83	0.42	12.88%	13.8%
237	Average				12.0%

Note: In applying the DCF Model to the S&P 500, I include in the DCF analysis only those companies in the S&P 500 group which pay a dividend, have a positive growth rate, and have at least three analysts' long-term growth estimates. In addition, I exclude all companies in the I/B/E/S group of insurance companies. I also eliminate those companies with DCF results that vary from the mean by one standard deviation or more.

D_0 = Latest dividend per Thomson Reuters.
d_0 = Latest quarterly dividend.
P_0 = Average of monthly high and low stock prices March, April, and May 2017 per Thomson Reuters.
FC = Selling and flotation costs.
g = I/B/E/S forecast of future earnings growth May 2017.
k = Cost of equity using the quarterly version of the DCF Model and a five percent allowance for flotation costs as shown by the formula below:

$$k = \left[\frac{d_0(1+g)^{\frac{1}{4}}}{P_0(1-FC)} + (1+g)^{\frac{1}{4}} \right]^4 - 1$$

THE QUARTERLY DCF MODEL

The simple DCF Model assumes that a firm pays dividends only at the end of each year. Since firms in fact pay dividends quarterly and investors appreciate the time value of money, the annual version of the DCF Model generally underestimates the value investors are willing to place on the firm's expected future dividend stream. In this appendix, we review two alternative formulations of the DCF Model that allow for the quarterly payment of dividends.

When dividends are assumed to be paid annually, the DCF Model suggests that the current price of the firm's stock is given by the expression:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_n + P_n}{(1+k)^n} \quad (1)$$

where

P_0	=	current price per share of the firm's stock,
$D_1, D_2, \ldots, D_n$	=	expected annual dividends per share on the firm's stock,
P_n	=	price per share of stock at the time investors expect to sell the stock, and
k	=	return investors expect to earn on alternative investments of the same risk, i.e., the investors' required rate of return.

Unfortunately, expression (1) is rather difficult to analyze, especially for the purpose of estimating k. Thus, most analysts make a number of simplifying assumptions. First, they assume that dividends are expected to grow at the constant rate g into the indefinite future. Second, they assume that the stock price at time n is simply the present value of all dividends expected in periods subsequent to n. Third, they assume that the investors' required rate of return, k, exceeds the expected dividend growth rate g. Under the above simplifying assumptions, a firm's stock price may be written as the following sum:

$$P_0 = \frac{D_0(1+g)}{(1+k)} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \ldots, \qquad (2)$$

where the three dots indicate that the sum continues indefinitely.

As we shall demonstrate shortly, this sum may be simplified to:

$$P_0 = \frac{D_0(1+g)}{(k-g)}$$

First, however, we need to review the very useful concept of a geometric progression.

Geometric Progression

Consider the sequence of numbers 3, 6, 12, 24,…, where each number after the first is obtained by multiplying the preceding number by the factor 2. Obviously, this sequence of numbers may also be expressed as the sequence 3, 3 x 2, 3 x 2^2, 3 x 2^3, … This sequence is an example of a geometric progression.

Definition: A geometric progression is a sequence in which each term after the first is obtained by multiplying some fixed number, called the common ratio, by the preceding term.

A general notation for geometric progressions is: a, the first term, r, the common ratio, and n, the number of terms. Using this notation, any geometric progression may be represented by the sequence:

$$a, ar, ar^2, ar^3, \ldots, ar^{n-1}.$$

In studying the DCF Model, we will find it useful to have an expression for the sum of n terms of a geometric progression. Call this sum S_n. Then

$$S_n = a + ar + \ldots + ar^{n-1} . \qquad (3)$$

However, this expression can be simplified by multiplying both sides of equation (3) by r and then subtracting the new equation from the old. Thus,

$$rS_n = ar + ar^2 + ar^3 + \ldots + ar^n$$

and

$$S_n - rS_n = a - ar^n \quad ,$$

or

$$(1 - r)\, S_n = a\,(1 - r^n) \quad .$$

Solving for S_n, we obtain:

$$S_n = \frac{a(1 - r^n)}{(1 - r)} \qquad \textbf{(4)}$$

as a simple expression for the sum of n terms of a geometric progression. Furthermore, if $|r| < 1$, then S_n is finite, and as n approaches infinity, S_n approaches $a \div (1 - r)$. Thus, for a geometric progression with an infinite number of terms and $|r| < 1$, equation (4) becomes:

$$S = \frac{a}{1 - r} \qquad \textbf{(5)}$$

Application to DCF Model

Comparing equation (2) with equation (3), we see that the firm's stock price (under the DCF assumption) is the sum of an infinite geometric progression with the first term

$$a = \frac{D_0(1+g)}{(1+k)}$$

and common factor

$$r = \frac{(1+g)}{(1+k)}$$

Applying equation (5) for the sum of such a geometric progression, we obtain

$$S = a \bullet \frac{1}{(1-r)} = \frac{D_0(1+g)}{(1+k)} \bullet \frac{1}{1-\frac{1+g}{1+k}} = \frac{D_0(1+g)}{(1+k)} \bullet \frac{1+k}{k-g} = \frac{D_0(1+g)}{k-g}$$

as we suggested earlier.

Quarterly DCF Model

The Annual DCF Model assumes that dividends grow at an annual rate of g% per year (see Figure 1).

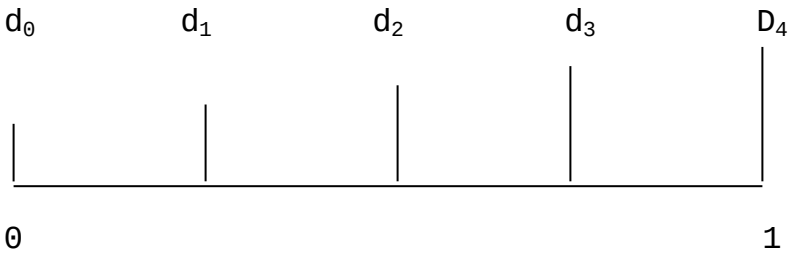
Figure 1

Annual DCF Model

$D_0 = 4d_0$ $D_1 = D_0(1 + g)$

Figure 2

Quarterly DCF Model (Constant Growth Version)



$d_1 = d_0(1+g)^{.25}$ $d_2 = d_0(1+g)^{.50}$

$d_3 = d_0(1+g)^{.75}$ $d_4 = d_0(1+g)$

In the Quarterly DCF Model, it is natural to assume that quarterly dividend payments differ from the preceding quarterly dividend by the factor $(1 + g)^{.25}$, where g is expressed in terms of percent per year and the decimal .25 indicates that the growth has only occurred for one quarter of the year. (See Figure 2.) Using this assumption, along with the assumption of constant growth and ***k*** > ***g***, we obtain a new expression for the firm's stock price, which takes account of the quarterly payment of dividends. This expression is:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}}} + \frac{d_0(1+g)^{\frac{2}{4}}}{(1+k)^{\frac{2}{4}}} + \frac{d_0(1+g)^{\frac{3}{4}}}{(1+k)^{\frac{3}{4}}} + \ldots \qquad (6)$$

where d_0 is the last quarterly dividend payment, rather than the last annual dividend payment. (We use a lower case d to remind the reader that this is not the annual dividend.)

Although equation (6) looks formidable at first glance, it too can be greatly simplified using the formula [equation (4)] for the sum of an infinite geometric progression. As the reader can easily verify, equation (6) can be simplified to:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}} - (1+g)^{\frac{1}{4}}} \qquad (7)$$

Solving equation (7) for ***k***, we obtain a DCF formula for estimating the cost of equity under the quarterly dividend assumption:

$$k = \left[\frac{d_0(1+g)^{\frac{1}{4}}}{P_0} + (1+g)^{\frac{1}{4}} \right]^4 - 1 \qquad \textbf{(8)}$$

An Alternative Quarterly DCF Model

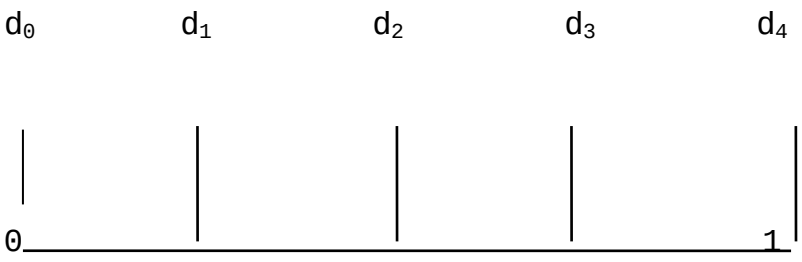
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly DCF Model that allows for constant quarterly dividend payments within each dividend year.

Assume then that the firm pays dividends quarterly and that each dividend payment is constant for four consecutive quarters. There are four cases to consider, with each case distinguished by varying assumptions about where we are evaluating the firm in relation to the time of its next dividend increase. (See Figure 3.)

Figure 3

Quarterly DCF Model (Constant Dividend Version)

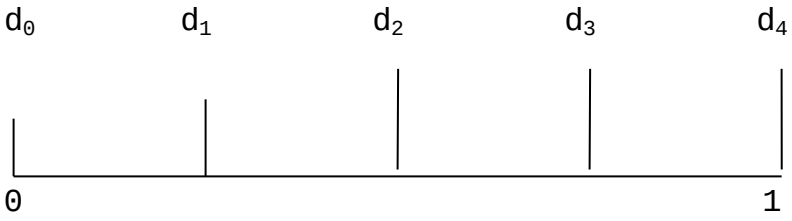
Case 1



Year

$d_1 = d_2 = d_3 = d_4 = d_0(1+g)$

Case 2



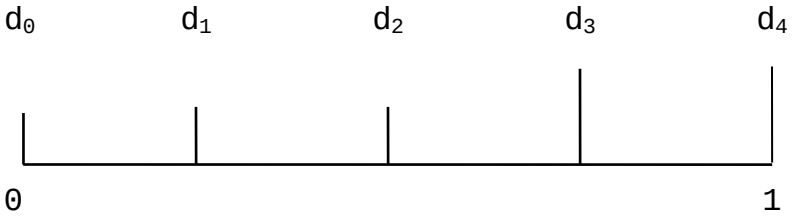
Year

$d_1 = d_0$

$d_2 = d_3 = d_4 = d_0(1+g)$

Figure 3 (continued)

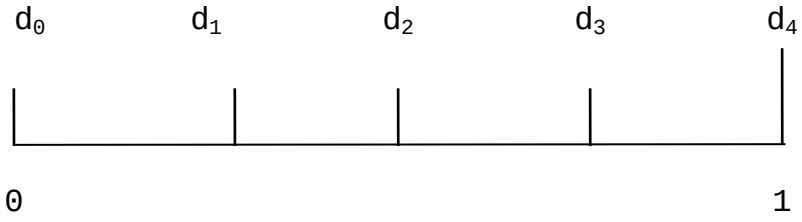
Case 3



$d_1 = d_2 = d_0$

$d_3 = d_4 = d_0(1+g)$

Case 4



$d_1 = d_2 = d_3 = d_0$

$d_4 = d_0(1+g)$

If we assume that the investor invests the quarterly dividend in an alternative investment of the same risk, then the amount accumulated by the end of the year will in all cases be given by

$$D_1^* = d_1 (1+k)^{3/4} + d_2 (1+k)^{1/2} + d_3 (1+k)^{1/4} + d_4$$

where d_1, d_2, d_3 and d_4 are the four quarterly dividends. Under these new assumptions, the firm's stock price may be expressed by an Annual DCF Model of the form (2), with the exception that

$$D_1^* = d_1 (1 + k)^{3/4} + d_2 (1 + k)^{1/2} + d_3 (1 + k)^{1/4} + d_4 \qquad \textbf{(9)}$$

is used in place of $D_0(1+g)$. But, we already know that the Annual DCF Model may be reduced to

$$P_0 = \frac{D_0(1+g)}{k-g}$$

Thus, under the assumptions of the second Quarterly DCF Model, the firm's cost of equity is given by

$$k = \frac{D_1^*}{P_0} + g \qquad \textbf{(10)}$$

with D_1^* given by (9).

Although equation (10) looks like the Annual DCF Model, there

are at least two very important practical differences. First, since D_1* is always greater than $D_0(1+g)$, the estimates of the cost of equity are always larger (and more accurate) in the Quarterly Model (10) than in the Annual Model. Second, since D_1* depends on k through equation (9), the unknown “k” appears on both sides of (10), and an iterative procedure is required to solve for k.

COMPARATIVE RETURNS ON S&P 500 STOCKS AND MOODY'S A-RATED UTILITY BONDS 1926-2016

LINE NO.	YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RATE OF RETURN	RISK PREMIUM
1	2017	2,275.12	0.0209		$96.13		
2	2016	1,918.60	0.0222	20.80%	$95.48	4.87%	15.93%
3	2015	2,028.18	0.0208	-3.32%	$107.65	-7.59%	4.26%
4	2014	1,822.36	0.0210	13.39%	$89.89	24.20%	-10.81%
5	2013	1,481.11	0.0220	25.24%	$97.45	-3.65%	28.89%
6	2012	1,300.58	0.0214	16.02%	$94.36	7.52%	8.50%
7	2011	1,282.62	0.0185	3.25%	$77.36	27.14%	-23.89%
8	2010	1,123.58	0.0203	16.18%	$75.02	8.44%	7.74%
9	2009	865.58	0.0310	32.91%	$68.43	15.48%	17.43%
10	2008	1,378.76	0.0206	-35.16%	$72.25	0.24%	-35.40%
11	2007	1,424.16	0.0181	-1.38%	$72.91	4.59%	-5.97%
12	2006	1,278.72	0.0183	13.20%	$75.25	2.20%	11.01%
13	2005	1,181.41	0.0177	10.01%	$74.91	5.80%	4.21%
14	2004	1,132.52	0.0162	5.94%	$70.87	11.34%	-5.40%
15	2003	895.84	0.0180	28.22%	$62.26	20.27%	7.95%
16	2002	1,140.21	0.0138	-20.05%	$57.44	15.35%	-35.40%
17	2001	1,335.63	0.0116	-13.47%	$56.40	8.93%	-22.40%
18	2000	1,425.59	0.0118	-5.13%	$52.60	14.82%	-19.95%
19	1999	1,248.77	0.0130	15.46%	$63.03	-10.20%	25.66%
20	1998	963.36	0.0162	31.25%	$62.43	7.38%	23.87%
21	1997	766.22	0.0195	27.68%	$56.62	17.32%	10.36%
22	1996	614.42	0.0231	27.02%	$60.91	-0.48%	27.49%
23	1995	465.25	0.0287	34.93%	$50.22	29.26%	5.68%
24	1994	472.99	0.0269	1.05%	$60.01	-9.65%	10.71%
25	1993	435.23	0.0288	11.56%	$53.13	20.48%	-8.93%
26	1992	416.08	0.0290	7.50%	$49.56	15.27%	-7.77%
27	1991	325.49	0.0382	31.65%	$44.84	19.44%	12.21%
28	1990	339.97	0.0341	-0.85%	$45.60	7.11%	-7.96%
29	1989	285.41	0.0364	22.76%	$43.06	15.18%	7.58%
30	1988	250.48	0.0366	17.61%	$40.10	17.36%	0.25%
31	1987	264.51	0.0317	-2.13%	$48.92	-9.84%	7.71%
32	1986	208.19	0.0390	30.95%	$39.98	32.36%	-1.41%
33	1985	171.61	0.0451	25.83%	$32.57	35.05%	-9.22%
34	1984	166.39	0.0427	7.41%	$31.49	16.12%	-8.72%
35	1983	144.27	0.0479	20.12%	$29.41	20.65%	-0.53%
36	1982	117.28	0.0595	28.96%	$24.48	36.48%	-7.51%
37	1981	132.97	0.0480	-7.00%	$29.37	-3.01%	-3.99%
38	1980	110.87	0.0541	25.34%	$34.69	-3.81%	29.16%
39	1979	99.71	0.0533	16.52%	$43.91	-11.89%	28.41%
40	1978	90.25	0.0532	15.80%	$49.09	-2.40%	18.20%
41	1977	103.80	0.0399	-9.06%	$50.95	4.20%	-13.27%
42	1976	96.86	0.0380	10.96%	$43.91	25.13%	-14.17%
43	1975	72.56	0.0507	38.56%	$41.76	14.75%	23.81%
44	1974	96.11	0.0364	-20.86%	$52.54	-12.91%	-7.96%

COMPARATIVE RETURNS ON S&P 500 STOCKS
AND MOODY'S A-RATED UTILITY BONDS 1926-2016

LINE NO.	YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RATE OF RETURN	RISK PREMIUM
45	1973	118.40	0.0269	-16.14%	$58.51	-3.37%	-12.77%
46	1972	103.30	0.0296	17.58%	$56.47	10.69%	6.89%
47	1971	93.49	0.0332	13.81%	$53.93	12.13%	1.69%
48	1970	90.31	0.0356	7.08%	$50.46	14.81%	-7.73%
49	1969	102.00	0.0306	-8.40%	$62.43	-12.76%	4.36%
50	1968	95.04	0.0313	10.45%	$66.97	-0.81%	11.26%
51	1967	84.45	0.0351	16.05%	$78.69	-9.81%	25.86%
52	1966	93.32	0.0302	-6.48%	$86.57	-4.48%	-2.00%
53	1965	86.12	0.0299	11.35%	$91.40	-0.91%	12.26%
54	1964	76.45	0.0305	15.70%	$92.01	3.68%	12.02%
55	1963	65.06	0.0331	20.82%	$93.56	2.61%	18.20%
56	1962	69.07	0.0297	-2.84%	$89.60	8.89%	-11.73%
57	1961	59.72	0.0328	18.94%	$89.74	4.29%	14.64%
58	1960	58.03	0.0327	6.18%	$84.36	11.13%	-4.95%
59	1959	55.62	0.0324	7.57%	$91.55	-3.49%	11.06%
60	1958	41.12	0.0448	39.74%	$101.22	-5.60%	45.35%
61	1957	45.43	0.0431	-5.18%	$100.70	4.49%	-9.67%
62	1956	44.15	0.0424	7.14%	$113.00	-7.35%	14.49%
63	1955	35.60	0.0438	28.40%	$116.77	0.20%	28.20%
64	1954	25.46	0.0569	45.52%	$112.79	7.07%	38.45%
65	1953	26.18	0.0545	2.70%	$114.24	2.24%	0.46%
66	1952	24.19	0.0582	14.05%	$113.41	4.26%	9.79%
67	1951	21.21	0.0634	20.39%	$123.44	-4.89%	25.28%
68	1950	16.88	0.0665	32.30%	$125.08	1.89%	30.41%
69	1949	15.36	0.0620	16.10%	$119.82	7.72%	8.37%
70	1948	14.83	0.0571	9.28%	$118.50	4.49%	4.79%
71	1947	15.21	0.0449	1.99%	$126.02	-2.79%	4.79%
72	1946	18.02	0.0356	-12.03%	$126.74	2.59%	-14.63%
73	1945	13.49	0.0460	38.18%	$119.82	9.11%	29.07%
74	1944	11.85	0.0495	18.79%	$119.82	3.34%	15.45%
75	1943	10.09	0.0554	22.98%	$118.50	4.49%	18.49%
76	1942	8.93	0.0788	20.87%	$117.63	4.14%	16.73%
77	1941	10.55	0.0638	-8.98%	$116.34	4.55%	-13.52%
78	1940	12.30	0.0458	-9.65%	$112.39	7.08%	-16.73%
79	1939	12.50	0.0349	1.89%	$105.75	10.05%	-8.16%
80	1938	11.31	0.0784	18.36%	$99.83	9.94%	8.42%
81	1937	17.59	0.0434	-31.36%	$103.18	0.63%	-31.99%
82	1936	13.76	0.0327	31.10%	$96.46	11.12%	19.99%
83	1935	9.26	0.0424	52.84%	$82.23	22.17%	30.66%
84	1934	10.54	0.0336	-8.78%	$66.78	29.13%	-37.91%
85	1933	7.09	0.0542	54.08%	$79.55	-11.03%	65.11%
86	1932	8.30	0.0822	-6.36%	$70.67	18.23%	-24.59%
87	1931	15.98	0.0550	-42.56%	$84.49	-11.63%	-30.93%
88	1930	21.71	0.0438	-22.01%	$81.19	8.99%	-31.00%

COMPARATIVE RETURNS ON S&P 500 STOCKS
AND MOODY'S A-RATED UTILITY BONDS 1926-2016

LINE NO.	YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RATE OF RETURN	RISK PREMIUM
89	1929	24.86	0.0336	-9.31%	$83.95	1.48%	-10.79%
90	1928	17.53	0.0431	46.12%	$86.71	1.43%	44.69%
91	1927	13.40	0.0502	35.84%	$83.28	8.92%	26.92%
92	1926	12.65	0.0446	10.39%	$80.81	8.01%	2.38%
93	Average 1926 - 2016			11.43%		6.77%	4.66%

Note: See Page 4 for an explanation of how stock and bond returns are derived and the source of the data presented.

COMPARATIVE RETURNS ON S&P 500 STOCKS
AND MOODY'S A-RATED UTILITY BONDS 1926-2016

RISK PREMIUM APPROACH

SOURCE OF DATA

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in thirty years with a $4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated Utility bond yield. The values shown on the ex post risk premium schedule are the January values of the respective indices.

Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column:

$$\text{Stock Return (2016)} = \left[\frac{\text{Stock Price (2017)} - \text{Stock Price (2016)} + \text{Dividend (2016)}}{\text{Stock Price (2016)}} \right]$$

where Dividend (2016) = Stock Price (2016) x Stock Div. Yield (2016)

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2016)} = \left[\frac{\text{Bond Price (2017)} - \text{Bond Price (2016)} + \text{Interest (2016)}}{\text{Bond Price (2016)}} \right]$$

where Interest = $4.00.

Exhibit RB-11

PREFILED TESTIMONY
OF
DAVID APPEL

2017 WORKERS COMPENSATION
ASSIGNED RISK INSURANCE RATE FILING
BY THE NORTH CAROLINA RATE BUREAU

AUGUST, 2017

I. QUALIFICATIONS AND SUMMARY

Q. Please state your name and present business address.

A. My name is David Appel, and my business address is 1 Pennsylvania Plaza, New York, NY.

Q. What is your occupation?

A. I am a Senior Consultant with the firm of Milliman, Inc.

Q. What is Milliman, Inc.?

A. Milliman, Inc. (formerly Milliman & Robertson) is one of the nation's largest independently owned firms of actuaries and consultants. The company has more than 3400 employees, and operates offices in approximately 60 cities in the U.S., Europe, Asia, Africa, the Pacific and Latin America. Our clients number in the thousands: they include insurers, self-insured entities, Federal and State Governments and many others. I am a Senior Consultant with the firm.

Q. Please describe your educational and employment history.

A. A complete statement of my educational, employment and academic credentials is included as Exhibit RB-12 filed with this testimony.

To summarize, I have a B.A. in economics from Brooklyn College, City University of New York, and M.A. and Ph.D. degrees in economics from Rutgers University. Prior to joining Milliman, I was employed for nine years by the National Council on Compensation Insurance (NCCI), the nation's largest workers compensation insurance statistical, research and ratemaking organization. I joined NCCI as Research Economist in 1980, and held progressively responsible positions as Senior Research Economist, Director of Research, Assistant Vice President and finally Vice President, beginning in July 1985. Prior to 1980, I was an instructor in economics at Rutgers University.

Q. Would you please describe some of your other professional activities?

A. Yes. Throughout my professional career, I have participated in a variety of academic and business activities related to insurance. I have twice been an elected member of the Board of Directors of the American Risk and Insurance Association, the leading learned society of insurance academics. For many years, I was a member of the editorial board of the *Journal of Insurance Regulation* (the official research publication of the National Association of Insurance Commissioners) and I acted as a peer referee for a number of scholarly journals in economics and insurance. In addition, I was, for twelve years, an Adjunct Professor of Economics at Rutgers University.

Q. Have you ever published any papers or books?

A. Yes. During my career, I have authored many papers on various aspects of insurance that have been published in refereed books or scholarly journals. In addition, I have published a large number of papers in non-refereed journals as well. I have also co-edited three volumes of research papers dealing with various aspects of workers compensation and property-casualty insurance. My refereed publications are listed in Exhibit RB-12 filed with this testimony.

Q. Are you a member of any professional associations?

A. Yes, I am a member of the American Risk and Insurance Association, and an elected fellow of the National Academy of Social Insurance. I have also been a certified arbitrator and umpire with ARIAS, the world's largest insurance and reinsurance arbitration society, and a member of the panel of neutrals of the American Arbitration Association.

Q. Have you ever testified in insurance rate regulatory proceedings?

A. Yes. I have testified on many occasions in such proceedings, including several occasions in North Carolina in the past several years. A complete list is contained in Exhibit RB-12 filed with this testimony.

Q. What was the general nature of your testimony in these cases?

A. I have addressed a wide variety of insurance issues during public testimony, including such diverse topics as the impact of economic and demographic factors on insurance costs; the effects of regulation on insurance availability; the use of econometric and statistical models in insurance forecasting; and the use of modern financial theory in developing insurance prices. In North Carolina workers compensation cases, my testimony in recent years has focused primarily on the last of these issues, specifically on matters relating to the cost of capital and the expected returns attributable to insurance operations.

Q. Have you been retained by the North Carolina Rate Bureau as a consultant with respect to the subject of profitability in this rate case?

A. Yes. I have reviewed or considered the following specific matters in connection with this case:

1. Dr. Vander Weide's estimation of the cost of capital;

2. Whether other insurer characteristics suggest additional risk factors that should be considered in estimating the cost of capital in this case;

3. Whether there are any characteristics of workers compensation assigned risk insurance which render it more or less risky than the average line of business; and

4. The return insurers would expect to earn from underwriting workers compensation assigned risk insurance in North Carolina, assuming that the projected loss and expense provisions contained in the rate filing are realized.

I have performed various studies and analyses on these matters.

Q. Have you reached any conclusions in regard to these matters?

A. Yes. I will summarize them in bullet form here, and then discuss them each more fully later in the testimony.

1. I have reviewed Dr. Vander Weide's cost of capital estimates and find them to be reasonable. Dr. Vander Weide's estimates are based on the implicit assumption that insurers present investors with roughly average risk, relative to all possible investment activities. However, based on my analyses, I believe that investors in the property-casualty insurance industry are subject to an above average degree of risk. Thus, I think it would be prudent to view Dr. Vander Weide's estimates as a conservative estimate of the return to which insurers are entitled.

2. I have considered two additional characteristics that affect the degree of risk to which investors in property/casualty insurance stocks are exposed: One is the fact that insurers are subject to an unusual degree of interest rate risk, and the other is that insurers writing workers compensation in North Carolina tend to be smaller than those used in Dr. Vander Weide's cost of capital analysis. Since there is strong evidence that interest rate risk requires compensation in the form of higher returns, and that small firms are also expected to yield higher returns, I believe Dr. Vander Weide’s estimates are conservative, in that investors must be compensated for these risks in the form of an additional risk premium above that required for the average security.

3. I have also considered the specific characteristics of the workers compensation assigned risk business and have concluded that it is above average risk when compared with the average activity in which property casualty insurers are engaged. Thus, the cost of capital for this specific business activity will be higher than the average cost of capital for the industry as a whole.

4. I have tested the underwriting profit provision selected and filed by the NCRB to determine if it produces a fair and reasonable return for insurers. To do so, I estimated the returns insurers would expect to earn from North Carolina workers' compensation assigned risk insurance assuming that the projected loss and expense provisions contained in the rate filing are realized. I am aware that North Carolina law provides that insurers are entitled to expect to earn a return equal to the returns of industries of comparable risk, and that in calculating that expected return, investment income from capital and surplus funds is not to be considered. I refer to that operating return as the statutory return. However, as is evident from the attached exhibits, I have estimated insurer pro forma returns both including and excluding expected investment income from capital and surplus. I have done this to demonstrate that if the filed underwriting profit is actually realized, and even if investment income on surplus is considered, insurer returns will not be excessive. Obviously, if returns are not excessive including investment income from capital and surplus, they will be non-excessive excluding such income.

   Based on my calculations, the selected underwriting profit provision generates a statutory return on net worth of 8.2%. (In my testimony, I will use "net worth" to mean net worth according to Generally Accepted Accounting Principles.) In addition, the total return on net worth (i.e., including investment income on surplus) is approximately 10.6%. Since even the total return is well within Dr. Vander Weide's range for the fair rate of return, I conclude that the selected underwriting profit provision complies with North Carolina law and is clearly not excessive.

II. COST OF CAPITAL REVIEW

Q. You indicated you had reviewed Dr. Vander Weide's estimate of the cost of capital. Are you familiar with Dr. Vander Weide's approach to estimating the cost of capital in insurance rate cases?

A. Yes. I am aware of the methodology which Dr. Vander Weide relies upon to estimate the cost of capital and have reviewed it on a number of occasions in the course of previous rate cases in North Carolina. Dr. Vander Weide has used what have traditionally been the most widely recognized and accepted models for this purpose, namely the Discounted Cash Flow (DCF) model and the risk premium method. These models, when taken together and properly applied to a reasonably selected data set, provide acceptable estimates of the cost of capital for regulated insurers.

Q. What has Dr. Vander Weide concluded with respect to the cost of capital in this case?

A. Dr. Vander Weide has concluded that the fair rate of return for insurers is now in the range of 8.8% to 12.1% on net worth as determined under generally accepted accounting principles (GAAP).

Q. In your opinion, is this an appropriate estimate of the required rate of return?

A. Yes, however as I indicated a moment ago, I believe that Dr. Vander Weide may have been conservative in his calculation of the required rate of return. Dr. Vander Weide has assumed that the property-casualty industry presents investors with average risk. However, based on my studies, I conclude the following:

1. There is evidence that additional factors affecting the risk and required return for property casualty insurance stocks are not accounted for in Dr. Vander Weide's analysis. These factors – interest rate risk and the small size of the typical workers compensation insurer – suggest that the insurance industry is above average risk, and hence requires above average returns. I would note that these additional risks may be captured in alternative cost of capital models, in particular the variant of the risk premium model known as the Fama French Three Factor model (FF3F). My studies suggest that the FF3F model produces insurance cost of capital estimates that are up to several percentage points greater than those produced by the standard risk premium model used by Dr. Vander Weide.

2. To the extent that workers compensation assigned risk insurance is viewed as above average in risk when compared with other activities in which property casualty insurers are engaged, the cost of capital will be higher than average as well.

III. ADDITIONAL FACTORS AFFECTING RISK

Q. Your comments about additional risk factors suggest that Dr. Vander Weide's cost of capital may be conservative, or understated, for insurers writing workers compensation in North Carolina. Can you please elaborate on this?

A. Certainly. As mentioned earlier, I have considered whether other factors not addressed in the standard cost of capital analysis conducted by Dr. Vander Weide might indeed affect the risk and therefore the required return in this case. In fact, there were two such factors – interest rate risk and the small size of firms writing workers compensation in the state - that I have been studying for a number of years and which clearly increase the cost of capital, or required return, in this case. Based on analyses I have conducted for previous rate hearings in North Carolina, I have concluded that both of these factors create additional risks that require additional compensation above that demanded for the average security.

Q. You have made reference to the term interest rate risk. Can you please define this term?

A. Yes. Interest rate risk refers to the risk that the value of fixed income investments (such as bonds) will fluctuate with changes in interest rates. This means that there is a risk associated with holding bonds, particularly those with a relatively long term to maturity. While investments in equities are still considerably riskier than investments in long term bonds, as evidenced by the fact that returns to large company stocks have had a much higher mean and standard deviation than returns on long term government bonds over the past 85 years, bond investments impose risk as well.

Q. Does interest rate risk affect investments in property-casualty insurance stocks?

A. Yes. Property-casualty insurance companies invest large amounts of funds in bonds issued by both corporations and governmental bodies. The risk that investors face is that when interest rates change, the values of the bonds also change, and hence their investments in property-casualty stocks are subject to interest rate risk. This fact is widely recognized by the financial community. Since investors cannot diversify away interest rate risk, only the prospect of higher returns will induce them to purchase interest-sensitive stocks. That is, investors must be compensated for purchasing interest-sensitive stocks because they are increasing their exposure to interest rate risk.

Q. Why is interest rate risk different from market risk?

A. Interest rate risk is a separate source of volatility for insurance stocks. Interest rates often change as a result of changes in expectations of future inflation. These changes primarily affect firms that hold what are called nominal assets and liabilities. Nominal assets and liabilities have cash flows that are fixed in nominal terms (for example, accounts receivable, most contracts, and bonds) and are thus subject to erosion in value due to inflation. On the other hand, the cash flows associated with manufacturing and service operations tend to fluctuate with the price level. Since most non-financial firms hold relatively few nominal assets and liabilities, their stocks are not particularly sensitive to changes in interest rates that are due to changes in expected inflation. Therefore interest rate risk adds additional risk to insurance stocks, above and beyond market risk, that is not diversifiable.

Changes in interest rates that are not associated with changes in expected inflation will affect all stocks. This accounts for the moderate degree of correlation between changes in long term interest rates and returns to common stocks. However, the fact that most stocks are not very sensitive to changes in interest rates that are due to changes in expected inflation means that interest rate risk is not fully captured in measures of market risk.

Q. Is it possible to measure interest rate risk?

A. Yes, and in the past I have conducted a number of studies designed specifically to address this issue. The principal conclusion of those studies is that since insurer assets on average have a substantially longer financial duration than insurance liabilities, when interest rates change, the value of insurer equity is subject to potentially wide fluctuation. While the market risk for insurers as measured by beta is roughly average, the degree of interest rate risk to which the industry is exposed is higher than average. Since this risk cannot be entirely diversified away, the overall risk associated with an investment in property/casualty insurance is greater than average. As a consequence, insurers are entitled to a rate of return above that allowed for the average risk investment in the U.S. economy. I believe that there are three main reasons for this conclusion.

First, as noted, the high degree of financial leverage and mismatched durations of assets and liabilities contributes to the volatility of returns to investors in insurance stocks.

Second, the insurance industry is in the business of bearing risk. Individuals and corporations transfer to property-casualty insurers the potential liability for a wide range of possible adverse

events, ranging from property damage to professional liability. In light of the unforeseen events that can occur, and, in the recent past, actually have occurred, investors in property-casualty insurance stocks are subject to considerable risk.

Finally, insurance is in the unique position of being a highly competitive industry that is also subject to a high degree of regulation. This combination of regulation and competition creates an environment in which insurers are subject not only to the demands of the market but also to the pressures of the political process. There is substantial evidence that regulation can increase risk for a regulated enterprise, and when that is combined with an aggressively competitive industrial structure, risk is increased.

Q. You said that the combination of regulation and competition increased risk for insurers. Can you describe what you mean?

A. Yes. Traditionally, direct price and rate of return regulation has been imposed on industries known as "public utilities," such as generation and transmission of electric power, distribution of natural gas, provision of local water and sewer service and the like. Because of the nature of the production process, these industries are characterized as "natural monopolies," meaning that it is most efficient for a single producer to provide the service in question. In such circumstances, the state normally grants a monopoly to a single provider and then regulates that firm directly to prevent abuse of monopoly power.

Property-casualty insurance differs dramatically from this model. Rather than a single firm providing service, there are in most states literally hundreds of firms competing in the market, none of which typically have significant market power. These firms compete aggressively to increase market share and attract the best insureds by offering a variety of price and quality combinations that are best tailored to their business objectives. This vigorous competition provides discipline in the marketplace, and, when combined with direct rate of return regulation, the risk for insurers is increased.

I should note that historically, a number of competitively structured industries (such as airlines, trucking, and telecommunications) were subject to regulation, but in the past several decades there has been a movement to deregulate these activities. This is due in part to the widespread agreement that competition itself is an adequate regulator.

Q. You also said that you considered whether the size distribution of North Carolina insurers should impact the cost of capital in this case. Can you please describe this issue briefly and discuss its implications for this case?

A. Yes. It is a well established fact of empirical finance that small stocks tend to outperform large stocks. Ibbotson Associates, for instance, reports that firms in the ninth and tenth deciles of stocks listed on the principal U.S. stock exchanges have outperformed the market as a whole by approximately 4.5 percentage points over the period 1926 to 2015, even after accounting for the fact that these firms have above average betas. Therefore an adjustment should be made to the cost of capital to the extent that the property-casualty insurance industry is composed of small stocks.

Q. Have you conducted any studies with respect to the significance of the small stock effect?

A. Yes. As with interest rate risk, I have conducted a number of studies of this issue in previous years, and in each instance I found that (1) investors have earned higher returns from small stocks than from large stocks, and (2) the insurers in Dr. Vander Weide's cost of capital analysis are among the largest companies in the U.S. economy. The insurers in Dr. Vander Weide's analysis are larger, on average, than the companies in the property-casualty insurance industry, and they are larger, on average, than the companies writing workers compensation insurance in North Carolina.

These facts suggest that the cost of capital for insurers writing workers compensation insurance in North Carolina should be higher than for those firms contained in Dr. Vander Weide's cost of capital analysis. This reaffirms my conclusion that the cost of capital Dr. Vander Weide has presented is conservative.

Q. Can you please summarize your testimony on the cost of capital of the property-casualty insurance industry?

A. Yes. Dr. Vander Weide has assumed that the property-casualty insurance industry presents investors with risks comparable to the average investment in equities. My analysis has shown that property-casualty insurance stocks are subject to additional volatility due to interest rate sensitivity, and are relatively small when compared with the broad cross section of publicly traded firms in the U.S. economy. Since these additional risks require compensation in the form of a higher return, I conclude that Dr. Vander Weide has been conservative in his calculation of the required rate of return on property-casualty insurance investments.

IV. RELATIVE RISK OF WORKERS COMPENSATION ASSIGNED RISK BUSINESS

Q. Will you please now turn to the issue of the relative risk of North Carolina workers compensation assigned risk insurance?

A. Yes. As I mentioned before, the cost of capital Dr. Vander Weide estimated is the return investors require for placing their capital at risk in a large, publicly traded property-casualty insurance company that writes at least some workers compensation insurance. This is best interpreted as the return required for the average risk activity of this set of companies. If the specific activity in question in this filing, North Carolina workers compensation assigned risk insurance, is perceived as riskier than the average activity of the firms in this sample, then the fair rate of return, or cost of capital, will be higher than the value Dr. Vander Weide has estimated.

Q. Do you have any reason to believe that North Carolina workers compensation assigned risk insurance is riskier than the average investment undertaken by these companies?

A. Yes. There are a number of characteristics peculiar to the workers compensation line of insurance which render it of higher than average risk among all lines of property-casualty insurance. In addition, there are aspects of workers compensation assigned risk insurance which render it more risky than the average workers compensation coverage.

Among the many relevant considerations relating to workers compensation in general are the following:

1. Workers compensation is subject to unlimited liability; there are neither per claim, per occurrence or aggregate loss limits under the policy terms. This is in contrast to the typical property-casualty insurance contract, in which all these limits may apply.

2. Workers compensation is a "long-tailed" line of business, meaning that the payment of losses may extend for many years beyond the sale date of the policy. It is a well known principle of statistics that the longer the time horizon of a forecast, the greater the expected error in the estimate. Thus the forecast of ultimate losses in this line is subject to greater risk than in many other lines of business.

3. Workers compensation has a substantial exposure to medical inflation, which has been more rapid and less predictable than general inflation.

4. Workers compensation is subject to the risk of occupational disease, which can lead to substantial and inherently unpredictable losses in the future.

5. Workers compensation is subject to the phenomenon of "benefit utilization." This term refers to the observation that as benefits become more generous, workers increase their utilization of the system.

   While the term has traditionally been applied to indemnity benefits (as benefits increase both claim frequency and duration increase), it is equally applicable to medical benefits as well. Since medical costs are covered with no deductibles or co-payments, workers compensation has become an increasingly attractive alternative to health insurance for coverage of any illness or injury.

All these characteristics suggest that workers compensation is of above average risk when compared with the other activities in which property-casualty insurers are engaged.

Q. In addition to these factors, which relate to the workers compensation line in general, are there any other considerations specific to North Carolina assigned risk business which render it riskier than average?

A. Yes. In the workers compensation line, assigned risk business is universally regarded as less favorable than voluntary market business. Participation in the assigned risk market, otherwise known as the involuntary or residual market, is not elective. Insurers have no opportunity to select insureds or underwrite the risks; as a consequence, they cannot apply business judgment to their underwriting activities.

In addition, compared with the voluntary market, assigned risk loss experience has been consistently worse than the average (i.e. combined voluntary and assigned risk) loss experience.

Q. How do these considerations affect your evaluation of the cost of capital applicable in this proceeding?

A. Based on the characteristics discussed earlier, I have concluded that: (1) workers compensation in general is riskier than the average line of property-casualty insurance business, and (2) assigned risk business is riskier than average workers compensation business. Because the risk of this activity is greater than average, the cost of capital is higher than average as well. Although it is difficult to quantify the incremental change in the fair rate of return, all the considerations noted earlier suggest that an upward adjustment would be necessary. Therefore, in my opinion Dr. Vander Weide's cost of capital must be considered to be the lower bound for the fair and reasonable rate of return in this case.

V. PROJECTED RETURN ATTRIBUTABLE TO INSURANCE OPERATIONS

Q. Earlier you said that you had calculated the statutory return insurers would expect from underwriting workers compensation assigned risk insurance in North Carolina. Would you describe your analysis?

A. Yes. I relied on the traditional insurance profitability analysis utilized by the NCRB for all lines of business, and have calculated the pro forma statutory returns on equity that would be expected to arise assuming that actual underwriting and investment results materialize exactly as projected in this filing. The results are contained in Exhibit RB-13 filed with this testimony. (I note that for long tailed lines of insurance such as workers compensation, insurers frequently rely on models that explicitly consider the time pattern of future cash flows, such as the internal rate of return model.)

Q. What do you mean when you use the term pro forma in connection with rate of return?

A. I use this term to indicate that the rate of return presented in this exhibit is based on a series of assumptions regarding such inputs as underwriting profit, investment gain, leverage, and the like. If these assumptions actually materialize, then the “pro forma” rates of return calculated in the exhibit will prevail. However, to the extent that these assumptions are not realized, the rate of return will differ from that calculated in the exhibit.

Q. Are you aware of the provisions of G.S. 58-36-10, providing that in making rates the NCRB is to consider investment income earned and realized on unearned premium and loss reserves?

A. Yes, and I understand that investment income on capital and surplus is not to be considered when making rates. As I have already indicated, I have estimated and presented the returns that can be expected, both excluding and including investment income on capital and surplus, and those returns fall either below or well within Dr. Vander Weide’s range for the industry’s fair rate of return. Since the NCRB’s filed underwriting profit provision generates expected

returns that are not excessive even if the investment income on capital and surplus is included, the expected returns which exclude that investment income cannot be excessive.

Q. Can you please now describe the components of the model you developed?

A. Yes. The model really consists of a single page which calculates the rate of return on equity attributable to undertaking the insurance activity. It includes estimates of revenues derived from underwriting and investment activities, and estimates of costs, comprised of losses, expenses, and taxes. This exhibit is supported by several other exhibits which provide calculations of investment yield rates, tax rates, and premium to surplus and net worth to surplus ratios. I will describe the principal elements of these exhibits below.

1. Underwriting profit is the difference between earned premiums (net of uncollectible premium) and incurred losses and expenses, expressed as a percent of premium.

2. Uncollectible premium is projected by NCCI, based on historical data from the North Carolina assigned risk pool.

3. Taxes are calculated assuming that the regular corporate tax rate applies to underwriting income and that an additional tax liability applies due to the reserve discounting and revenue offset provisions of the Internal Revenue Code as it applies to property casualty insurers. Taxes on investment income are calculated assuming that the current statutory tax rates apply to the various classes of investment income earned.

4. Investment gain on the insurance transaction is estimated as the product of an investment yield rate and the investible funds available from loss, loss adjustment expense and unearned premium reserves (i.e., policyholder supplied funds). Investible funds are estimated using the well-known ISO State-X calculation, modified as described below. The investment yield rate itself is derived as the average of the "embedded yield" and the "current yield," based on the actual portfolios of securities held by insurers. This estimated yield rate includes income from interest, dividends, real estate, and other assets, as well as realized capital gains.

5. In my estimates of the expected total return, investment gain on surplus is estimated as the product of the aforementioned investment yield rate and the amount of surplus attributable to the insurance transaction. The amount of surplus attributable to the transaction includes an adjustment to reflect the additional surplus required to support the prepayment of expenses. (In statutory accounting, the prepayment of expenses acts to reduce statutory surplus. Since prepaid expenses are already deducted from investible reserves in the investment income calculation, they are added back here to avoid deducting them from the investible balance twice.)

These components are each expressed as a percent of premium. To calculate the rate of return on equity, the components must be summed (before or after tax), and then multiplied by the ratio of premium to net worth.

Q. Can you describe how you have reflected agents' balances in the rate of return calculations?

A. Agents' balances, that is, delays in the collection and remission of premium to the companies, result in funds that are not available for investment. To estimate the level of agents' balances, I calculated the average date of premium collection using the distribution of North Carolina workers compensation assigned risk premium by size and the provisions of the assigned risk pool installment pay plan. The estimated average premium collection date is approximately 6.9 months. Given that the average policy sale date is 6 months, the average delay in remission is 0.9 months, which is 0.076 years.

Q. Could you please clarify how the underwriting profit provision contained in the rate filing was determined?

A. Yes. The issue of how that Rate Bureau determines the underwriting profit and contingency factor has frequently arisen in rate hearings in North Carolina in past years. Although it is evident from my exhibits that the Rate Bureau selects an underwriting profit provision to be included in the rates, there has been lengthy cross examination on this issue in every rate hearing in recent memory. Therefore, to clarify this matter, I will briefly discuss the procedure used by the Rate Bureau to determine the underwriting profit factor that is included in the proposed rates.

Each year, prior to making its rate filing, the Workers Compensation Committee of the Rate Bureau meets to review data and determine values for a number of the important components of the proposed rates. One of these components is the underwriting profit factor. To determine this value, a procedure is followed in which I provide the committee with the estimated returns on equity (both statutory returns as well as returns adjusted to include investment income on surplus) associated with alternative underwriting profit provisions, and the committee then selects a provision that is consistent with the cost of capital that has been developed by Dr. Vander Weide. Thus, the process is best described as one in which I test alternative underwriting profit provisions, and the committee selects a value based on these tests.

Q. How do you know what values of the underwriting profit provision to test?

A. I have been performing this type of analysis on behalf of the NCRB for many years, and I am quite familiar with the dynamics of these models. Therefore, it is relatively easy to know the general range of values around which the underwriting profit is likely to fall. Normally, for any particular line of business, I will select approximately five or six values of the underwriting profit provision to test, that comprise a range of perhaps two to four percentage points, and the committee typically selects a value within that range. Of course, if the committee is not satisfied with the range of values I propose, it is relatively straightforward to calculate returns associated with alternative values proposed by the committee.

As an example of this process, for this filing, I believe I tested underwriting profit provisions ranging from 8.0% to 11.5%, and the committee selected a value of 9.0%.

Q. From what you've said, it appears that the NCRB *selects* an underwriting profit provision, rather than *deriving* such a provision from the cost of capital. Is that correct, and if so, isn't it true that actuarial standards of practice require that the underwriting profit provision be *derived* from an underlying cost of capital?

A. It is correct that the Rate Bureau committee selects an underwriting profit provision and then tests whether that provision results in an expected rate of return on net worth that is consistent with the cost of capital. However, it is *not true* that actuarial standards of practice require that an underwriting profit be derived from the cost of capital. In fact, that issue is addressed explicitly in ASOP #30, entitled "Treatment of Underwriting Profit and Contingency Factors and the Cost of Capital in Property/Casualty Insurance Ratemaking." Section 3.1 of that ASOP states the following:

> Estimating the Cost of Capital and the Underwriting Profit Provision – Property/casualty insurance rates should provide for all expected costs, including an appropriate cost of capital associated with the specific risk transfer. This cost of capital can be provided for by estimating that cost and translating it into an underwriting profit provision, after taking leverage and investment income into account. Alternatively, the actuary may develop an underwriting profit provision and test that profit provision for consistency with the cost of capital. The actuary may use any appropriate method, as long as such method is consistent with the considerations in this standard.

The procedure utilized by the Rate Bureau is exactly the approach articulated in this section (i.e., "the actuary may develop an underwriting profit provision and test that profit provision for consistency with the cost of capital").

Q. Although most of these calculations are self-explanatory, could you please clarify how you selected your investment yield rate and premium to surplus ratio?

A. Yes. To select the investment yield rate, I took the average of what are known as the "embedded" and "current" yields, where each was based on the actual asset portfolios insurers currently hold. The Commissioner adopted this approach in his 1994 automobile insurance rate case, and, in his decision in the 1996 auto case, he selected a yield which approximated the yield obtained from this approach. Since then, the Rate Bureau has consistently followed this approach.

To estimate the embedded yield, I calculated the ratio of the most recent available industrywide investment income to average invested assets and added to that an estimate of the ten year average ratio of realized capital gains to invested assets. The sum of these two is the estimated embedded yield.

To estimate the current yield, I determined the yields available in today's capital markets for the portfolio of securities currently held by the property-casualty insurance industry. I then calculated a weighted average of these yield rates, based on the proportion of assets held by the industry in each of the various securities such as stocks, bonds, real estate and the like.

As far as the premium to surplus ratio is concerned, I relied on information which reflects the actual degree of leverage for insurers writing workers compensation insurance in North Carolina over the past ten years. My selected premium to surplus ratio is based on the ten year average premium to surplus ratio for the top 30 insurers which wrote workers compensation in North Carolina over that time period.

Q. Can you please provide the results of your calculations regarding the projected rate of return to the insurance transaction?

A. Yes. Assuming that the inputs to the pro forma model materialize exactly as expected, I estimate that insurers would expect to earn a statutory return on net worth of 8.2%. If one includes consideration of investment income on surplus, the total return on GAAP equity equals 10.6%.

The total return on GAAP equity is well within Dr. Vander Weide's range for the industry's fair return on equity. The statutory return on net worth falls below the lower bound of Dr. Vander Weide's range for the industry's fair return on equity.

VII. CONCLUSION

Q. Based on the studies you have conducted, have you come to any conclusions regarding the selected underwriting profit provision of 9.0% that has been filed by the NCRB in this case?

A. Yes. Based on my evaluation of Dr. Vander Weide's cost of capital estimates, my consideration of insurer specific risk characteristics, and my estimation of the projected pro forma return associated with underwriting workers compensation assigned risk insurance in North Carolina, I believe that the selected underwriting profit provision, and the return expected to be realized by insurers, comply with North Carolina law.

Q. Does this conclude your testimony?

A. Yes, it does.

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1989 to present	**MILLIMAN, INC.**
2017	Senior Consultant
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1980 to 1989	**NATIONAL COUNCIL ON COMPENSATION INSURANCE** Economic and Social Research Division
1985 to 1989	Vice President
1983	Assistant Vice President Responsible for all economic and social research of NCCI
1982	Director of Economic and Social Research
1981	Senior Research Economist
1980	Associate Research Economist
1976 to 1997	**RUTGERS UNIVERSITY**
1981-97	Associate of the Graduate Faculty, Department of Economics, Newark, New Jersey
1981-93	Teach variety of graduate courses including: Microeconomic Theory, Industrial Organization, Public Finance
1978-80	Instructor, Department of Economics, New Brunswick, New Jersey
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1980	Ph.D., Economics, Rutgers University
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"Framing, Firm Size and Financial Incentives in Workers' Compensation Insurance" (with Richard J. Butler and John D. Worrall)

"Application of NAIC Profitability Models to Long Tailed Lines of Insurance" (with James Gerofsky)

INVITED PRESENTATIONS

Huntington Beach, California, March 11, 2013
CAS RPM Seminar
"Risk Loads for Property Catastrophe Covers: Primary and Reinsurer Perspectives"

Huntington Beach, California, March 11, 2013
CAS RPM Seminar
"The Actuary as Expert Witness"

Philadelphia, Pennsylvania, March 20, 2012
CAS Ratemaking Seminar
"How Reinsurers Consider Risk Loads and Cost of Capital for Property Cat Covers"

Chicago, IL , March 17, 2010
CAS Ratemaking Seminar
"Logic, Fallacies and Paradoxes in Risk/Profit Loading in Ratemaking: A Socratic Dialogue"

Chicago, IL , March 16, 2010
CAS Ratemaking Seminar
"Quantifying Risk Loads for Property Catastrophe Exposure"

Las Vegas, NV, March 10, 2009
CAS Ratemaking Seminar
"Using Catastrophe Bonds to Infer Risk Loads/Profit Margins/Reinsurance Costs"

Boston, MA, March 17, 2008
CAS Ratemaking Seminar
"Using Catastrophe Bonds to Infer Risk Loads/Profit Margins/Reinsurance Costs"

Pinehurst, North Carolina, May 21, 2007
Workers Compensation Insurance Organizations Annual Meeting
"Enterprise Risk Management: What Is It and Why Is It Important?"

Salt Lake City, Utah, March 13, 2006
CAS Ratemaking Seminar
"Including Reinsurance Costs in Primary Insurance Rates"

New Orleans, Louisiana, March 11, 2005
CAS Ratemaking Seminar
"Including Reinsurance Costs in Primary Insurance Rates"

Philadelphia, Pennsylvania, March 11, 2004
CAS Ratemaking Seminar
"The Consideration of Risk Loads and Reinsurance Costs in Primary Insurance Ratemaking"

New York, New York, December 12, 2003
Goldman Sachs Insurance Conference
"Interest Rate Changes and Insurance Underwriting"

San Antonio, Texas, March 28, 2003
CAS Ratemaking Seminar
"The Consideration of Risk Loads and Reinsurance Costs in Primary Insurance Ratemaking"

San Antonio, Texas, March 27, 2003
CAS Ratemaking Seminar
"Rate of Return Models in Insurance Ratemaking"

San Diego, California, May 20, 2002
CAS Annual Meeting
“The Actuary as an Expert Witness”

Tampa, Florida, March 7, 2002
CAS Ratemaking Seminar
"Parameterizing Rate of Return Models in Insurance Ratemaking"

Chicago, Illinois, December 10, 2001
NAIC Meeting
“The Impact of Proposition 103 in California”

Kansas City, Missouri, April 30, 2001
NAIC Meeting
“Personal Lines Regulation”

Las Vegas, Nevada, March 12, 2001
CAS Ratemaking Seminar
"Parameterizing Rate of Return Models in Insurance Ratemaking"

Washington DC, January 18, 2001
Brookings Institution Conference on Insurance Regulation
“Auto Insurance Experience in California”

Bermuda, September 14, 2000
Ace Insurance Worldwide Actuarial Conference
“Rate of Return Models In Property Casualty Insurance Ratemaking”

Orlando, Florida, June 9, 1998
Florida Managed Care Institute Annual Conference
"Issues in Integrated Health Care"

Seattle, Washington, July 21, 1997
CAS Dynamic Financial Analysis Seminar
"Dynamic Financial Analysis of a Workers Compensation Insurer"

Boston, Massachusetts, March 14, 1997
CAS Ratemaking Seminar
"Discounted Cash Flow Models in Insurance Ratemaking"

East Lansing, Michigan, July 15, 1996
National Symposium on Workers Compensation
"Managed Care in Workers Compensation"

New Orleans, Louisiana, March 20, 1996
Global Business Research Seminar: Partnerships Between Insurers and Providers
"Integrating the Data Systems"

Orlando, Florida, November 15, 1995
Global Business Research Seminar: Documenting Savings From Managed Care
"Evaluating Savings From Managed Care"

Orlando, Florida, October 27, 1995
Self Insurance Association of America Annual Meeting
"Managed Care in Workers Compensation: A Magic Act or Humbug?"

San Diego, California, October 16, 1995
Global Business Research Seminar: Documenting Savings From Managed Care
"Technical Issues in Measuring Savings From Managed Care"

Durham, North Carolina, September 6, 1995
North Carolina HMO Association Annual Meeting
"Workers Compensation in North Carolina: Risks and Opportunities for HMO's"

Washington, DC, May 22, 1995
Global Business Research Seminar: Outcomes for Workers' Compensation Managed Care
"Measuring and Reporting the Savings"

Orlando, Florida, April 13, 1995
NCCI Annual Meeting
"Managed Care in Workers Compensation"

Phoenix, Arizona, April 3, 1995
Casualty Actuarial Society Seminar on Profitability
"Rate of Return Models - Selecting the Parameters"

New Orleans, Louisiana, March 16, 1995
Casualty Actuarial Society Ratemaking Seminar
"Discounted Cash Flow Models for Insurance Ratemaking"

Orlando, Florida, March 14, 1995
Standard & Poor's Rating Conference
"Consolidation in the Property/Casualty Insurance Industry"

Minneapolis, Minnesota, October 11, 1994
Casualty Actuarial Society Seminar on Medical Cost Containment
"Managed Care and Workers' Compensation"

Toronto, Ontario, August 22, 1994
American Risk and Insurance Association Annual Meeting
"Current Issues in Workers' Compensation"

Boston, Massachusetts, May 17, 1994
Casualty Actuarial Society Annual Meeting
"Standard Of Practice on Profit and Contingency"

Hartford, Connecticut, April 20, 1994
University of Connecticut Blue Cross/Blue Shield Symposium
"24 Hour Coverage - What Will It Involve"

Atlanta, Georgia, March 10, 1994
Casualty Actuarial Society Ratemaking Seminar
"Cash Flow Models for Insurance Ratemaking"

Cambridge, Massachusetts, March 2, 1994
Workers' Compensation Research Institute Health Care Reform Conference
"Early Results of the Florida Pilot Project"

Phoenix, Arizona, November 15, 1993
Casualty Actuarial Society Annual Meeting
"The Use Of Managed Care in Workers' Compensation"

New York, New York, October 20, 1993
Insurance Information Institute/Reinsurance Association of America Research Conference
The Impact of Health Care Reform on Casualty Insurance"

Somerset, New Jersey, July 13, 1993
National Symposium on Workers' Compensation
"Economic Analysis of Workers' Compensation Issues"

Boston, Massachusetts, June 30, 1993
Institute of Actuaries of Japan Special Meeting
"Health Care Costs in Workers' Compensation"

Dallas, Texas, June 15, 1993
Stirling-Cooke Workers' Compensation Seminar
"Workers' Compensation Medical Costs: Trends, Causes and Solutions"

New York, New York, June 3, 1993
New York Business Group On Health
"The Crisis in Workers' Compensation Health Care"

Mauna Lani Bay, Hawaii, May 3, 1993
Western Association of Insurance Brokers Annual Meeting
"Trends in Insurance Insolvency"

Kingston, Ontario, April 28, 1993
Queen's University Workers' Compensation Conference
"Exposure Bases for Workers' Compensation: Equity vs. Practicality"

Sanibel Island, Florida, March 29, 1993
Workers' Compensation Reinsurance Bureau Annual Meeting
"The Use of Managed Care in Workers' Compensation"

Baltimore, Maryland, March 23, 1993
CAMAR Annual Meeting
"Estimating the Cost of Capital in Insurance Ratemaking"

Philadelphia, Pennsylvania, December 1, 1992
Economic Issues in Workers' Compensation Seminar,
"Rate of Return Regulation in Workers' Compensation"

Seattle, Washington, October 16, 1992
Casualty Actuarial Society Seminar on Profitability
"Risk Based Capital Standards for Property Casualty Insurers"

Washington, DC, August 18, 1992
American Risk and Insurance Association Annual Meeting
"The Crisis in Workers' Compensation"

New York, New York, May 19, 1992
Executive Enterprises Institute Seminar: Winning Approval of Rate and Form Filings
"Determining a Fair Rate of Return for Property/Casualty Insurers"

Palm Beach, Florida, April 23, 1992
NCCI Annual Meeting
"Is the Workers' Compensation Industry Competitive?"

Philadelphia, Pennsylvania, March 20, 1992
University of Pennsylvania/Duncanson & Holt Special Seminar
"Current Issues in Workers' Compensation"

Dallas, Texas, March 12, 1992
Casualty Actuarial Society Ratemaking Seminar
"Profitability Models in Insurance Ratemaking: Estimating the Parameters"

Houston, Texas, December 11, 1991
NCCI/NAIC Commissioners Symposium
"Rate Adequacy: Solvency and Safety Implications"

New York, New York, November 17, 1991
Executive Enterprises Institute Seminar: Winning Approval of Rate and Form Filings
"Determining a Fair Rate of Return for Property/Casualty Insurers"

Philadelphia, Pennsylvania, November 12, 1991
Casualty Actuarial Society Annual Meeting
"The Impact of Medical Costs on Casualty Coverages"

New York, New York, May 17, 1991
Executive Enterprises Institute Seminar: Winning Approval of Rate and Form Filings
"Determining a Fair Rate of Return for Property/Casualty Insurers"

Kiawah Island, South Carolina, April 15 & 16, 1991
Casualty Actuarial Society Seminar on Profitability
"Cost of Capital Estimation: Lessons From Public Utilities"

Chicago, Illinois, March 14, 1991
Casualty Actuarial Society Ratemaking Seminar
"The Use of Profitability Models in Insurance Ratemaking"

Orlando, Florida, October 24, 1990,
Financial Management Association Annual Meeting,
"Current Issues in Insurance Rate Regulation: California Prop. 103 and Pennsylvania Act 6"

New Brunswick, New Jersey, May 18, 1990,
Joint Conference on Workers' Compensation,
"Current State Issues and Benefit Reforms"

Orlando, Florida, May 8, 1990,
National Association of Insurance Commissioners Southeast Zone Raters Conference,
"Loss Cost Rating for Workers' Compensation"

Orlando, Florida, April 3, 1990,
Workers' Compensation Reinsurance Bureau Annual Meeting,
"Medical Costs in Workers' Compensation: Recent Trends in Cost Containment"

Philadelphia, Pennsylvania, March 15, 1990,
CAS Ratemaking Seminar,
"Rate of Return Models in Insurance Regulation: Return on Sales vs. Return on Equity"

Chicago, Illinois, November 10, 1989,
Alliance of American Insurers Research Committee,
"Recent Developments in Rate Regulation: California Proposition 103"

New York, New York, October 5, 1989,
NCCI Legal Trends Seminar,
"Medical Cost Containment in Workers' Compensation"

Philadelphia, Pennsylvania, September 7, 1989,
Workers' Compensation Congress,
"Medical Cost Containment in Workers' Compensation"

Denver, Colorado, August 21, 1989,
American Risk and Insurance Association Annual Meeting,
"Regulatory Survival: Rate Changes in Workers' Compensation" (with Richard J. Butler)

Hilton Head, South Carolina, April 4,1989,
Workers' Compensation Reinsurance Bureau Annual Meeting,
"Prospects for Workers' Compensation in the 1990's"

Mountain Lakes, New Jersey, March 29, 1989,
St. Clares-Riverside Medical Center,
"Stress in the Workplace"

Dallas, Texas, March 16, 1989,
Casualty Actuarial Society Ratemaking Seminar,
"The Impact of Tax Reform on Insurance Profitability"

New Orleans, Louisiana, December 15, 1988,
NAIC-NCCI Commissioners School,
"A Forecast for Workers' Compensation"

Philadelphia, Pennsylvania, November 17,1988,
Economic Issues in Workers' Compensation Seminar,
"The Impact of Regulation on the Probability of Insolvency" (with John D. Worrall and David Durbin)

Boston, Massachusetts, November 14, 1988,
American Public Health Association Annual Meeting,
"Stress in the Workplace"

Atlanta, Georgia, September 14, 1988,
Casualty Loss Reserve Seminar,
"Estimating the Cost of Social Inflation in Workers' Compensation"

Reno, Nevada, August 15, 1988,
American Risk and Insurance Association Annual Meeting,
"Benefit Increases in Workers' Compensation"

New York, New York, June 13, 1988,
National Association Of Insurance Commissioners Annual Meeting,
"Alternative Rate of Return Models for Insurance Regulation"

Syracuse, New York, May 5, 1988,
Current Issues in Workers' Compensation Symposium,
"Workers' Compensation Stress Claims"

Hilton Head, South Carolina, April 22, 1988,
Workers' Compensation Reinsurance Bureau Annual Meeting,
"A Forecast for Workers' Compensation Insurers"

Absecon, New Jersey, April 19, 1988,
Pennsylvania Coal Mine Rating Bureau Annual Meeting,
"The Use of Rate of Return Models in Insurance Rate Regulation"

Philadelphia, Pennsylvania, November 17, 1987,
Economic Issues in Workers' Compensation Seminar,
"The Transition to Permanent Disability Status" (with John D. Worrall and David Durbin)

Charlotte, North Carolina, October 20, 1987,
American Insurance Association Government Affairs Conference,
"Prospects for Workers' Compensation in 1988"

Minneapolis, Minnesota, September 29, 1987,
Minnesota Workers' Compensation Reinsurance Association Annual Meeting,
"Economic and Demographic Characteristics of Workers' Compensation Claims"

Airlie, Virginia, July 7, 1987,
National Symposium on Workers' Compensation,
"Forecasting Workers' Compensation Experience"

Santa Clara, California, June 30, 1987,
Symposium on Recent Advances in Ratemaking,
"Econometric Models of Workers' Compensation Losses"

Storrs, Connecticut, May 1, 1987,
University of Connecticut Symposium on Current Issues in Workers' Compensation,
"Current Research in Workers' Compensation"

Philadelphia, Pennsylvania, April 16, 1987,
Wharton School Graduate Seminar Series,
"Impact of Tax Reform on Workers' Compensation Profitability"

Boca Raton, Florida, December 4, 1986,
National Association of Insurance Commissioners/NCCI Commissioners School,
Panel Discussion on Current Issues in Workers' Compensation

Philadelphia, Pennsylvania, November 7, 1985,
Wharton School, University of Pennsylvania, Graduate Seminar Series,
"Litigation in Workers' Compensation"

Vancouver, British Columbia, August 19, 1985,
American Risk and Insurance Association Annual Meeting,
"Earnings Loss and Permanent Disability"

Washington, D.C., April 23, 1985,
Washington Conference on the Economics of Disability,
"Employment Effects of Workers' Compensation Insurance"

Schenectady, New York, January 18, 1985,
Union University Graduate Business Seminar Series,
"The Use of Modern Portfolio Theory in Insurance Regulation"

EXPERT TESTIMONY

Utica, New York, July 6, 2016
Village of Ilion, et.al., v. County of Herkimer, et.al.

San Francisco, California, November 19, 2015
State Farm General Homeowners Insurance Rate Hearing

Tallahassee, Florida, October 21, 2015
NCCI Workers Compensation Insurance Rate Hearing

Raleigh, North Carolina, October 27, 2014
Homeowners Insurance Rate Hearing

Tallahassee, Florida, October 14, 2014
NCCI Workers Compensation Insurance Rate Hearing

New York, NY, June 24, 2014
Omar Tigbao and Dorothy Tigbao, *et. al.*,v. QBE Financial Institutions Risk Services, Deposition

New York, NY, March 7, 2014
Thrift Development Corporation v. American International Group, et. al., Deposition

New York, New York, January 28, 2014
Cheryl Hall, *et. al.* v. Bank of America, N.A., *et. al.*, Deposition

Santa Fe, New Mexico, November 7, 2013
Biennial Title Insurance Rate Hearing

Tallahassee, Florida, October 1, 2013
NCCI Workers Compensation Insurance Rate Hearing

New York, New York, July 10, 2013
Larry Arnett and Ronda Arnett, *et. al.* v. Bank of America, N.A., *et. al.*, Deposition

Austin, Texas, April 25, 2013
State Farm Lloyds Homeowners Rate Hearing

Tallahassee, Florida, October 4, 2012
NCCI Workers Compensation Insurance Rate Hearing

Boston, Massachusetts, May 14, 2012
Massachusetts Workers Compensation Rate Hearing

New York, New York, February 17, 2012
Temporary Services, Inc. *et. al.* v. American International Group, *et. al.*, Deposition

San Francisco, California, January 19, 2012
Mercury Insurance Company Homeowners Insurance Rate Hearing

Santa Fe, New Mexico, November 16, 2011
Biennial Title Insurance Rate Hearing

Tallahassee, Florida, October 11, 2011
NCCI Workers Compensation Insurance Rate Hearing

Tampa, Florida, September 13, 2011
Citizens Property Insurance Corporation Homeowners Insurance Hearing

Raleigh, North Carolina, July 25, 2011
Dwelling Fire and Extended Coverage Insurance Rate Hearing

Tallahassee, Florida, October 6, 2010
NCCI Workers Compensation Insurance Rate Hearing

Irvine, CA, April 21, 2010
Eastwood Insurance Services, Inc. *et. al*., vs. Titan Auto Insurance of NM, *et. al.* Deposition

San Francisco, California, March 9, 2010
Century National Insurance Company Proposition 103 Rollback Hearing

Santa Fe, New Mexico, November 18, 2009
Annual Title Insurance Rate Hearing

Tallahassee, Florida, October 29, 2009
NCCI Workers Compensation Insurance Rate Hearing

Austin, Texas, September 14, 2009
Biennial Title Insurance Rate Hearing

Austin, Texas, April 1, 2009
State Farm Lloyds Homeowners Rate Hearing

Santa Fe, New Mexico, November 19, 2008
Annual Title Insurance Rate Hearing

New York, New York, November 13, 2008
Georgia Hensley, *et. al*., vs. Computer Sciences Corp. *et. al.*, Deposition

Tallahassee, Florida, October 29, 2008
State Farm Florida Homeowners Insurance Hearing

Raleigh, North Carolina, July 1, 2008
Auto Insurance Rate Hearing

San Francisco, California, May 5, 2008
GeoVera Insurance Company Earthquake Rate Hearing

Tallahassee, Florida, January 23, 2008
Hartford Insurance Group Homeowners Insurance Rate Hearing

Boston, Massachusetts, January 9, 2008
Commerce Insurance Group Auto Insurance Rate Hearing

San Francisco, California, November 29, 2007
Explorer Insurance Company Automobile Rate Hearing

Santa Fe, New Mexico, November 19, 2007
Annual Title Insurance Rate Hearing

Reno, Nevada, June 14, 2007
Public Hearing Regarding Merger Between UnitedHealth Group and Sierra Health Systems

Austin, Texas, May 31, 2007
State Farm Lloyds Homeowners Rate Hearing

Reno, Nevada, October 26, 2006
Public Hearing Regarding Demutualization of Employers Insurance Group

San Francisco, California, August 30, 2006
Hearing on Proposed Title Insurance Rate Regulations

Austin, Texas, August 14, 2006
Biennial Title Insurance Rate Hearing

Raleigh, North Carolina, September 28, 2005
Auto Insurance Rate Hearing

Providence, Rhode Island, September 27, 2005
Norcal Medical Malpractice Insurance Rate Hearing

San Francisco, California, August 23, 2005
Safeco Insurance Company Earthquake Rate Hearing

Boston, Massachusetts, April 15, 2005
Massachusetts Workers Compensation Rate Hearing

Lawrence, Massachusetts, February 14, 2005
Highground, Inc. v. Mazonson

New York, NY, January 21, 2005
NFHA v. Prudential Deposition

Austin, Texas, July 13, 2004
Medical Protective Insurance Company Medical Malpractice Insurance Rate Hearing

Austin, Texas, December 16, 2003
Biennial Title Insurance Rate Hearing

Providence, Rhode Island, November 17, 2003
Norcal Medical Malpractice Insurance Rate Hearing

San Francisco, California, September 16, 2003
Century National Proposition 103 Rollback Hearing

Austin, Texas, September 11, 2003
Farmers Insurance Exchange Homeowner Rate Rollback Hearing

Austin, Texas, September 2, 2003
State Farm Lloyds Homeowners Rate Rollback Hearing

Austin, Texas, May 21, 2003
Farmers Insurance Group Settlement Hearing

Boston, Massachusetts, April 29, 2003
Massachusetts Workers Compensation Rate Hearing

Los Angeles, California, March 12, 2003
SCPIE Medical Malpractice Rate Hearing

Raleigh, North Carolina, July 17, 2002
Auto Insurance Rate Hearing

Tallahassee, Florida, February 25, 2002
NCCI Workers Compensation Insurance Rate Hearing

Austin, Texas, February 5, 2002
Biennial Title Insurance Rate Hearing

Raleigh, North Carolina, September 24, 2001
Auto Insurance Rate Hearing

Boston, Massachusetts, August 14, 2001
Massachusetts Auto Insurance Bureau Rate Hearing

Austin, Texas, March 6, 2001
Texas Auto Benchmark Rate Hearing

Boston, Massachusetts, August 23, 2000
Massachusetts Auto Insurance Bureau Rate Hearing

Austin, Texas, December 7, 1999
Texas Auto Insurance Plan Association Rate Hearing

Raleigh, North Carolina, December 3, 1999
Auto Insurance Rate Hearing

Austin, Texas, November 3, 1999
Biennial Title Insurance Rate Hearing

Austin, Texas, September 8, 1999
Texas Auto Benchmark Rate Hearing

Boston, Massachusetts, August 13, 1999
Massachusetts Auto Insurance Bureau Rate Hearing

Austin, Texas, June 22, 1999
Texas Property Benchmark Rate Hearing

Honolulu, Hawaii, December 16, 1998
NCCI Workers Compensation Insurance Rate Hearing

Richmond, Virginia, November 15, 1998
NCCI Workers Compensation Insurance Rate Hearing

Boston, Massachusetts, October 9, 1998
Massachusetts Auto Insurance Bureau Rate Hearing

Austin, Texas, May 19, 1998
Texas Auto Insurance Plan Association Rate Hearing

Austin, Texas, April 7, 1998
Auto Insurance Benchmark Rate Hearing

Austin, Texas, February 17, 1998
Property Insurance Benchmark Rate Hearing

Austin, Texas, November 18, 1997
Biennial Title Insurance Rate Hearing

Tallahassee, Florida, September 8, 1997
NCCI Workers Compensation Insurance Rate Hearing

Austin, Texas, April 8, 1997
Texas Auto Insurance Plan Association Rate Hearing

Austin, Texas, March 10, 1997
Auto Insurance Benchmark Rate Hearing

San Francisco, California, March 4, 1997
Insurance Department Hearing on Rating Factors

Raleigh, North Carolina, July 16, 1996
Auto Insurance Rate Hearing

San Francisco, California, March 11, 1996
Century National Proposition 103 Rollback Hearing

Sacramento, California, January 30, 1996
Hartford Steam Boiler Proposition 103 Rollback Hearing

San Francisco, California, January 8, 1996
SAFECO Insurance Company Earthquake Rate Hearing

Austin, Texas, December 21, 1995
Residential Property Insurance Benchmark Rate Hearing

Clearwater, Florida, December 8, 1995
Florida Windstorm Underwriting Association Rate Hearing

Austin, Texas, November 28, 1995
Private Passenger Auto Insurance Benchmark Rate Hearing

Austin, Texas, October 31, 1995
Texas Automobile Insurance Plan Association Rate Hearing

Sacramento, California, April 18, 1995
California Insurance Department Hearing on Auto Insurance Rating Factors

Portland, Maine, April 13, 1995
Workers Compensation Assigned Risk Pool Fresh Start Hearing

San Francisco, California, February 6, 1995
Farmers Insurance Group Earthquake Insurance Rate Hearing

Austin, Texas, January 6, 1995
Special Hearing on Classification Rules for Automobile Insurance

Austin, Texas, December 15, 1994
Residential Property Insurance Benchmark Rate Hearing

Austin, Texas, October 4, 1994
Texas Automobile Insurance Plan Association Rate Hearing

Austin, Texas, September 27, 1994
Private Passenger Auto Insurance Benchmark Rate Hearing

Raleigh, North Carolina, July 19, 1994
Private Passenger Auto Insurance Rate Hearing

San Francisco, California, December 22, 1993
Century National Homeowner's Insurance Rate Hearing

Raleigh, North Carolina, October 13, 1993
Homeowners/Farmowners Insurance Rate Hearing

Tallahassee, Florida, October 4, 1993
Workers' Compensation Insurance Rate Hearing

Boston, Massachusetts, September 9, 1993
Automobile Insurance Rate Hearing

Austin, Texas, March 4, 1993
Residential Property Insurance Benchmark Rate Hearing

Austin, Texas, February 10, 1993
Automobile Insurance Benchmark Rate Hearing

Honolulu, Hawaii, November 18, 1992
Liberty Mutual Insurance Automobile Rate Hearing

Raleigh, North Carolina, November 13, 1992
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, October 29, 1992
Workers' Compensation Insurance Rate Hearing

San Francisco, California, October 14, 1992
Workers' Compensation Insurance Rate Hearing

Atlanta, Georgia, September 24, 1992
Workers' Compensation Insurance Rate Hearing

Nashville, Tennessee, May 27, 1992
Workers' Compensation Insurance Rate Hearing

San Francisco, California, May 13, 1992
Workers' Compensation Insurance Rate Hearing

Los Angeles, California, April 10, 1992
Mercury General Proposition 103 Rollback Proceedings

Austin, Texas, January 27, 1992
Texas Automobile Insurance Plan Rate Hearing

Austin, Texas, December 17, 1991
Automobile Insurance Rate Hearing

Raleigh, North Carolina, December 16, 1991
Workers' Compensation Insurance Rate Hearing

San Francisco, California, October 22, 1991
Workers' Compensation Rate Hearing

Los Angeles, California, May 23, 1991,
Proposition 103 RCD-2 Proceedings

San Francisco, California, April 9, 1991
California Workers' Compensation Rate Study Commission

Nashville, Tennessee, March 20, 1991
Workers' Compensation Insurance Rate Hearing

Los Angeles, California, March 12, 1991,
California Workers' Compensation Rate Study Commission

Olympia, Washington, February 26, 1991,
House Financial Institutions/Insurance Committee Hearing on Rules for Insurance Regulatory Legislation

Olympia, Washington, November 27, 1990,
Insurance Department Public Hearing on Proposed Rules for Ratemaking

Harrisburg, Pennsylvania, November 12, 1990,
Allstate Insurance Company Automobile Insurance Rate Hearing

Tallahassee, Florida, November 1, 1990,
Scanlan v. Martinez, et.al., Superior Court of Leon County

San Bruno, California, October 1, 1990,
SAFECO Insurance Group Proposition 103 Rate Rollback Hearing

Austin, Texas, July 23, 1990,
Texas State Board of Insurance Special Hearing on Investment Income in Ratemaking

Harrisburg, Pennsylvania, July 18, 1990,
Pennsylvania National Mutual Insurance Company Automobile Insurance Rate Hearing

Harrisburg, Pennsylvania, June 28, 1990,
Harleysville Mutual Insurance Company Automobile Insurance Rate Hearing

Columbia, South Carolina, March 30, 1990,
Workers' Compensation Insurance Rate Hearing

San Bruno, California, March 19, 1990,
California Proposition 103 Generic Hearing

Denver, Colorado, December 12, 1989,
Workers' Compensation Insurance Rate Hearing

Tampa, Florida, October 23, 1989,
Workers' Compensation Insurance Rate Hearing

Austin, Texas, October 17, 1989,
Workers' Compensation Insurance Rate Hearing

Los Angeles, California, September 25, 1989,
SAFECO Insurance Company of America Proposition 103 Rate Hearing

Austin, Texas, August 29, 1989,
Texas Insurance Advisory Association Property Insurance Rate Hearing

Providence, Rhode Island, April 13, 1989,
Workers' Compensation Insurance Rate Hearing

Augusta, Maine, January 24, 1989,
Workers' Compensation Insurance Rate Hearing

Hartford, Connecticut, November 14, 1988,
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, November 3, 1988,
Workers' Compensation Insurance Rate Hearing

Austin, Texas, November 2, 1988,
Workers' Compensation Insurance Rate Hearing

Montgomery, Alabama, June 30, 1988,
Workers' Compensation Insurance Rate Hearing

Augusta, Maine, March 24, 1988,
Workers' Compensation Insurance Rate Hearing

Austin, Texas, October 27, 1987,
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, October 9, 1987,
Workers' Compensation Insurance Rate Hearing

Atlanta, Georgia, August 6, 1987,
Workers' Compensation Insurance Rate Hearing

Augusta, Maine, February 24, 1987,
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, November 14, 1986,
Workers' Compensation Insurance Rate Hearing

Austin, Texas, November 18, 1986,
Workers' Compensation Insurance Rate Hearing

Augusta, Maine, May 28, 1986,
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, December 6, 1985,
Workers' Compensation Insurance Rate Hearing

Oklahoma City, Oklahoma, October 10, 1985,
Workers' Compensation Insurance Rate Hearing

Austin, Texas, July 23, 1985,
Workers' Compensation Insurance Rate Hearing

Austin Texas, June 14, 1985,
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, November 18, 1984,
Workers' Compensation Insurance Rate Hearing

Austin, Texas, August 29, 1984,
Workers' Compensation Insurance Rate Hearing

Portland, Oregon, March 6, 1984,
NA IC Public Hearing on Investment Income and Insurance Profitability

Tallahassee, Florida, February 25, 1984,
Workers' Compensation Insurance Rate Hearing

Tallahassee, Florida, August 18, 1983,
Workers' Compensation Insurance Rate Hearing

Austin Texas, July 13, 1983,
Workers' Compensation Insurance Rate Hearing

Oklahoma City, Oklahoma, March 6, 1983,
Workers' Compensation Insurance Rate Hearing

Baton Rouge, Louisiana, March 16, 1982,
Louisiana Insurance Commission Public Hearing on Investment Income

Providence, Rhode Island, February 3, 1982,
Workers' Compensation Insurance Rate Hearing

Augusta, Maine, October 1, 1981,
Workers' Compensation Insurance Rate Hearing

NCRB - PRO FORMA STATUTORY RETURN

WORKERS COMPENSATION

	Pre-Tax	Tax Liability	Post-Tax
1. Premiums	100.00%		
Loss & Loss Adjustment Expense	58.46%		
Commissions & Brokerage	5.00%		
Taxes, Licenses and Fees	2.66%		
General & Other Acquisition Expenses	2.54%		
Servicing Carrier Allowance plus Other Expenses	15.50%		
Uncollectible Premium Income	6.84%		
2. Pro-Forma Underwriting Profit	9.00%		
3. Regular tax		3.15%	
4. Additional tax due to TRA		0.27%	
5. Total Return from Underwriting (post-tax)			5.58%
6. Investment Gain on Insurance Transaction	7.78%	1.91%	5.87%
7. Total Return as a % of Premium (post-tax)			11.45%
8. Premium-to-Net Worth Ratio			0.718
9. Total Return as a % of Net Worth (post-tax)			8.22%

Note: Lines (1) to (7) are all expressed as a % of premium.

Assumptions

(a) UW Tax Rate =	35.00%
(b) Inv. Income Tax Rate =	24.55%
(c) Inv. Yield =	3.45%
(d) P/S Ratio =	0.84
(e) NW/S Ratio =	1.16
(f) Uncollectible Premium (adj. to reflect expense offsets)	6.84%
(g) Additional TRA tax=	0.27%
(h) Prepaid Expense Ratio	23.14%
(i) Unearned Premium Reserve to Premium Ratio	32.56%

NOTES TO EXHIBIT RB-13, Page 1

1. Selected expense provisions, using servicing carrier allowance as proxy for direct assignment carrier expenses. Servicing carrier share =72.56 %; direct assignment carrier share =27.45%.
   Therefore, General & OAE for direct assignment carriers = 9.26%*27.45%=2.54%, of total market premium, while the servicing carrier allowance plus other expenses = (19.02%+2.34%)*72.56%=15.50% of total market premium
   Commission and brokerage expenses are the same for all carriers.

2. Selected underwriting profit provision

3. (2) x (a.)

4. See RB-13, p. 3

5. [(2) - (3) - (4)]

6. See RB-13, pp.4-7

7. (5) + (6)

8. (d)/(e)

9. (7) x (8)

ASSUMPTIONS

(a) Internal Revenue Code

(b) See RB-13, pp. 8-10; 1-avg post-tax yield/avg pre-tax yield

(c) See RB-13, pp. 8-10; average of current and embedded yields

(d) See RB-13, p. 11

(e) See RB-13, p. 12

(f) See RB-1, Exhibit II-F

(g) See RB-13, p. 3

(h) See RB-13, p. 4

(i) See RB-13, p. 5

NCRB - PRO FORMA STATUTORY RETURN
ADJUSTED TO INCLUDE INVESTMENT INCOME ON SURPLUS
WORKERS COMPENSATION

	Pre-Tax	Tax Liability	Post-Tax
1. Premiums	100.00%		
Loss & Loss Adjustment Expense	58.46%		
Commissions & Brokerage	5.00%		
Taxes, Licenses and Fees	2.66%		
General & Other Acquisition Expenses	2.54%		
Servicing Carrier Allowance plus Other Expenses	15.50%		
Uncollectible Premium	6.84%		
2. Pro-Forma Underwriting Profit	9.00%		
3. Regular tax		3.15%	
4. Additional tax due to TRA		0.27%	
5. Total Return from Underwriting (post-tax)			5.58%
6. Investment Gain on Insurance Transaction	7.78%	1.91%	5.87%
7. Investment Gain on Surplus (Including Prepaid Expense Adjustment)	4.38%	1.08%	3.31%
8. Total Return as a % of Premium (post-tax)			14.76%
9. Premium-to-Net Worth Ratio			0.718
10. Total Return as a % of Net Worth (post-tax)			10.60%

Note: Lines (1) to (9) are all expressed as a % of premium.

Assumptions

(a) UW Tax Rate =	35.00%
(b) Inv. Income Tax Rate =	24.55%
(c) Inv. Yield =	3.45%
(d) P/S Ratio =	0.84
(e) NW/S Ratio =	1.16
(f) Uncollectible Premium (adj. to reflect expense offsets)	6.84%
(g) Additional TRA tax=	0.27%
(h) Prepaid Expense Ratio	23.14%
(i) Unearned Premium Reserve to Premium Ratio	32.56%

NOTES TO EXHIBIT RB-13, Page 1A

1. Selected expense provisions, using servicing carrier allowance as proxy for direct assignment carrier expenses. Servicing carrier share =72.56 %; direct assignment carrier share =27.45%.
   Therefore, General & OAE for direct assignment carriers = 9.26%*27.45%=2.54%, of total market premium, while the servicing carrier allowance plus other expenses = (19.02%+2.34%)*72.56%=15.50% of total market premium
   Commission and brokerage expenses are the same for all carriers.

2. Selected underwriting profit provision

3. (2) x (a.)

4. See RB-13, p. 3

5. [(2) - (3) - (4)]

6. See RB-13, pp.4-7

7. (c) x [1/(d) + (h)x(i)]

8. (5) + (6) + (7)

9. (d)/(e)

10. (8) x (9)

ASSUMPTIONS

(a) Internal Revenue Code

(b) See RB-13, pp. 8-10; 1-avg post-tax yield/avg pre-tax yield

(c) See RB-13, pp. 8-10; average of current and embedded yields

(d) See RB-13, p. 11

(e) See RB-13, p. 12

(f) See RB-1, Exhibit II-F

(g) See RB-13, p. 3

(h) See RB-13, p. 4

(i) See RB-13, p. 5

NORTH CAROLINA
WORKERS COMPENSATION

CALCULATION OF TAXABLE INCOME

The Tax Reform Act of 1986 increased taxable income for property casualty insurers, by including in the tax base several items that were previously not considered taxable income. These items include:

1. Inclusion of 20% of the annual increase in unearned premium reserve as income.
2. The use of discounted loss reserves in the calculation of underwriting income.
3. Inclusion of 15% of tax exempt income and the deductible portion of dividends received from investments made after August 7, 1986.

Of these three items, the first two (revenue offset and loss reserve discounting) must be accounted for directly in the calculation of the underwriting profit tax. The third item must be accounted for in the calculation of the investment income tax rate. The calculations below assume annual premium growth of 4.0%

(a)	Earned Premium (current year)	100.00%
(b)	UEPR (previous year)	31.92%
(c)	UEPR (current year)	33.20%
(d)	Increase = (c)-(b)	1.28%
(e)	20% of Increase = Taxable Income	0.26%
(f)	Tax Liability = (e)x.35	0.09%

The additional taxable income derived from treating unpaid losses on a discounted basis is given by the difference between unpaid losses and undiscounted unpaid losses in year N, minus the difference between unpaid losses and undiscounted unpaid losses in year N-1. Discounting is on the basis of payment patterns provided by NCCI.

(g)	Unpaid Losses (current year)	168.49%
(h)	Discounted unpaid losses (current year)	154.94%
(i)	Unpaid Losses (previous year)	162.01%
(j)	Discounted unpaid losses (previous year)	148.98%
(k)	Additional Income	0.52%
(l)	Tax Liability	0.18%

The sum of these two calculations results in the following:

Other Tax Liabilities

(m)	UEP	0.09%
(n)	Discounting of Loss Reserves	0.18%
(o)	Total	**0.27%**

NORTH CAROLINA
WORKERS COMPENSATION

CALCULATION OF TAXABLE INCOME

(1) AY Avg Acc Date	(2) AY Pay Pattern	(3) Percent Unpaid	(4) Volume as % of Premium	(5) Combined Weight	(6) AY at 12/31 of Current Yr.	(7) Discount Factor	(8) Discounted Weight	(9) AY at 12/31 of Previous Yr.	(10) Weight	(11) Discount Factor	(12) Discounted Weight
0.5	29.1%	70.9%	58.461	41.4	2014	92.8001%	38.5				
1.5	49.4%	50.6%	56.212	28.4	2013	91.7519%	26.1	2013	39.8	92.8001%	37.0
2.5	60.8%	39.2%	54.050	21.2	2012	91.0240%	19.3	2012	27.3	91.7519%	25.1
3.5	68.5%	31.5%	51.972	16.4	2011	90.7181%	14.9	2011	20.4	91.0240%	18.5
4.5	74.1%	25.9%	49.973	13.0	2010	90.6188%	11.7	2010	15.8	90.7181%	14.3
5.5	78.3%	21.7%	48.051	10.4	2009	90.3641%	9.4	2009	12.5	90.6188%	11.3
6.5	81.7%	18.3%	46.203	8.5	2008	90.9836%	7.7	2008	10.0	90.3641%	9.1
7.5	84.3%	15.7%	44.426	7.0	2007	91.8119%	6.4	2007	8.1	90.9836%	7.4
8.5	86.5%	13.5%	42.717	5.8	2006	92.3034%	5.3	2006	6.7	91.8119%	6.1
9.5	88.3%	11.7%	41.074	4.8	2005	93.2810%	4.5	2005	5.5	92.3034%	5.1
10.5	90.1%	9.9%	39.494	3.9	2004	94.3111%	3.7	2004	4.6	93.2810%	4.3
11.5	92.0%	8.1%	37.975	3.1	2003	95.4044%	2.9	2003	3.7	94.3111%	3.5
12.5	93.8%	6.2%	36.515	2.3	2002	96.5746%	2.2	2002	2.9	95.4044%	2.8
13.5	95.6%	4.4%	35.110	1.6	2001	97.8408%	1.5	2001	2.2	96.5746%	2.1
14.5	97.4%	2.6%	33.760	0.9	2000	99.2290%	0.9	2000	1.5	97.8408%	1.5
15.5	100.0%	0.0%	32.461	0.0	1999	99.2290%	0.0	1999	0.9	99.2290%	0.8
16.5	100.0%	0.0%	31.213	0.0	1998	99.2290%	0.0	1998	0	99.2290%	0.0
17.5	100.0%	0.0%	30.012	0.0	1997	99.2290%	0.0	1997	0	99.2290%	0.0
18.5	100.0%	0.0%	28.858	0.0	1996	99.2290%	0.0	1996	0	99.2290%	0.0
19.5	100.0%	0.0%	27.748	0.0	1995	99.2290%	0.0	1995	0	99.2290%	0.0
20.5	100.0%	0.0%	26.681	0.0	1994	99.2290%	0.0	1994	0	99.2290%	0.0
21.5	100.0%	0.0%	25.655	0.0	1993	99.2290%	0.0	1993	0	99.2290%	0.0
22.5	100.0%	0.0%	24.668	0.0	1992	99.2290%	0.0	1992	0	99.2290%	0.0
23.5	100.0%	0.0%	23.719	0.0	1991	99.2290%	0.0	1991	0	99.2290%	0.0
24.5	100.0%	0.0%	22.807	0.0	1990	99.2290%	0.0	1990	0	99.2290%	0.0
25.5	100.0%	0.0%	21.930	0.0	1989	99.2290%	0.0	1989	0	99.2290%	0.0
26.5	100.0%	0.0%	21.086	0.0	1988	99.2290%	0.0	1988	0	99.2290%	0.0
27.5	100.0%	0.0%	20.275	0.0	1987	99.2290%	0.0	1987	0	99.2290%	0.0
28.5	100.0%	0.0%	19.495	0.0	1986	99.2290%	0.0	1986	0	99.2290%	0.0
29.5	100.0%	0.0%	18.746	0.0	1985	99.2290%	0.0	1985	0	99.2290%	0.0
30.5	100.0%	0.0%	18.025	0.0	1984	99.2290%	0.0	1984	0	99.2290%	0.0
31.5	100.0%	0.0%	17.331	0.0	1983	99.2290%	0.0	1983	0	99.2290%	0.0
32.5	100.0%	0.0%	16.665	0.0	1982	99.2290%	0.0	1982	0	99.2290%	0.0
33.5	100.0%	0.0%	16.024	0.0	1981	99.2290%	0.0	1981	0	99.2290%	0.0
34.5	100.0%	0.0%	15.408	0.0	1980	99.2290%	0.0	1980	0	99.2290%	0.0
35.5	100.0%	0.0%	14.815	0.0	1979	99.2290%	0.0	1979	0	99.2290%	0.0
36.5	100.0%	0.0%	14.245	0.0	1978	99.2290%	0.0	1978	0	99.2290%	0.0
37.5	100.0%	0.0%	13.697	0.0	1977	99.2290%	0.0	1977	0	99.2290%	0.0
38.5	100.0%	0.0%	13.170	0.0	1976	99.2290%	0.0	1976	0	99.2290%	0.0
39.5	100.0%	0.0%	12.664	0.0	1975	99.2290%	0.0	1975	0	99.2290%	0.0
40.5	100.0%	0.0%	12.177	0.0	1974	99.2290%	0.0	1974	0	99.2290%	0.0
41.5	100.0%	0.0%	11.708	0.0	1973	99.2290%	0.0	1973	0	99.2290%	0.0
42.5	100.0%	0.0%	11.258	0.0	1972	99.2290%	0.0	1972	0	99.2290%	0.0
43.5	100.0%	0.0%	10.825	0.0	1971	99.2290%	0.0	1971	0	99.2290%	0.0
44.5	100.0%	0.0%	10.409	0.0	1970	99.2290%	0.0	1970	0	99.2290%	0.0
45.5	100.0%	0.0%	10.008	0.0	1969	99.2290%	0.0	1969	0	99.2290%	0.0
46.5	100.0%	0.0%	9.623	0.0	1968	99.2290%	0.0	1968	0	99.2290%	0.0
47.5	100.0%	0.0%	9.253	0.0	1967	99.2290%	0.0	1967	0	99.2290%	0.0
48.5	100.0%	0.0%	8.897	0.0	1966	99.2290%	0.0	1966	0	99.2290%	0.0
49.5	100.0%	0.0%	8.555	0.0	1965	99.2290%	0.0	1965	0	99.2290%	0.0
50.5	100.0%	0.0%	8.226	0.0	1964	99.2290%	0.0	1964	0	99.2290%	0.0
51.5	100.0%	0.0%	7.910	0.0	1963	99.2290%	0.0	1963	0	99.2290%	0.0
52.5	100.0%	0.0%	7.606	0.0	1962	99.2290%	0.0	1962	0	99.2290%	0.0
53.5	100.0%	0.0%	7.313	0.0	1961	99.2290%	0.0	1961	0	99.2290%	0.0
54.5	100.0%	0.0%	7.032	0.0	1960	99.2290%	0.0	1960	0	99.2290%	0.0
55.5	100.0%	0.0%	6.761	0.0	1959	99.2290%	0.0	1959	0	99.2290%	0.0
56.5	100.0%	0.0%	6.501	0.0	1958	99.2290%	0.0	1958	0	99.2290%	0.0
57.5	100.0%	0.0%	6.251	0.0	1957	99.2290%	0.0	1957	0	99.2290%	0.0
58.5	100.0%	0.0%	6.011	0.0	1956	99.2290%	0.0	1956	0	99.2290%	0.0
59.5	100.0%	0.0%	5.780	0.0	1955	99.2290%	0.0	1955	0	99.2290%	0.0
60.5	100.0%	0.0%	5.557	0.0	1954	99.2290%	0.0	1954	0	99.2290%	0.0
61.5	100.0%	0.0%	5.344	0.0	1953	99.2290%	0.0	1953	0	99.2290%	0.0
62.5	100.0%	0.0%	5.138	0.0	1952	99.2290%	0.0	1952	0	99.2290%	0.0
63.5	100.0%	0.0%	4.940	0.0	1951	99.2290%	0.0	1951	0	99.2290%	0.0
64.5	100.0%	0.0%	4.750	0.0	1950	99.2290%	0.0	1950	0	99.2290%	0.0
65.5	100.0%	0.0%	4.568	0.0	1949	99.2290%	0.0	1949	0	99.2290%	0.0
66.5	100.0%		4.392	0.0	1948	99.2290%	0.0	1948	0	99.2290%	0.0
Sum	Total Res @ 12/31 current year			168.49	Sum		154.94	Sum			148.98
	Total Res @ 12/31 previous year			162.01							

NOTES TO PAGES 3 AND 3A

Page 3

(a) - (c) Annual Statement, statutory page 14, for all companies writing workers compensation insurance in North Carolina, and assumed growth rate.

(d) Line (c) - line (b)

(e) Line (d) x .20.

(f) Line (e) x .35.

(g) Unpaid current-year losses at year-end as a percent of premium. Sum of Page 3A, Column (5).

(h) Discounted unpaid current-year losses at year-end as a percent of premium. Sum of Page 3A, Column (8).

(i) Unpaid prior-year losses at year-end as a percent of premium. Sum of Page 3A, Column (5) divided by 4% growth rate.

(j) Discounted unpaid prior-year losses at year-end as a percent of premium. Sum of Page 3A, Column (12).

(k) Line (g) - Line (h) - [Line (i) - Line (j)]

(l) Line (k) x .35

(m) Line (f)

(n) Line (l)

(o) Line (m) + Line (n)

Page 3A

1 Midpoint of number of years since end of accident period.

2 Accident year payout pattern developed from policy year developed losses.

3 1 - Column (2)

4 Losses, given a 4% historical growth rate.

5 Column (3) x Column (4)

6 Accident Year at December 31, current year.

7 Discount factor per IRS Regulations.

8 Column (5) x Column (7)

9 Accident Year at December 31, previous year.

10 Column (3), previous period x Column (4), current period.

11 Discount factor per IRS Regulations.

12 Column (10) x Column (11)

NCRB INVESTMENT INCOME CALCULATION
WORKERS COMPENSATION
Projected Investment Earnings on Loss, Loss
Adjustment Expense and Unearned Premium Reserves

A. UNEARNED PREMIUM RESERVES		
1. Direct Earned Premiums		1,000,000
2. Mean UEPR	32.56%	325,587
3. Deductions for prepaid expenses: % of Total Market Premium		
Total Market		
Commissions & Brokerage	5.00%	
Taxes, Licenses and Fees	2.22%	
Direct Assignment Carriers (=27.45% of the market)		
One-Half of General & Other Acquisition Expenses	1.27%	
Servicing Carriers (=72.56% of the market)		
Servicing Carrier Allowance	14.65%	
Total	23.14%	
4. Deduction for Prepaid Expenses: (2) x (3)		75,331
5. Net UEPR		325,587
6. Net UEPR Subject to Inv (5) - (4)		250,256
B. Delayed Remission of Prems (Ag Bals)		
1. Direct Earned Premium		1,000,000
2. Average Agents Balances		0.076
3. Delayed Remissions (1)x(2)		76,000
C. Loss and Loss Expense Reserves		
1. Direct Earned Premium		1,000,000
2. Expected Inc Loss & LAE to Premium Ratio	0.5846	584,609
3. Expected Mean Loss & LAE Reserve to Inc. L & LAE Ratio	3.561	2,081,878
D. Net PH Funds Subj to Inv (A6 - B3 + C3)		2,256,134
E. Average Rate of Return		3.45%
F. Investment Earnings from Net Reserves (D) x (E)		77,837
G. Average Rate of Return as a Percent of Direct Earned Premium (F) / (A1)		7.78%

NORTH CAROLINA
WORKERS' COMPENSATION INSURANCE
ASSIGNED RISK

ESTIMATED INVESTMENT EARNINGS ON UNEARNED PREMIUM RESERVES AND ON LOSS RESERVES

EXPLANATORY NOTES

Line A-1

All calculations are displayed per $1,000,000 of earned premium

Line A-2

The mean unearned premium reserve is determined by multiplying the direct earned premiums in line (1) by the ratio of the unearned premium reserve to the collected earned premium for the current calendar year and assuming 4% annual growth in premiums for all companies.

(1)	Earned Premium (current year)	1,500,507,385
(2)	UEPR (previous year)	478,965,888
(3)	UEPR (current year)	498,124,524
(4)	Mean Unearned Premium Reserve (1/2)*[(2) + (3)]	488,545,206
(5)	Ratio (4) / (1)	**32.56%**

Line A-3

Deduction for prepaid expenses:

Servicing Carriers Market Share	72.56%
Direct Assignment Writers Market Share	27.45%

Commission and brokerage expenses are the same for all carriers.

General and other acquisition expenses for direct assignment writers are 9.26% one half of which are prepaid. Since direct assignment carriers are 27.45% of the market, these account for .5*27.45%*9.26%=1.27% of the market as a whole.

For servicing carriers, the entire servicing carrier allowance and half of OPA are prepaid expenses. These expenses account for 14.65% for the market as a whole.

Line B-2

Delayed remission of premium:

This deduction is necessary because of delay in collection and remission of premium to the companies. Therefore, funds for the unearned premium reserve required during the initial days of all policies must be taken from the company's surplus. Based on the distribution of North Carolina workers compensation assigned risk premiums by installment pay plan, the average date of premium collection is calculated.The difference between that date and 6 months is divided by 12 months to calculate the effect of delayed remission of premium.

Line C-2

The expected loss and loss adjustment ratio reflects the expense provisions used in this filing.

Line C-3

The mean loss & LAE reserve to incurred loss and LAE ratio is the weighted average of the ratios for direct assignment and servicing carriers:
(3.581*0.2745 + 3.752*0.7256) = 3.561.

Line E

The average rate of return is calculated as the arithmetic mean of the embedded and current yields. The embedded yield is the sum of two ratios: the most recent ratio of investment income to invested assets from Best's Aggregates & Averages, plus the 10-year average ratio of capital gains to invested assets (see Exhibit RB-13, page 9).
The current yield is the estimated, currently available rate of return (including income and expected capital gains) on the property/casualty industry investment portfolio (see Exhibit RB-13, page 8).

Embedded yield	=	3.46%
Current Yield	=	3.44%
Average		**3.45%**

Reserve to Incurred Loss Ratio*

Year	(1) Loss Reserve	(2) LAE Reserve	(3) Incurred Loss	(4) Incurred LAE	(5) (L+LAER)/ (IL+ILAE)
2007	3.061	0.369	1.000	0.172	2.926
2008	3.141	0.387	1.000	0.163	3.032
2009	3.568	0.443	1.000	0.176	3.412
2010	3.763	0.469	1.000	0.184	3.575
2011	3.664	0.462	1.000	0.160	3.558
2012	3.504	0.449	1.000	0.171	3.375
2013	3.964	0.524	1.000	0.181	3.800
2014	4.022	0.556	1.000	0.209	3.788
2015	4.266	0.613	1.000	0.204	4.051
2016	4.567	0.679	1.000	0.222	4.293
10 - yr avg	**3.752**				**3.581**

* Columns (1) - (4) shown as ratio to incurred loss

Source: NCCI

PORTFOLIO YIELD AND TAX RATE - CURRENT YIELD

(1)	(2) Percent of Assets	(3) Estimated Prospective Pre-Tax Return	(4) Tax Rate	(5) Estimated Prospective Post-Tax Return
Bonds				
U.S. Govt	9.33%	1.56%	35.00%	1.01%
States & territories	9.81%	1.90%	5.25%	1.80%
Special revenue	19.16%	2.11%	5.25%	2.00%
Industrial	30.05%	2.42%	35.00%	1.57%
Preferred stock	0.97%	5.84%	14.18%	5.01%
Common stock	22.58%	9.39%	30.90%	6.49%
Mortgage Loans	0.87%	3.75%	35.00%	2.44%
Real estate	0.82%	4.63%	35.00%	3.01%
Cash & short-term invs.	6.39%	0.69%	35.00%	0.45%
Rate of Return Pre-Inv Exp	100.00%	3.76%	27.69%	2.72%
Investment Expenses		0.32%	35.00%	0.21%
Portfolio Rate of Return		**3.44%**	27.01%	**2.51%**

Sources:

Various issues of Federal Reserve Statistical Release, H.15(519).
Mergent Bond Record.
Standard & Poor's CreditWeek.
Value Line Investment Survey, Part II.
Ibbotson Associates, SBBI Valuation Edition 2016 Yearbook.
Ibbotson and Siegel, AREUEA Journal, 1984.
A.M. Best's Aggregates & Averages, 2015 edition.

PORTFOLIO YIELD AND TAX RATE
EMBEDDED YIELD

	Income	Tax Rate
Bonds		
Taxable	22,250,748	35.00%
Non-Taxable	11,053,798	5.25%
Stocks		
Taxable	7,417,662	14.18%
Non-Taxable	1,533,307	5.25%
Mortgage Loans	559,969	35.00%
Real Estate	1,696,990	35.00%
Contract Loans	730	35.00%
Cash / Short Term Inv.	176,203	35.00%
All Other	9,604,417	35.00%
Total	54,293,824	25.26%
Inv. Expenses	4,970,945	35.00%
Net Inv. Income	49,322,879	24.28%
Mean Invested Assets	1,567,611,077	
Inv. Inc. Yield Rate	3.15%	24.28%
Capital Gains (10 yr. avg) (% Of Inv. Assets)	0.31%	0.00%
Invest. Yield Rate (pre-tax)	**3.46%**	**22.10%**
Invest. Yield Rate (post-tax)	**2.69%**	

Source: Best's Aggregates and Averages, 2016 Edition, p. 12 (Exhibit of Net Investment Income, Col. 2 (Earned During Year)).
Capital Gains, RB-13, page 10

CAPITAL GAINS OR LOSSES
AS A PERCENT OF MEAN ASSETS
(All amounts in thousands of dollars)

Calendar Year	Mean Total Invested Assets	Realized Capital Gains	
		Amount	Percent
2006	1,217,432,187	3,587,228	0.29%
2007	1,297,478,130	9,031,778	0.70%
2008	1,288,393,875	(21,018,623)	-1.63%
2009	1,274,678,809	(8,079,575)	-0.63%
2010	1,330,998,082	8,100,143	0.61%
2011	1,366,568,026	7,563,305	0.55%
2012	1,350,656,619	9,035,405	0.67%
2013	1,423,600,934	12,163,890	0.85%
2014	1,543,882,475	12,093,078	0.78%
2015	1,567,611,077	9,887,732	0.63%
Total	13,661,300,212	42,364,361	0.31%

Source: "Best's Aggregates & Averages--Property-Casualty,"
various editions

NORTH CAROLINA
WORKERS COMPENSATION

PREMIUM-TO-SURPLUS RATIOS

Year	Premium to Surplus Ratio
2006	1.06
2007	0.93
2008	1.01
2009	0.72
2010	0.69
2011	0.77
2012	0.76
2013	0.80
2014	0.79
2015	0.83
Ten-Year Average	0.84
Selected	**0.84**

Notes:

Ratios based on net premium written and average surplus
Top 30 Groups in each year
From Best's DataBase Service and
Best's Aggregates & Averages.

NORTH CAROLINA WORKERS COMPENSATION
CALCULATION OF GAAP NET WORTH TO SURPLUS RATIO

	2009	2010	2011	2012	2013
Policyholder Surplus	511,396,566,997	559,247,073,797	553,794,328,471	587,061,063,988	653,380,281,255
+ Deferred Acquisition Costs	26,770,216,415	27,142,965,854	27,670,594,098	28,717,782,350	30,010,149,317
+ Non-Admitted DTA Provision	24,344,929,355	17,507,669,410	16,898,320,478	12,829,214,564	11,638,345,594
+ Non-admitted Assets (non-tax part)	31,004,819,190	33,948,822,530	34,839,553,748	36,238,971,886	33,348,888,924
+ Provision for Reinsurance	3,457,351,496	3,217,305,985	2,981,599,506	2,595,871,371	2,471,928,096
+ Provision for FASB 115(after-tax)	16,691,215,237	19,411,210,713	35,069,557,742	42,220,449,087	14,722,750,582
- Surplus Notes	(13,916,580,127)	(15,935,710,149)	(14,704,469,032)	(12,279,333,642)	(12,190,299,603)
	0	0	0	0	0
GAAP-adjusted Net Worth	599,748,518,562	644,539,338,140	656,549,485,011	697,384,019,604	733,382,044,165
Ratio of GAAP Net Worth to Statutory Surplus	1.17	1.15	1.19	1.19	1.12
Five Year Average	1.16				

Source: ISO