NCRB-NCRF-NCIGA
north carolina
RATE BUREAU
REINSURANCE FACILITY
INSURANCE GUARANTY ASSOCIATION

August 30, 2019

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

Re: Workers Compensation Insurance
2019 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, 2020 and shall be applied to all residual market policies as of the first normal anniversary rating date which is on or after April 1, 2020, 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 August 30, 2019 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 7.6%.

This premium level change includes a 10.3% decrease in loss costs detailed in the 2019 loss cost filing and a 1.03% increase in the loss cost multiplier detailed in this filing.

By industry group, the changes are: Manufacturing, 6.6% decrease; Contracting, 9.6% decrease; Office and Clerical, 8.5% decrease; Goods & Services, 7.7% decrease; and Miscellaneous, 5.4% 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 6.6% to the overall residual market premium level of the "F" classifications.

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) Brett Foster, 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. George Zanjani – University of Alabama 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, 2020

I. Industrial Classifications

Overall Proposed Change in Rate Level

- New and Renewal Policies: -7.6%

By Industry Group

Manufacturing	-6.6%
Contracting	-9.6%
Office and Clerical	-8.5%
Goods and Services	-7.7%
Miscellaneous	-5.4%
Overall	-7.6%

II. Federal Classifications

Overall Proposed Change in Rate Level

- New and Renewal Policies: -6.6%

III. Summary of Miscellaneous Changes

	Current	Proposed
- USL&HW %	90%	59%

NORTH CAROLINA – ASSIGNED RISK

TABLE OF CONTENTS

Exhibit I - Determination of Filed Rate Level Change

Exhibit II - Expense Provision for Inclusion in Rates

Exhibit III - Proposed Rates and Rating Values

*Appendix A - Factors Underlying Rate Level Change

*A-I - Determination of Policy Year On-level Factors
*A-II - Determination of Premium and Losses Developed to an Ultimate Report
*A-III - Policy Year Trend Factors
*A-IV - Carriers Not Included in Policy Year Experience
*A-V - Derivation of Industry Group Differentials

*Appendix B - Factor to Convert from Loss Costs to Assigned Risk Rates

*B-I - Distribution of Loss Cost Level Change to Occupational Classification
*B-II - Individual Classification Experience
*B-III - Adjustments to Obtain Loss Costs
*B-IV - Derivation of Proposed Loss Cost - Code 8810
*B-V - Determination and Distribution of Premium Level Change to "F" Classifications

*Appendix C - Memoranda for Laws and Assessments

*C-I - Impact Due to Medical Fee Schedule Changes, Effective October 1, 2018 and January 1, 2019
*C-II - Longshore and Harbor Workers' Compensation Act Assessment

*Appendix D - North Carolina Data Reporting Requirements

Appendix E - Comparison of 4/1/2019 and 4/1/2020 Rates

Supplemental Material

*Sections incorporated by reference to the Loss Cost Filing

NORTH CAROLINA

EXHIBIT I

Determination of Indicated Loss Cost Level Change

Section A - Policy Year 2017 Experience

Premium:

(1)	Standard Earned Premium Developed to Ultimate (Appendix A-II)	$1,031,174,624
(2)	Premium On-level Factor (Appendix A-I)	0.670
(3)	Premium Available for Benefit Costs = (1) x (2)	$690,886,998

Indemnity Benefit Cost:

(4)	Limited Indemnity Losses Developed to Ultimate (Appendix A-II)	$323,294,207
(5)	Indemnity Loss On-level Factor (Appendix A-I)	1.000
(6)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.190
(7)	Composite Adjustment Factor = (5) x (6)	1.190
(8)	Adjusted Limited Indemnity Losses = (4) x (7)	$384,720,106
(9)	Adjusted Limited Indemnity Cost Ratio excluding Trend and Benefits = (8) / (3)	0.557
(10)	Factor to Reflect Indemnity Trend (Appendix A-III)	0.873
(11)	Projected Limited Indemnity Cost Ratio = (9) x (10)	0.486
(12)	Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis (Appendix A-II)	1.006
(13)	Projected Indemnity Cost Ratio = (11) x (12)	0.489
(14)	Factor to Reflect Proposed Changes in Indemnity Benefits (Appendix C)	1.000
(15)	Projected Indemnity Cost Ratio including Benefit Changes = (13) x (14)	0.489

Medical Benefit Cost:

(16)	Limited Medical Losses Developed to Ultimate (Appendix A-II)	$263,519,553
(17)	Medical Loss On-level Factor (Appendix A-I)	1.006
(18)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.190
(19)	Composite Adjustment Factor = (17) x (18)	1.197
(20)	Adjusted Limited Medical Losses = (16) x (19)	$315,432,905
(21)	Adjusted Limited Medical Cost Ratio excluding Trend and Benefits = (20) / (3)	0.457
(22)	Factor to Reflect Medical Trend (Appendix A-III)	0.904
(23)	Projected Limited Medical Cost Ratio = (21) x (22)	0.413
(24)	Factor to Adjust Medical Cost Ratio to an Unlimited Basis (Appendix A-II)	1.006
(25)	Projected Medical Cost Ratio = (23) x (24)	0.415
(26)	Factor to Reflect Proposed Changes in Medical Benefits (Appendix C)	1.010
(27)	Projected Medical Cost Ratio including Benefit Changes = (25) x (26)	0.419

Total Benefit Cost:

(28)	Indicated Change Based on Experience, Trend and Benefits = (15) + (27)	0.908

NORTH CAROLINA

EXHIBIT I

Determination of Indicated Loss Cost Level Change

Section B - Policy Year 2016 Experience

Premium:

(1)	Standard Earned Premium Developed to Ultimate (Appendix A-II)	$1,110,296,351
(2)	Premium On-level Factor (Appendix A-I)	0.587
(3)	Premium Available for Benefit Costs = (1) x (2)	$651,743,958

Indemnity Benefit Cost:

(4)	Limited Indemnity Losses Developed to Ultimate (Appendix A-II)	$299,418,433
(5)	Indemnity Loss On-level Factor (Appendix A-I)	1.000
(6)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.190
(7)	Composite Adjustment Factor = (5) x (6)	1.190
(8)	Adjusted Limited Indemnity Losses = (4) x (7)	$356,307,935
(9)	Adjusted Limited Indemnity Cost Ratio excluding Trend and Benefits = (8) / (3)	0.547
(10)	Factor to Reflect Indemnity Trend (Appendix A-III)	0.838
(11)	Projected Limited Indemnity Cost Ratio = (9) x (10)	0.458
(12)	Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis (Appendix A-II)	1.006
(13)	Projected Indemnity Cost Ratio = (11) x (12)	0.461
(14)	Factor to Reflect Proposed Changes in Indemnity Benefits (Appendix C)	1.000
(15)	Projected Indemnity Cost Ratio including Benefit Changes = (13) x (14)	0.461

Medical Benefit Cost:

(16)	Limited Medical Losses Developed to Ultimate (Appendix A-II)	$259,089,520
(17)	Medical Loss On-level Factor (Appendix A-I)	1.009
(18)	Factor to Include Loss Adjustment Expense (Exhibit II)	1.190
(19)	Composite Adjustment Factor = (17) x (18)	1.201
(20)	Adjusted Limited Medical Losses = (16) x (19)	$311,166,514
(21)	Adjusted Limited Medical Cost Ratio excluding Trend and Benefits = (20) / (3)	0.477
(22)	Factor to Reflect Medical Trend (Appendix A-III)	0.877
(23)	Projected Limited Medical Cost Ratio = (21) x (22)	0.418
(24)	Factor to Adjust Medical Cost Ratio to an Unlimited Basis (Appendix A-II)	1.006
(25)	Projected Medical Cost Ratio = (23) x (24)	0.421
(26)	Factor to Reflect Proposed Changes in Medical Benefits (Appendix C)	1.010
(27)	Projected Medical Cost Ratio including Benefit Changes = (25) x (26)	0.425

Total Benefit Cost:

(28)	Indicated Change Based on Experience, Trend and Benefits = (15) + (27)	0.886

NORTH CAROLINA

EXHIBIT I

Determination of Indicated Rate Level Change

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

(1)	Policy Year 2017 Indicated Change Based on Experience, Trend, and Benefits	0.908	(-9.2%)
(2)	Policy Year 2016 Indicated Change Based on Experience, Trend, and Benefits	0.886	(-11.4%)
(3)	Indicated Change Based on Experience, Trend, and Benefits = [(1)+(2)] / 2	0.897	(-10.3%)

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

(1)	Indicated Loss Cost Level Change	0.897	(-10.3%)
(2)	Proposed Change in the Assigned Risk Loss Cost Multiplier = [Exhibit I-A, Sheet 1, Line (9) / Exhibit I-A, Sheet 2, Line (9)]	1.030	(3.0%)
(3)	Indicated Assigned Risk Rate Level Change = (1) x (2)	0.924	(-7.6%)

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

Industry Group Differentials (Appendix A-V):

Manufacturing	1.011
Contracting	0.978
Office & Clerical	0.990
Goods & Services	0.999
Miscellaneous	1.024

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	0.924	1.011	0.934	(-6.6%)
Contracting	0.924	0.978	0.904	(-9.6%)
Office & Clerical	0.924	0.990	0.915	(-8.5%)
Goods & Services	0.924	0.999	0.923	(-7.7%)
Miscellaneous	0.924	1.024	0.946	(-5.4%)
Overall	0.924	1.000	0.924	(-7.6%)

North Carolina Department of Insurance

Summary of Supporting Information Form
Calculation of INDICATED Assigned Risk Loss Cost Multiplier
Effective April 1, 2020

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): 1.804 (see attached) Cite the nature and percent modification. Attach supporting data and/or rationale for the modification(s).		
	B. Loss Cost Modification Factor:	1.804	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	24.1%	
	C. General Expenses	Incl. in B	
	D. Taxes, Licenses, Fees & Loss Based Assessments	2.66%	
	E. Profit, Contingencies and Investment Income	5.5%	
	F. Uncollectible Premium Provision	6.2%	
	G. Total (A + B + C + D + E + F)	43.5%	
4.	Development of Expected Loss & Loss Adjustment Expense* (Target Cost) Ratio: (Expressed in decimal form: 1.000 - 3G)	0.565	
5.	Overall impact of expense constant & minimum premiums: (Expressed in decimal form: i.e., 1.2% overall impact would be 1.012)	1.169	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)	2.732	
9.	Selected Loss Cost Multiplier: (Explain any differences between 8 and 9, other than rounding)	2.732	
10.	Rate Level Changes for the Coverages to which this page applies	-7.6%	
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, 2019

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): 1.712
   Cite the nature and percent modification. Attach supporting data and/or rationale for the modification(s).

   B. Loss Cost Modification Factor: 1.712

   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 24.5%

   C. General Expenses Incl. in B

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

   E. Profit, Contingencies and Investment Income 5.5%

   F. Uncollectible Premium Provision 5.8%

   G. Total (A + B + C + D + E + F) 43.5%

4. Development of Expected Loss & Loss Adjustment Expense (Target Cost) Ratio: 0.565
   (Expressed in decimal form: 1.000 - 3G)

5. Overall impact of expense constant & minimum premiums: 1.142
   (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) 2.653

9. Selected Lost Cost Multiplier 2.653

North Carolina - Assigned Risk

Calculation of Loss Cost Modification Factor

1.	Current Assigned Risk Differential	2.021
2.	Proposed Change in Assigned Risk Differential (See Exh. II-E, Sheet 1)	1.063
3.	Proposed Assigned Risk Differential (1) x (2)	2.148
4.	Selected loss adjustment expense provision (See Exhibit II-A, Sheet 1)	1.190
5.	Factor to Adjust Loss Costs to Avoid Double Counting Servicing Carrier LAE 1 / (4)	0.840
6.	Loss Cost Modification Factor (3) x (5)	1.804

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)		19.0%
Factor to adjust loss costs to avoid double counting Servicing Carrier LAE (See Exhibit I-A, Sheet 3)	0.840	
3. Other Acquisition, General Expense * and LAE (See Exhibit II-B)		24.1%
4. Uncollectible Premium Provision (See Exhibit II-F, Sheet 1)		8.5%
5. Underwriting Profit and Contingencies		5.5%
a. Underwriting Profit (See Exhibits RB-11 and RB-13)	5.5%	
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)		16.9%

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

North Carolina

Derivation of Loss Adjustment Expense Provision

(1) Calendar/ Accident Year	(2) Calendar Year LAE Ratio*	(3) Accident Year Developed AOE Ratio+	(4) Policy Year	(5) Policy Year Developed DCCE Ratio^
2014	19.7%	6.9%	2013	10.0%
2015	19.7%	7.2%	2014	10.7%
2016	21.6%	7.7%	2015	11.0%
2017	22.9%	8.1%	2016	11.1%
2018	23.4%	7.9%	2017	11.0%

Current North Carolina Loss Adjustment Expense Provision	18.0%
Selected North Carolina Loss Adjustment Expense Provision	19.0%

* Source: NCCI Call for Calendar Year Expense (Financial Call 14).
\+ Source: NCCI Call for Loss Adjustment Expense (See Exhibit RB-4).
^ Exhibit II-A, Sheet 2.

North Carolina

Selection of DCCE Provision

Policy Year	(1) Reported Ratio of Paid DCCE to Paid Losses	(2) Age to Ultimate Development Factor	(3) Ultimate DCCE Ratio (1) x (2)
2013	10.2%	0.981	10.0%
2014	11.0%	0.975	10.7%
2015	11.2%	0.979	11.0%
2016	11.3%	0.984	11.1%
2017	10.4%	1.060	11.0%

Summary of Paid DCCE to Paid Loss Ratio Development Factors

Report	(1) DCCE Ratio Development To Next Report	(2) DCCE Ratio Development To Ultimate
1st	1.077	1.060
2nd	1.005	0.984
3rd	1.004	0.979
4th	0.994	0.975
5th	1.001	0.981
6th	0.999	0.980
7th	0.998	0.981
8th	0.997	0.983
9th	0.999	0.986
10th	0.998	0.987
11th	0.995	0.989
12th	0.999	0.994
13th	1.000	0.995
14th	1.000	0.995
15th	0.998	0.995
16th	1.001	0.997
17th	0.995	0.996
18th	1.001	1.001
19th		1.000*

(1) Selected two-year average.
(2) = Cumulative upward product of column (1).
* Selection.

North Carolina - Assigned Risk

Expense Provision
Other Acquisition, General Expense and LAE

1.	Weighted-Average of 1/1/2019 Three-Year Servicing Carrier Allowances* (Includes LAE)	22.42%
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)	24.1%

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

North Carolina - Assigned Risk

Pool Expense Provision*

Data Valued as of 12/31/2018

Calendar Year	Gross Written Premium^	Administrative & Separately Reimbursable Expense	Expenses as a % of GWP
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%
2017	77,799,928	1,109,597	1.4%
2018	90,297,741	978,036	1.1%
		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 *	$	3,124,169	$	3,124,169
(4) Standard Premium Including Additional Premium Generated by MPM and MMP *	$	32,453,225	$	32,453,225
(5) Impact of MPM and MMP = (3) / (4)		0.096		0.096
(6) Expense Constant		160		160
(7) Standard Premium Including Expense Constant Premium and Balance to Minimum Premium **	$	75,504,226	$	75,504,226
(8) Standard Premium Excluding Expense Constant Premium and Balance to Minimum Premium **	$	64,601,346	$	64,601,346
(9) Premium Generated from Expense Constant and Balance to Minimum Premium = (7) - (8)	$	10,902,880	$	10,902,880
(10) Effect of Expense Constant and Minimum Premiums = (9) / (8)				0.169

* Source: Unit Statistical Data for policy years 2008 through 2015.
** Source: Policy Data collected by the NCRB for policy years 2016 through 2018.

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 12/31/2018				
2008	$16,544,747	$36,460,620	2.204	
2009	11,460,302	21,788,119	1.901	
2010	9,154,481	17,403,589	1.901	
2011	8,728,821	27,004,429	3.094	
2012	12,322,710	31,578,220	2.563	
2013	15,870,773	43,409,375	2.735	
2014	16,667,730	39,827,608	2.390	
2015	17,607,774	43,460,165	2.468	
2016	18,408,338	40,199,208	2.184	
2017	18,871,936	36,901,106	1.955	
II. Statewide Experience Valued as of 12/31/2018				
2008	$509,729,269	$717,337,729	1.407	1.566
2009	476,518,322	663,161,911	1.392	1.366
2010	494,062,821	685,038,058	1.387	1.371
2011	510,759,173	682,229,463	1.336	2.316
2012	518,127,525	632,594,548	1.221	2.099
2013	542,191,343	605,293,029	1.116	2.451
2014	570,794,007	593,017,155	1.039	2.300
2015	608,144,123	578,458,090	0.951	2.595
2016	651,546,512	566,798,863	0.870	2.510
2017	691,233,077	589,024,869	0.852	2.295
			Average Differential ^	2.087

(a)	Indicated Differential in Standard Pure Premium Based on Experience	2.087
(b)	Current Impact of Standard Pure Premium Programs@	2.047
(c)	Indicated Change in Assigned Risk Pure Premium Differential Based on Paid Losses = (a) / (b)	1.020
(d)	Indicated Change in Assigned Risk Pure Premium Differential Based on Paid+Case Losses [See Exhibit II-E, Sheet 4, Item (c)]	1.105
(e)	Selected Change in Assigned Risk Pure Premium Differential (Proposed Assigned Risk Pure Premium Differential = 2.148)	1.063

* Developed to fifth report and brought to the 4/1/2019 pure premium level.
** Developed to ultimate and brought to the 1/1/2018 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 1.3% and a differential of 2.021. 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
2008	$74,525,886	0.457	2.055	$16,544,747
2009	51,856,572	0.454	2.057	11,460,302
2010	41,422,993	0.453	2.053	9,154,481
2011	40,411,209	0.448	2.070	8,728,821
2012	55,507,701	0.461	2.072	12,322,710
2013	72,139,877	0.459	2.086	15,870,773
2014	78,621,367	0.440	2.080	16,667,730
2015	81,517,470	0.447	2.074	17,607,774
2016	84,056,337	0.451	2.057	18,408,338
2017	80,306,111	0.480	2.045	18,871,936

Policy Year	(5) Ind. Losses Paid	(6) Development Factor	(7) On-level Factor^	(8) = ((5) x (6)) x (7) Adjusted Ind. Losses
2008	$17,604,301	1.056	0.979	$18,199,749
2009	10,605,302	1.062	0.979	11,026,312
2010	9,960,445	1.072	0.981	10,474,723
2011	11,381,081	1.087	0.996	12,321,750
2012	13,228,330	1.104	1.000	14,604,076
2013	20,014,707	1.128	1.000	22,576,589
2014	18,597,386	1.181	1.000	21,963,513
2015	17,545,307	1.286	1.000	22,563,265
2016	12,729,937	1.611	1.000	20,507,929
2017	6,925,003	3.035	1.000	21,017,384

Policy Year	(9) Med. Losses Paid	(10) Development Factor	(11) On-level Factor^	(12) = ((9) x (10)) x (11) Adjusted Med. Losses
2008	$17,228,212	1.130	0.938	$18,260,871
2009	10,072,996	1.139	0.938	10,761,807
2010	6,405,368	1.152	0.939	6,928,866
2011	13,350,803	1.165	0.944	14,682,679
2012	15,215,723	1.178	0.947	16,974,144
2013	18,155,977	1.194	0.961	20,832,786
2014	14,892,703	1.224	0.980	17,864,095
2015	16,443,454	1.262	1.007	20,896,900
2016	14,276,253	1.367	1.009	19,691,279
2017	8,870,218	1.780	1.006	15,883,722

* Developed to a fifth report. See Exhibit II-E, Sheet 7.
^ See Appendix A-I for the derivation of the factors for policy years 2016 and 2017. Factors for the remaining years are calculated in a similar manner.
# This is composed of a differential of 2.021 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
2008	$493,184,522	$16,544,747	$509,729,269
2009	465,058,020	11,460,302	476,518,322
2010	484,908,340	9,154,481	494,062,821
2011	502,030,352	8,728,821	510,759,173
2012	505,804,815	12,322,710	518,127,525
2013	526,320,570	15,870,773	542,191,343
2014	554,126,277	16,667,730	570,794,007
2015	590,536,349	17,607,774	608,144,123
2016	633,138,174	18,408,338	651,546,512
2017	672,361,141	18,871,936	691,233,077

Policy Year	(4) Ind. Losses Paid	(5) Development Factor	(6) On-level Factor^	(7) = ((4) x (5)) x (6) Adjusted Ind. Losses
2008	$377,464,948	1.056	0.979	$390,232,322
2009	347,704,573	1.062	0.979	361,507,750
2010	346,327,078	1.072	0.981	364,208,638
2011	325,130,565	1.087	0.996	352,003,256
2012	290,794,942	1.104	1.000	321,037,616
2013	282,589,997	1.128	1.000	318,761,517
2014	264,798,691	1.181	1.000	312,727,254
2015	238,537,339	1.286	1.000	306,759,018
2016	188,042,273	1.611	1.000	302,936,102
2017	106,491,761	3.035	1.000	323,202,495

Policy Year	(8) Med. Losses Paid	(9) Development Factor	(10) On-level Factor^	(11) = ((8) x (9)) x (10) Adjusted Med. Losses
2008	$308,607,475	1.130	0.938	$327,105,407
2009	282,346,727	1.139	0.938	301,654,161
2010	296,589,734	1.152	0.939	320,829,420
2011	300,271,156	1.165	0.944	330,226,207
2012	279,281,487	1.178	0.947	311,556,932
2013	249,715,027	1.194	0.961	286,531,512
2014	233,668,385	1.224	0.980	280,289,901
2015	213,795,879	1.262	1.007	271,699,072
2016	191,301,520	1.367	1.009	263,862,761
2017	148,447,726	1.780	1.006	265,822,374

* 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 2016 and 2017.
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 12/31/2018				
2008	$16,544,747	$35,254,956	2.131	
2009	11,460,302	24,308,526	2.121	
2010	9,154,481	16,485,744	1.801	
2011	8,728,821	25,138,641	2.880	
2012	12,322,710	33,892,693	2.750	
2013	15,870,773	45,368,258	2.859	
2014	16,667,730	38,978,843	2.339	
2015	17,607,774	46,451,423	2.638	
2016	18,408,338	49,255,536	2.676	
2017	18,871,936	42,368,326	2.245	
II. Statewide Experience Valued as of 12/31/2018				
2008	$509,729,269	$702,001,974	1.377	1.548
2009	476,518,322	656,750,088	1.378	1.539
2010	494,062,821	683,971,588	1.384	1.301
2011	510,759,173	655,722,616	1.284	2.243
2012	518,127,525	611,942,855	1.181	2.329
2013	542,191,343	574,868,359	1.060	2.697
2014	570,794,007	578,436,313	1.013	2.309
2015	608,144,123	560,886,891	0.922	2.861
2016	651,546,512	554,880,655	0.852	3.141
2017	691,233,077	587,764,885	0.850	2.641
			Average Differential ^	2.261

(a)	Indicated Differential in Standard Pure Premium Based on Experience	2.261
(b)	Current Impact of Standard Pure Premium Programs@	2.047
(c)	Indicated Change in Assigned Risk Pure Premium Differential = (a)/(b)	1.105

* Developed to fifth report and brought to the 4/1/2019 pure premium level.
** Developed to ultimate and brought to the 1/1/2018 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 1.3% and a differential of 2.021. 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
2008	$74,525,886	0.457	2.055	$16,544,747
2009	51,856,572	0.454	2.057	11,460,302
2010	41,422,993	0.453	2.053	9,154,481
2011	40,411,209	0.448	2.070	8,728,821
2012	55,507,701	0.461	2.072	12,322,710
2013	72,139,877	0.459	2.086	15,870,773
2014	78,621,367	0.440	2.080	16,667,730
2015	81,517,470	0.447	2.074	17,607,774
2016	84,056,337	0.451	2.057	18,408,338
2017	80,306,111	0.480	2.045	18,871,936

Policy Year	(5) Ind. Losses Paid+Case	(6) Development Factor	(7) On-level Factor^	(8) = ((5) x (6)) x (7) Adjusted Ind. Losses
2008	$18,278,168	1.029	0.979	$18,413,262
2009	11,562,796	1.031	0.979	11,670,897
2010	10,061,114	1.034	0.981	10,205,531
2011	11,513,512	1.040	0.996	11,926,156
2012	14,090,759	1.049	1.000	14,781,206
2013	21,372,616	1.061	1.000	22,676,346
2014	20,541,175	1.084	1.000	22,266,634
2015	19,856,758	1.121	1.000	22,259,426
2016	16,154,318	1.222	1.000	19,740,577
2017	16,786,091	1.593	1.000	26,740,243

Policy Year	(9) Med. Losses Paid+Case	(10) Development Factor	(11) On-level Factor^	(12) = ((9) x (10)) x (11) Adjusted Med. Losses
2008	$17,330,983	1.036	0.938	$16,841,694
2009	12,942,317	1.041	0.938	12,637,629
2010	6,412,457	1.043	0.939	6,280,213
2011	13,393,566	1.045	0.944	13,212,485
2012	19,220,080	1.050	0.947	19,111,487
2013	22,445,639	1.052	0.961	22,691,912
2014	16,179,577	1.054	0.980	16,712,209
2015	22,685,392	1.059	1.007	24,191,997
2016	27,648,104	1.058	1.009	29,514,959
2017	14,711,055	1.056	1.006	15,628,083

* Developed to a fifth report. See Exhibit II-E, Sheet 7.
^ See Appendix A-I for the derivation of the factors for policy years 2016 and 2017. Factors for the remaining years are calculated in a similar manner.
# This is composed of a differential of 2.021 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
2008	$493,184,522	$16,544,747	$509,729,269
2009	465,058,020	11,460,302	476,518,322
2010	484,908,340	9,154,481	494,062,821
2011	502,030,352	8,728,821	510,759,173
2012	505,804,815	12,322,710	518,127,525
2013	526,320,570	15,870,773	542,191,343
2014	554,126,277	16,667,730	570,794,007
2015	590,536,349	17,607,774	608,144,123
2016	633,138,174	18,408,338	651,546,512
2017	672,361,141	18,871,936	691,233,077

Policy Year	(4) Ind. Losses Paid+Case	(5) Development Factor	(6) On-level Factor^	(7) = ((4) x (5)) x (6) Adjusted Ind. Losses
2008	$387,293,162	1.029	0.979	$390,155,646
2009	357,260,917	1.031	0.979	360,600,949
2010	360,734,972	1.034	0.981	365,912,962
2011	332,247,198	1.040	0.996	344,154,938
2012	300,009,236	1.049	1.000	314,709,689
2013	292,739,441	1.061	1.000	310,596,547
2014	285,170,125	1.084	1.000	309,124,416
2015	267,251,238	1.121	1.000	299,588,638
2016	242,144,651	1.222	1.000	295,900,764
2017	203,004,343	1.593	1.000	323,385,918

Policy Year	(8) Med. Losses Paid+Case	(9) Development Factor	(10) On-level Factor^	(11) = ((8) x (9)) x (10) Adjusted Med. Losses
2008	$320,906,151	1.036	0.938	$311,846,328
2009	303,289,173	1.041	0.938	296,149,139
2010	324,756,070	1.043	0.939	318,058,626
2011	315,837,805	1.045	0.944	311,567,678
2012	298,922,076	1.050	0.947	297,233,166
2013	261,403,691	1.052	0.961	264,271,812
2014	260,728,708	1.054	0.980	269,311,897
2015	245,025,382	1.059	1.007	261,298,253
2016	242,599,113	1.058	1.009	258,979,891
2017	248,865,676	1.056	1.006	264,378,967

* 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 2016 and 2017.
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	
2014	79,232,498	78,893,767	0.996
2015	81,176,518	81,882,459	1.009
2016	83,925,000	84,140,477	1.003
Average			1.003
	2nd Report	3rd Report	
2013	72,164,317	72,887,282	1.010
2014	78,909,912	78,725,308	0.998
2015	81,882,459	81,844,849	1.000
Average			1.003
	3rd Report	4th Report	
2012	55,647,940	55,544,497	0.998
2013	72,889,238	72,125,998	0.990
2014	78,725,308	78,621,367	0.999
Average			0.996
	4th Report	5th Report	
2011	40,425,626	40,419,233	1.000
2012	55,545,144	55,504,813	0.999
2013	72,125,998	72,139,877	1.000
Average			1.000

Three-year average premium development factors

1st/5th	2nd/5th	3rd/5th	4th/5th
1.002	0.999	0.996	1.000

Section B - Calculation of Developed Assigned Risk Standard Premium

Policy Year	Standard Premium	Development Factor	Developed Premium
2008	74,525,886	1.000	74,525,886
2009	51,856,572	1.000	51,856,572
2010	41,422,993	1.000	41,422,993
2011	40,411,209	1.000	40,411,209
2012	55,507,701	1.000	55,507,701
2013	72,139,877	1.000	72,139,877
2014	78,621,367	1.000	78,621,367
2015	81,844,849	0.996	81,517,470
2016	84,140,477	0.999	84,056,337
2017	80,145,819	1.002	80,306,111

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	
2014	1,000,407,581	1,013,735,163	1.013
2015	1,037,392,092	1,050,421,911	1.013
2016	1,013,963,876	1,026,155,874	1.012
Average			1.013
	2nd Report	3rd Report	
2013	963,528,238	963,098,125	1.000
2014	1,006,081,201	1,005,958,247	1.000
2015	1,042,192,935	1,043,350,440	1.001
Average			1.000
	3rd Report	4th Report	
2012	937,132,860	936,786,716	1.000
2013	955,407,604	955,865,096	1.000
2014	998,438,533	998,425,724	1.000
Average			1.000
	4th Report	5th Report	
2011	920,094,215	920,049,211	1.000
2012	931,854,332	931,719,871	1.000
2013	948,209,169	948,325,352	1.000
Average			1.000

Three-year average premium development factors

1st/5th	2nd/5th	3rd/5th	4th/5th
1.013	1.000	1.000	1.000

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

Policy Year	Standard Premium	Development Factor	Voluntary On-level Factor*	Voluntary Prem Dev't & On-level
2008	1,029,612,781	1.000	0.479	493,184,522
2009	945,239,878	1.000	0.492	465,058,020
2010	909,771,745	1.000	0.533	484,908,340
2011	914,445,085	1.000	0.549	502,030,352
2012	924,688,875	1.000	0.547	505,804,815
2013	948,325,352	1.000	0.555	526,320,570
2014	998,425,724	1.000	0.555	554,126,277
2015	1,043,350,440	1.000	0.566	590,536,349
2016	1,026,155,874	1.000	0.617	633,138,174
2017	938,801,438	1.013	0.707	672,361,141

* See Appendix A-I for the derivation of the figures for policy years 2016 and 2017.

North Carolina - Assigned Risk

Impact of the Assigned Risk Adjustment Program*

Based on Assigned Risk Data for Policies with Effective Dates in 2018

Type of Risk	(1) Experience Modified Premium	(2) ARAP Premium	(3) ARAP Impact (2) / (1)
Risks with Credit Mods	$4,411,261	$4,411,261	1.000
Risks with Debit Mods	4,753,978	5,704,095	1.200
Risks with Mods of 1.00	21,703	21,703	1.000
Risks with No Mods	66,642,775	66,642,775	1.000
Totals	$75,829,717	$76,779,834	1.013

Historical Impacts of the Assigned Risk Adjustment Program

Policy Year	ARAP Impact
2008	1.017
2009	1.018
2010	1.016
2011	1.024
2012	1.025
2013	1.032
2014	1.029
2015	1.026
2016	1.018
2017	1.012

* Source: North Carolina Rate Bureau

North Carolina - Assigned Risk

Uncollectible Premium Provision

Section 1 - Gross Premium as of 12/31/2018 - Traumatic Only (000s)

Policy Year	1st	2nd	3rd	4th	5th	6th	7th	8th	Ultimate Gross
2007						81,968	81,979	81,978	81,978
2008					55,431	55,456	55,470	55,484	55,484
2009				37,363	37,388	37,391	37,393	37,393	37,393
2010			27,350	27,460	27,486	27,487	27,494	27,494	27,494
2011		29,958	29,964	29,962	29,960	29,962	29,949		29,949
2012	44,773	45,425	45,592	45,469	45,430	45,440			45,440
2013	61,228	62,178	63,011	62,246	62,181				62,181
2014	58,723	58,063	57,964	57,800					57,800
2015	62,522	62,941	62,906						62,780
2016	59,840	59,795							59,735
2017	63,712								64,094

Policy Year	1 / 2	2 / 3	3 / 4	4 / 5	5 / 6	6 / 7	7 / 8	8 / Ult
2007						1.000	1.000	
2008					1.000	1.000	1.000	
2009				1.001	1.000	1.000	1.000	
2010			1.004	1.001	1.000	1.000	1.000	
2011		1.000	1.000	1.000	1.000	1.000		
2012	1.015	1.004	0.997	0.999	1.000			
2013	1.016	1.013	0.988	0.999				
2014	0.989	0.998	0.997					
2015	1.007	0.999						
2016	0.999							
5-Yr Avg x H/L	1.007	1.001	0.998	1.000	1.000	1.000	1.000	
Selected	1.007	1.001	0.998	1.000	1.000	1.000	1.000	1.000
Ultimate	1.006	0.999	0.998	1.000	1.000	1.000	1.000	1.000

Section 2 - Collected Premium as of 12/31/2018 - Traumatic Only (000s)

Policy Year	1st	2nd	3rd	4th	5th	6th	7th	8th	Ultimate Collected	Uncollected/ Gross
2007						67,589	67,634	67,692	67,692	17.4%
2008					48,444	48,492	48,530	48,540	48,540	12.5%
2009				33,482	33,537	33,585	33,581	33,587	33,587	10.2%
2010			25,078	25,124	25,242	25,230	25,339	25,351	25,351	7.8%
2011		27,566	26,525	26,706	26,727	26,752	26,738		26,738	10.7%
2012	42,451	40,444	41,616	41,757	41,818	41,850			41,892	7.8%
2013	58,222	56,917	58,070	57,683	57,661				57,776	7.1%
2014	56,754	55,302	55,184	55,141					55,307	4.3%
2015	59,850	58,787	59,314						59,551	5.1%
2016	57,434	54,132							54,836	8.2%
2017	58,251								57,144	10.8%

Policy Year	1 / 2	2 / 3	3 / 4	4 / 5	5 / 6	6 / 7	7 / 8	8 / Ult
2007						1.001	1.001	
2008					1.001	1.001	1.000	
2009				1.002	1.001	1.000	1.000	
2010			1.002	1.005	1.000	1.004	1.000	
2011		0.962	1.007	1.001	1.001	0.999		
2012	0.953	1.029	1.003	1.001	1.001			
2013	0.978	1.020	0.993	1.000				
2014	0.974	0.998	0.999					
2015	0.982	1.009						
2016	0.943							
5-Yr Avg x H/L	0.968	1.009	1.001	1.001	1.001	1.001	1.000	
Selected	0.968	1.009	1.001	1.001	1.001	1.001	1.000	1.000
Ultimate	0.981	1.013	1.004	1.003	1.002	1.001	1.000	1.000

3-Yr Avg	8.0%
5-Yr Avg	7.1%
10-Yr Avg	8.5%
Selected	8.5%

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

North Carolina - Assigned Risk

Uncollectible Premium Provision

1. Selected Uncollectible Premium Provision	8.5%
2. Expense Components Calculated as a Percentage of Collected Premium	
A. Commission and Brokerage	5.0%
B. Servicing Carrier Allowance	22.42%
C. Total (A + B)	27.42%
3. Uncollectible Premium Provision Adjustment Factor (1.000 - 2C)	0.726
4. Adjusted Uncollectible Premium Provision (1 x 3)	6.2%

North Carolina - Assigned Risk

Factor to Convert Loss Costs to Assigned Risk Rates

For all classification codes, the proposed loss cost multiplier of 2.732 is applied to the advisory loss costs (contained in the Rate Bureau's Loss Costs Reference Filing proposed effective April 1, 2020) 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, 2020

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	5.33	1226	1.35	0.35	2003	4.45	1050	1.12	0.35	2705X*	98.35	1500	22.02	0.29
0008	3.47	854	0.83	0.31	2014	7.38	1500	1.66	0.28	2709	12.92	1500	2.89	0.29
0016	9.43	1500	2.12	0.28	2016	3.93	946	1.02	0.39	2710	12.76	1500	2.68	0.25
0034	5.19	1198	1.31	0.35	2021	3.42	844	0.81	0.31	2714	5.63	1286	1.48	0.38
0035	3.50	860	0.91	0.38	2039	3.52	864	0.92	0.39	2727X	15.05	1500	3.38	0.29
0036	6.20	1400	1.57	0.35	2041	3.82	924	1.00	0.39	2731	6.42	1444	1.45	0.28
0037	5.66	1292	1.35	0.31	2065	3.44	848	0.87	0.35	2735	5.38	1236	1.41	0.38
0042	7.73	1500	1.85	0.31	2070	7.68	1500	1.93	0.35	2759	7.79	1500	2.04	0.38
0050	8.36	1500	2.11	0.35	2081	4.34	1028	1.10	0.35	2790	2.38	636	0.62	0.38
0059D	0.55	–	0.05	0.28	2089	4.21	1002	1.06	0.35	2791	–	–	1.51	0.38
0065D	0.14	–	0.02	0.28	2095	5.33	1226	1.35	0.35	2797	7.46	1500	1.89	0.35
0066D	0.14	–	0.02	0.29	2105	5.27	1214	1.38	0.38	2799	10.19	1500	2.43	0.31
0067D	0.14	–	0.02	0.29	2110	2.76	712	0.72	0.39	2802	7.68	1500	1.84	0.31
0079	3.91	942	0.88	0.28	2111	3.55	870	0.93	0.39	2835	3.25	810	0.89	0.44
0083	6.04	1368	1.53	0.35	2112	5.52	1264	1.44	0.38	2836	3.39	838	0.93	0.44
0106	25.33	1500	5.32	0.25	2114	3.91	942	1.03	0.38	2841	5.74	1308	1.51	0.38
0113	6.75	1500	1.71	0.35	2121	1.99	558	0.50	0.35	2881	4.92	1144	1.35	0.44
0170	3.44	848	0.87	0.35	2130	2.90	740	0.74	0.35	2883	5.25	1210	1.33	0.35
0251	6.07	1374	1.53	0.35	2131	3.06	772	0.77	0.35	2913	–	–	1.33	0.35
0400	–	–	0.78	0.31	2143	3.42	844	0.89	0.38	2915	4.94	1148	1.18	0.31
0401	15.05	A	3.17	0.25	2157	5.55	1270	1.39	0.35	2916	5.68	1296	1.20	0.25
0771N	0.63	–	–	–	2172	2.21	602	0.53	0.31	2923	3.01	762	0.78	0.39
0908P	240.00	400	60.81	0.35	2174	4.23	1006	1.11	0.38	2942	–	–	0.38	0.44
0913P	932.00	1092	235.32	0.35	2211	10.33	1500	2.32	0.28	2960	6.34	1428	1.60	0.35
0917	6.28	1416	1.65	0.38	2220	3.09	778	0.78	0.35	3004	1.97	554	0.44	0.29
1005	11.77	1500	2.25	0.24	2286	2.84	728	0.74	0.39	3018	4.89	1138	1.10	0.29
1164	6.99	1500	1.34	0.24	2288	5.57	1274	1.46	0.38	3022	6.75	1500	1.76	0.39
1165XD	4.59	1078	0.95	0.26	2300	–	–	0.78	0.35	3027	3.22	804	0.73	0.29
1320	3.03	766	0.63	0.25	2302	2.40	640	0.61	0.35	3028	4.10	980	1.03	0.35
1322	12.92	1500	2.70	0.25	2305	3.42	844	0.82	0.31	3030	8.77	1500	1.97	0.29
1430	7.21	1500	1.62	0.28	2361	2.81	722	0.71	0.35	3040	7.76	1500	1.74	0.29
1438	6.86	1500	1.43	0.25	2362	3.11	782	0.79	0.35	3041	5.25	1210	1.33	0.35
1452	3.42	844	0.76	0.29	2380	2.92	744	0.74	0.35	3042	4.97	1154	1.19	0.31
1463	13.03	1500	2.73	0.25	2386	–	–	0.78	0.35	3064	5.55	1270	1.40	0.35
1470	–	–	0.76	0.25	2388	2.49	658	0.65	0.38	3069	–	–	1.10	0.35
1472	3.61	882	0.76	0.25	2402	4.94	1148	1.12	0.28	3076	4.34	1028	1.10	0.35
1473	–	–	0.76	0.25	2413	4.29	1018	1.09	0.35	3081D	6.09	1378	1.35	0.29
1474	–	–	0.76	0.25	2416	3.03	766	0.76	0.35	3082D	6.23	1406	1.37	0.28
1624D	5.60	1280	1.16	0.25	2417	1.86	532	0.47	0.35	3085D	6.07	1374	1.34	0.29
1642	3.11	782	0.70	0.29	2501	3.09	778	0.78	0.35	3110	6.15	1390	1.55	0.35
1654	18.41	1500	4.10	0.29	2503	1.89	538	0.49	0.39	3111	3.96	952	1.00	0.35
1655	–	–	0.70	0.29	2534	–	–	0.78	0.35	3113	2.68	696	0.67	0.35
1699	4.13	986	0.92	0.29	2570	5.52	1264	1.44	0.39	3114	4.15	990	1.05	0.35
1701	4.97	1154	1.12	0.28	2585	5.08	1176	1.32	0.39	3118	2.87	734	0.75	0.39
1710	9.59	1500	2.16	0.29	2586	4.15	990	1.05	0.35	3119	0.98	356	0.27	0.44
1741	–	–	1.12	0.28	2587	3.17	794	0.83	0.39	3122	3.14	788	0.82	0.38
1747	3.03	766	0.68	0.29	2589	3.39	838	0.86	0.35	3126	2.29	618	0.58	0.35
1748	6.23	1406	1.41	0.28	2600	5.68	1296	1.48	0.39	3131	2.68	696	0.67	0.35
1803D	10.49	1500	2.01	0.25	2623	9.56	1500	2.29	0.31	3132	3.85	930	0.98	0.35
1852	–	–	0.48	0.23	2651	2.49	658	0.65	0.38	3145	2.81	722	0.71	0.35
1853	–	–	1.12	0.28	2660	3.42	844	0.89	0.38	3146	3.42	844	0.86	0.35
1860	–	–	0.90	0.35	2670	2.92	744	0.81	0.44	3169	4.34	1028	1.10	0.35
1924	4.32	1024	1.13	0.39	2683	2.84	728	0.75	0.38	3175	–	–	1.10	0.35
1925	5.38	1236	1.30	0.31	2688	3.85	930	1.01	0.39	3179	2.40	640	0.63	0.39
2002	3.85	930	1.01	0.38	2702	30.19	1500	5.83	0.24	3180	3.01	762	0.78	0.38

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

Effective April 1, 2020

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
3188	2.65	690	0.69	0.39	3865	2.84	728	0.79	0.44	4558	2.40	640	0.61	0.35
3220	2.98	756	0.75	0.35	3881	5.27	1214	1.33	0.35	4568	2.81	722	0.63	0.29
3223	–	–	0.78	0.38	4000	6.64	1488	1.39	0.26	4581	1.39	438	0.29	0.25
3224	4.26	1012	1.11	0.39	4021	6.83	1500	1.53	0.28	4583	7.13	1500	1.50	0.25
3227	4.48	1056	1.16	0.39	4024D	4.64	1088	1.03	0.29	4611	1.09	378	0.29	0.39
3240	5.35	1230	1.40	0.39	4034	8.77	1500	1.97	0.29	4635	4.67	1094	0.90	0.24
3241	5.22	1204	1.31	0.35	4036	3.96	952	0.89	0.29	4653	2.60	680	0.68	0.39
3255	3.44	848	0.94	0.44	4038	3.82	924	1.05	0.44	4665	9.29	1500	2.08	0.29
3257	4.29	1018	1.09	0.35	4053	–	–	1.06	0.35	4670	–	–	1.22	0.35
3270	3.85	930	0.97	0.35	4061	–	–	1.06	0.35	4683	4.86	1132	1.22	0.35
3300	5.08	1176	1.29	0.35	4062	4.21	1002	1.06	0.35	4686	2.90	740	0.65	0.29
3303	3.55	870	0.93	0.38	4101	4.04	968	0.96	0.31	4692	1.07	374	0.28	0.39
3307	4.97	1154	1.26	0.35	4109	0.68	296	0.18	0.38	4693	1.39	438	0.35	0.35
3315	5.27	1214	1.38	0.38	4110	1.28	416	0.32	0.35	4703	2.21	602	0.56	0.35
3334	4.45	1050	1.12	0.35	4111	2.13	586	0.56	0.39	4717	2.87	734	0.79	0.44
3336	3.55	870	0.80	0.29	4113	–	–	0.56	0.39	4720	2.57	674	0.65	0.35
3365	8.17	1500	1.83	0.29	4114	4.78	1116	1.20	0.35	4740	2.57	674	0.58	0.29
3372	4.73	1106	1.13	0.31	4130	4.92	1144	1.24	0.35	4741	3.80	920	0.95	0.35
3373	5.44	1248	1.37	0.35	4131	9.78	1500	2.57	0.38	4751	2.65	690	0.59	0.29
3383	2.10	580	0.55	0.39	4133	2.57	674	0.68	0.38	4771N	3.55	996	0.69	0.24
3385	1.15	390	0.30	0.38	4149	1.17	394	0.33	0.44	4777	4.51	1062	0.87	0.23
3400	4.56	1072	1.09	0.31	4206	3.39	838	0.85	0.35	4825	1.37	434	0.31	0.29
3507	3.33	826	0.84	0.35	4207	3.44	848	0.76	0.29	4828	2.65	690	0.63	0.31
3515	3.14	788	0.80	0.35	4239	3.22	804	0.72	0.29	4829	1.86	532	0.39	0.25
3516	–	–	0.80	0.35	4240	5.03	1166	1.32	0.38	4902	3.44	848	0.90	0.38
3548	1.67	494	0.42	0.35	4243	2.76	712	0.69	0.35	4923	1.31	422	0.33	0.35
3559	3.33	826	0.84	0.35	4244	3.11	782	0.78	0.35	5020	9.84	1500	2.20	0.29
3574	1.37	434	0.36	0.39	4250	2.51	662	0.64	0.35	5022	11.86	1500	2.48	0.25
3581	1.72	504	0.45	0.38	4251	3.52	864	0.89	0.35	5037	20.38	1500	3.93	0.24
3612	2.38	636	0.57	0.31	4263	3.77	914	0.95	0.35	5040	12.68	1500	2.44	0.24
3620	5.44	1248	1.22	0.28	4273	4.07	974	1.03	0.35	5057	9.04	1500	1.75	0.24
3629	2.24	608	0.59	0.39	4279	3.55	870	0.90	0.35	5059	31.88	1500	6.16	0.24
3632	3.61	882	0.86	0.31	4282	–	–	0.90	0.35	5069	–	–	6.16	0.24
3634	2.21	602	0.58	0.38	4283	2.35	630	0.59	0.35	5102	9.64	1500	2.02	0.25
3635	3.28	816	0.83	0.35	4299	2.51	662	0.66	0.39	5146	7.46	1500	1.67	0.29
3638	2.49	658	0.65	0.38	4301	–	–	0.90	0.35	5160	4.21	1002	0.88	0.25
3642	1.86	532	0.47	0.35	4304	6.34	1428	1.52	0.31	5183	5.08	1176	1.14	0.29
3643	2.35	630	0.59	0.35	4307	2.65	690	0.73	0.44	5188	5.55	1270	1.24	0.29
3647	3.11	782	0.74	0.31	4351	2.24	608	0.56	0.35	5190	5.38	1236	1.21	0.29
3648	2.02	564	0.53	0.38	4352	2.21	602	0.58	0.38	5191	1.37	434	0.34	0.35
3681	1.15	390	0.30	0.38	4360	–	–	0.23	0.31	5192	4.59	1078	1.16	0.35
3685	1.61	482	0.42	0.39	4361	1.45	450	0.38	0.38	5213	11.20	1500	2.35	0.25
3719	1.80	520	0.35	0.24	4410	4.54	1068	1.14	0.35	5215	9.51	1500	2.26	0.31
3724	5.05	1170	1.06	0.25	4417	–	–	1.14	0.35	5221	7.32	1500	1.64	0.29
3726	7.24	1500	1.39	0.24	4420	8.63	1500	1.80	0.25	5222	12.35	1500	2.58	0.25
3803	3.01	762	0.75	0.35	4431	2.02	564	0.55	0.44	5223	10.85	1500	2.44	0.29
3807	3.11	782	0.81	0.39	4432	1.37	434	0.38	0.44	5348	6.97	1500	1.56	0.29
3808	6.97	1500	1.65	0.31	4439	–	–	0.61	0.35	5402	8.36	1500	2.18	0.39
3821	9.23	1500	2.22	0.31	4452	3.39	838	0.85	0.35	5403	9.04	1500	1.89	0.25
3822X	4.62	1084	1.11	0.31	4459	3.74	908	0.94	0.35	5437	8.77	1500	1.96	0.29
3824X	5.55	1270	1.33	0.31	4470	3.06	772	0.77	0.35	5443	6.78	1500	1.71	0.35
3826	1.20	400	0.31	0.35	4484	3.55	870	0.90	0.35	5445	15.33	1500	3.21	0.25
3827	2.65	690	0.63	0.31	4493	3.44	848	0.87	0.35	5462	10.44	1500	2.34	0.29
3830	1.86	532	0.45	0.31	4511	0.76	312	0.18	0.31	5472	11.67	1500	2.25	0.24
3851	3.39	838	0.88	0.39	4557	3.25	810	0.85	0.38	5473	16.97	1500	3.27	0.24

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

Effective April 1, 2020

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
5474	11.77	1500	2.47	0.25	6874F	40.02	1500	6.82	0.21	7538	9.86	1500	1.90	0.24
5478	5.63	1286	1.25	0.29	6882	5.63	1286	1.08	0.24	7539	2.73	706	0.57	0.25
5479	10.14	1500	2.42	0.31	6884	6.47	1454	1.24	0.24	7540	6.69	1498	1.30	0.23
5480	10.30	1500	2.14	0.26	7016M	7.21	1500	1.39	0.24	7580	4.62	1084	1.04	0.29
5491	3.88	936	0.81	0.25	7024M	8.00	1500	1.54	0.24	7590	5.14	1188	1.22	0.31
5506	10.49	1500	2.03	0.24	7038M	8.22	1500	1.61	0.23	7600	8.09	1500	1.81	0.29
5507	5.96	1352	1.24	0.25	7046M	10.16	1500	1.96	0.24	7605	4.15	990	0.93	0.29
5508	–	–	1.24	0.25	7047M	11.75	1500	2.15	0.24	7610	0.96	352	0.23	0.31
5535	11.42	1500	2.57	0.29	7050M	13.41	1500	2.50	0.23	7705	8.58	1500	2.04	0.31
5537	7.62	1500	1.71	0.29	7090M	9.12	1500	1.79	0.23	7710	5.90	1340	1.24	0.25
5551	26.25	1500	5.08	0.24	7098M	11.28	1500	2.17	0.24	7711	5.90	1340	1.24	0.25
5606	1.72	504	0.36	0.25	7099M	16.58	1500	3.03	0.24	7720X	4.18	996	0.94	0.28
5610	9.67	1500	2.44	0.35	7133	6.28	1416	1.32	0.25	7723X	3.69	898	0.72	0.23
5645	27.07	1500	5.68	0.25	7151M	7.62	1500	1.61	0.25	7855	6.15	1390	1.38	0.29
5703	22.98	1500	5.17	0.29	7152M	12.46	1500	2.49	0.25	8001	4.15	990	1.09	0.38
5705	45.49	1500	10.26	0.28	7153M	8.50	1500	1.79	0.25	8002	3.20	800	0.81	0.35
5951	0.49	258	0.13	0.38	7219	13.82	1500	2.88	0.26	8006	3.69	898	0.93	0.35
6003	12.21	1500	2.73	0.29	7222X	12.35	1500	2.76	0.29	8008	2.02	564	0.53	0.38
6005	10.35	1500	2.32	0.29	7225	11.53	1500	2.58	0.29	8010	2.57	674	0.68	0.38
6017	–	–	2.35	0.25	7228	–	–	2.88	0.26	8013	0.60	280	0.15	0.35
6018	4.62	1084	1.02	0.29	7229	–	–	2.88	0.26	8015	1.45	450	0.37	0.35
6045	7.35	1500	1.63	0.29	7230X	15.82	1500	3.76	0.31	8017	2.27	614	0.59	0.38
6204	12.35	1500	2.58	0.25	7231	14.18	1500	3.37	0.31	8018	4.13	986	1.07	0.39
6206	4.48	1056	0.86	0.24	7232X	16.75	1500	3.48	0.26	8021	3.69	898	0.93	0.35
6213	2.49	658	0.52	0.25	7309F	23.25	1500	3.98	0.21	8031	4.07	974	1.03	0.35
6214	2.98	756	0.58	0.24	7313F	9.40	1500	1.61	0.21	8032	3.01	762	0.79	0.38
6216	9.12	1500	1.75	0.24	7317F	20.90	1500	3.54	0.22	8033	2.60	680	0.66	0.35
6217	7.95	1500	1.67	0.25	7323	–	–	1.95	0.22	8037	1.99	558	0.52	0.38
6229	8.80	1500	1.85	0.25	7327F	40.46	1500	6.98	0.21	8039	2.38	636	0.63	0.38
6233	3.50	860	0.73	0.26	7333M	4.89	1138	0.93	0.24	8044	4.94	1148	1.18	0.31
6235	8.25	1500	1.59	0.24	7335M	5.44	1248	1.04	0.24	8045	1.15	390	0.30	0.38
6236	11.15	1500	2.49	0.29	7337M	7.98	1500	1.45	0.24	8046	3.39	838	0.85	0.35
6237	2.57	674	0.57	0.29	7350F	25.57	1500	4.62	0.22	8047	1.34	428	0.35	0.39
6251D	7.21	1500	1.49	0.26	7360	6.56	1472	1.47	0.29	8058	3.88	936	0.99	0.35
6252D	6.33	1426	1.20	0.24	7370	6.91	1500	1.74	0.35	8072	1.09	378	0.29	0.38
6260	–	–	1.49	0.26	7380	8.61	1500	2.04	0.31	8102	2.43	646	0.64	0.38
6306	7.92	1500	1.66	0.25	7382	7.43	1500	1.87	0.35	8103	3.25	810	0.78	0.31
6319	6.47	1454	1.36	0.25	7390	6.47	1454	1.63	0.35	8105	–	–	1.07	0.39
6325	6.17	1394	1.29	0.25	7394M	5.35	1230	1.03	0.24	8106	6.31	1422	1.42	0.29
6400	8.93	1500	2.13	0.31	7395M	5.96	1352	1.14	0.24	8107	4.54	1068	1.02	0.29
6503	3.09	778	0.80	0.39	7398M	8.74	1500	1.59	0.24	8111	2.81	722	0.71	0.35
6504	4.15	990	1.08	0.38	7402	0.16	192	0.04	0.35	8116	3.50	860	0.88	0.35
6702M*	7.46	1500	1.67	0.29	7403	7.81	1500	1.76	0.29	8203	9.10	1500	2.29	0.35
6703M*	12.18	1500	2.60	0.29	7405N	3.44	1078	0.77	0.29	8204	7.35	1500	1.65	0.28
6704M*	8.31	1500	1.86	0.29	7420	13.28	1500	2.53	0.24	8209	5.44	1248	1.38	0.35
6801F	6.91	1500	1.32	0.26	7421	1.12	384	0.23	0.25	8215	5.14	1188	1.15	0.29
6811	7.57	1500	1.69	0.29	7422	2.49	658	0.48	0.24	8227	6.64	1488	1.28	0.24
6824F	19.15	1500	3.50	0.22	7425	3.33	826	0.64	0.24	8232	6.97	1500	1.57	0.29
6826F	8.91	1500	1.68	0.26	7431N	1.86	658	0.36	0.24	8233	4.45	1050	0.99	0.29
6834	5.03	1166	1.20	0.31	7445N	1.15	–	–	–	8235	6.91	1500	1.74	0.35
6836	6.47	1454	1.46	0.28	7453N	0.63	–	–	–	8236X	8.50	1500	1.91	0.29
6843F	19.89	1500	3.41	0.21	7502	3.28	816	0.73	0.29	8263	10.16	1500	2.43	0.31
6845F	15.76	1500	2.70	0.21	7515	1.67	494	0.32	0.24	8264	6.61	1482	1.49	0.28
6854	8.66	1500	1.67	0.24	7520	4.84	1128	1.22	0.35	8265	9.26	1500	1.95	0.25
6872F	22.92	1500	3.93	0.21	7529X	23.30	1500	4.49	0.24	8279	9.37	1500	1.97	0.25

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

Effective April 1, 2020

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
8288	8.74	1500	1.97	0.28	8901	0.30	220	0.07	0.31					
8291X	5.22	1204	1.25	0.31	9012	1.39	438	0.33	0.31					
8292X	5.08	1176	1.28	0.35	9014	4.73	1106	1.20	0.35					
8293X	12.73	1500	2.86	0.29	9015	4.23	1006	1.07	0.35					
8304	7.49	1500	1.68	0.28	9016	3.61	882	0.92	0.35					
8350	10.71	1500	2.25	0.25	9019	4.02	964	0.90	0.29					
8380	3.58	876	0.85	0.31	9033	3.17	794	0.80	0.35					
8381	3.17	794	0.76	0.31	9040	4.64	1088	1.22	0.38					
8385	2.98	756	0.67	0.29	9044	1.75	510	0.46	0.38					
8392	3.44	848	0.87	0.35	9052	2.79	718	0.73	0.38					
8393	2.35	630	0.59	0.35	9058	2.27	614	0.62	0.44					
8500	8.31	1500	1.86	0.29	9060	1.89	538	0.49	0.38					
8601	0.46	252	0.11	0.31	9061	1.64	488	0.45	0.44					
8602	2.27	614	0.54	0.31	9062	1.78	516	0.49	0.44					
8603	0.11	182	0.03	0.35	9063	1.26	412	0.33	0.38					
8606	3.03	766	0.64	0.25	9077F	5.11	1182	1.03	0.33					
8709F	10.65	1500	1.82	0.21	9082	1.80	520	0.50	0.44					
8710	–	–	0.63	0.29	9083	1.80	520	0.50	0.44					
8719	3.42	844	0.66	0.24	9084	2.10	580	0.53	0.35					
8720	1.58	476	0.36	0.29	9089	1.69	498	0.45	0.38					
8721	0.55	270	0.13	0.28	9093	2.02	564	0.53	0.38					
8723	0.27	214	0.07	0.35	9101	4.40	1040	1.15	0.38					
8725	4.07	974	0.91	0.29	9102	4.92	1144	1.24	0.35					
8726F	5.14	1188	0.97	0.26	9154	2.62	684	0.67	0.35					
8734M	0.63	286	0.14	0.29	9156	3.28	816	0.78	0.31					
8737M	0.57	274	0.13	0.29	9170	11.86	1500	2.29	0.24					
8738M	0.93	346	0.19	0.29	9178	9.78	1500	2.72	0.44					
8742	0.46	252	0.10	0.29	9179	19.73	1500	5.16	0.38					
8745	5.25	1210	1.25	0.31	9180	7.54	1500	1.70	0.28					
8748	0.87	334	0.21	0.31	9182	2.81	722	0.72	0.35					
8755	0.41	242	0.09	0.28	9186	26.20	1500	5.55	0.25					
8799	0.63	286	0.16	0.35	9220	8.44	1500	2.03	0.31					
8800	2.24	608	0.62	0.44	9402	8.39	1500	1.88	0.29					
8803	0.08	176	0.02	0.28	9403	12.70	1500	2.66	0.25					
8805M	0.25	210	0.06	0.35	9410	4.18	996	1.05	0.35					
8810	0.19	198	0.05	0.35	9501	4.62	1084	1.10	0.31					
8814M	0.25	210	0.06	0.35	9505	8.47	1500	2.02	0.31					
8815M	0.38	236	0.09	0.35	9516	4.67	1094	1.05	0.29					
8820	0.19	198	0.04	0.31	9519	5.33	1226	1.19	0.29					
8824	3.88	936	1.01	0.39	9521	5.46	1252	1.22	0.29					
8825	–	–	0.77	0.35	9522	2.43	646	0.61	0.35					
8826	3.03	766	0.77	0.35	9534	8.88	1500	1.85	0.26					
8831	1.91	542	0.48	0.35	9554	16.34	1500	3.43	0.25					
8832	0.49	258	0.12	0.35	9586	0.66	292	0.18	0.44					
8833	1.69	498	0.43	0.35	9600	3.42	844	0.89	0.39					
8835	3.82	924	0.96	0.35	9620	1.97	554	0.47	0.31					
8842X	3.31	822	0.84	0.35										
8848	–	–	1.01	0.39										
8849	–	–	1.01	0.39										
8855	0.19	198	0.05	0.35										
8856	0.68	296	0.17	0.35										
8864X	1.83	526	0.47	0.35										
8868	0.71	302	0.19	0.38										
8869	1.64	488	0.43	0.38										
8871	0.11	182	0.03	0.39										

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

Effective April 1, 2020
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	0.55	S	1624D	0.03	S	4024D	0.05	S
0065D	0.14	S	1803D	0.87	S	6251D	0.05	S
0066D	0.14	S	3081D	0.11	S	6252D	0.05	S
0067D	0.14	S	3082D	0.11	S			
1165XD	0.05	S	3085D	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 1.983 and elr x 1.887.

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.

Effective April 1, 2020
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	$72,900
Leased or rented vehicle	$48,600

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	1.19
Tax Multiplier	1.027

Loss Development Factors	
1st Adjustment	0.18
2nd Adjustment	0.11
3rd Adjustment	0.08
4th Adjustment	0.06

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" $1,900

Minimum Weekly Payroll applicable in accordance with ***Basic Manual*** Rule 2-E-1 -- "Executive Officers" $950

Premium Determination for Partners and Sole Proprietors in accordance with ***Basic Manual*** Rule 2-E-3 (Annual Payroll) $48,600

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%	0.7%	0.6%	0.4%	0.3%	0.2%	0.2%
$200	1.5%	1.3%	1.0%	0.7%	0.5%	0.3%	0.3%
$300	2.1%	1.8%	1.4%	1.0%	0.7%	0.5%	0.4%
$400	2.7%	2.2%	1.8%	1.3%	1.0%	0.6%	0.6%
$500	3.1%	2.6%	2.1%	1.5%	1.1%	0.7%	0.7%
$1,000	5.0%	4.1%	3.4%	2.5%	1.9%	1.3%	1.2%
$1,500	6.3%	5.2%	4.4%	3.2%	2.6%	1.8%	1.6%
$2,000	7.5%	6.1%	5.3%	3.9%	3.2%	2.2%	2.0%
$2,500	8.5%	7.0%	6.0%	4.5%	3.7%	2.6%	2.4%
$5,000	12.4%	10.2%	9.0%	7.1%	5.9%	4.4%	3.9%

Terrorism - (Assigned Risk) $0.01

Effective April 1, 2020
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…… 59%

(Multiply a Non-F classification rate by a factor of 1.59 to adjust for differences in benefits and loss-based expenses. This factor is the product of the adjustment for differences in benefits (1.50) and the adjustment for differences in loss-based expenses (1.057).)

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 $11,000. If more than two years, an average annual premium of at least $5,500 is required. These amounts are applicable for ratings effective April 1, 2019, and subsequent. The ***Experience Rating Plan Manual*** should be referenced for the latest approved eligibility amounts by state.

TABLE OF WEIGHTING VALUES
APPLICABLE TO ALL POLICIES
Experience Rating Program - ERA

Expected Losses			Weighting Values	Expected Losses			Weighting Values
0	--	2,387	0.04	1,346,215	--	1,420,471	0.44
2,388	--	9,650	0.05	1,420,472	--	1,499,027	0.45
9,651	--	17,069	0.06	1,499,028	--	1,582,267	0.46
17,070	--	24,648	0.07	1,582,268	--	1,670,625	0.47
24,649	--	32,393	0.08	1,670,626	--	1,764,588	0.48
32,394	--	54,180	0.09	1,764,589	--	1,864,708	0.49
54,181	--	80,650	0.10	1,864,709	--	1,971,610	0.50
80,651	--	104,194	0.11	1,971,611	--	2,086,010	0.51
104,195	--	127,118	0.12	2,086,011	--	2,208,726	0.52
127,119	--	150,046	0.13	2,208,727	--	2,340,699	0.53
150,047	--	173,255	0.14	2,340,700	--	2,483,018	0.54
173,256	--	196,905	0.15	2,483,019	--	2,636,952	0.55
196,906	--	221,100	0.16	2,636,953	--	2,803,982	0.56
221,101	--	245,923	0.17	2,803,983	--	2,985,855	0.57
245,924	--	271,439	0.18	2,985,856	--	3,184,643	0.58
271,440	--	297,709	0.19	3,184,644	--	3,402,821	0.59
297,710	--	324,789	0.20	3,402,822	--	3,643,372	0.60
324,790	--	352,737	0.21	3,643,373	--	3,909,925	0.61
352,738	--	381,607	0.22	3,909,926	--	4,206,937	0.62
381,608	--	411,456	0.23	4,206,938	--	4,539,947	0.63
411,457	--	442,346	0.24	4,539,948	--	4,915,922	0.64
442,347	--	474,338	0.25	4,915,923	--	5,343,752	0.65
474,339	--	507,500	0.26	5,343,753	--	5,834,959	0.66
507,501	--	541,900	0.27	5,834,960	--	6,404,756	0.67
541,901	--	577,616	0.28	6,404,757	--	7,073,644	0.68
577,617	--	614,727	0.29	7,073,645	--	7,869,934	0.69
614,728	--	653,321	0.30	7,869,935	--	8,833,860	0.70
653,322	--	693,491	0.31	8,833,861	--	10,024,587	0.71
693,492	--	735,339	0.32	10,024,588	--	11,532,835	0.72
735,340	--	778,973	0.33	11,532,836	--	13,505,153	0.73
778,974	--	824,514	0.34	13,505,154	--	16,194,671	0.74
824,515	--	872,092	0.35	16,194,672	--	20,079,523	0.75
872,093	--	921,846	0.36	20,079,524	--	26,184,280	0.76
921,847	--	973,933	0.37	26,184,281	--	37,172,830	0.77
973,934	--	1,028,522	0.38	37,172,831	--	62,812,758	0.78
1,028,523	--	1,085,798	0.39	62,812,759	--	191,012,336	0.79
1,085,799	--	1,145,967	0.40	191,012,337		AND OVER	0.80
1,145,968	--	1,209,255	0.41				
1,209,256	--	1,275,911	0.42				
1,275,912	--	1,346,214	0.43				

(a) G	11.40
(b) State Per Claim Accident Limitation	$285,000
(c) State Multiple Claim Accident Limitation	$570,000
(d) USL&HW Per Claim Accident Limitation	$875,500
(e) USL&HW Multiple Claim Accident Limitation	$1,751,000
(f) Employers Liability Accident Limitation	$55,000
(g) Primary/Excess Loss Split Point	$17,500
(h) USL&HW Act -- Expected Loss Factor -- Non-F Classes	1.50

(Multiply a Non-F classification ELR by the USL&HW Act - Expected Loss Factor of 1.50.)

Effective April 1, 2020

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	--	61,318	28,500	1,967,652	--	2,024,618	228,000	3,962,073	--	4,019,064	427,500
61,319	--	105,535	34,200	2,024,619	--	2,081,588	233,700	4,019,065	--	4,076,056	433,200
105,536	--	156,340	39,900	2,081,589	--	2,138,559	239,400	4,076,057	--	4,133,049	438,900
156,341	--	209,936	45,600	2,138,560	--	2,195,532	245,100	4,133,050	--	4,190,041	444,600
209,937	--	264,836	51,300	2,195,533	--	2,252,506	250,800	4,190,042	--	4,247,034	450,300
264,837	--	320,425	57,000	2,252,507	--	2,309,481	256,500	4,247,035	--	4,304,027	456,000
320,426	--	376,416	62,700	2,309,482	--	2,366,457	262,200	4,304,028	--	4,361,020	461,700
376,417	--	432,661	68,400	2,366,458	--	2,423,435	267,900	4,361,021	--	4,418,013	467,400
432,662	--	489,075	74,100	2,423,436	--	2,480,413	273,600	4,418,014	--	4,475,007	473,100
489,076	--	545,608	79,800	2,480,414	--	2,537,393	279,300	4,475,008	--	4,532,000	478,800
545,609	--	602,227	85,500	2,537,394	--	2,594,373	285,000	4,532,001	--	4,588,994	484,500
602,228	--	658,910	91,200	2,594,374	--	2,651,355	290,700	4,588,995	--	4,645,988	490,200
658,911	--	715,642	96,900	2,651,356	--	2,708,337	296,400	4,645,989	--	4,702,982	495,900
715,643	--	772,414	102,600	2,708,338	--	2,765,320	302,100	4,702,983	--	4,759,976	501,600
772,415	--	829,216	108,300	2,765,321	--	2,822,303	307,800	4,759,977	--	4,816,971	507,300
829,217	--	886,043	114,000	2,822,304	--	2,879,287	313,500	4,816,972	--	4,873,965	513,000
886,044	--	942,891	119,700	2,879,288	--	2,936,272	319,200	4,873,966	--	4,930,960	518,700
942,892	--	999,756	125,400	2,936,273	--	2,993,257	324,900	4,930,961	--	4,987,955	524,400
999,757	--	1,056,636	131,100	2,993,258	--	3,050,243	330,600	4,987,956	--	5,044,950	530,100
1,056,637	--	1,113,527	136,800	3,050,244	--	3,107,230	336,300	5,044,951	--	5,101,945	535,800
1,113,528	--	1,170,429	142,500	3,107,231	--	3,164,216	342,000	5,101,946	--	5,158,940	541,500
1,170,430	--	1,227,341	148,200	3,164,217	--	3,221,204	347,700	5,158,941	--	5,215,935	547,200
1,227,342	--	1,284,259	153,900	3,221,205	--	3,278,192	353,400	5,215,936	--	5,272,930	552,900
1,284,260	--	1,341,185	159,600	3,278,193	--	3,335,180	359,100	5,272,931	--	5,329,926	558,600
1,341,186	--	1,398,117	165,300	3,335,181	--	3,392,168	364,800	5,329,927	--	5,386,921	564,300
1,398,118	--	1,455,054	171,000	3,392,169	--	3,449,157	370,500	5,386,922	--	5,443,500	570,000
1,455,055	--	1,511,996	176,700	3,449,158	--	3,506,147	376,200				
1,511,997	--	1,568,942	182,400	3,506,148	--	3,563,136	381,900				
1,568,943	--	1,625,891	188,100	3,563,137	--	3,620,126	387,600				
1,625,892	--	1,682,845	193,800	3,620,127	--	3,677,117	393,300				
1,682,846	--	1,739,801	199,500	3,677,118	--	3,734,107	399,000				
1,739,802	--	1,796,760	205,200	3,734,108	--	3,791,098	404,700				
1,796,761	--	1,853,721	210,900	3,791,099	--	3,848,089	410,400				
1,853,722	--	1,910,685	216,600	3,848,090	--	3,905,081	416,100				
1,910,686	--	1,967,651	222,300	3,905,082	--	3,962,072	421,800				

For Expected Losses greater than $5,443,500, the Ballast Value can be calculated using the following formula (rounded to the nearest 1):

Ballast = (0.10)(Expected Losses) + 2500(Expected Losses)(11.40) / (Expected Losses + (700)(11.40))

G = 11.40

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
0005	5.39	5.33	-1.1%
0008	3.93	3.47	-11.7%
0016	10.69	9.43	-11.8%
0034	5.39	5.19	-3.7%
0035	3.61	3.50	-3.0%
0036	7.14	6.20	-13.2%
0037	6.15	5.66	-8.0%
0042	8.36	7.73	-7.5%
0050	8.54	8.36	-2.1%
0059	0.58	0.55	-5.2%
0065	0.13	0.14	7.7%
0066	0.13	0.14	7.7%
0067	0.13	0.14	7.7%
0079	4.78	3.91	-18.2%
0083	6.31	6.04	-4.3%
0106	24.81	25.33	2.1%
0113	7.24	6.75	-6.8%
0170	3.79	3.44	-9.2%
0251	6.31	6.07	-3.8%
0401	15.89	15.05	-5.3%
0771	0.66	0.63	-4.5%
0908	239.00	240.00	0.4%
0913	1067.00	932.00	-12.7%
0917	6.92	6.28	-9.2%
1005	11.28	11.77	4.3%
1164	8.38	6.99	-16.6%
1165	4.72	4.59	-2.8%
1320	3.29	3.03	-7.9%
1322	14.46	12.92	-10.7%
1430	7.75	7.21	-7.0%
1438	6.87	6.86	-0.1%
1452	3.48	3.42	-1.7%
1463	13.03	13.03	0.0%
1472	3.69	3.61	-2.2%
1624	5.94	5.60	-5.7%
1642	3.48	3.11	-10.6%
1654	21.57	18.41	-14.6%
1699	4.85	4.13	-14.8%
1701	5.39	4.97	-7.8%
1710	10.53	9.59	-8.9%
1747	2.87	3.03	5.6%
1748	6.71	6.23	-7.2%
1803	11.36	10.49	-7.7%
1924	4.64	4.32	-6.9%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
1925	4.64	5.38	15.9%
2002	3.85	3.85	0.0%
2003	5.17	4.45	-13.9%
2014	8.04	7.38	-8.2%
2016	4.17	3.93	-5.8%
2021	3.16	3.42	8.2%
2039	3.58	3.52	-1.7%
2041	4.14	3.82	-7.7%
2065	3.98	3.44	-13.6%
2070	7.88	7.68	-2.5%
2081	4.46	4.34	-2.7%
2089	4.09	4.21	2.9%
2095	5.33	5.33	0.0%
2105	5.68	5.27	-7.2%
2110	3.16	2.76	-12.7%
2111	4.11	3.55	-13.6%
2112	5.68	5.52	-2.8%
2114	4.27	3.91	-8.4%
2121	2.04	1.99	-2.5%
2130	3.13	2.90	-7.3%
2131	3.58	3.06	-14.5%
2143	3.48	3.42	-1.7%
2157	5.70	5.55	-2.6%
2172	2.52	2.21	-12.3%
2174	4.56	4.23	-7.2%
2211	10.77	10.33	-4.1%
2220	3.29	3.09	-6.1%
2286	2.39	2.84	18.8%
2288	6.42	5.57	-13.2%
2302	2.68	2.40	-10.4%
2305	3.56	3.42	-3.9%
2361	3.08	2.81	-8.8%
2362	3.10	3.11	0.3%
2380	3.26	2.92	-10.4%
2388	2.55	2.49	-2.4%
2402	5.23	4.94	-5.5%
2413	4.24	4.29	1.2%
2416	3.21	3.03	-5.6%
2417	2.02	1.86	-7.9%
2501	3.29	3.09	-6.1%
2503	2.15	1.89	-12.1%
2570	6.00	5.52	-8.0%
2585	5.54	5.08	-8.3%
2586	4.56	4.15	-9.0%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
2587	3.34	3.17	-5.1%
2589	3.45	3.39	-1.7%
2600	6.08	5.68	-6.6%
2623	10.51	9.56	-9.0%
2651	2.49	2.49	0.0%
2660	3.26	3.42	4.9%
2670	2.20	2.92	32.7%
2683	2.68	2.84	6.0%
2688	4.56	3.85	-15.6%
2702	31.62	30.19	-4.5%
2705	107.45	98.35	-8.5%
2709	14.25	12.92	-9.3%
2710	12.84	12.76	-0.6%
2714	6.08	5.63	-7.4%
2727	15.15	15.05	-0.7%
2731	6.71	6.42	-4.3%
2735	5.97	5.38	-9.9%
2759	8.73	7.79	-10.8%
2790	2.55	2.38	-6.7%
2797	7.85	7.46	-5.0%
2799	10.85	10.19	-6.1%
2802	7.85	7.68	-2.2%
2835	3.79	3.25	-14.2%
2836	3.32	3.39	2.1%
2841	5.68	5.74	1.1%
2881	5.73	4.92	-14.1%
2883	5.76	5.25	-8.9%
2915	4.70	4.94	5.1%
2916	6.02	5.68	-5.6%
2923	3.40	3.01	-11.5%
2960	6.31	6.34	0.5%
3004	2.10	1.97	-6.2%
3018	6.10	4.89	-19.8%
3022	8.25	6.75	-18.2%
3027	3.48	3.22	-7.5%
3028	4.14	4.10	-1.0%
3030	8.99	8.77	-2.4%
3040	8.78	7.76	-11.6%
3041	5.81	5.25	-9.6%
3042	4.83	4.97	2.9%
3064	6.58	5.55	-15.7%
3076	4.40	4.34	-1.4%
3081	6.00	6.09	1.5%
3082	6.29	6.23	-1.0%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
3085	6.19	6.07	-1.9%
3110	6.31	6.15	-2.5%
3111	4.38	3.96	-9.6%
3113	2.87	2.68	-6.6%
3114	4.01	4.15	3.5%
3118	3.21	2.87	-10.6%
3119	1.09	0.98	-10.1%
3122	3.10	3.14	1.3%
3126	2.47	2.29	-7.3%
3131	2.76	2.68	-2.9%
3132	4.14	3.85	-7.0%
3145	2.84	2.81	-1.1%
3146	3.58	3.42	-4.5%
3169	4.54	4.34	-4.4%
3179	2.57	2.40	-6.6%
3180	3.42	3.01	-12.0%
3188	3.02	2.65	-12.3%
3220	3.05	2.98	-2.3%
3224	4.54	4.26	-6.2%
3227	4.80	4.48	-6.7%
3240	5.60	5.35	-4.5%
3241	5.86	5.22	-10.9%
3255	3.66	3.44	-6.0%
3257	4.72	4.29	-9.1%
3270	3.82	3.85	0.8%
3300	5.39	5.08	-5.8%
3303	4.19	3.55	-15.3%
3307	5.70	4.97	-12.8%
3315	5.68	5.27	-7.2%
3334	4.70	4.45	-5.3%
3336	3.98	3.55	-10.8%
3365	8.86	8.17	-7.8%
3372	5.20	4.73	-9.0%
3373	5.94	5.44	-8.4%
3383	2.15	2.10	-2.3%
3385	1.19	1.15	-3.4%
3400	4.75	4.56	-4.0%
3507	3.45	3.33	-3.5%
3515	3.26	3.14	-3.7%
3548	1.86	1.67	-10.2%
3559	3.21	3.33	3.7%
3574	1.38	1.37	-0.7%
3581	1.54	1.72	11.7%
3612	2.52	2.38	-5.6%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
3620	6.29	5.44	-13.5%
3629	2.60	2.24	-13.8%
3632	4.17	3.61	-13.4%
3634	2.44	2.21	-9.4%
3635	3.56	3.28	-7.9%
3638	2.41	2.49	3.3%
3642	2.07	1.86	-10.1%
3643	2.41	2.35	-2.5%
3647	3.08	3.11	1.0%
3648	1.96	2.02	3.1%
3681	1.27	1.15	-9.4%
3685	1.75	1.61	-8.0%
3719	2.02	1.80	-10.9%
3724	5.57	5.05	-9.3%
3726	8.33	7.24	-13.1%
3803	2.73	3.01	10.3%
3807	3.16	3.11	-1.6%
3808	7.43	6.97	-6.2%
3821	9.95	9.23	-7.2%
3822	4.64	4.62	-0.4%
3824	5.86	5.55	-5.3%
3826	1.30	1.20	-7.7%
3827	2.68	2.65	-1.1%
3830	1.88	1.86	-1.1%
3851	3.87	3.39	-12.4%
3865	3.18	2.84	-10.7%
3881	5.52	5.27	-4.5%
4000	7.40	6.64	-10.3%
4021	7.93	6.83	-13.9%
4024	4.20	4.64	10.5%
4034	9.21	8.77	-4.8%
4036	4.32	3.96	-8.3%
4038	4.14	3.82	-7.7%
4062	4.30	4.21	-2.1%
4101	4.54	4.04	-11.0%
4109	0.72	0.68	-5.6%
4110	1.22	1.28	4.9%
4111	1.88	2.13	13.3%
4114	4.80	4.78	-0.4%
4130	5.36	4.92	-8.2%
4131	9.29	9.78	5.3%
4133	2.84	2.57	-9.5%
4149	1.19	1.17	-1.7%
4206	3.58	3.39	-5.3%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
4207	3.66	3.44	-6.0%
4239	3.42	3.22	-5.8%
4240	5.04	5.03	-0.2%
4243	2.84	2.76	-2.8%
4244	3.32	3.11	-6.3%
4250	2.84	2.51	-11.6%
4251	3.69	3.52	-4.6%
4263	4.11	3.77	-8.3%
4273	4.17	4.07	-2.4%
4279	3.74	3.55	-5.1%
4283	2.39	2.35	-1.7%
4299	2.60	2.51	-3.5%
4304	6.61	6.34	-4.1%
4307	2.81	2.65	-5.7%
4351	2.33	2.24	-3.9%
4352	2.20	2.21	0.5%
4361	1.57	1.45	-7.6%
4410	4.91	4.54	-7.5%
4420	10.19	8.63	-15.3%
4431	2.12	2.02	-4.7%
4432	1.51	1.37	-9.3%
4452	3.66	3.39	-7.4%
4459	4.17	3.74	-10.3%
4470	3.32	3.06	-7.8%
4484	3.87	3.55	-8.3%
4493	3.63	3.44	-5.2%
4511	0.82	0.76	-7.3%
4557	3.32	3.25	-2.1%
4558	2.23	2.40	7.6%
4568	3.08	2.81	-8.8%
4581	1.35	1.39	3.0%
4583	7.88	7.13	-9.5%
4611	1.06	1.09	2.8%
4635	4.62	4.67	1.1%
4653	2.71	2.60	-4.1%
4665	9.44	9.29	-1.6%
4683	5.28	4.86	-8.0%
4686	2.92	2.90	-0.7%
4692	1.11	1.07	-3.6%
4693	1.51	1.39	-7.9%
4703	2.41	2.21	-8.3%
4717	3.02	2.87	-5.0%
4720	2.57	2.57	0.0%
4740	3.34	2.57	-23.1%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
4741	4.01	3.80	-5.2%
4751	2.73	2.65	-2.9%
4771	3.74	3.55	-5.1%
4777	4.99	4.51	-9.6%
4825	1.49	1.37	-8.1%
4828	2.84	2.65	-6.7%
4829	1.91	1.86	-2.6%
4902	4.19	3.44	-17.9%
4923	1.30	1.31	0.8%
5020	11.86	9.84	-17.0%
5022	13.19	11.86	-10.1%
5037	22.87	20.38	-10.9%
5040	12.60	12.68	0.6%
5057	9.68	9.04	-6.6%
5059	34.97	31.88	-8.8%
5102	9.58	9.64	0.6%
5146	8.46	7.46	-11.8%
5160	4.46	4.21	-5.6%
5183	5.86	5.08	-13.3%
5188	6.87	5.55	-19.2%
5190	6.10	5.38	-11.8%
5191	1.30	1.37	5.4%
5192	5.17	4.59	-11.2%
5213	12.71	11.20	-11.9%
5215	10.48	9.51	-9.3%
5221	7.51	7.32	-2.5%
5222	13.08	12.35	-5.6%
5223	11.57	10.85	-6.2%
5348	7.30	6.97	-4.5%
5402	7.64	8.36	9.4%
5403	10.48	9.04	-13.7%
5437	9.60	8.77	-8.6%
5443	6.74	6.78	0.6%
5445	17.30	15.33	-11.4%
5462	11.49	10.44	-9.1%
5472	12.81	11.67	-8.9%
5473	18.78	16.97	-9.6%
5474	12.23	11.77	-3.8%
5478	5.92	5.63	-4.9%
5479	11.30	10.14	-10.3%
5480	10.77	10.30	-4.4%
5491	4.09	3.88	-5.1%
5506	11.89	10.49	-11.8%
5507	6.34	5.96	-6.0%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
5535	12.10	11.42	-5.6%
5537	8.81	7.62	-13.5%
5551	31.36	26.25	-16.3%
5606	1.78	1.72	-3.4%
5610	11.49	9.67	-15.8%
5645	28.63	27.07	-5.4%
5703	23.29	22.98	-1.3%
5705	54.39	45.49	-16.4%
5951	0.50	0.49	-2.0%
6003	13.69	12.21	-10.8%
6005	11.06	10.35	-6.4%
6018	4.75	4.62	-2.7%
6045	8.30	7.35	-11.4%
6204	15.02	12.35	-17.8%
6206	4.83	4.48	-7.2%
6213	3.02	2.49	-17.5%
6214	3.42	2.98	-12.9%
6216	10.37	9.12	-12.1%
6217	9.21	7.95	-13.7%
6229	9.47	8.80	-7.1%
6233	3.79	3.50	-7.7%
6235	9.15	8.25	-9.8%
6236	12.73	11.15	-12.4%
6237	2.89	2.57	-11.1%
6251	8.70	7.21	-17.1%
6252	7.08	6.33	-10.6%
6306	8.65	7.92	-8.4%
6319	7.00	6.47	-7.6%
6325	7.64	6.17	-19.2%
6400	9.84	8.93	-9.2%
6503	3.13	3.09	-1.3%
6504	4.24	4.15	-2.1%
6702	7.67	7.46	-2.7%
6703	14.33	12.18	-15.0%
6704	8.52	8.31	-2.5%
6801	6.61	6.91	4.5%
6811	8.54	7.57	-11.4%
6824	20.96	19.15	-8.6%
6826	9.05	8.91	-1.5%
6834	5.28	5.03	-4.7%
6836	6.29	6.47	2.9%
6843	18.65	19.89	6.6%
6845	16.29	15.76	-3.3%
6854	9.18	8.66	-5.7%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
6872	23.43	22.92	-2.2%
6874	39.93	40.02	0.2%
6882	6.23	5.63	-9.6%
6884	7.30	6.47	-11.4%
7016	6.39	7.21	12.8%
7024	7.11	8.00	12.5%
7038	8.81	8.22	-6.7%
7046	10.82	10.16	-6.1%
7047	11.94	11.75	-1.6%
7050	16.45	13.41	-18.5%
7090	9.79	9.12	-6.8%
7098	12.02	11.28	-6.2%
7099	20.19	16.58	-17.9%
7133	5.89	6.28	6.6%
7151	7.16	7.62	6.4%
7152	13.34	12.46	-6.6%
7153	7.96	8.50	6.8%
7219	14.54	13.82	-5.0%
7222	12.63	12.35	-2.2%
7225	12.31	11.53	-6.3%
7230	17.93	15.82	-11.8%
7231	14.67	14.18	-3.3%
7232	16.82	16.75	-0.4%
7309	24.65	23.25	-5.7%
7313	9.13	9.40	3.0%
7317	23.03	20.90	-9.2%
7327	39.40	40.46	2.7%
7333	5.41	4.89	-9.6%
7335	6.02	5.44	-9.6%
7337	10.11	7.98	-21.1%
7350	27.11	25.57	-5.7%
7360	7.51	6.56	-12.6%
7370	8.01	6.91	-13.7%
7380	8.57	8.61	0.5%
7382	7.80	7.43	-4.7%
7390	6.90	6.47	-6.2%
7394	5.44	5.35	-1.7%
7395	6.05	5.96	-1.5%
7398	10.16	8.74	-14.0%
7402	0.19	0.16	-15.8%
7403	9.10	7.81	-14.2%
7405	3.87	3.44	-11.1%
7420	14.01	13.28	-5.2%
7421	1.17	1.12	-4.3%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
7422	2.71	2.49	-8.1%
7425	3.58	3.33	-7.0%
7431	1.86	1.86	0.0%
7445	1.30	1.15	-11.5%
7453	0.61	0.63	3.3%
7502	3.79	3.28	-13.5%
7515	1.83	1.67	-8.7%
7520	5.36	4.84	-9.7%
7529	26.72	23.30	-12.8%
7538	12.71	9.86	-22.4%
7539	2.84	2.73	-3.9%
7540	7.19	6.69	-7.0%
7580	5.15	4.62	-10.3%
7590	5.73	5.14	-10.3%
7600	8.60	8.09	-5.9%
7605	4.14	4.15	0.2%
7610	0.98	0.96	-2.0%
7705	10.08	8.58	-14.9%
7710	6.29	5.90	-6.2%
7711	6.29	5.90	-6.2%
7720	4.01	4.18	4.2%
7723	4.06	3.69	-9.1%
7855	6.31	6.15	-2.5%
8001	4.03	4.15	3.0%
8002	3.16	3.20	1.3%
8006	4.01	3.69	-8.0%
8008	1.99	2.02	1.5%
8010	2.57	2.57	0.0%
8013	0.64	0.60	-6.3%
8015	1.67	1.45	-13.2%
8017	2.44	2.27	-7.0%
8018	3.95	4.13	4.6%
8021	3.85	3.69	-4.2%
8031	4.80	4.07	-15.2%
8032	3.08	3.01	-2.3%
8033	2.71	2.60	-4.1%
8037	2.81	1.99	-29.2%
8039	2.49	2.38	-4.4%
8044	5.28	4.94	-6.4%
8045	1.19	1.15	-3.4%
8046	3.29	3.39	3.0%
8047	1.54	1.34	-13.0%
8058	4.19	3.88	-7.4%
8072	1.27	1.09	-14.2%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
8102	2.60	2.43	-6.5%
8103	3.42	3.25	-5.0%
8106	6.66	6.31	-5.3%
8107	4.96	4.54	-8.5%
8111	3.05	2.81	-7.9%
8116	3.77	3.50	-7.2%
8203	9.66	9.10	-5.8%
8204	7.48	7.35	-1.7%
8209	5.49	5.44	-0.9%
8215	5.33	5.14	-3.6%
8227	7.27	6.64	-8.7%
8232	7.27	6.97	-4.1%
8233	4.85	4.45	-8.2%
8235	7.69	6.91	-10.1%
8236	9.50	8.50	-10.5%
8263	10.88	10.16	-6.6%
8264	6.95	6.61	-4.9%
8265	10.43	9.26	-11.2%
8279	11.49	9.37	-18.5%
8288	9.39	8.74	-6.9%
8291	6.10	5.22	-14.4%
8292	5.70	5.08	-10.9%
8293	14.25	12.73	-10.7%
8304	7.96	7.49	-5.9%
8350	11.14	10.71	-3.9%
8380	3.90	3.58	-8.2%
8381	3.32	3.17	-4.5%
8385	3.21	2.98	-7.2%
8392	3.66	3.44	-6.0%
8393	2.52	2.35	-6.7%
8500	8.81	8.31	-5.7%
8601	0.50	0.46	-8.0%
8602	2.49	2.27	-8.8%
8603	0.11	0.11	0.0%
8606	3.34	3.03	-9.3%
8709	10.67	10.65	-0.2%
8719	3.87	3.42	-11.6%
8720	1.75	1.58	-9.7%
8721	0.53	0.55	3.8%
8723	0.29	0.27	-6.9%
8725	4.11	4.07	-1.0%
8726	5.36	5.14	-4.1%
8734	0.69	0.63	-8.7%
8737	0.61	0.57	-6.6%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
8738	1.14	0.93	-18.4%
8742	0.50	0.46	-8.0%
8745	6.31	5.25	-16.8%
8748	0.96	0.87	-9.4%
8755	0.45	0.41	-8.9%
8799	0.72	0.63	-12.5%
8800	2.26	2.24	-0.9%
8803	0.11	0.08	-27.3%
8805	0.29	0.25	-13.8%
8810	0.21	0.19	-9.5%
8814	0.27	0.25	-7.4%
8815	0.48	0.38	-20.8%
8820	0.21	0.19	-9.5%
8824	4.62	3.88	-16.0%
8826	3.34	3.03	-9.3%
8831	1.96	1.91	-2.6%
8832	0.56	0.49	-12.5%
8833	1.88	1.69	-10.1%
8835	4.43	3.82	-13.8%
8842	3.48	3.31	-4.9%
8855	0.21	0.19	-9.5%
8856	0.58	0.68	17.2%
8864	1.94	1.83	-5.7%
8868	0.77	0.71	-7.8%
8869	1.72	1.64	-4.7%
8871	0.11	0.11	0.0%
8901	0.29	0.30	3.4%
9012	1.46	1.39	-4.8%
9014	5.04	4.73	-6.2%
9015	4.51	4.23	-6.2%
9016	3.93	3.61	-8.1%
9019	3.63	4.02	10.7%
9033	3.45	3.17	-8.1%
9040	4.99	4.64	-7.0%
9044	1.94	1.75	-9.8%
9052	3.21	2.79	-13.1%
9058	2.39	2.27	-5.0%
9060	1.99	1.89	-5.0%
9061	1.64	1.64	0.0%
9062	2.02	1.78	-11.9%
9063	1.30	1.26	-3.1%
9077	5.04	5.11	1.4%
9082	1.96	1.80	-8.2%
9083	1.96	1.80	-8.2%

NORTH CAROLINA

APPENDIX E

Assigned Risk Rates Comparison

Class Code	Current 04/01/19	Proposed 04/01/20	Percent Change
9084	2.31	2.10	-9.1%
9089	1.88	1.69	-10.1%
9093	2.23	2.02	-9.4%
9101	4.78	4.40	-7.9%
9102	5.17	4.92	-4.8%
9154	2.84	2.62	-7.7%
9156	3.42	3.28	-4.1%
9170	13.77	11.86	-13.9%
9178	10.45	9.78	-6.4%
9179	18.12	19.73	8.9%
9180	7.85	7.54	-3.9%
9182	2.81	2.81	0.0%
9186	28.60	26.20	-8.4%
9220	9.52	8.44	-11.3%
9402	8.52	8.39	-1.5%
9403	13.03	12.70	-2.5%
9410	4.56	4.18	-8.3%
9501	5.12	4.62	-9.8%
9505	9.13	8.47	-7.2%
9516	5.65	4.67	-17.3%
9519	5.97	5.33	-10.7%
9521	6.31	5.46	-13.5%
9522	2.76	2.43	-12.0%
9534	9.18	8.88	-3.3%
9554	17.51	16.34	-6.7%
9586	0.74	0.66	-10.8%
9600	3.48	3.42	-1.7%
9620	1.96	1.97	0.5%

NORTH CAROLINA – ASSIGNED RISK

TABLE OF CONTENTS

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.

Item	
*1	North Carolina losses and loss adjustment expenses
*2	Credibility factor development and application
*3	Loss development factor development and application
*4	Trending factor development and application
*5	Changes in premium base and exposures
*6	Limiting factor development and application
*7	Percent rate or loss cost change
8	Underwriting profit and contingencies and investment income
9	Investment earnings on capital and surplus
*10	Additional supplemental information per 11 NCAC 10.1111

* 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 G. Zanjani (Exhibits RB-6 through RB-14).

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 4.41% of premium. Given the 4.5% 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 G. Zanjani (Exhibits RB-11 through RB-14). Also shown therein is the ratio of net worth to surplus of 1.14. Accordingly, the corresponding return on statutory surplus would be 12.68%. Based on data from A.M. Best's Aggregates & Averages, the 5-year average ratio of surplus to assets is .373. Accordingly, the corresponding return on assets would be 4.73%. If 4.5% is not in fact earned as underwriting profit, the resulting returns would be correspondingly lower.

See also the pre-filed testimony of G. Zanjani (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
2019 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 August 30, 2019 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 2018 premium writings, the direct assignment carriers will receive approximately 27% of the assigned risk premium during 2019 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 2018?

A. Five hundred fifty (550) insurance companies.

Q. How many insurance companies were actually writing workers compensation insurance in North Carolina during 2018?

A. Three hundred seventeen (317) 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
BRETT S. FOSTER

2019 NORTH CAROLINA WORKERS COMPENSATION
LOSS COST AND ASSIGNED RISK RATE FILINGS
PROPOSED TO BE EFFECTIVE ON APRIL 1, 2020

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

A. My name is Brett Foster, and I am a Manager and Associate 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 three jurisdictions (including North Carolina).

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

A. I have a Bachelor of Science degree with majors in mathematics and economics from Missouri State University, in Springfield, Missouri. 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 have worked for NCCI since June of 2012, during which time I have contributed in various areas of NCCI's Actuarial and Economic Services division, including class ratemaking, individual risk rating, legislative analysis, and aggregate ratemaking. In addition to overseeing the actuarial function for three jurisdictions, I am currently responsible for leading NCCI's aggregate ratemaking area.

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 this information 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 500 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, 2020 through March 31, 2021 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 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 2017 and then $10 million in 2018 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 10.3% 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 7.6% 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, 2020. 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, 2020 through March 31, 2021. 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 2017 and is commonly referred to as "Policy Year 2017" data. The second block of data reflects the experience from all policies with effective dates during 2016 and is referred to as "Policy Year 2016" 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 2016 and 2017 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 2017 (Exhibit I, Section A) and 2016 (Exhibit I, Section B). An average of the separate Policy Year 2016 and 2017 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 19.0% so that the final loss costs will include a provision for loss adjustment expense (lines 6 and 18).

The resulting loss figures (lines 8 and 20) 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 -4.0% per year for indemnity losses and -3.0% 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 2016 and 2017 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 10.3% 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 19.0% loss adjustment expense provision for use in the Filings.

Q. *Do the Filings reflect a change in the data used by the NCRB in selecting a loss adjustment expense provision?*

A. Yes, previously, the Defense and Cost Containment Expense (DCCE) portion of the LAE provision displayed in column (5) of Exhibit II-A Sheet 1 has been calculated based on a selected countrywide DCCE provision calculated from the NCCI Call for Loss Adjustment Expenses. This countrywide DCCE provision was adjusted by applying a North Carolina-specific relativity derived using NAIC Annual Statement payment data.

This year, the Filings present a more direct calculation of the DCCE

provision by utilizing North Carolina-specific paid DCCE and losses, which are reported on the NCCI Call for Policy Year Data. Utilizing policy year data for the DCCE calculation is consistent with the basis for the losses and premium underlying the loss cost level change (Exhibit I). The AOE ratios displayed in column (3) of Exhibit II-A Sheet 1 are unaffected by this change to the DCCE methodology.

Q. *Please explain the change in how annual increases to maximum weekly benefits are reflected in the Filings.*

A. The Filings propose a change in the handling of benefit changes that result from annual revisions in maximum weekly indemnity benefits. These benefit changes are tied to annual statutory changes in the State Average Weekly Wage (SAWW). NCCI has historically recognized annual SAWW-related changes to maximum weekly benefits via complex calculations relying on wage distributions, which vary the impacted inflation-sensitive parameters while holding all other values constant. The resulting impact became a benefit component of the indication and was used to bring historical indemnity losses to the proposed benefit level.

During a review of current procedures, NCCI determined that this adjustment unnecessarily increases the complexity of the calculation of expected benefit levels in the ratemaking process. Annual changes in maximum indemnity benefits reflect inflationary changes in premium/payroll; they do not result in changes to injured worker benefit levels over and above changes in wage inflation. Therefore, it is preferable to not explicitly adjust historical losses to account for these types of indemnity benefit changes.

The Rate Bureau adopted the change proposed by NCCI and, going forward, the impact on indemnity benefit costs due to annual adjustments to maximum weekly benefits because of changes in the SAWW will not be calculated or displayed in Appendix C of the Filings. Further, historical changes of this type will no longer be included in loss on-level factors. There is no expected overall loss cost level impact due to this change.

Q. *Are there other changes in methodology in these Filings?*

A. Yes, the Rate Bureau also adopted an NCCI change to the swing limit methodology. As part of NCCI's class ratemaking procedure, proposed loss costs by classification are subject to upper and lower bounds. The bounds are determined as the product of the swing limits by industry group and the classification's present loss cost. NCCI recently evaluated the bound calculations to determine if they are performing optimally, particularly for classifications with significantly low loss costs. In these cases, the current multiplicative bound calculation can result in an upper and lower bound equal to the current loss cost for a classification. For example, a classification with a loss cost of $0.02 in a state with 25% swing limits and an indication of –10% would have upper and lower bounds both equal to $0.02.

This restricts a classification's proposed loss cost to its present loss cost, eliminating any possible responsiveness to change indicated by the underlying data. To enhance responsiveness to the data in these scenarios, NCCI developed a modification to the calculation of loss cost bounds by classification when both the upper and lower bounds are equal to the current loss cost. In these cases, NCCI will review the change indicated by the classification and the corresponding industry group. If the direction of these two indications are aligned, the upper or lower bound will be adjusted so that the proposed loss cost may change by one cent from the present loss cost in the direction of the change indicated for the classification. As I noted above, the Rate Bureau adopted this modification.

Applications of this methodology change are expected to be rare. This year in the Filings, no adjustments have been made as a result of the proposed methodology. In future years, if a class code is adjusted per this methodology change, the affected class codes would be listed in the Filings.

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 7.6% 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. Zanjani.

(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 16.9% of premium in the assigned risk market (Exhibit II-D).

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

A. Yes. The Filings propose a revision to the United States Longshore and Harbor Workers' (USL&HW) Coverage Percentage factor found on the Miscellaneous Values page in the Filings. The USL&HW Act is a federal law that extends federal benefits to employees such as harbor workers and others for disability or death resulting from an injury occurring upon the navigable waters of the United States. For USL&HW Act exposure that does not correspond to an F-class code, the USL&HW factor is applied to the industrial class loss cost for the portion of payroll that the USL&HW Act exposure represents.

NCCI's prior full study of the USL&HW factors was completed in 2003. Since that time, the revised factor has been updated annually with each filing to account for how federal benefits have changed relative to state benefits, as calculated and displayed in those filings. NCCI recently completed a full study of the USL&HW factors using Unit Statistical Data to determine the indicated USL&HW factor. As a result of this study, the Rate Bureau in these Filings proposes to decrease the benefits-only portion of the USL&HW factor from 1.8 to 1.5.

In future filings, the USL&HW factor will not be automatically adjusted annually for filed benefit changes as has been current practice. Instead,

unless a significant change to the state's benefit system occurs, NCCI will periodically review the current approved USL&HW factor to determine if an update to the USL&HW factor is warranted.

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 -9.3% from the current loss cost level. The Assigned Risk filing proposes an overall average rate level change of -6.6% 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
2019 ANNUAL COUNTRYWIDE ADJUSTING AND OTHER EXPENSE REVIEW

Exhibit 1: Ultimate AOE Ratios

Accident Year	Ultimate AOE Ratio Based on Paid Data	Ultimate AOE Ratio Based on Incurred Data	Ultimate AOE Ratio Based on Avg. of Paid and Incurred Data
2012	6.9%	6.5%	6.7%
2013	7.1%	6.8%	7.0%
2014	7.0%	6.7%	6.9%
2015	7.3%	7.0%	7.2%
2016	7.9%	7.5%	7.7%
2017	8.3%	7.8%	8.1%
2018	8.1%	7.7%	7.9%

NATIONAL COUNCIL ON COMPENSATION INSURANCE
2019 ANNUAL COUNTRYWIDE ADJUSTING AND OTHER EXPENSE REVIEW

Exhibit 2: Calculation of Ultimate AOE Ratios—Paid Data

Accident Year	(1) Paid AOE at Current Report	(2) Cumulative Paid AOE Development Factors	(3)=(1)x(2) Estimated Paid AOE Developed to a 10th Report	(4) Paid Losses at Current Report	(5) Cumulative Paid Loss Development Factors	(6)=(4)x(5) Estimated Paid Losses Developed to a 10th Report
2012	1,739,599,418	1.039	1,807,443,795	16,744,876,648	1.060	17,749,569,247
2013	1,792,751,936	1.061	1,902,109,804	16,259,445,875	1.094	17,787,833,787
2014	1,711,786,105	1.093	1,870,982,213	15,682,463,360	1.145	17,956,420,547
2015	1,669,507,130	1.145	1,911,585,664	14,753,918,663	1.230	18,147,319,955
2016	1,666,476,549	1.242	2,069,763,874	12,995,274,078	1.403	18,232,369,531
2017	1,557,824,188	1.437	2,238,593,358	10,232,582,266	1.817	18,592,601,977
2018	1,063,796,927	2.137	2,273,334,033	4,936,850,078	3.981	19,653,600,161

Accident Year	(7) 10th Report-to-Ultimate Paid AOE Tail Factor	(8)=(3)/(6)x(7) Estimated Ultimate AOE Ratio Before Adjustments	(9) Adjustment for AOE Below the Deductible Limit	(10) Adjustment to Convert From Net to Gross of Deductible	(11)=[(8)+(9)] x (10) Estimated Ultimate AOE Ratio After Adjustments
2012	0.910	9.3%	0.005	0.70	6.9%
2013	0.910	9.7%	0.004	0.70	7.1%
2014	0.910	9.5%	0.005	0.70	7.0%
2015	0.910	9.6%	0.008	0.70	7.3%
2016	0.910	10.4%	0.009	0.70	7.9%
2017	0.910	10.9%	0.010	0.70	8.3%
2018	0.910	10.6%	0.010	0.70	8.1%

NATIONAL COUNCIL ON COMPENSATION INSURANCE
2019 ANNUAL COUNTRYWIDE ADJUSTING AND OTHER EXPENSE REVIEW

Exhibit 3: Calculation of Ultimate AOE Ratios—Incurred Data

Accident Year	(1) Incurred AOE at Current Report	(2) Cumulative Incurred AOE Development Factors	(3)=(1)x(2) Estimated Incurred AOE Developed to a 10th Report	(4) Incurred Losses at Current Report	(5) Cumulative Incurred Loss Development Factors	(6)=(4)x(5) Estimated Incurred Losses Developed to a 10th Report
2012	1,914,083,150	1.014	1,940,880,314	22,001,626,805	0.997	21,935,621,925
2013	2,020,039,054	1.018	2,056,399,757	22,330,831,891	0.995	22,219,177,732
2014	1,989,657,656	1.019	2,027,461,151	22,585,153,651	0.988	22,314,131,807
2015	2,080,760,376	1.015	2,111,971,782	23,526,157,589	0.972	22,867,425,177
2016	2,237,936,060	1.011	2,262,553,357	24,179,250,969	0.955	23,091,184,675
2017	2,377,643,436	0.994	2,363,377,575	24,962,494,199	0.932	23,265,044,593
2018	2,432,242,890	0.957	2,327,656,446	25,565,620,314	0.907	23,188,017,625

Accident Year	(7) 10th Report-to-Ultimate Incurred AOE Tail Factor	(8)=(3)/(6)x(7) Estimated Ultimate AOE Ratio Before Adjustments	(9) Adjustment for AOE Below the Deductible Limit	(10) Adjustment to Convert From Net to Gross of Deductible	(11)=[(8)+(9)] x (10) Estimated Ultimate AOE Ratio After Adjustments
2012	1.000	8.8%	0.005	0.70	6.5%
2013	1.000	9.3%	0.004	0.70	6.8%
2014	1.000	9.1%	0.005	0.70	6.7%
2015	1.000	9.2%	0.008	0.70	7.0%
2016	1.000	9.8%	0.009	0.70	7.5%
2017	1.000	10.2%	0.010	0.70	7.8%
2018	1.000	10.0%	0.010	0.70	7.7%

PRE-FILED TESTIMONY

OF

MARK MULVANEY

2019 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 31 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, the Middle East, and Africa. Milliman employs more than 3,800 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 2019 workers compensation insurance Assigned Risk Rate Filing (the "Filing")?

A. Yes I was.

Q. What was the scope of that engagement?

A. For this year's filing, the Rate Bureau 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. Zanjani and Dr. 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 filed loss costs by classification 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 filing a 7.6% decrease in rate level for the industrial classifications, and a 6.6% 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 7.6% decrease for the industrial classifications and a 6.6% 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 6.6% decrease
Contracting 9.6% decrease
Office and Clerical 8.5% decrease
Goods and Services 7.7% decrease
Miscellaneous 5.4% decrease

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

A. April 1, 2020.

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

A. The current Assigned Risk rates became effective April 1, 2019.

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 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 4/1/2019 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 4/1/2019 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 4/1/2019 level.

When taking the ratio of the ratios, the measurement unit in the denominator of each is common, both representing pure premiums at the 4/1/2019 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, 2008 through 2017. 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 2.021 and the impact of ARAP of 1.013) 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 (1.063) multiplied by the current assigned risk differential results in an indicated assigned risk differential of 2.148.

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 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 .840 and is the inverse of the loss adjustment expense factor. The indicated differential of 2.148 multiplied by the adjustment factor of .840 results in the proposed Loss Cost Modification factor of 1.804 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 1.804 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 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, 2019 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 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. Vander Weide and a rate of return model provided by Dr. Zanjani. 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. 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 2016 through 2018. The impact of minimum premiums is based on Unit Statistical Data for policy years 2008 to 2015. The combined impact of the expense constant and minimum premiums is 16.9% of assigned risk premium excluding these items. This impact is expressed as a factor (1.169) 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 2.732 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

2019 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 public service commissions of forty-five states and four Canadian provinces, the Federal Energy Regulatory Commission, the National Energy Board (Canada), the Federal Communications Commission, the Canadian Radio-Television and Telecommunications Commission, the United States Congress, the National Telecommunications and Information Administration, 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 United States District Court for the District of Nebraska; the United States District Court for the District of New Hampshire; the United States District Court for the District of Northern Illinois; the United States District Court for the Eastern District of North Carolina; the Montana Second Judicial District Court, Silver Bow County; the United States District Court for the Northern District of California; the Superior Court, North Carolina; the United States Bankruptcy Court for the Southern District of West Virginia; the United States 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 8.9 percent to 12.9 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. A future dollar is valued less than a current dollar because investors could invest a current dollar 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, $D_{2...}D_n$	=	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. Because 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 use is described by Equation 10 on page 10 in Exhibit RB-9. This equation shows that the cost of equity is equal to 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 Refinitiv). 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 Refinitiv, 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, February, March, and April 2019. These high and low stock prices are obtained from Refinitiv.

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 12.9 percent; and for the S&P 500 companies, 12.2 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 in the range 12.2 percent to 12.9 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-three 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 2018 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 4.7 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

4.7 percentage points above the expected yield on A-rated long-term debt issues.

The average yield on Moody's seasoned A-rated utility bonds for the three months February through April was 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 4.2 percent. Adding a 4.7 percentage point risk premium to the 4.2 percent expected yield on A-rated utility bonds, I obtain an expected return on equity of 8.9 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 United States government and the Federal Reserve Bank to keep interest rates low in order to stimulate the economy. The ex post risk premium cost of equity result is the sum of the risk premium and the bond yield; and, as a result, 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.

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 8.9 percent to 12.9 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.	0.500	94.084	13.3%	15.8%
2	Amer. Financial Group	0.400	97.916	6.1%	7.9%
3	Berkley (W.R.)	0.150	55.985	11.6%	12.9%
4	Chubb Ltd.	0.730	136.237	12.1%	14.6%
5	Cincinnati Financial	0.560	86.250	4.9%	7.7%
6	CNA Fin'l	0.350	44.221	6.7%	10.3%
7	Erie Indemnity	0.900	175.144	10.0%	12.4%
8	First American Financial Corp	0.420	52.380	12.5%	16.4%
9	Old Republic	0.200	21.003	10.0%	14.5%
10	RLI Corp.	0.220	71.695	9.8%	11.3%
11	Selective Ins. Group	0.200	65.252	12.3%	13.7%
12	Travelers Cos.	0.770	134.103	14.8%	17.8%
13	Average				12.9%

Note:

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 April 2019 per Refinitiv.
FC	=	Flotation costs.
g	=	I/B/E/S forecast of future earnings growth April 2019.
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:

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

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	203.78	5.76	6.59%	9.8%
2	ABBOTT LABORATORIES	76.50	1.28	11.60%	13.6%
3	ABBVIE	79.97	4.28	9.59%	15.9%
4	ACCENTURE CLASS A	168.59	2.92	8.88%	10.9%
5	ACTIVISION BLIZZARD	45.10	0.37	7.30%	8.2%
6	ADV.AUTO PARTS	167.45	0.24	17.52%	17.7%
7	AGILENT TECHS.	78.38	0.66	10.65%	11.6%
8	ALBEMARLE	84.06	1.47	13.29%	15.4%
9	ALLEGION	91.44	1.08	8.67%	10.0%
10	ALTRIA GROUP	53.13	3.20	7.03%	14.0%
11	AMER.ELEC.PWR.	82.43	2.68	5.96%	9.6%
12	AMERISOURCEBERGEN	79.64	1.60	8.62%	10.9%
13	APPLE	184.31	3.08	13.00%	15.0%
14	AT&T	30.70	2.04	2.85%	10.2%
15	AVERY DENNISON	109.20	2.32	11.97%	14.5%
16	BANK OF NEW YORK MELLON	51.63	1.12	9.43%	12.0%
17	BAXTER INTL.	76.13	0.76	10.90%	12.1%
18	BECTON DICKINSON	243.74	3.08	11.67%	13.2%
19	BEST BUY	69.20	2.00	8.67%	12.0%
20	BLACKROCK	438.57	13.20	6.51%	9.9%
21	BRISTOL MYERS SQUIBB	49.15	1.64	7.58%	11.4%
22	BROWN-FORMAN 'B'	50.47	0.66	9.44%	11.0%
23	CARDINAL HEALTH	50.15	1.91	4.92%	9.2%
24	CBS 'B'	49.46	0.72	15.33%	17.1%
25	CENTERPOINT EN.	30.41	1.15	5.78%	10.1%
26	CH ROBINSON WWD.	87.80	2.00	8.19%	10.8%
27	CHUBB	136.24	2.92	10.77%	13.3%
28	CHURCH & DWIGHT CO.	68.12	0.91	8.62%	10.2%
29	CIGNA	170.73	0.04	14.51%	14.5%
30	CINTAS	202.71	2.05	14.60%	15.8%
31	CISCO SYSTEMS	52.49	1.40	9.91%	13.0%
32	CITRIX SYS.	103.11	1.40	9.13%	10.7%
33	CMS ENERGY	54.11	1.53	7.09%	10.3%
34	COCA COLA	46.85	1.60	5.35%	9.2%
35	COGNIZANT TECH.SLTN.'A'	72.10	0.80	8.81%	10.1%
36	COMCAST A	39.56	0.84	13.78%	16.3%
37	CONAGRA BRANDS	25.72	0.85	6.14%	9.9%
38	CONSTELLATION BRANDS 'A'	178.29	3.00	6.44%	8.3%
39	COSTCO WHOLESALE	228.78	2.60	10.68%	12.0%
40	COTY CL.A	10.47	0.50	7.55%	13.1%
41	CSX	73.21	0.96	11.64%	13.2%
42	CUMMINS	157.67	4.56	8.50%	11.8%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
43	CVS HEALTH	57.54	2.00	8.25%	12.3%
44	DANAHER	125.00	0.68	8.21%	8.8%
45	DELTA AIR LINES	52.09	1.40	12.52%	15.7%
46	DENTSPLY SIRONA	46.85	0.35	8.81%	9.7%
47	DOLLAR GENERAL	117.90	1.28	11.43%	12.7%
48	DOMINION ENERGY	74.76	3.67	4.68%	10.2%
49	DXC TECHNOLOGY	65.65	0.76	9.95%	11.3%
50	E TRADE FINANCIAL	48.41	0.56	10.31%	11.7%
51	EATON	80.81	2.84	7.43%	11.5%
52	EBAY	36.76	0.56	11.24%	13.0%
53	ECOLAB	173.38	1.84	13.37%	14.6%
54	EDISON INTL.	61.74	2.45	4.79%	9.2%
55	EMERSON ELECTRIC	68.70	1.96	9.05%	12.4%
56	ESTEE LAUDER COS.'A'	158.20	1.72	10.86%	12.1%
57	EVERSOURCE ENERGY	70.03	2.14	5.72%	9.2%
58	EXPEDIA GROUP	125.06	1.28	12.77%	14.0%
59	FEDEX	182.55	2.60	8.80%	10.4%
60	FIDELITY NAT.INFO.SVS.	110.09	1.40	11.70%	13.2%
61	FOOT LOCKER	60.36	1.52	9.75%	12.7%
62	FORTIVE	81.71	0.28	12.55%	13.0%
63	FORTUNE BNS.HM.& SCTY.	47.92	0.88	8.49%	10.6%
64	GENERAL MILLS	48.41	1.96	5.36%	9.9%
65	GOLDMAN SACHS GP.	197.71	3.40	6.10%	8.0%
66	HARTFORD FINL.SVS.GP.	49.05	1.20	14.84%	17.8%
67	HCA HEALTHCARE	132.08	1.60	11.93%	13.4%
68	HERSHEY	113.13	2.89	7.85%	10.8%
69	HOME DEPOT	191.45	5.44	10.68%	14.0%
70	HONEYWELL INTL.	157.04	3.28	6.38%	8.7%
71	HUMANA	274.90	2.20	14.13%	15.1%
72	HUNT JB TRANSPORT SVS.	104.34	1.04	12.40%	13.6%
73	INGERSOLL-RAND	108.53	2.12	10.48%	12.8%
74	INTEL	52.96	1.26	7.85%	10.6%
75	INTERCONTINENTAL EX.	77.11	1.10	7.45%	9.1%
76	INTUIT	246.05	1.88	15.23%	16.2%
77	INVESCO	19.63	1.24	2.95%	10.0%
78	JOHNSON & JOHNSON	136.80	3.80	6.24%	9.4%
79	JUNIPER NETWORKS	26.90	0.76	13.23%	16.6%
80	KROGER	26.73	0.56	6.06%	8.4%
81	MARTIN MRTA.MATS.	198.66	1.92	14.64%	15.8%
82	MASCO	38.09	0.48	11.90%	13.4%
83	MAXIM INTEGRATED PRDS.	55.30	1.84	13.36%	17.4%
84	MEDTRONIC	89.96	2.00	7.77%	10.3%
85	MERCK & COMPANY	79.28	2.20	9.94%	13.2%
86	METLIFE	44.14	1.76	9.94%	14.6%
87	MICROSOFT	115.78	1.84	14.53%	16.5%
88	MONDELEZ INTERNATIONAL CL.A	48.41	1.04	5.83%	8.2%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
89	MORGAN STANLEY	43.28	1.20	11.18%	14.5%
90	MOTOROLA SOLUTIONS	138.19	2.28	14.16%	16.2%
91	NEXTERA ENERGY	188.29	5.00	7.45%	10.5%
92	NIELSEN	25.64	1.40	4.71%	10.9%
93	NIKE 'B'	85.11	0.88	14.03%	15.3%
94	NORFOLK SOUTHERN	185.69	3.44	13.60%	15.8%
95	NORTHERN TRUST	92.67	2.40	13.63%	16.8%
96	NVIDIA	167.41	0.64	10.58%	11.0%
97	ORACLE	52.85	0.96	10.40%	12.5%
98	PARKER-HANNIFIN	173.98	3.04	9.12%	11.1%
99	PEPSICO	119.22	3.82	4.92%	8.5%
100	PERKINELMER	94.58	0.28	12.59%	12.9%
101	PFIZER	41.80	1.44	5.50%	9.4%
102	PINNACLE WEST CAP.	93.20	2.95	4.56%	8.1%
103	PNC FINL.SVS.GP.	126.54	3.80	8.46%	11.9%
104	PPG INDUSTRIES	111.75	1.92	9.29%	11.3%
105	PRINCIPAL FINL.GP.	51.79	2.16	6.20%	10.9%
106	PROCTER & GAMBLE	101.28	2.98	6.24%	9.6%
107	PVH	120.38	0.15	11.82%	12.0%
108	QUEST DIAGNOSTICS	88.10	2.12	5.61%	8.3%
109	RALPH LAUREN CL.A	125.39	2.50	11.92%	14.3%
110	REPUBLIC SVS.'A'	78.54	1.50	11.93%	14.2%
111	ROCKWELL AUTOMATION	177.52	3.88	8.61%	11.1%
112	ROSS STORES	94.16	1.02	9.93%	11.2%
113	SEALED AIR	44.39	0.64	15.28%	17.0%
114	SHERWIN-WILLIAMS	433.62	4.52	14.01%	15.3%
115	SKYWORKS SOLUTIONS	83.84	1.52	11.18%	13.3%
116	SOUTHWEST AIRLINES	53.90	0.64	12.04%	13.4%
117	STANLEY BLACK & DECKER	136.93	2.64	8.31%	10.5%
118	STATE STREET	69.23	1.88	5.95%	9.0%
119	STRYKER	187.23	2.08	10.48%	11.8%
120	SYMANTEC	23.10	0.30	10.57%	12.1%
121	SYSCO	67.04	1.56	9.79%	12.5%
122	TEXAS INSTRUMENTS	108.72	3.08	8.04%	11.3%
123	THERMO FISHER SCIENTIFIC	259.59	0.76	10.82%	11.2%
124	TIFFANY & CO	98.93	2.20	8.96%	11.5%
125	TJX	52.16	0.92	9.42%	11.5%
126	TOTAL SYSTEM SERVICES	95.00	0.52	12.70%	13.4%
127	TRACTOR SUPPLY	95.77	1.24	11.41%	12.9%
128	UNION PACIFIC	167.47	3.52	12.78%	15.3%
129	UNITED PARCEL SER.'B'	108.91	3.84	9.07%	13.2%
130	UNITEDHEALTH GROUP	243.94	3.60	14.51%	16.3%
131	UNIVERSAL HEALTH SVS.'B'	132.89	0.40	11.51%	11.9%
132	V F	87.52	2.04	13.39%	16.2%
133	VERISK ANALYTICS CL.A	129.47	1.00	9.94%	10.8%
134	VERIZON COMMUNICATIONS	57.07	2.41	4.19%	8.9%

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT
135	VIACOM 'B'	28.85	0.80	4.98%	8.1%
136	WALGREENS BOOTS ALLIANCE	65.22	1.76	5.12%	8.1%
137	WASTE MANAGEMENT	100.57	2.05	10.50%	12.9%
138	WEC ENERGY GROUP	76.44	2.36	4.62%	8.1%
139	WHIRLPOOL	137.95	4.80	8.60%	12.6%
140	WILLIS TOWERS WATSON	174.28	2.60	10.94%	12.7%
141	ZOETIS	95.56	0.66	14.63%	15.5%
142	Average				12.2%

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 Refinitiv.
d_0 = Latest quarterly dividend.
P_0 = Average of monthly high and low stock prices February, March, and April 2019 per Refinitiv.
FC = Selling and flotation costs.
g = I/B/E/S forecast of future earnings growth April 2019.
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

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

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

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

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).

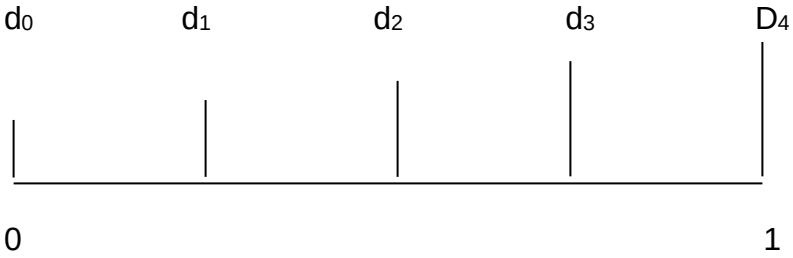
Figure 1

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 $\boldsymbol{k} > \boldsymbol{g}$, we obtain a new expression for the firm's stock price, which takes account of the quarterly payment of dividends. This expression is:

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

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:

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

Solving equation (7) for $\boldsymbol{k}$, 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

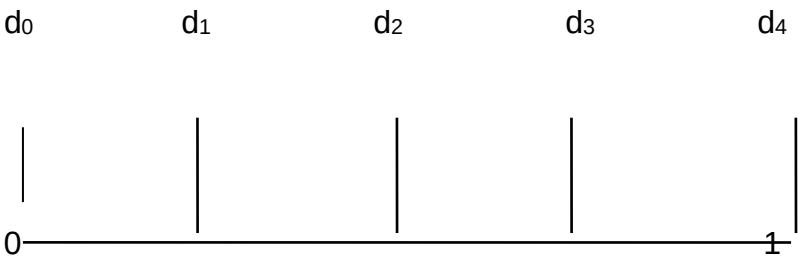
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly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

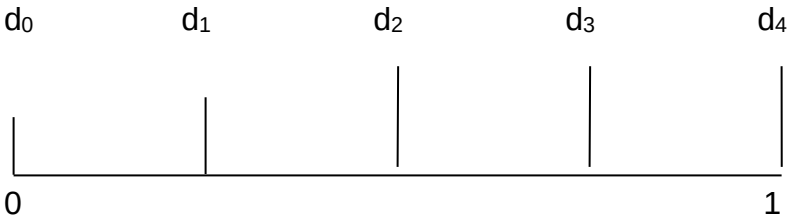
Case 1



Year

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

Case 2



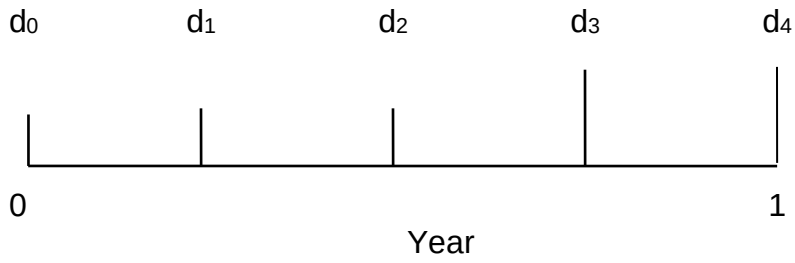
Year

$d_1 = d_0$

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

Figure 3 (continued)

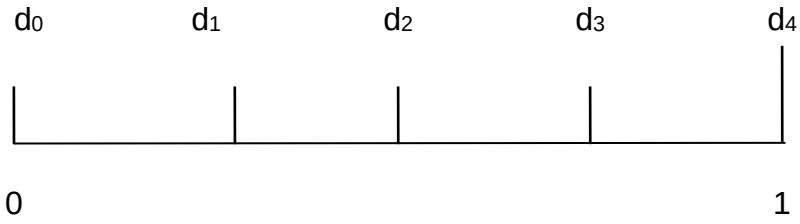
Case 3



$d_1 = d_2 = d_0$

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

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 1926-2018

YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RATE OF RETURN	RISK PREMIUM
2018	2,789.80	0.0198	-4.56%	$102.46	-2.59%	-1.97%
2017	2,275.12	0.0209	24.71%	$96.13	10.75%	13.97%
2016	1,918.60	0.0222	20.80%	$95.48	4.87%	15.93%
2015	2,028.18	0.0208	-3.32%	$107.65	-7.59%	4.26%
2014	1,822.36	0.0210	13.39%	$89.89	24.20%	-10.81%
2013	1,481.11	0.0220	25.24%	$97.45	-3.65%	28.89%
2012	1,300.58	0.0214	16.02%	$94.36	7.52%	8.50%
2011	1,282.62	0.0185	3.25%	$77.36	27.14%	-23.89%
2010	1,123.58	0.0203	16.18%	$75.02	8.44%	7.74%
2009	865.58	0.0310	32.91%	$68.43	15.48%	17.43%
2008	1,378.76	0.0206	-35.16%	$72.25	0.24%	-35.40%
2007	1,424.16	0.0181	-1.38%	$72.91	4.59%	-5.97%
2006	1,278.72	0.0183	13.20%	$75.25	2.20%	11.01%
2005	1,181.41	0.0177	10.01%	$74.91	5.80%	4.21%
2004	1,132.52	0.0162	5.94%	$70.87	11.34%	-5.40%
2003	895.84	0.0180	28.22%	$62.26	20.27%	7.95%
2002	1,140.21	0.0138	-20.05%	$57.44	15.35%	-35.40%
2001	1,335.63	0.0116	-13.47%	$56.40	8.93%	-22.40%
2000	1,425.59	0.0118	-5.13%	$52.60	14.82%	-19.95%
1999	1,248.77	0.0130	15.46%	$63.03	-10.20%	25.66%
1998	963.36	0.0162	31.25%	$62.43	7.38%	23.87%
1997	766.22	0.0195	27.68%	$56.62	17.32%	10.36%
1996	614.42	0.0231	27.02%	$60.91	-0.48%	27.49%
1995	465.25	0.0287	34.93%	$50.22	29.26%	5.68%
1994	472.99	0.0269	1.05%	$60.01	-9.65%	10.71%
1993	435.23	0.0288	11.56%	$53.13	20.48%	-8.93%
1992	416.08	0.0290	7.50%	$49.56	15.27%	-7.77%
1991	325.49	0.0382	31.65%	$44.84	19.44%	12.21%
1990	339.97	0.0341	-0.85%	$45.60	7.11%	-7.96%
1989	285.41	0.0364	22.76%	$43.06	15.18%	7.58%
1988	250.48	0.0366	17.61%	$40.10	17.36%	0.25%
1987	264.51	0.0317	-2.13%	$48.92	-9.84%	7.71%
1986	208.19	0.0390	30.95%	$39.98	32.36%	-1.41%
1985	171.61	0.0451	25.83%	$32.57	35.05%	-9.22%
1984	166.39	0.0427	7.41%	$31.49	16.12%	-8.72%
1983	144.27	0.0479	20.12%	$29.41	20.65%	-0.53%
1982	117.28	0.0595	28.96%	$24.48	36.48%	-7.51%
1981	132.97	0.0480	-7.00%	$29.37	-3.01%	-3.99%
1980	110.87	0.0541	25.34%	$34.69	-3.81%	29.16%
1979	99.71	0.0533	16.52%	$43.91	-11.89%	28.41%
1978	90.25	0.0532	15.80%	$49.09	-2.40%	18.20%
1977	103.80	0.0399	-9.06%	$50.95	4.20%	-13.27%

COMPARATIVE RETURNS ON S&P 500 STOCKS AND MOODY'S A-RATED UTILITY BONDS 1926-2018

YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RATE OF RETURN	RISK PREMIUM
1976	96.86	0.0380	10.96%	$43.91	25.13%	-14.17%
1975	72.56	0.0507	38.56%	$41.76	14.75%	23.81%
1974	96.11	0.0364	-20.86%	$52.54	-12.91%	-7.96%
1973	118.40	0.0269	-16.14%	$58.51	-3.37%	-12.77%
1972	103.30	0.0296	17.58%	$56.47	10.69%	6.89%
1971	93.49	0.0332	13.81%	$53.93	12.13%	1.69%
1970	90.31	0.0356	7.08%	$50.46	14.81%	-7.73%
1969	102.00	0.0306	-8.40%	$62.43	-12.76%	4.36%
1968	95.04	0.0313	10.45%	$66.97	-0.81%	11.26%
1967	84.45	0.0351	16.05%	$78.69	-9.81%	25.86%
1966	93.32	0.0302	-6.48%	$86.57	-4.48%	-2.00%
1965	86.12	0.0299	11.35%	$91.40	-0.91%	12.26%
1964	76.45	0.0305	15.70%	$92.01	3.68%	12.02%
1963	65.06	0.0331	20.82%	$93.56	2.61%	18.20%
1962	69.07	0.0297	-2.84%	$89.60	8.89%	-11.73%
1961	59.72	0.0328	18.94%	$89.74	4.29%	14.64%
1960	58.03	0.0327	6.18%	$84.36	11.13%	-4.95%
1959	55.62	0.0324	7.57%	$91.55	-3.49%	11.06%
1958	41.12	0.0448	39.74%	$101.22	-5.60%	45.35%
1957	45.43	0.0431	-5.18%	$100.70	4.49%	-9.67%
1956	44.15	0.0424	7.14%	$113.00	-7.35%	14.49%
1955	35.60	0.0438	28.40%	$116.77	0.20%	28.20%
1954	25.46	0.0569	45.52%	$112.79	7.07%	38.45%
1953	26.18	0.0545	2.70%	$114.24	2.24%	0.46%
1952	24.19	0.0582	14.05%	$113.41	4.26%	9.79%
1951	21.21	0.0634	20.39%	$123.44	-4.89%	25.28%
1950	16.88	0.0665	32.30%	$125.08	1.89%	30.41%
1949	15.36	0.0620	16.10%	$119.82	7.72%	8.37%
1948	14.83	0.0571	9.28%	$118.50	4.49%	4.79%
1947	15.21	0.0449	1.99%	$126.02	-2.79%	4.79%
1946	18.02	0.0356	-12.03%	$126.74	2.59%	-14.63%
1945	13.49	0.0460	38.18%	$119.82	9.11%	29.07%
1944	11.85	0.0495	18.79%	$119.82	3.34%	15.45%
1943	10.09	0.0554	22.98%	$118.50	4.49%	18.49%
1942	8.93	0.0788	20.87%	$117.63	4.14%	16.73%
1941	10.55	0.0638	-8.98%	$116.34	4.55%	-13.52%
1940	12.30	0.0458	-9.65%	$112.39	7.08%	-16.73%
1939	12.50	0.0349	1.89%	$105.75	10.05%	-8.16%
1938	11.31	0.0784	18.36%	$99.83	9.94%	8.42%
1937	17.59	0.0434	-31.36%	$103.18	0.63%	-31.99%
1936	13.76	0.0327	31.10%	$96.46	11.12%	19.99%
1935	9.26	0.0424	52.84%	$82.23	22.17%	30.66%
1934	10.54	0.0336	-8.78%	$66.78	29.13%	-37.91%
1933	7.09	0.0542	54.08%	$79.55	-11.03%	65.11%

COMPARATIVE RETURNS ON S&P 500 STOCKS AND MOODY'S A-RATED UTILITY BONDS 1926-2018

YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RATE OF RETURN	RISK PREMIUM
1932	8.30	0.0822	-6.36%	$70.67	18.23%	-24.59%
1931	15.98	0.0550	-42.56%	$84.49	-11.63%	-30.93%
1930	21.71	0.0438	-22.01%	$81.19	8.99%	-31.00%
1929	24.86	0.0336	-9.31%	$83.95	1.48%	-10.79%
1928	17.53	0.0431	46.12%	$86.71	1.43%	44.69%
1927	13.40	0.0502	35.84%	$83.28	8.92%	26.92%
1926	12.65	0.0446	10.39%	$80.81	8.01%	2.38%
Average 1926 - 2018			11.57%		6.82%	4.69%

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 1926-2018

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:

$$\text{StockReturn}(2018) = \left[\frac{\text{StockPrice}(2019) - \text{StockPrice}(2018) + \text{Dividend}(2018)}{\text{StockPrice}(2018)} \right]$$

where Dividend (2018) = Stock Price (2018) x Stock Div. Yield (2018)

Sample calculation of "Bond Return" column:

$$\text{Bond Return}(2018) = \left[\frac{\text{Bond Price}(2019) - \text{Bond Price}(2018) + \text{Interest}\ (2018)}{\text{Bond Price}(2018)} \right]$$

where Interest = $4.00.

PREFILED TESTIMONY
OF
GEORGE ZANJANI

2019 WORKERS COMPENSATION
ASSIGNED RISK INSURANCE RATE FILING
NORTH CAROLINA RATE BUREAU

I. Qualifications and Summary

Q: What is your name, occupation, and business address?

A: My name is George Zanjani. I am Professor of Finance and the holder of the Frank Park Samford Chair of Insurance at the University of Alabama. My business address is 1074 Alderwood Lane NE, Marietta, Georgia 30068.

Q: Please describe your educational and employment background.

A: A complete curriculum vitae is attached as Exhibit RB-12 with this testimony. To summarize, my undergraduate studies were at Stanford University from 1987-1990, where I earned an A.B./B.S in Economics and Biology. I joined the commercial lines actuarial department of Fireman's Fund Insurance Companies in 1990 as an Assistant Actuarial Analyst. Upon leaving in 1994, I was a Senior Actuarial Analyst, an Associate of the Casualty Actuarial Society, and the head of the company's Workers Compensation actuarial unit. I did my graduate studies in Economics at the University of Chicago, earning a Ph.D. in 2000. I joined the Research Department of the Federal Reserve Bank of New York in the Capital Markets Function as a Research Economist in 2000, leaving as a Senior Economist in 2008. I joined the Robinson College of Business of Georgia State University in 2008 as an Associate Professor of Risk Management and Insurance and was honored as the inaugural holder of the AAMGA Distinguished Chair in Risk Management and Insurance in 2011. I started my current position in 2017.

Q: Please elaborate on some of your professional activities.

A: My professional career has been focused on insurance. After four years of actuarial work in commercial lines insurance, my dissertation addressed the economics of insurance pricing. I specialized on insurance issues while at the Federal Reserve Bank of New York. In particular, I served for the Bank on the Presidential Working Group on Financial Markets during its review of the renewal of the Terrorism Risk Insurance Act in 2006 and on the Committee on the Global Financial System Task Force on Institutional Investors, Global Savings, and Asset Allocation.

My academic service activities include 1) service as referee for various academic journals, 2) service as an associate editor of the *Journal of Insurance Issues*, and 3) (current) service as a senior editor for the *Journal of Risk and Insurance*. In addition, I have served on the Board of the American Risk and Insurance Association and served as President of that association. I have

also served as President of the Risk Theory Society. I currently serve on the International Research Advisory Board of National Chengchi University.

As an academic, I continue to write on insurance pricing, participate in academic conferences on insurance, and engage in various sponsored research and consulting activities related to insurance. The latter activities include two research projects on capital allocation sponsored by the Casualty Actuarial Society during the last decade and a project on the financial crisis and the insurance industry sponsored by the Society of Actuaries in 2009. In addition, I have taught various courses at the undergraduate and graduate levels over the past decade, including classes on financial risk management, risk modeling, and property-casualty insurance.

Q: Have you published any papers or books?

A: Yes. I have published various articles, book chapters, reviews, and white papers on insurance pricing and other aspects of insurance markets. Published or forthcoming work includes articles on insurance topics in the *American Economic Review*, *Insurance: Mathematics and Economics*, the *Journal of Financial Economics*, the *Journal of Public Economics*, the *Journal of Risk and Insurance*, *Management Science,* and the *North American Actuarial Journal.* My co-authors and I have two chapters in the 2013 edition of the Handbook of Insurance, one on capital allocation for insurance companies, and the other on the financial pricing of insurance. Two papers have won awards for their contributions to the field of actuarial science: I received the 2010 ARIA award from the Casualty Actuarial Society and shared the 2015 Charles A. Hachemeister Prize (also from the Casualty Actuarial Society) with a co-author.

Q: Are you a member of any professional organizations?

A: I am a member of the American Economic Association, the American Finance Association, the American Risk and Insurance Association, and the Risk Theory Society. I am also an Associate of the Casualty Actuarial Society. I served on the Board of Directors of the American Risk and Insurance Association from 2007 to 2014 and served as President in 2012-2013. I served as President of the Risk Theory Society in 2012.

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

A: Yes. I have offered testimony in Workers Compensation insurance rate filings in Florida (2015 and 2017) and Virginia (2016). In addition, I have supplied testimony for the 2019 Private Passenger Auto, Mobile Homeowners, and Dwelling rate filings in North Carolina.

Q: What was the nature of your testimony in those previous cases?

A: In the Florida and Virginia cases, I offered testimony on the underwriting profit factors used in the rates. Specifically, I evaluated the suitability of the methods and assumptions used to develop those factors, as well as whether the rate of return on capital implied by those factors was reasonable. For the North Carolina filings, I estimated the rate of return on capital implied by the selected underwriting profit factors and assessed whether that rate of return was reasonable.

Q: What is the purpose of your testimony?

A: I was asked by the North Carolina Rate Bureau, as a financial economist with expertise in insurance, 1) to assist the Bureau committee with the underwriting profit factor selection, 2) to determine the expected return on insurance net worth implicit in the filing, and 3) to assess whether the expected return on net worth constitutes a reasonable rate of return and thus whether the selected underwriting profit factor selection satisfies North Carolina's statutory requirements.

Q: Please summarize the main findings of your testimony.

A: Using a pro forma return model, I analyzed how the selected underwriting profit provisions used in the filing translate into expected returns on net worth. Consistent with previous filings, and with North Carolina law stipulating that the investment income earned on capital and surplus is not to be considered in determining the appropriate rate of return for the insurance industry, I refer to the expected return on net worth without including investment income on capital and surplus as the *statutory return*. When calculating the expected return on net worth including investment income earned on capital and surplus, I refer to the figure as the *total return.* My calculations are detailed in Exhibit RB-13 and are summarized below:

Return Definition	Return on Net Worth
Statutory Return	8.12%
Total Return	11.10%

I then reviewed Dr. Vander Weide's testimony on the cost of insurance capital and considered other third-party estimates of the cost of insurance capital. I also considered adjustments to those cost of capital estimates that I deemed necessary for the North Carolina Workers Compensation insurance market. In particular, since non-public companies underwrite a significant portion of the market, I considered the effects of non-public ownership on the cost of equity. Ultimately, I found the expected returns implied by the underwriting profit provisions used in the filing to be reasonable and not excessive. Specifically, the expected returns fall toward the middle of the range of cost of equity estimates produced by Dr. Vander Weide and others. Moreover, my conclusion is unchanged after adjusting the cost of capital to reflect both 1) the presence of debt financing at insurance holding companies and 2) a market value-to-book value premium at insurance holding companies. It is also unchanged after considering the impact of an alternative investment portfolio more closely matched to the portfolios of companies underwriting Workers Compensation insurance.

II. Expected Return on Net Worth

Q: In general terms, how did you determine the expected return on net worth implied by the underwriting profit provision used in the filing?

A: I used a *pro forma* return model similar to that used in previous filings in North Carolina. The model accounts for underwriting income, investment income on unearned premium and loss/loss adjustment expense (LAE) reserves, and taxes as a percentage of premium. Total after-

tax income from these sources (as a percentage of premium) is then related to net worth (as a percentage of premium) to obtain an expected return on net worth.

Q: What do you mean by *pro forma*?

A: The model is *pro forma* in the sense that it assumes 1) that the indicated rate change will be implemented and 2) that all loss, expense, and investment return realizations will coincide with their projected expected values.

The results of the model and supporting information are presented in Exhibit RB-13.

Q: Could you state what you mean by "net worth"?

A: Net worth is the book value of equity of a company under Generally Accepted Accounting Principles (GAAP) rather than Statutory Accounting Principles (SAP).

Q: Did you account for investment income on capital and surplus in calculating the expected return?

A: It is my understanding that North Carolina law provides that insurance rates are to be set such that those rates are expected to provide a return to insurers that is equal to the returns of industries of comparable risk and that, in calculating that expected return, the investment income on capital and surplus is to be excluded from consideration. Therefore, I present the expected return projected to result from the selected underwriting profit provision excluding investment income on capital and surplus. However, for informational purposes, I also present the expected return projected to result from the selected underwriting profit provision including investment income on capital and surplus.

Q: Would you please elaborate on the elements of the return and how they are calculated?

A: The return is composed of underwriting profit (Line 2 of Exhibit RB-13, Pages 1 and 1A) and investment gain on insurance transaction (Line 6 of Exhibit RB-13, Pages 1 and 1A). In the calculation that includes investment income on surplus for informational purposes, I additionally include investment gain on surplus (Line 7 of Exhibit RB-13, Page 1A). (Please note that, in my exhibits and sometimes in my testimony, I refer to investment income on surplus as a shorthand reference to investment income on capital and surplus.) All of the foregoing income components are adjusted for taxes. The components are discussed in greater detail below:

Underwriting profit - As a matter of arithmetic and definition, the underwriting profit as a percentage of premium matches the underwriting profit provision selected by the NCRB. It is the percentage of premium left over after accounting for the loss and expense provisions. Expenses include Commissions; Taxes, Licenses, and Fees; Servicing Carrier Allowance and an Other Acquisition and General provision attributable to direct writers; and a provision for uncollectible premium. The underwriting profit is assumed to be taxed at the current corporate rate of 21% (Line 3 of Exhibit RB-13, Pages 1 and 1A), as revised in the Tax Cut and Jobs Act of 2017. I also account for additional tax liabilities relating to IRS rules regarding the treatment of unearned premium reserves and of loss reserves (Line 4 of Exhibit RB-13, Pages 1 and 1A). Details of the calculation of these additional tax liabilities are found on Pages 3, 3A, and 3B of Exhibit RB-13.

Net Investment Gain on Insurance Transaction – This portion of the return reflects investment income on investible funds generated by the insurance transaction. Specifically, this quantity is estimated as the product of an investment yield and the average loss/LAE and unearned premium reserves. An adjustment is made for investment income on agents' balances (specifically, to account for the fact that agents' balances, which are premiums held by agents and not yet remitted to the company, are not available for investment by the insurance company). The details of the estimation of investible reserves and the pre-tax investment income generated from those reserves are found on Pages 4 to 7 of Exhibit RB-13. The tax liability is based on a weighted average of estimated tax rates on the different sources of investment income, with the weights based on the composition of the overall property-casualty industry portfolio.

Investment Gain on Surplus – This portion of the return reflects investment income generated from surplus. The pre-tax investment yield is applied to investible surplus, the amount of which is based on the ten-year average premium-to-surplus ratio for groups writing Workers Compensation insurance in North Carolina from Page 11 of Exhibit RB-13. The tax liability is again based on a weighted average of estimated tax rates on the different sources of investment income, with the weights based on the composition of the overall property-casualty industry portfolio.

These components of after-tax return, which are all denominated as a percent of premium, are then summed and related to net worth. This is accomplished by multiplying the returns as percent of premium by the product of the premium-to-surplus ratio from Page 11 of Exhibit RB-13 and the inverse of the industry-wide net worth-to-surplus ratio from Page 12 of Exhibit RB-13.

Q: Please explain how the investment yield is calculated.

A: My understanding is that the accepted approach in North Carolina, based on a decision by the Commissioner in the 1990's, is to estimate the investment yield as an average of the "embedded yield" based on the industry statutory annual statement reports and a "current yield" based on current market rates. I have treated this as settled practice in North Carolina and thus followed this convention in my analysis. For the current yield, I start with the overall industry invested asset portfolio and use various sources to estimate the current market yields for those assets. Sources for current market rates, and a summary of the overall calculation, are provided on Page 8 of Exhibit RB-13. For each of the bond subcategories, I obtain a maturity distribution for the industry portfolio in that subcategory from the Schedule D summary exhibits and match each maturity level from the exhibits to a corresponding bond yield of similar maturity, so that the average yield shown on Page 8 is a weighted average across maturities according to the industry portfolio. The overall pre-tax current yield on the industry portfolio as thus determined is 4.23%. The embedded yield calculations, based on the actual investment income reported by the industry, are shown on Pages 9 and 10 of Exhibit RB-13; the pre-tax embedded yield is 3.42%. For the pro forma calculations, I average these two figures to obtain 3.82% (shown on Page 10 of Exhibit RB-13).

The tax liability for investment income is determined for each asset class, reflecting tax advantages as appropriate on municipal bond interest, preferred and common stock dividends,

and capital gains on stock. The expected return on equity is split into a capital gain and dividend component, for tax purposes, based on the experience of the S&P 500 over the 1998-2018 period.

Q: What is the expected return on net worth?

A: To calculate the implied return on insurance company equity, components of after-tax return are summed and related to net worth, which, as a percentage of premium, is calculated based on the product of the premium-to-surplus ratio from Page 11 of Exhibit RB-13 and the inverse of the industry-wide net worth-to-surplus ratio from Page 12 of Exhibit RB-13. This approach indicates that the selected underwriting profit factor of 4.5%, if achieved, would yield an expected statutory return on net worth of 8.12% (without including investment income on surplus) and a total return on net worth of 11.10% (when including investment income on surplus).

Q: Have you considered the impact of any other alternative assumptions on your estimates?

A: Yes, I have considered the impact of an alternative investment yield calculation, based on data from the Commercial Casualty Composite compiled by A.M. Best. The models used to estimate the return on net worth in other NCRB filings in North Carolina rely on the aggregated industry invested asset distribution. While I have followed this convention in Exhibit RB-13, the assumption may not be suitable for the case of Workers Compensation because the industry portfolio reflects heavy common stock allocations by certain personal lines carriers and other companies that do not underwrite Workers Compensation. The high common stock allocation tends to inflate the estimated investment yields, particularly current yields, where the expected rate of return on common stock is much higher than typical bond yields (see Page 8 of Exhibit RB-13). The Commercial Casualty Composite, in my opinion and based on my analyses in previous work, offers a much closer approximation to the average investment portfolio supporting Workers Compensation underwriting.

I tested the sensitivity of the results to replacing the investment yields in Exhibit RB-13 with yields based on data from the Commercial Casualty Composite. Specifically, I replaced the average industry allocations for the various asset categories on Page 8 with ones based on the Assets page for the Commercial Casualty Composite as reported in the 2018 edition of A.M. Best's Aggregates & Averages. (It was necessary to rely on industry data to split up the bond allocation between the subcategories of bonds, as A.M. Best does not report this level of investment detail for the Commercial Casualty Composite. Similarly, for investment expenses, it was necessary to use the overall industry figure.) I based an embedded yield estimate on the figures for net investment income and realized capital gains in the Statement of Income for the Commercial Casualty Composite, with the realized capital gains figures being based on a 10-year average. Similarly, mean invested assets were sourced from the Assets page for the Commercial Casualty Composite.

Relative to Exhibit RB-13, these changes dropped the estimate for the average pre-tax investment yield from 3.82% to 3.63%. If the lower yield were substituted, the returns on net worth shown in Exhibit RB-13 would drop from 8.12% to 7.86% (not including investment income on surplus) and from 11.10% to 10.70% (including investment income on surplus).

Q: How were the underwriting profit factors determined?

A: The Bureau selected the 4.5% provision. I participated in the Bureau's Workers Compensation Committee meeting for the discussion of the profit portion of the rate review. I described for the Committee my pro forma profit analysis and provided an array of underwriting profit provisions and their associated returns on net worth, both without including investment income on surplus and including investment income on surplus. The returns shown in that array spanned the range for the cost of equity that had been provided by Dr. Vander Weide. Following my presentation and the committee discussion, the committee selected the underwriting profit factor.

III. Rate of Return on Capital

Q: What steps did you take in the course of assessing whether the returns described above would produce a reasonable rate of return on equity?

A: I first reviewed Dr. Vander Weide's testimony. I then compared his results to other independent estimates based on various methodologies. I then made adjustments to both sets of estimates to account for the particular ownership structures that prevail in the North Carolina market. Finally, I compared the estimated statutory and total return on net worth determined in Section II above to these adjusted cost of equity estimates.

Q: What was the nature of Dr. Vander Weide's analysis?

A: The cost of equity for an industry is a difficult figure to pin down, and Dr. Vander Weide uses two approaches to estimate it. The first is a discounted cash flow (DCF) model, which estimates the cost of equity under the assumption that the current equity price is a discounted present value of future dividend cash flows. The critical input to this calculation is the dividend growth rate estimate, which he bases on analyst forecasts. His final estimates under this approach are 12.9%, which he obtains when restricting his attention to property-casualty firms specifically, and 12.2% when using the S&P 500, which he views as having generally similar risk characteristics as the property-casualty industry. The second approach is a risk premium approach, which estimates the current cost of equity as a current bond yield plus a spread, or risk premium. This analysis, which again uses the S&P 500 for purposes of estimating the risk premium, produces an estimate of 8.9%.

Q: How do Dr. Vander Weide's estimates compare with other estimates of the cost of equity for the industry?

A: The two methods employed by Dr. Vander Weide---the DCF and the risk premium method---are perhaps the two most widely accepted and widely deployed methods for estimating the cost of equity. However, there is substantial variation in implementation of these methods, which can have significant effects on the estimates. For example, the DCF/dividend growth model is sometimes estimated with different time period stages, with time-varying growth rates. There is also substantial methodological variation in implementation of the risk premium method---differences in averaging techniques, differences in the sample period used to estimate the risk premium, differences in the choice of the reference bond yield, differences in the methods used to estimate the relative risk of the industry of interest, and so forth. To get a sense of the

import of these differences, I reviewed some additional third-party estimates of the cost of equity for the property-casualty industry, particularly those from Damodaran Online (an open-access website maintained by Aswath Damodaran, a valuation expert affiliated with New York University) and Duff & Phelps (a consultancy that took over the pioneering Ibbotson Cost of Capital franchise). The most recent estimates from Damodaran Online (January 2019) and Duff & Phelps (March 31, 2019 edition of *Valuation Handbook – U.S. Industry Cost of Capital*, for the SIC Code Composite) are listed along with Dr. Vander Weide's estimates in the table below.

Property-Casualty Industry Cost of Equity Estimates

Source	Method	Estimate
James Vander Weide	Risk Premium	8.9%
Duff & Phelps	Risk Premium (CAPM)	8.1%
Damodaran Online	Risk Premium (CAPM)	7.1%
James Vander Weide	DCF	12.2% to 12.9%
Duff & Phelps	DCF (1-stage)	17.1%
Duff & Phelps	DCF (3-stage)	16.2%
Duff & Phelps	CAPM + Size Premium	8.5%
Duff & Phelps	Fama-French	10.4%

As can be seen from the table, Dr. Vander Weide's estimates are comparable to other estimates for the industry produced using various methods.

Q: In the table, you also listed additional cost of equity estimates from Duff & Phelps. Can you explain these methods and their relevance to this filing?

A: Yes. While the CAPM and DCF methods are the basic models and are widely used, various extensions have gained acceptance over the years because of the need to draw finer distinctions among industries and firms when calculating the cost of equity. In particular, the "CAPM + size premium" recognizes the higher cost of capital endured by smaller firms and thus corrects for the average size of firms within an industry. The Fama-French-5-factor model extends the single risk factor framework of the CAPM to a five factor risk framework, thus pricing an industry's equity on the basis of its sensitivity to four additional factors in addition to overall market returns. These methods produce higher estimates for the cost of equity in the property-casualty industry than the single factor risk premium model approaches. They provide additional perspective on the cost of equity.

Q: Do you believe any adjustments are necessary to the estimated cost of equity in the context of this filing?

A: Yes. All of the foregoing estimates are based on the data of publicly traded companies, which have the easiest access to financing and thus the lowest costs of capital. However, I found that operating companies affiliated with publicly traded holding companies wrote about 59% of the 2017 direct premiums written for North Carolina Workers Compensation insurance. The remaining 41% was underwritten by companies associated with private, often mutual, ownership---a segment well-known to have more difficulty in accessing the capital markets. The

industry average cost of equity needs to be adjusted upward to account for this non-public ownership.

Q: How much higher is the cost of equity for non-public firms?

A: Research dating back at least as far as the 1960's has demonstrated that private equity trades at a substantial discount to public equity. The discount is thought to derive from a variety of factors, including the illiquid nature of private equity stakes (also known as a "lack of marketability") as well as information, monitoring, and control issues. The discount translates into a higher cost of equity. For example, if a public firm's cost of equity is estimated at 10% and the equity of a comparable private firm is selling at a 20% discount to that of the public firm, the private firm's cost of equity would be estimated as:

$$12.5\% \;=\; 10\% \;/\; (1 - 20\%)$$

The discount is difficult to estimate. Exhibit RB-14 summarizes some of the academic research on the private firm discount. Studies have taken a variety of approaches to measurement. "IPO" studies compare the prices of pre-IPO share transactions in a private company with post-IPO share prices after the company is public. "Acquisition" studies compare the valuations of acquired private companies versus the valuations of acquired public companies. "Restricted stock" and "private placement" studies compare the prices of restricted stock issued by public companies with the prices of their traded shares.

All the approaches have their flaws. IPO studies, for example, are thought to have a bias toward overstating the discount because of the differences in timing of transactions. Restricted stock and private placement studies tend to understate the discount: Since they confine their attention to public companies, they do not account for factors other than the discount for lack of marketability (DLOM), and, moreover, the actual restrictions on marketability for private placements have been loosened significantly over the years by the Securities and Exchange Commission.

On balance, however, the studies point to a substantial discount. For purposes of this testimony, I use a discount of 25%, which is slightly below the average of the averages of the three groups in Exhibit RB-14 (when taking the midpoint of the ranges for the studies with ranges of estimates).

Q: How would this affect the estimated cost of equity for the industry?

A: Assuming a 25% private company discount and a 41% market share for non-public companies, I calculate adjusted estimates of the private cost of equity and the public cost of equity:

$$41\% * \left(\frac{COE}{(1 - 0.25)}\right) + (59\%) * (COE),$$

where COE is the estimated cost of equity for public companies. The adjusted estimates are as follows:

Cost of Equity Estimates, Adjusted for Non-Public Ownership

Source	Method	Adjusted Estimate
James Vander Weide	Risk Premium	10.1%
Duff & Phelps	Risk Premium (CAPM)	9.2%
Damodaran Online	Risk Premium (CAPM)	8.1%
James Vander Weide	DCF	13.9% to 14.7%
Duff & Phelps	DCF (1-stage)	19.4%
Duff & Phelps	DCF (3-stage)	18.4%
Duff & Phelps	CAPM + Size Premium	9.7%
Duff & Phelps	Fama-French	11.8%

Q: How do these figures speak to the issue of whether or not the pro forma expected return on net worth is reasonable?

A: There are at least two schools of thought on this issue.

The first is that the "net worth" in the pro forma return exhibit should be interpreted as an equity investment akin to the equity analyzed by Dr. Vander Weide and others. Thus, it should be entitled to a similar rate of return. Under this school of thought, the return on net worth calculated in the previous section should be compared directly with the figures in the table above. If one does this, the projected returns are, in my opinion, clearly not excessive, even when including investment income on surplus in the calculation of the return. The projected return of 11.10% falls toward the lower end of the span of estimates above, which range from 8.1% to 19.4%. If one instead focuses on the statutory return by excluding investment income on surplus, the projected return is at the very low end of the span of estimates.

A second school of thought is that, although the capital of the operating subsidiaries may be fully financed by equity, one should "look through" the operating subsidiaries to the level of the holding companies to determine a cost of capital, which is important because the holding companies---unlike the insurance subsidiaries---typically hold some debt in the capital structure. Holding companies that are typically classified as property-casualty companies have, in recent history and on average, had in the neighborhood of 20% debt. Thus, the cost of capital for the holding company is, under this school of thought, calculated as a weighted average of the cost of equity and the cost of debt, with the weights based on each component's share of the capital structure. The result is a weighted average cost of capital (WACC), which is typically lower than the cost of equity as a reflection of the lower cost of debt. On the other hand, another consideration is that the market value of the capital of the holding company will be different than the book value of the capital invested in the insurance subsidiaries. Thus, a particular return on net worth at the level of the operating subsidiary will translate into a lower (higher) return on holding company capital if the market value of the holding company capital exceeds (is less than) the net worth of the insurance subsidiaries.

The following table shows the most current WACC estimates for the property-casualty industry from Damodaran Online and Duff & Phelps, after adjusting the cost of equity for non-public ownership as described above. It also shows the required return on operating company net

worth under different assumptions about the ratio of holding company equity market capitalization to holding company net worth and under the assumption of 20% debt (trading at par) in the capital structure. For example, the required return on operating company net worth for a WACC estimate of 10.0% and a Market-to-Net Worth Ratio of 1.2, would be:

$$10\% * (1.2 * 80\% + 20\%) = 11.6\%$$

Note that the WACC estimates vary, due not only to the previously described differences in estimating the cost of equity, but also due to different estimates for the cost of debt and for the share of debt in the capital structure.

Property-Casualty WACC Estimates, Adjusted for Non-Public Ownership

Source	Method	Adjusted WACC Estimate	Required Return on Net Worth, Assuming Market-to-Net Worth Ratio of:		
			1	1.2	1.4
Duff & Phelps	Risk Premium (CAPM)	7.8%	7.8%	9.1%	10.3%
Damodaran Online	Risk Premium (CAPM)	7.0%	7.0%	8.1%	9.2%
Duff & Phelps	DCF (1-stage)	16.5%	16.5%	19.1%	21.8%
Duff & Phelps	DCF (3-stage)	15.6%	15.6%	18.1%	20.6%
Duff & Phelps	CAPM + Size Premium	8.2%	8.2%	9.5%	10.8%
Duff & Phelps	Fama-French	10.0%	10.0%	11.6%	13.2%

At current stock market valuations, the market-to-net worth ratio of public companies that own the major underwriters of Workers Compensation insurance in North Carolina, using August 19, 2019 market capitalization data and the most recent available accounting data from Yahoo Finance (6/30/19, in most cases), is typically well above 1. However, even if one sets this ratio to 1, the table above demonstrates that a return on capital near 11% (counting investment income on surplus) is reasonable and not excessive; it falls toward the middle of the span of estimates (7.0% to 16.5%). The same characterization---of reasonable and not excessive---applies to a return on capital near 8% (not counting investment income on surplus), which falls toward the low end of the range of estimates.

In summary, the expected return on net worth calculated in Section II is, in my opinion, consistent with a reasonable and not excessive return on invested capital.

Q: Is this conclusion affected when considering your alternative estimates of expected investment yield?

A: No. As discussed above, the return impact of using an alternative yield based on the investment portfolio of the Commercial Casualty composite amounts to a few tens of basis points, so the returns on net worth still fall comfortably within the span of capital cost estimates identified in Section III.

IV. Conclusion

Q: Based on your knowledge and experience and on the studies and analyses you have performed, have you come to any conclusions regarding the underwriting profit factor selected by the Bureau and used in its indicated rate level calculations in this filing?

A: Yes. I found that the expected statutory return on net worth implied by the selected 4.5% underwriting profit factor was 8.12% (not including investment income on surplus). The expected total return on net worth was 11.10% (including investment income on surplus). After reviewing and analyzing the cost of capital estimates for the industry produced by Dr. Vander Weide and others, I found the expected returns on net worth resulting from the selected underwriting profit factors to be consistent with a reasonable and not excessive return on invested capital. Thus, I believe that the selected underwriting profit factors are reasonable and not excessive.

An important caveat to this analysis, however, is that all conclusions are predicated on the assumption that the indicated rate level is achieved. In the event that a lower rate level is implemented, the expected rate of return could be inadequate.

George Zanjani

University of Alabama
The Culverhouse College of Business
Department of Economics, Finance, & Legal Studies
200 Alston Hall
Box 870224
Tuscaloosa, AL 35487

Mobile: 917-863-9332
Email: ghzanjani@cba.ua.edu

Education

Ph.D., Economics, University of Chicago, 2000
ACAS, Casualty Actuarial Society, 1994
A.B. / B.S., Economics and Biology, Stanford University, 1990

Work Experience

University of Alabama (Tuscaloosa, Alabama)
Professor of Finance and Frank Park Samford Chair of Insurance, 2017-

Georgia State University (Atlanta, Georgia)
AAMGA Distinguished Chair in Risk Management & Insurance, 2011-2017
Associate Professor, 2008-2017

Nanyang Technological University (Singapore)
Visiting Senior Research Fellow, 2011-12, 2013-2014

Federal Reserve Bank of New York (New York, New York)
Senior Economist, 2006-2008
Economist, 2000-2006

Fireman's Fund Insurance Companies (Novato, California)
Senior Actuarial Analyst, 1993-94
Actuarial Analyst, 1991-1993
Assistant Actuarial Analyst, 1990-1991

Publications: Refereed Scholarly

"Dynamic Capital Allocation with Irreversible Investments," (with Daniel Bauer, Shinichi Kamiya, and Xiaohu Ping), ***Insurance: Mathematics and Economics*** 85: 138-52, (2019)

"What Drives Tort Reform Legislation? Economics and Politics of the State Decisions to Restrict Liability Torts," (with Yiling Deng), ***Journal of Risk & Insurance*** 85: 959-991, (2018)

"Egalitarian Equivalent Capital Allocation," (with Shinichi Kamiya), ***North American Actuarial Journal*** 21: 382-96, (2017)

"The Marginal Cost of Risk, Risk Measures, and Capital Allocation," (with Daniel Bauer), ***Management Science*** 62: 1431-1457 (2016)

"Economic Analysis of Risk and Uncertainty Induced by Health Shocks: A Review and Extension," (with Tomas J. Philipson), in *Handbook of the Economics of Risk and Uncertainty*, Volume 1, Mark J. Machina and W. Kip Viscusi (eds.), North Holland: Elsevier (2014)

"Capital Allocation and Its Discontents," (with Daniel Bauer), in *Handbook of Insurance* (2nd edition), Georges Dionne (ed.), New York: Springer (2013)

"Financial Pricing of Insurance," (with Daniel Bauer and Richard D. Phillips), in *Handbook of Insurance* (2nd edition), Georges Dionne (ed.), New York: Springer (2013)

"Insurance Risk, Risk Measures, and Capital Allocation: Navigating a Copernican Shift," (with Michael R. Powers), ***Annual Review of Financial Economics*** 5: 201-223 (2013)

"Catastrophe Bonds, Reinsurance, and the Optimal Collateralization of Risk Transfer," (with Darius Lakdawalla), ***Journal of Risk & Insurance*** 79**,** pp. 449-76 (2012)

"An Economic Approach to Capital Allocation," ***Journal of Risk and Insurance*** 77, pp. 523-549 (2010) [Winner of Casualty Actuarial Society ARIA Award, 2010]

"Federal Financial Exposure to Catastrophic Risk," (with J. David Cummins and Michael Suher), in *Measuring and Managing Federal Financial Risk,* Deborah Lucas (ed.), Chicago: University of Chicago Press (2010)

"Public versus Private Underwriting of Catastrophe Risk: Lessons from the California Earthquake Authority," in *Risking House and Home: Disasters, Cities, Public Policy,* John M. Quigley and Larry A. Rosenthal (eds.), Berkeley: Berkeley Public Policy Press (2008)

"Regulation, Capital, and the Evolution of Organizational Form in U.S. Life Insurance," ***American Economic Review*** 97, pp. 973-983 (2007)

"Insurance, Self Protection, and the Economics of Terrorism," (with Darius Lakdawalla), ***Journal of Public Economics*** 89, pp. 1891-1905 (2005)

"Terrorism Insurance Policy and the Public Good," (with Darius Lakdawalla), ***St. John's Journal of Legal Commentary*** 18, pp. 463-469 (2004)

"The Production and Regulation of Health Insurance: Limiting Opportunism in Proprietary and Non-Proprietary Organizations," (with Tomas Philipson) in *Individual Decisions for Health*, Bjorn Lindgren (ed.), pp. 194-206, Routledge International Studies in Health Economics, Routledge: London (2003)

"Pricing and Capital Allocation in Catastrophe Insurance," ***Journal of Financial Economics*** 65, pp. 283-305 (2002) [reprinted in *Insurance and Risk Management Volume I: Economics of Insurance Markets*, Gregory Niehaus (ed.), Northampton: Edward Elgar Publishing, (2008)]

Publications: Professional/Practitioner

Book review of "Moral Hazard in Health Insurance," *Journal of Economic Literature* 53, pp. 682-3 (2015)

"Microinsurance Lessons from History," (with Rick Koven), *Microinsurance Learning and Knowledge (MILK)* (2013)

"Institutional Investors and Asset Allocations: Accounting and Regulation of Private Defined Benefit Pension Plans and Other Institutional Investors in the United States, Mexico, and Australia," (with John Broadbent, Michael Palumbo, and Julio Santaella), *CGFS Publication No. 27*, *Working Group on Institutional Investors, Global Savings, and Asset Allocation* (2006)

"An Overview of Political Risk Insurance" (with Kausar Hamdani and Elise Liebers), *CGFS Publication No. 22, Working Group on Foreign Direct Investment in the Financial Sector of Emerging Market Economies* (2005)

Work in Progress

"Market Discipline and Guaranty Funds in Life Insurance," (with Martin Grace, Shinichi Kamiya, and Robert W. Klein), working paper, 2019

"The Effect of Government Guarantees on Market Discipline in the Property-Casualty Insurance Industry," (with Yiling Deng and Ty Leverty), working paper, 2019

"The Marginal Cost of Risk in a Multi-Period Model," (with Daniel Bauer), working paper, 2019. [Winner of Casualty Actuarial Society Hachemeister Prize, 2015]

"An Integrated Approach to Measuring Asset and Liability Risks in Financial Institutions," (with Daniel Bauer), working paper, 2019

"Optimal Insurance Contracts with Insurer Background Risk," (with Xiaohu Ping), working paper, 2015

"The Effect of Banking Crises: Evidence from Non-Life Insurance Consumption," (with Shinichi Kamiya and Jackie Li), working paper, 2015

"Bankruptcy in the Core and Periphery of Financial Groups: The Case of the Property-Casualty Insurance Industry" working paper, 2010

"The Rise and Fall of the Fraternal Life Insurer: Law and Organizational Form in U.S. Life Insurance, 1870-1920," working paper, (*revise and resubmit, Journal of Law & Economics),* 2007

"Organizational Form and the Underwriting Cycle: Theory with Evidence from the Pennsylvania Fire Insurance Market, 1873-1909," working paper, 2004

"Consumption versus Production of Insurance," (with Tomas Philipson), *NBER Working Paper #6225,* 1997

External Research Projects and Consulting

2017	Expert Witness, Florida Workers' Compensation Rate Hearing
2016	Expert Witness, Virginia Assigned Risk Workers' Compensation Rate Hearing
2015	Expert Witness, Florida Workers' Compensation Rate Hearing
2015	NCCI Revision of Underwriting Profit and Contingency Internal Rate of Return Model
2015	An Extension of the Project on the Costs of Holding Capital, sponsored by the CAS
2013	Microinsurance Centre Lessons from History Project
2012	Allocation of the Costs of Holding Capital, sponsored by the CAS,
2011	CRO Risk Index Project, co-sponsored by SOA and Bloomberg, co-founder
2009	"The Financial Crisis and Lessons for Insurers," $50,000 SOA grant, role: report co-author

Papers Presented at Professional Meetings

2019	"An Integrated Approach to Measuring Asset and Liability Risks in Financial Institutions," ARIA Annual Meeting, San Francisco, CA
2019	"An Integrated Approach to Measuring Asset and Liability Risks in Financial Institutions," RTS Annual Seminar, Tuscaloosa, AL
2017	"The Effect of Government Guarantees on Market Discipline in the Property-Casualty Insurance Industry," NBER Insurance Project Workshop, Boston, MA
2015	"The Marginal Cost of Risk in a Multi-Period Model," NBER Insurance Project Workshop, Stanford, CA
2015	"The Marginal Cost of Risk in a Multi-Period Model," CAS Annual Meeting, Philadelphia, PA
2015	"Dynamic Capital Allocation," IME Annual Conference, Liverpool UK

2015 "What Drives Tort Reform Legislation? Economics and Politics of the State Decisions to Restrict Liability Torts," ASSA Annual Meeting, Boston, MA
2014 "The Marginal Cost of Risk in a Multi-Period Model," CAS Centennial, New York, NY
2014 "Market Discipline and Guaranty Funds in Life Insurance," EGRIE Annual Seminar, St. Gallen, CH
2014 "Dynamic Capital Allocation with Irreversible Investments," EGRIE Annual Seminar, St. Gallen, CH
2014 "What Drives Tort Reform Legislation? Economics and Politics of the State Decisions to Restrict Liability Torts," ARIA Annual Meeting, Seattle, WA
2014 "The Marginal Cost of Risk in a Multi-Period Model," ARIA Annual Meeting, Seattle, WA
2014 "Market Discipline and Guaranty Funds in Life Insurance," ARIA Annual Meeting, Seattle, WA
2014 "The Marginal Cost of Risk in a Multi-Period Model," IME Conference, Shanghai, CN
2014 "The Effect of Banking Crises: Evidence from Non-Life Insurance Consumption," Risk Theory Seminar, Munich, Germany
2013 "The Effect of Banking Crises: Evidence from Non-Life Insurance Consumption," ASSA Annual Meeting, Philadelphia, PA
2013 "Optimal Insurance Contracts with Insurer Background Risk," EGRIE Annual Meeting, Paris, FR
2013 "The Effect of Banking Crises: Evidence from Non-Life Insurance Consumption," ARIA Annual Meeting, Washington D.C.
2013 "The Marginal Cost of Risk, Risk Measures, and Capital Allocation," IRFRC Catastrophe Risk Conference, Singapore
2013 "Optimal Insurance Contracts with Insurer Background Risk," ARIA Annual Meeting, Washington D.C.
2013 "The Marginal Cost of Risk, Risk Measures, and Capital Allocation," CEAR/ETH Indices of Risk and New Risk Measures Conference, Zurich, CH
2012 "The Marginal Cost of Risk, Risk Measures, and Capital Allocation," CAS Spring Meeting, Phoenix, AZ
2012 "The Marginal Cost of Risk, Risk Measures, and Capital Allocation," Symposium: Risk and Catastrophic Events, State College, PA
2012 "The Marginal Cost of Risk, Risk Measures, and Capital Allocation," ASSA Annual Meeting, Chicago, IL
2011 "The Marginal Cost of Risk, Risk Measures, and Capital Allocation," NBER Insurance Project Workshop, Cambridge, MA
2010 "Bankruptcy in the Core and Periphery of Financial Groups: The Case of the Property-Casualty Insurance Industry," ASSA Annual Meeting, Atlanta, GA
2009 "Bankruptcy in the Core and Periphery of Financial Groups: The Case of the Property-Casualty Insurance Industry," Risk Management and Corporate Governance Conference, Loyola University of Chicago
2009 "Bankruptcy in the Core and Periphery of Financial Groups: The Case of the Property-Casualty Insurance Industry," ARIA Annual Meeting, Providence, RI
2008 "An Economic Approach to Capital Allocation," Risk Theory Society, Annual Meeting, Fort Collins, CO
2007 "Federal Financial Exposure to Catastrophic Risk," ARIA Annual Meeting, Quebec City, CA
2007 "Catastrophe Bonds, Reinsurance, and the Optimal Collateralization of Risk Transfer," EFMA Annual Meeting, Vienna, AT
2007 "Catastrophe Bonds, Reinsurance, and the Optimal Collateralization of Risk Transfer," 5th Infiniti Conference on International Financial Integration, Dublin, IE
2007 "Federal Financial Exposure to Catastrophic Risk," NBER Conference on Measuring and Managing Federal Financial Risk, Evanston, IL
2006 Insuring Catastrophic Losses: The Status of TRIA and Proposed Natural Disaster Backstops, Wash., D.C.
2006 "Catastrophe Bonds, Reinsurance, and the Optimal Collateralization of Risk Transfer," Risk Theory Society, Annual Meeting, Richmond,VA
2006 "Public versus Private Underwriting of Catastrophe Risk: Lessons from the California Earthquake Authority," Berkeley Symposium on Real Estate, Catastrophic Risk, and Public Policy
2006 "Catastrophe Bonds, Reinsurance, and the Optimal Collateralization of Risk Transfer," NBER Insurance Project Workshop, Cambridge, MA
2005 "Regulation, Capital, and the Evolution of Organizational Form in U.S. Life Insurance," NBER Insurance Project Workshop, Cambridge, MA

2004 "The Rise and Fall of the Fraternal Life Insurer: Law and Organizational Form in U.S. Life Insurance," NBER Insurance Project Workshop, Cambridge, MA
2004 "Regulation, Capital, and the Evolution of Organizational Form in U.S. Life Insurance," American Finance Association, Annual Meeting, San Diego, CA
2003 "Insurance, Self-Protection, and the Economics of Terrorism," Risk Theory Society, Annual Meeting, Atlanta, GA
2003 "Terrorism Insurance Policy and the Public Good," St. John's Journal of Legal Commentary 10th Annual Legal Symposium: Terrorism and its Impact on Insurance: Legislative Responses and Coverage Issues, Queens, NY
2003 "Insurance, Self-Protection, and the Economics of Terrorism," NBER Insurance Project Workshop, Cambridge, MA
2002 "Pricing and Capital Allocation in Catastrophe Insurance," CAS Risk and Capital Management Seminar, Toronto, CA
2002 "Market Discipline and Government Guarantees in U.S. Life Insurance," Risk Theory Society, Annual Meeting, Urbana-Champaign, IL
2001 "Pricing and Capital Allocation in Catastrophe Insurance," Risk Theory Society, Annual Meeting, Montreal

Other Conferences Talks and Panel Participation

2017 International Conference on Business Sciences, Cairo University, Egypt
2016 IIF Insurance Colloquium, Basel, Switzerland
2016 Surplus Lines Association of California, California (keynote)
2014 Surplus Lines Automation Conference, Florida
2011 PRMIA Annual Risk Leadership Conference, Atlanta, GA
2011 7th International Microinsurance Conference, Rio de Janeiro, Brazil
2010 Property Loss Research Bureau Eastern Adjusters Conference, Atlanta, GA (keynote)
2008 NCOIL Annual Meeting, Duck Key, FL
2007 Capital Markets Symposium on Securitizing Insurance Risk, New York, NY
2006 Insuring Catastrophic Losses: The Status of TRIA and Proposed Natural Disaster Backstops, Wash., D.C.
2006 Catastrophe Bonds and Insurance Linked Securities Summit, New York, NY
2005 12th Annual International Conference Promoting Business Ethics, New York, NY

Service Activities in Academic and Professional Organizations

American Risk & Insurance Association President (2012-13)
Risk Theory Society President (2011-2012)
American Risk & Insurance Association Board Member (2007-2014)
International Research Advisory Board, Risk and Insurance Research Center, NCCU, Taiwan
Editorial Board, *Journal of Insurance Issues* (2012-2014)
Senior Editor, Journal of Risk and Insurance (2019-)
Huebner Colloquium Panelist (2016-2019)

External Committees
American Risk & Insurance Association Program Committee, 2006, 2011, 2012; ARIA Nominations Committee, 2015, 2016; Kulp-Wright Book Award Committee, 2005

Discussant: *ARIA Annual Meeting, San Francisco, 2019; ARIA Annual Meeting, Chicago, 2018; ARIA Annual Meeting, Boston, 2016; SIFR Insurance Conference, Stockholm, 2015; EGRIE Annual Seminar, St. Gallen, 2014*; *ARIA Annual Meeting, Seattle, 2014; ARIA Annual Meeting, San Diego, 2011; CEAR*

Workshop on Insurance for the Poor, Atlanta, 2010; *CEAR Workshop on Risk Perception and Subjective Beliefs, Atlanta, 2010*; *Midwest Finance Association Annual Meeting, Chicago, 2009; 5th Infiniti Conference, Dublin, 2007; EFMA Annual Meeting, Vienna, 2007; AEA Annual Meeting, San Diego, 2004*

Session Chair: *ARIA Annual Meeting, Chicago, 2018, ARC, Atlanta, 2017; IME, Atlanta, 2017; ARIA Annual Meeting, San Diego, 2011; Midwest Finance Association Annual Meeting, Chicago, 2009; ARIA Annual Meeting, Quebec City, 2007; EFMA Annual Meeting, Vienna, 2007;*

Referee for *Asia-Pacific Journal of Risk and Insurance, Astin Bulletin, Australian Social Monitor, Contemporary Economic Policy, Current Issues in Economics and Finance, Defense and Peace Economics, European Economic Review, Financial Review, Geneva Papers: Issues and Practice, Geneva Risk and Insurance Review, Health Affairs, Insurance: Mathematics and Economics, Journal of Banking and Finance, Journal of Business, Journal of Finance, Journal of Financial Intermediation, Journal of Financial Services Research, Journal of Law and Economics, Journal of Money, Credit, and Banking, Journal of Political Economy, Journal of Risk and Insurance, Management Science, North American Actuarial Journal, Proceedings of the National Academy of Sciences, Review of Financial Studies, Risk Management and Insurance Review, Scandinavian Actuarial Journal,* and *Science.*

Working Group Participation

Committee on the Global Financial System, Working Group on Institutional Investors, Global Savings, and Asset Allocation (2006); *Presidential Working Group on Financial Markets, Working Group on Terrorism Insurance* (2006)

Continuing Education Activities

2004-2007	Central Banking Seminar, Federal Reserve Bank of New York, Topics: Introduction to U.S. Financial Markets; Introduction to Non-bank Financial Institutions
2009	Texas Farm Bureau Program, Georgia State University, Topic: Securitization, the Insurance Industry, and the Panic of 2007
2009-2012	Horst K. Jannott Visiting Fellows Program, Georgia State University, Topics: Securitization, the Insurance Industry, and the Panic of 2007; Introduction to Statistics;

NCRB - Pro Forma Statutory Rate of Return
Workers Compensation

		Pre-Tax	Tax Liability	Post-Tax
1	**Premiums**	100.00%		
	Loss & LAE	60.90%		
	Commissions	5.00%		
	Other Acquisition & General	3.24%		
	Taxes, Licenses & Fees	2.66%		
	Servicing Carrier Allowance & Other	17.53%		
	Uncollectible Premium	6.17%		
2	**Pro Forma Underwriting Profit**	4.50%		
3	**Regular Tax**		0.95%	
4	**Additional Tax Due to IRS Treatment of Reserves**		0.11%	
5	**Return from Underwriting Post-Tax**			3.44%
6	**Investment Gain on Insurance Transaction**	10.28%	1.70%	8.59%
7	**Statutory Return as a Percent of Premium (post-tax)**			12.03%
8	**Premium-to-Net Worth Ratio**			0.68
9	**Statutory Return as a Percent of Net Worth (post-tax)**			8.12%

Lines (1) to (8) are expressed as a percentage of premium.

Assumptions and Parameters

(a)	Underwriting Income Tax Rate	21.00%
(b)	Investment Income Tax Rate	16.52%
(c)	Pre-tax Investment Yield	3.82%
(d)	Premium-to-Surplus Ratio	0.771
(e)	Net Worth-to-Surplus Ratio	1.14
(f)	Uncollectible Premium (adjusted for expense offsets)	6.17%
(g)	Additional Tax Due to IRS Treatment of Loss Reserves and UEPR	0.11%
(h)	Prepaid Expense Ratio	25.75%
(i)	Unearned Premium Reserve to Premium Ratio	33.41%

Notes to Exhibit RB-13 Page 1

1 Selected expense provisions from the filing. Servicing carrier allowance times servicing carrier market share 0.2412 x 0.72667 = 0.1753. Other Acquisition & General (OA&G) based on 2017 Total Industry Direct IEE for Workers Compensation line (source: 2018 A.M. Best Aggregates and Averages) times direct assignment market share: 0.1185 x 0.27333 = 0.0324.

2 Selected by North Carolina Rate Bureau

3 (2) x (a)

4 See Exhibit RB-13, Page 3

5 (2) - (3) - (4)

6 See Exhibit RB-13, Pages 4-7

7 (5) + (6)

8 (d) / (e)

9 (7) x (8)

Assumptions

(a) Current corporate tax rate, based on the Tax Cut and Jobs Act of 2017.
(b) See Exhibit RB-13, Pages 8-10. Calculated as 1- average post-tax yield/average pre-tax yield.
(c) See Exhibit RB-13, Page 6, with supporting information on Pages 8-10
(d) See Exhibit RB-13, Page 11
(e) See Exhibit RB-13, Page 12
(f) See RB-1, Exhibit II-F
(g) See Exhibit RB-13, Pages 3, 3A, and 3B
(h) See Exhibit RB-13, Page 4
(i) See Exhibit RB-13, Pages 4-5

NCRB - Pro Forma Total Rate of Return
(Including Investment Income on Surplus)
Workers Compensation

		Pre-Tax	Tax Liability	Post-Tax
1	**Premiums**	100.00%		
	Loss & LAE	60.90%		
	Commissions	5.00%		
	Other Acquisition & General	3.24%		
	Taxes, Licenses & Fees	2.66%		
	Servicing Carrier Allowance & Other	17.53%		
	Uncollectible Premium	6.17%		
2	**Pro Forma Underwriting Profit**	4.50%		
3	**Regular Tax**		0.95%	
4	**Additional Tax Due to IRS Treatment of Reserves**		0.11%	
5	**Return from Underwriting Post-Tax**			3.44%
6	**Investment Gain on Insurance Transaction**	10.28%	1.70%	8.59%
7	**Investment Gain on Surplus**	5.29%	0.87%	4.41%
8	**Total Return as a Percent of Premium (post-tax)**			16.44%
9	**Premium-to-Net Worth Ratio**			0.68
10	**Total Return as a Percent of Net Worth (post-tax)**			11.10%

Lines (1) to (8) are expressed as a percentage of premium.

Assumptions and Parameters

(a)	Underwriting Income Tax Rate	21.00%
(b)	Investment Income Tax Rate	16.52%
(c)	Pre-tax Investment Yield	3.82%
(d)	Premium-to-Surplus Ratio	0.77
(e)	Net Worth-to-Surplus Ratio	1.14
(f)	Uncollectible Premium (adjusted for expense offsets)	6.17%
(g)	Additional Tax Due to IRS Treatment of Loss Reserves and UEPR	0.11%
(h)	Prepaid Expense Ratio	25.75%
(i)	Unearned Premium Reserve to Premium Ratio	33.41%

Notes to Exhibit RB-13 Page 1

1 Selected expense provisions from the filing. Servicing carrier allowance times servicing carrier market share 0.2412 x 0.72667 = 0.1753. Other Acquisition & General (OA&G) based on 2017 Total Industry Direct IEE for Workers Compensation line (source: A.M. Best Aggregates and Averages) times direct assignment market share: 0.1185 x 0.27333 = 0.0324.

2 Selected by North Carolina Rate Bureau

3 (2) x (a)

4 See Exhibit RB-13, Page 3

5 (2) - (3) - (4)

6 See Exhibit RB-13, Pages 4-7

7 (c) x [(1 / (d)) + (h) x (i)]

8 (5) + (6) + (7)

9 (d) / (e)

10 (8) x (9)

Assumptions

(a) Current corporate tax rate, based on the Tax Cut and Jobs Act of 2017.
(b) See Exhibit RB-13, Pages 8-10. Calculated as 1- average post-tax yield/average pre-tax yield.
(c) See Exhibit RB-13, Page 6, with supporting information on Pages 8-10
(d) See Exhibit RB-13, Page 11
(e) See Exhibit RB-13, Page 12
(f) See RB-1, Exhibit II-F
(g) See Exhibit RB-13, Pages 3, 3A, and 3B
(h) See Exhibit RB-13, Page 4
(i) See Exhibit RB-13, Pages 4-5

North Carolina
Workers Compensation
Calculation of Additional Tax Liability

1. Collected Earned Premium for Current Year	100.00%
2. Unearned Premium Reserve 12/31/Current	33.14%
3. Unearned Premium Reserve 12/31/Prior	33.04%
4. Increase: (2) - (3)	0.10%
5. 20% of Increase = Taxable Income	0.02%
6. Additional Tax Liability due to Unearned Premium Reserve	0.00%
7. Unpaid Loss Current Year	158.68%
8. Discounted Unpaid Loss Prior Year	135.59%
9. Unpaid Loss Prior Year	153.83%
10. Discounted Unpaid Loss Prior Year	131.26%
11. Additional Income	0.52%
12. Additional Tax Liability due to Loss Reserve Discounting	0.11%
13. Total Additional Tax Liabilities (6) + (12)	0.11%

NORTH CAROLINA
Workers Compensation
Calculation of Taxable Income

Calculation of Unpaid Loss for Current Accident Year					Calculation of Discounted Unpaid Loss for Current Accident Year			Calculation of Discounted Unpaid Loss for Prior Accident Year			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AY Avg Acc Date	AY Pay Pattern	Percent Unpaid	Total Losses	Unpaid Losses	AY at 12/31 yr t	Discount Factor	Discounted Unpaid Loss	AY at 12/31/yr t-1	Unpaid Losses	Discount Factor	Discounted Unpaid Loss
0.5	26.50%	73.50%	60.901	44.76	2018	0.874184	39.1302				
1.5	55.05%	44.95%	60.715	27.29	2017	0.858524	23.4303	2017	44.625	0.874184	39.0109
2.5	72.20%	27.80%	60.530	16.83	2016	0.846991	14.2525	2016	27.208	0.858524	23.3588
3.5	80.10%	19.90%	60.345	12.01	2015	0.831346	9.9834	2015	16.776	0.846991	14.2091
4.5	84.00%	16.00%	60.161	9.63	2014	0.825478	7.9459	2014	11.972	0.831346	9.9529
5.5	86.30%	13.70%	59.977	8.22	2013	0.819913	6.7372	2013	9.596	0.825478	7.9216
6.5	87.70%	12.30%	59.795	7.35	2012	0.823684	6.0580	2012	8.192	0.819913	6.7166
7.5	88.85%	11.15%	59.612	6.65	2011	0.832518	5.5335	2011	7.332	0.823684	6.0395
8.5	89.90%	10.10%	59.430	6.00	2010	0.838871	5.0353	2010	6.626	0.832518	5.5167
9.5	90.65%	9.35%	59.249	5.54	2009	0.858606	4.7565	2009	5.984	0.838871	5.0199
10.5	91.15%	8.85%	59.068	5.23	2008	0.87132	4.5549	2008	5.523	0.858606	4.7420
11.5	91.85%	8.15%	58.888	4.80	2007	0.884289	4.2440	2007	5.212	0.87132	4.5410
12.5	92.55%	7.45%	58.708	4.37	2006	0.897517	3.9255	2006	4.785	0.884289	4.2311
13.5	92.95%	7.05%	58.529	4.13	2005	0.911009	3.7591	2005	4.360	0.897517	3.9136
14.5	93.50%	6.50%	58.351	3.79	2004	0.924766	3.5075	2004	4.114	0.911009	3.7476
15.5	93.95%	6.05%	58.173	3.52	2003	0.938755	3.3039	2003	3.781	0.924766	3.4968
16.5	94.15%	5.85%	57.995	3.39	2002	0.953051	3.2334	2002	3.509	0.938755	3.2938
17.5	94.70%	5.30%	57.818	3.06	2001	0.967511	2.9648	2001	3.382	0.953051	3.2236
18.5	95.25%	4.75%	57.642	2.74	2000	0.981886	2.6884	2000	3.055	0.967511	2.9558
19.5	95.55%	4.45%	57.466	2.56	1999	0.98464	2.5180	1999	2.730	0.981886	2.6802
20.5	95.85%	4.15%	57.291	2.38	1998	0.98464	2.3411	1998	2.549	0.98464	2.5103
21.5	96.15%	3.85%	57.116	2.20	1997	0.98464	2.1652	1997	2.370	0.98464	2.3339
22.5	96.45%	3.55%	56.942	2.02	1996	0.98464	1.9904	1996	2.192	0.98464	2.1586
23.5	96.75%	3.25%	56.768	1.84	1995	0.98464	1.8166	1995	2.015	0.98464	1.9843
24.5	97.05%	2.95%	56.595	1.67	1994	0.98464	1.6439	1994	1.839	0.98464	1.8111
25.5	97.35%	2.65%	56.422	1.50	1993	0.98464	1.4722	1993	1.664	0.98464	1.6389
26.5	97.65%	2.35%	56.250	1.32	1992	0.98464	1.3016	1992	1.491	0.98464	1.4677
27.5	97.95%	2.05%	56.079	1.15	1991	0.98464	1.1320	1991	1.318	0.98464	1.2976
28.5	98.25%	1.75%	55.908	0.98	1990	0.98464	0.9634	1990	1.146	0.98464	1.1285
29.5	98.55%	1.45%	55.737	0.81	1989	0.98464	0.7958	1989	0.975	0.98464	0.9604
30.5	98.85%	1.15%	55.567	0.64	1988	0.98464	0.6292	1988	0.806	0.98464	0.7933
31.5	99.15%	0.85%	55.398	0.47	1987	0.98464	0.4636	1987	0.637	0.98464	0.6273
32.5	99.45%	0.55%	55.229	0.30	1986	0.98464	0.2991	1986	0.469	0.98464	0.4622
33.5	99.75%	0.25%	55.060	0.14	1985	0.98464	0.1355	1985	0.303	0.98464	0.2982
34.5	100.00%	0.00%	54.892	0.00	1984	0.98464	0.0000	1984	0.137	0.98464	0.1351
Totals				158.68			135.59		153.83		131.26

Notes to Pages 3 and 3A

Page 3

2	Page 5, line (2) divided by Page 5, line (1)
3	(2) / (1 plus the 10 year average growth rate of North Carolina Workers Compensation DPW)
4	(2) - (3)
5	(4) x 20%
6	(5) x current corporate tax rate
7	Unpaid current-year losses at year-end as a percent of current year premium. Sum of Page 3A, Column (5)
8	Discounted unpaid current-year losses at year-end as a percent of current year premium. Sum of Page 3A, Column (8)
9	Unpaid prior-year losses at year-end as a percent of current year premium. Sum of Page 3A, Column (10)
10	Discounted unpaid prior-year losses at year-end as a percent of current year premium. Sum of Page 3A, Column (12)
11	Change in loss reserve discount: [(7) - (8)] - [(9) - (10)]
12	(11) x current corporate tax rate
13	(6) + (12)

Page 3A

1	Midpoint of number of years since end of accident period
2	Most recent available loss payment pattern for North Carolina Workers Compensation. Source: NCCI
3	1 - (2)
4	Latest period losses are based on projected loss ratio from Page 1. For previous years, losses are detrended at the 10 year average DPW growth rate for North Carolina Workers Compensation.
5	(3) x (4)
6	Accident Year at current year end
7	IRS discount factors for Workers Compensation for most recent tax year from Rev. Proc. 2019-06
8	(5) x (7)
9	Accident Year at prior year end
10	Column (3), previous period x Column (4), current period
11	IRS discount factors for Workers Compensation for previous tax year from Rev. Proc. 2019-06
12	(10) x (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 Unearned Premium Reserve	33.41%	334,147
3. Deductions for Prepaid Expenses		
Commissions & Brokerage	5.00%	
Taxes, Licenses, & Fees (5/6)	2.22%	
Direct Assignment Carriers		
Other Acquisition & General (1/2)	1.62%	
Servicing Carriers		
Servicing Carrier Allowance (100%) + Other (1/2)	16.91%	
Total	25.75%	
4. Deduction for Prepaid Expense: (2) x (3)		86,030
5. Net Unearned Premium Reserve Subject to Investment (2) - (4)		248,117
B. Delayed Remission of Premiums (Agents Balances)		
1. Direct Earned Premiums		1,000,000
2. Average Agents Balances		0.099
3. Delayed Remissions: (1) x (2)		99,272
C. Loss and Loss Expense Reserves		
1. Direct Earned Premiums		1,000,000
2. Expected Incurred Loss & LAE-to-Premium Ratio	0.6090	609,007
3. Expected Mean Loss and LAE Reserve-to-Incurred Ratio	4.173	2,541,386
D. Net Policyholder Funds Subject to Investment (A5 - B3 + C3)		2,690,231
E. Average Rate of Return		3.82%
F. Investment Earnings from Net Reserves: (D) x (E)		102,842
G. Average Rate of Return as a Percent of Direct Earned Premiums: (F) / (A1)		10.28%

NORTH CAROLINA
Workers Compensation

ESTIMATED INVESTMENT EARNINGS ON UNEARNED PREMIUM RESERVES AND ON LOSS RESERVES

EXPLANATORY NOTES

Line A-1
Calculations displayed are per million of direct earned premiums.

Line A-2
The mean unearned premium reserve (UEPR) is determined by multiplying the direct earned premiums in line (1) by the ratio of the mean unearned premium reserve to the direct earned premium for the current calendar year ended 12/31. The data are for North Carolina Workers Compensation.

1	Direct Earned Premium for most recent calendar year	1,429,356,953
2	UEPR at end of most recent calendar year	473,709,312
3	UEPR at end of previous calendar year	481,521,335
4	Mean UEPR	477,615,324
5	Ratio [(4) / (1)]	33.41%

Line A-3
Deduction for prepaid expenses

Commissions are assumed to be incurred when the policy is written and before the premium is paid. In addition, 5/6 of Taxes, Licenses and Fees are assumed to be prepaid.

Servicing Carriers Market Share	72.67%
Direct Assignment Carriers Market Share	27.33%

The entire servicing carrier allowance and half of the other pool administration expense are assumed to be prepaid so the provision is calculated as: 0.72667 x [0.2242 + 0.5 x 0.017]. For direct assignment carriers, one-half of OA&G is assumed to be prepaid, so the provision is calculated as: 0.5 x 0.1185 x 0.27333.

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 percentage of premium still to be remitted is estimated, using the distribution of premium across months and assuming that the distribution by plan is the same within months.

NORTH CAROLINA
Workers Compensation

ESTIMATED INVESTMENT EARNINGS ON UNEARNED PREMIUM RESERVES AND ON LOSS RESERVES

EXPLANATORY NOTES

Line C-2
The expected loss and loss adjustment ratio reflects the expense provisions used in this filing.

Line C-3
The mean loss and LAE reserve-to-incurred ratio is based on the weighted average of the figure for servicing carriers and the figure for direct assignment carriers. For servicing carriers, the ratio is based only on losses, since LAE is included in the servicing carrier allowance. Market shares are used for the weights. Thus, the calculation is: 0.72667 x 4.231 + 0.27333 x 4.02 = 4.173

Line E
The average rate of return is the average of the pretax current yield calculated on Page 8 and the pretax embedded yield. The embedded yield (see Page 9) is the sum of the ratio of investment income to invested assets for the most recent year plus the ten year average ratio of capital gains to invested assets (see Page 10). The current yield is the estimated currently available rate of return (including both income and capital gains) on the industry investment portfolio (see Page 8).

Embedded Yield	3.42%
Current Yield	4.23%
Average	3.82%

North Carolina Workers Compensation
Ratios to Incurred Loss

Year	(1) Loss Reserve	(2) LAE Reserve	(3) Incurred Loss	(4) Incurred LAE	(5) ((1) + (2))/ ((3) + (4))
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	4.294	0.610	1.000	0.194	4.107
2016	4.562	0.671	1.000	0.233	4.245
2017	5.165	0.790	1.000	0.243	4.789
2018	5.804	0.894	1.000	0.206	5.553
Average	**4.231**				**4.020**

Source: NCCI

Portfolio Yield and Tax Rate - Current Yield

Investable Asset	Percent of Assets	Estimated Prospective Pre-Tax Return	Tax Rate	Estimated Prospective Post-Tax Return
Bonds				
US Gov't	9.80%	2.12%	21.00%	1.67%
Municipal	25.81%	1.77%	5.25%	1.68%
Industrial	28.53%	3.09%	21.00%	2.44%
Preferred Stock	0.34%	5.92%	13.13%	5.14%
Common Stock	26.13%	10.26%	19.20%	8.29%
Mortgage Loans	1.10%	4.01%	21.00%	3.17%
Real Estate	0.82%	7.72%	21.00%	6.10%
Cash & Short-term Investments	7.46%	2.33%	21.00%	1.84%
Rate of Return Before Expenses	100.00%	4.53%	18.31%	3.70%
Investment Expenses		0.30%	21.00%	0.24%
Portfolio Rate of Return		4.23%	18.12%	3.46%

Sources

Preferred Stock	Current yield on iShares Preferred Stock Index ETF, 7/2/2019
Real Estate	REIT Sector Cost of Equity, using 3 month average T-Bill for risk free rate, 7.93% ERP, 0.68 Beta (source: Damodaran Online)
Cash	3 month Treasury rate, averaged over 3 months (source: US Treasury)
Municipal	Maturity weighted average of 3 month average MBIS Investment Grade yield curve; linearly interpolated
Industrial	Three month average of HQM par yields (source: FRED); linearly interpolated
Treasury	Three month average of Treasury yields; linearly interpolated (source: US Treasury)
Common Stock	7.93% ERP (source: Damodaran Online) plus 3 month average T-Bill Rate
Investment Expenses	Investment Expenses from statutory Page 12 - Exhibit of Net Investment Income divided by Cash and Invested Assets from statutory Page 2 - Assets. Data is for the Total Property-Casualty Industry, sourced from the 2018 edition of A.M. Best's Aggregates and Averages.

Portfolio Yield and Tax Rate
Embedded Yield

		Income	Tax Rate
Bonds			
	Taxable	23,362,682	21.00%
	Non-Taxable	9,714,339	5.25%
Stocks			
	Taxable	7,610,774	13.13%
	Non-Taxable	1,785,853	5.25%
Mortgage Loans		755,495	21.00%
Real Estate		1,839,346	21.00%
Contract Loans		622	21.00%
Cash & Short Term Inv		980,167	21.00%
All Other		10,228,290	21.00%
Total		56,277,568	16.72%
Inv. Expenses		5,185,109	21.00%
Net Inv. Income		51,092,459	16.29%
Mean Invested Assets		1,676,831,258	
Inv. Inc. Yield Rate		3.05%	16.29%
Capital Gains (10 yr. avg.) (% of Inv. Assets)		0.37%	0.00%
Invest. Yield Rate (pre=tax)		3.42%	14.53%
Invest. Yield Rate (post-tax)		2.92%	

Source: A.M. Best's Aggregates and Averages, 2018 Edition, statutory Page 12 - Exhibit of Net Investment Income (Column 2 - Earned During Year) for Total Property-Casualty Industry. For capital gains, see Exhibit RB-13, Page 10.

Realized Capital Gains or Losses
As a Percentage of Mean Invested Assets
(Amounts in Thousands of Dollars)

Calendar Year	Mean Invested Assets	Realized Capital Gains Amount	Percent
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	1,400,656,619	9,035,405	0.65%
2013	1,473,600,834	12,163,890	0.83%
2014	1,543,882,375	12,093,078	0.78%
2015	1,567,611,077	9,887,732	0.63%
2016	1,596,937,470	8,086,268	0.51%
2017	1,676,831,258	15,725,303	0.94%
Total	14,520,158,422	53,556,926	0.37%

"Mean Invested Assets" is the average of current and prior year values for Cash and Invested Assets (from statutory Page 2). Sourced from 2008-2018 editions of A.M. Best's Aggregates and Averages. Capital gains are expressed net of taxes.

North Carolina

Workers Compensation

Premium-to-Surplus Ratios

Year	Net
2008	0.908
2009	0.678
2010	0.649
2011	0.739
2012	0.762
2013	0.786
2014	0.785
2015	0.815
2016	0.807
2017	0.785
Average	0.771

Data from NAIC Statutory Filings for all groups and unaffiliated companies writing Workers Compensation insurance in North Carolina. Weighted average of group level surplus-to-premium ratios is based on group level North Carolina Workers Compensation premiums, which is then inverted for the premium-to-surplus ratio.

North Carolina
Workers Compensation
Calculation of Ratio of GAAP Net Worth to Statutory Surplus

	2012	2013	2014	2015	2016
Policyholder Surplus	587,061,063,988	653,380,281,255	675,233,591,461	674,150,481,028	700,833,588,840
+ Deferred Acquisition Costs	28,717,782,350	30,010,149,317	31,242,614,928	32,401,590,297	33,046,102,666
+ Non-Admitted DTA Provision	12,829,214,564	11,638,345,594	11,237,499,832	12,112,807,244	11,544,280,333
+ Non-admitted Assets (non-tax part)	36,238,971,886	33,348,888,924	33,563,586,431	40,260,421,135	43,722,898,341
+ Provision for Reinsurance	2,595,871,371	2,471,928,096	2,392,301,235	2,251,585,712	2,185,395,913
+ Provision for FASB 115 (after-tax)	42,220,449,087	14,722,750,582	25,814,318,855	16,081,984,811	10,015,172,605
- Surplus Notes	(12,279,333,642)	(12,190,299,603)	(11,673,768,635)	(12,446,044,946)	(12,027,889,160)
GAAP-adjusted Net Worth	697,384,019,604	733,382,044,165	767,810,144,106	764,812,825,281	789,319,549,538
Ratio of Net Worth to Surplus	1.19	1.12	1.14	1.13	1.13
Five Year Average	1.14				

Source: ISO

Sample of Findings on the Private Company Discount

Study	Years	Discount	Type
Emory (1994)	1992-1993	45%	IPO
Willamette Management Associates (various)	1975-1997	29% to 60%	IPO
Garland and Reilly (2004)	1998-2002	35%	IPO
Larcker et al. (2018)	2017	39% to 47%	IPO
Koeplin et al. (2000)	1984-1998	20% to 30%	Acquisitions
Block (2007)	1999-2006	20% to 25%	Acquisitions
Officer (2007)	1979-2003	15% to 30%	Acquisitions
Paglia and Harjoto (2010)	1993-2008	65% to 70%	Acquisitions
Jaffe et al. (2018)	1985-2014	0%	Acquisitions
Silber (1991)	1981-1988	34%	Restricted Stock
Johnson (1999)	1991-1995	20%	Restricted Stock
Bajaj et al. (2001)	1990-1995	7%	Private placements
Comment (2012)	2004-2010	5% to 6%	Private placements
Finnerty (2013)	1991-1997	21%	Private placements
Finnerty (2013)	1997-2007	15%	Private placements
Chen et al. (2015)	1999-2012	10%	Private placements

William L. Silber (1991), "Discounts on Restricted Stock: The Impact of Illiquidity on Stock Prices," Financial Analyst Journal, July-August 1991, 60-64.

John D. Emory, "The Value of Marketability as Illustrated in Initial Public Offerings of Common Stock-February 1992 through July 1993," Business Valuation Review, March 1994, 3-7.

BA Johnson (1999), "Quantitative Support for Discounts for Lack of Marketability" Business Valuation Review 16, 152-55.

John Koeplin, Atulya Sarin, Alan C. Shapiro (2000), "The Private Company Discount," Journal of Applied Corporate Finance 12, 94-101.

Mukesh Bajaj, David J. Denis, Stephen P Ferris, and Atulya Sarin (2001), "Firm Value and Marketability Discounts," Journal of Corporation Law 27, 89-115.

Garland, P.J., and Reilly, A.L. (2004), "Update on the Willamette Management Associates Pre-IPO Discount for Lack of Marketability Study for the Period 1998-2002," Willamette Management Associates Insights, Spring 2004, 38-44.

Block, S. (2007), "The Liquidity Discount in Valuing Privately Owned Companies," Journal of Applied Finance 17(2), 33-40.

Officer, M.S. (2007), "The Price of Corporate Liquidity: Acquisition Discounts for Unlisted Targets," Journal of Financial Economics 83(3), 571-598.

John K. Paglia and Maretno Harjoto (2010), "The Discount for Lack of Marketability in Private Companies: A Multiples Approach," Journal of Business Valuation and Economic Loss Analysis 5(1), Article 5.

Robert Comment (2012), "Revisiting the Illiquidity Discount: A New (and Skeptical) Restricted Stock Study," Journal of Applied Corporate Finance 24, 80-91.

John D. Finnerty (2013), "The Impact of Stock Transfer Restrictions on the Private Placement Discount," Financial Management 42, 575-609.

Chen, Linda H., Edward A. Dyl, George J. Jiang, and Januj A. Juneja (2015), "Risk, Illiquidity, or Marketability: What Matters for the Discounts on Private Placements?" Journal of Banking and Finance 57, 41-50.

Jeffrey F. Jaffe, Jan Jindra, David J. Pedersen, and Torben Voetmann (2018), "Do Unlisted Targets Sell at Discounts?" Journal of Financial and Quantitative Analysis, forthcoming.

David F. Larcker, Brian Tayan, and Edward Watts (2018), "Cashing it In: Private Company Exchanges and Employee Sales Prior to IPO," Stanford Closer Look Series, CGRP-73

* The Willamette research studies were unpublished but reported in Business Valuation Discounts and Premiums, Chapter 5, by Shannon Pratt (New York: John Wiley & Sons, Inc., p. 85).