

State of Missouri
Department of Commerce and Insurance

Actuarial Review of
NCCI Voluntary Market Advisory Loss Cost Filing
Effective January 1, 2020

October 2020

Prepared by:



STATE OF MISSOURI
DEPARTMENT OF COMMERCE AND INSURANCE

ACTUARIAL REVIEW OF
NCCI VOLUNTARY MARKET ADVISORY LOSS COST FILING
EFFECTIVE JANUARY 1, 2020

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STATE OF MISSOURI
DEPARTMENT OF COMMERCE AND INSURANCE

ACTUARIAL REVIEW OF
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EXECUTIVE SUMMARY

A. Introduction/Scope

Actuarial Solutions has been engaged by the Missouri Department of Commerce and Insurance (the “Department”) to conduct an independent actuarial review of the National Council on Compensation Insurance’s (NCCI) Missouri workers compensation voluntary market advisory loss cost filing effective January 1, 2020. We were asked by the Department to:

- review the NCCI’s ratemaking data, methods and assumptions to determine if the proposed loss costs meet the requirements of Missouri law and are actuarially sound;
- identify the effect on the filed loss costs if the NCCI had excluded assigned risk loss experience;
- conduct an independent analysis of the Missouri loss costs and recommend an alternative overall loss cost change, if warranted by our findings.

B. Summary of the NCCI Filing

The NCCI has filed an overall decrease in loss costs of 1.6% effective January 1, 2020. This decrease is smaller than the changes of -3.5% and -3.0% filed by the NCCI effective January 1, 2019 and January 1, 2018, respectively.

The 1.6% decrease filed by the NCCI is comprised of several items, including changes in experience, trend, Missouri workers compensation benefit levels and loss adjustment expense (LAE). The first component of the loss cost change is a decrease of 3.2% due to loss experience and development. The combined impact of the increase in the annual indemnity trend from -2.5% to -2.0%, and the increase in the annual medical trend from -1.5% to -1.0%, causes an increase of 1.8% in the loss cost level. The effect of Missouri benefit changes causes an increase of 0.0% in the loss costs. Finally, the impact of reflecting an 18.7% LAE provision in lieu of the January 1, 2019 LAE provision of 18.8% produces an indicated decrease of 0.1%.

C. Overall Findings

We find the NCCI's calculations to be actuarially sound. Three areas in which we have exercised alternative actuarial judgment with respect to the filing are the loss development, trend and LAE components of the indication.

1. *Development*

The NCCI has chosen its loss development factors (LDFs) based upon the application of various rules. For example, the NCCI selected age-to-age paid LDFs by taking the arithmetic average of the three most recent factors, and selected paid plus case LDFs by taking the average of the most recent five factors. We do not take exception to the rules utilized by the NCCI, but prefer to select each LDF judgmentally. Some of our LDFs vary from the corresponding LDF utilized by the NCCI. Overall, the experience indication based upon our selected development factors would be 0.4% higher than the NCCI's experience indication.

2. *Trend*

With respect to trend, we selected -2.25% as compared to the NCCI's selected annual indemnity loss ratio trend of -2.0%. Additionally, we selected an annual medical loss ratio trend equal to the NCCI's selection of -1.0%. The impact of changing the annual indemnity trend factor is a decrease from the NCCI's loss cost indication of 0.3%, all else equal.

3. *LAE Provision*

The NCCI's selected Missouri provision for LAE is slightly smaller than the LAE provision we are recommending. More specifically, the NCCI's selections result in a Missouri LAE provision of 18.7%; our alternative judgment supports the use of a Missouri LAE provision of 18.8%. Moving from 18.7% to 18.8% causes the indicated impact due to the LAE factor to increase by 0.1% (from -0.1% to 0.0%), all else equal.

Taking into consideration all elements reviewed, as discussed herein, we recommend an indicated Missouri voluntary market advisory loss cost change of -1.5% effective January 1, 2020 as compared to the NCCI's filed change of -1.6%.

Additionally, we would like to note the following observations which do not impact our recommended Missouri voluntary market advisory loss cost change:

1. The NCCI determined that excluding data for the assigned risk market from the experience component would decrease the indicated loss cost change to -3.9%. However, we believe it is appropriate to include the assigned risk data and, therefore, would not recommend modifying the NCCI's January 1, 2020 Missouri filing to exclude the impact of the assigned risk market.

2. The NCCI previously incorporated defense and cost containment expense (DCCE) into its Missouri filings based upon an approach which applied a state relativity to a selected countrywide DCCE ratio. This private carrier Missouri DCCE ratio was then weighted with the state fund DCCE ratio to produce an overall DCCE ratio. The approach now implemented by the NCCI directly calculates the Missouri DCCE ratio based upon policy year state-specific data from Financial Call #3, which includes both private carrier and state fund data. In response to an interrogatory relating to the January 1, 2020 filing, the NCCI noted that had this procedure been implemented last year, the DCCE ratio in the January 1, 2019 filing would have been 10.5% rather than 10.7%. Given the limited magnitude of the change in the DCCE provision due to the new approach, as well as the consistency between the DCCE, loss and premium data reflected in the filing, we do not take exception to the NCCI's methodology change.
3. The NCCI historically recognized annual changes to maximum and/or minimum weekly benefits related to the State Average Weekly Wage (SAWW) within the on-level calculation which bring losses to the proposed benefit level. During a procedural review, the NCCI determined that this approach unnecessarily made the ratemaking process more complex. The NCCI now implicitly recognizes such SAWW-related changes within the trend calculation. Overall, the NCCI believes there is no anticipated impact on the loss cost level as the various affects of the change are felt to offset over time. We do not take exception to the NCCI's new approach.
4. The NCCI conducts periodic studies to review the USL&HW factor utilized to recognize the additional cost, where applicable, of federal benefits rather than state benefits; the last full study was completed in 2003. Subsequently, for a given filing, the NCCI would annually update the USL&HW factor to reflect how federal benefit levels changed relative to Missouri benefit levels. The NCCI recently completed a full study of USL&HW factors based upon Unit Statistical Data. State versus federal relativities were calculated, and injury type and hazard group adjustments were made, separately for indemnity versus medical benefits. Each state was then placed into one of four USL&HW factor groups, based upon the given state's benefit structure. Going forward, the USL&HW factor will not be annually adjusted for differences in changes in federal versus state benefits during that period; rather, unless a major state benefit revision occurs, the NCCI will periodically review the current USL&HW factor to see if an update is warranted. This change has no impact on the January 1, 2020 filed loss costs, per the NCCI's response to our inquiry. We note that there is minimal such exposure in Missouri and do not take exception to the NCCI's approach.
5. The NCCI historically applied upper and lower multiplicative bounds on changes in the loss cost for each specified classification code from one filing to the next. The NCCI observed that strict application of this approach for classes with very small loss costs eliminated the possibility of a change in loss cost where such a revision may be warranted in response to the indication. The NCCI has therefore amended its methodology to allow for a one cent change in loss cost if the direction of the indicated change for a given effected class code and its industry group are the same. This revision did not result in any adjustments to the loss costs contained in the Missouri January 1, 2020 filing.

STATE OF MISSOURI
DEPARTMENT OF COMMERCE AND INSURANCE

ACTUARIAL REVIEW OF
NCCI VOLUNTARY MARKET ADVISORY LOSS COST FILING
EFFECTIVE JANUARY 1, 2020

REPORT

I. INTRODUCTION

Annually, the National Council on Compensation Insurance files workers compensation voluntary market advisory loss costs in Missouri to be effective January 1 of the upcoming year. These loss costs are available for use by carriers writing workers compensation policies with Missouri exposure under Missouri's use-and-file statute.

Actuarial & Technical Solutions, Inc. (Actuarial Solutions) has been retained by the Missouri Department of Commerce and Insurance to review the Missouri workers compensation loss cost filing submitted by the NCCI to be effective January 1, 2020. Where appropriate, we have recommended changes and have calculated the impact of such recommendations on the loss cost indication. Additionally, as requested by the Department, we have expressed our opinion on whether it is appropriate to include data for the assigned risk market in determining the filed indication.

II. OVERVIEW OF FILING

The NCCI filed a -1.6% overall change in advisory loss costs to be effective January 1, 2020. The indicated change by industry group is as follows:

Loss Cost Change by Industry Group			
Industry Group	Loss Cost Change	Missouri Premium Distribution*	Missouri Exposure Distribution**
Manufacturing	-0.7%	20.8%	10.1%
Contracting	-1.7%	21.5%	6.2%
Office & Clerical	-1.6%	11.4%	60.5%
Goods & Services	-1.9%	27.4%	18.3%
Miscellaneous	-1.8%	18.9%	4.9%
TOTAL	-1.6%	100.0%	100.0%

* Premium distribution based on 7/1/16-17 payroll excluding F-classes x 1/1/20 proposed loss costs.
 ** Exposure distribution based on 7/1/16-17 payroll excluding F-classes.

Tables 2 and 3 present changes in loss costs among the top twenty classifications (based on premium): Table 2 identifies such classes with increases, while Table 3 identifies those with decreases of 5% or more.

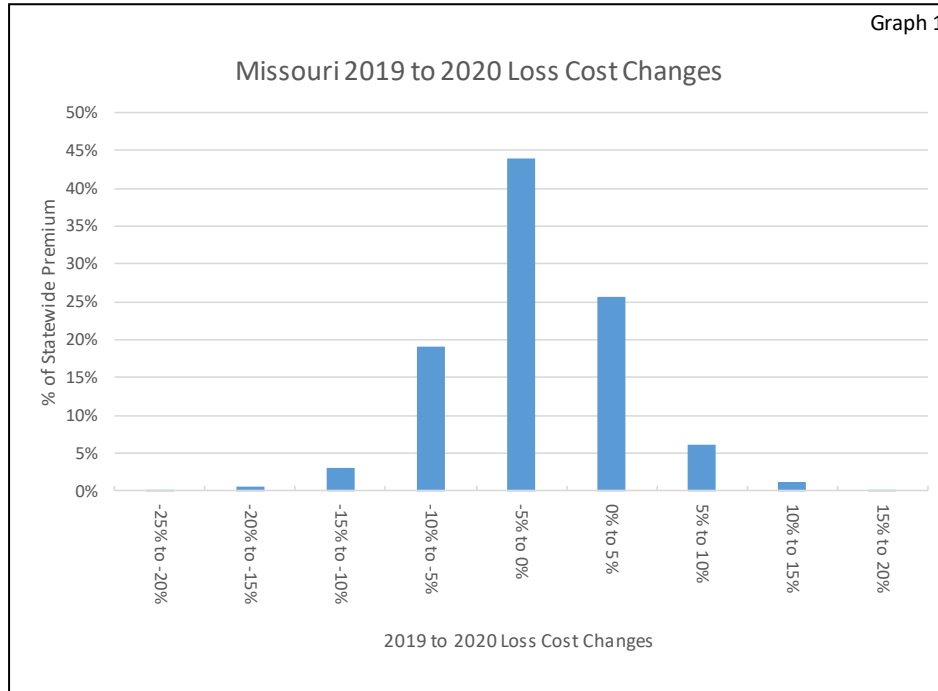
Largest Classes with an Increase in Loss Cost			
Class	Class Description	Loss Cost Change	Size Rank Based on Premium*
5537	HEATING, VENTILATION, AIR-CONDITIONING AND REFRIGERATION	8.5%	13
9014	JANITORIAL SERVICES BY CONTRACTORS - NO WINDOW CLEANING ABOVE GROUND LEVEL	7.0%	19
3076	SHEET METAL PRODUCTS MFG.	4.9%	8
8833	HOSPITAL: PROFESSIONAL EMPLOYEES	4.0%	5
8018	STORE: WHOLESALE NOC	3.3%	17
5645	CARPENTRY- CONSTRUCTION OF RESIDENTIAL DWELLINGS NOT EXCEEDING THREE	3.0%	3
8868	COLLEGE: PROFESSIONAL EMPLOYEES & CLERICAL	2.7%	14
8232	LUMBERYARD NEW MATERIALS ONLY: ALL OTHER EMPLOYEES & YARD, WAREHOUSE, DRIVERS	2.0%	11

* Rank based on 7/1/16-17 payroll x 1/1/2020 proposed loss cost.

Largest Classes with a Decrease in Loss Cost of at least 5%			
Class	Class Description	Loss Cost Change	Size Rank Based on Premium*
8810	CLERICAL OFFICE EMPLOYEES NOC	-8.3%	2
8037	STORE - SUPERSTORES AND WAREHOUSE CLUBS	-8.0%	7
8017	STORE: RETAIL NOC	-5.1%	18

* Rank based on 7/1/16-17 payroll x 1/1/2020 proposed loss cost.

As shown in Graph 1, the proposed loss cost revisions result in decreases for 66.68% of statewide premium¹. The majority of the decreases (43.92% of statewide premium) fall between -5% and 0%. Increases between 0% and 5% impact 25.75% of statewide premium, while 1.39% of statewide premium will experience an increase in excess of 10%.



The key factors selected by the NCCI in the determination of the advisory loss costs are shown in the tables below. There were several major changes in methodology from the January 1, 2019 filing to the January 1, 2020 filing. Tables 4 and 5 allow for a comparison of the key factors between these filings. Overall, there was no material impact due to the methodology changes.

	1/1/19 Filing	1/1/20 Filing	% Change From '19 to '20 Filing
Premium Development Factor	1.006	1.007	0.1%
Paid LDF - Indemnity	3.731	3.687	-1.2%
Paid + Case LDF - Indemnity	1.384	1.390	0.4%
Paid LDF - Medical	1.573	1.536	-2.4%
Paid + Case LDF - Medical	1.065	1.050	-1.4%
Indemnity Trend Factor	0.927	0.941	1.5%
Medical Trend Factor	0.956	0.970	1.5%
Excess Loss Loading	1.007	1.011	0.4%
Loss Adjustment Expense Factor	1.188	1.187	-0.1%

¹ Premium equals July 1, 2016-2017 payroll x January 1, 2020 proposed loss cost.

Table 5

NCCI Factors Applied to Prior Policy Year			
	<u>1/1/19 Filing</u>	<u>1/1/20 Filing</u>	<u>% Change From '19 to '20 Filing</u>
Premium Development Factor	1.000	1.000	0.0%
Paid LDF - Indemnity	2.065	2.028	-1.8%
Paid + Case LDF - Indemnity	1.232	1.228	-0.3%
Paid LDF - Medical	1.277	1.252	-2.0%
Paid + Case LDF - Medical	1.037	1.026	-1.1%
Indemnity Trend Factor	0.904	0.922	2.0%
Medical Trend Factor	0.941	0.961	2.1%
Excess Loss Loading	1.007	1.011	0.4%
Loss Adjustment Expense Factor	1.188	1.187	-0.1%

III. REVIEW OF THE NCCI FILING

The following presents the key components underlying the overall indicated loss cost level change filed by the NCCI effective January 1, 2020. We have reviewed the NCCI's general methodology as well as the calculations contained in the filing. The NCCI's approach to preparing state filings includes the incorporation of items which are state-specific (such as loss development and trend), as well as items which are based upon countrywide information and included in filings submitted in numerous states (such as adjusting and other expense (AOE)). The NCCI generally reflects a consistent methodology across all states, with judgment applied more by the manner in which elements are selected rather than in the selection of each individual item. We discuss below how the NCCI's judgment comes into play within each of the following elements.

A. Development Factors

The NCCI based its experience indication upon loss and premium for policy years 2016 and 2017 evaluated as of December 31, 2018. Ultimate losses for Missouri are estimated by averaging the results of a paid loss development method and a paid plus case loss development method. The NCCI's approach to selecting loss development factors (LDFs) in recent years has generally been to use an average of the latest three observed paid LDFs when preparing the paid loss projection², and to utilize an average of the latest five paid plus case LDFs when projecting paid plus case loss to ultimate. Thus, the NCCI's judgment comes into play in the selection of the rules which are applied to LDFs at all maturities. We generally prefer to apply judgment in selecting LDFs by reviewing the available historical LDFs at each maturity, and making a selection based upon our observations of factors within the given age-to-age period. In our analysis of the NCCI's January 1, 2020 Missouri filing, we reviewed the paid and the paid plus case age-to-age LDFs for each of indemnity loss and medical loss. For each set of factors, we applied our actuarial judgment to select a development factor for each age-to-age period; some selected LDFs were higher than those used by the NCCI, while others were lower. We then replaced the NCCI's rule-based LDFs with our LDF selections to test the impact on the loss cost indication. The indication produced by our selected LDFs, all other elements unchanged, is 0.4% larger than the indicated loss cost change filed by the NCCI (see Exhibit 1).

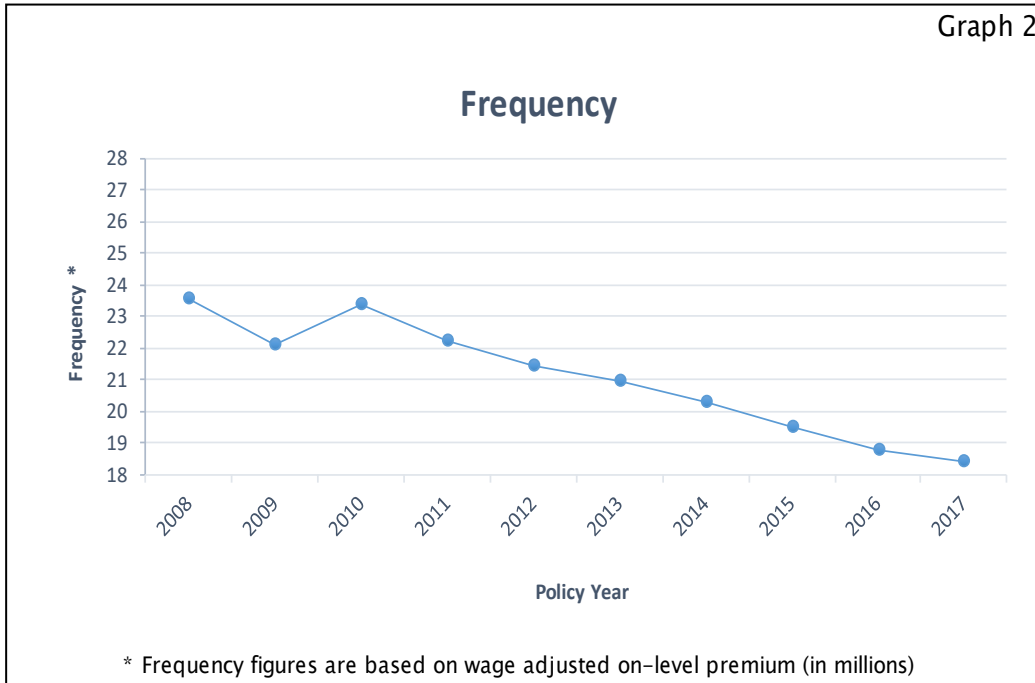
B. Trend Analysis

In selecting indemnity and medical loss ratio trends, the NCCI reviewed Missouri-specific frequency, indemnity severity and medical severity information, as well as ultimate indemnity and medical loss ratios, for policy years 2010-2017. Consistent with the prior three filings prepared by the NCCI in Missouri, the NCCI directly selected annual loss ratio trends for each of indemnity loss and medical loss for the January 1, 2020 Missouri filing. In addition to reviewing these loss ratio trends, we have also reviewed both the frequency and severity trend

² The NCCI's approach for selecting paid LDFs in the 2015, 2016 and 2017 filings differed in that it utilizes an average of the latest two observed LDFs.

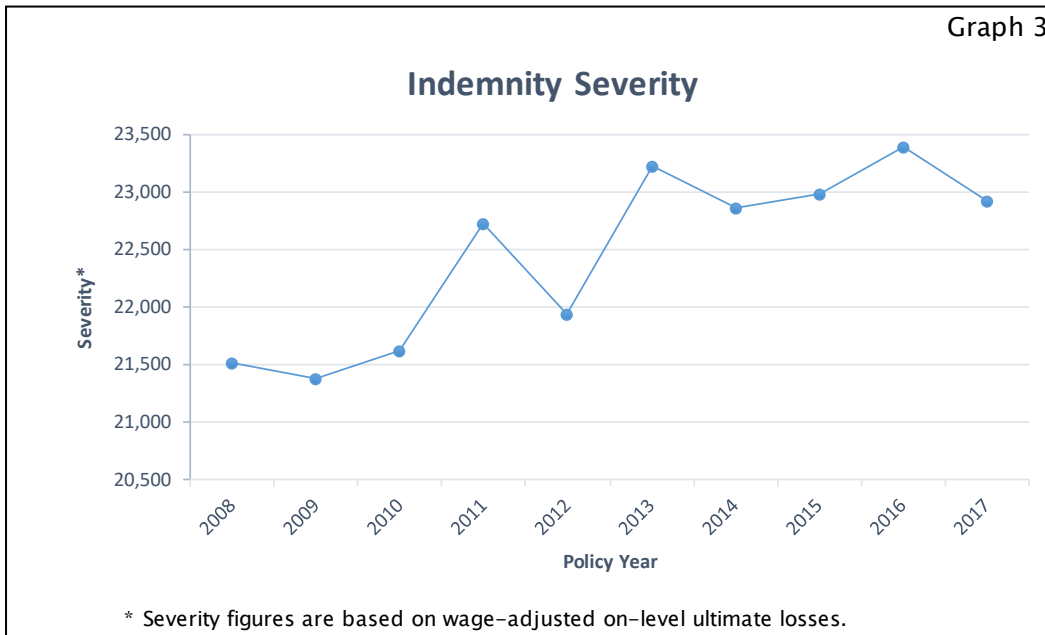
components. Appendix B presents our review of various combinations of policy years for frequency trend as well as both severity and loss ratio trends for indemnity loss and medical loss separately.

The NCCI's filing presents historical claim frequency for policy years 2010-2017; the NCCI provided comparable information for additional years at our request. Graph 2 presents the frequency for the 2008 through 2017 policy years.



In reviewing the data provided by the NCCI, we note that frequency levels have declined since 2010. Further, these recent policy years display a fairly consistent downward trend. We believe an annual frequency trend of -3.0% is appropriate for consideration in the determination of the January 1, 2020 loss costs.

For indemnity severity, the NCCI calculated the ultimate cost per claim based upon ultimate loss (which equals an average of the ultimate loss produced via the paid development and the paid plus case development projections) divided by projected ultimate claim counts. Graph 3 presents the indemnity severities for each of policy years 2008 through 2017.

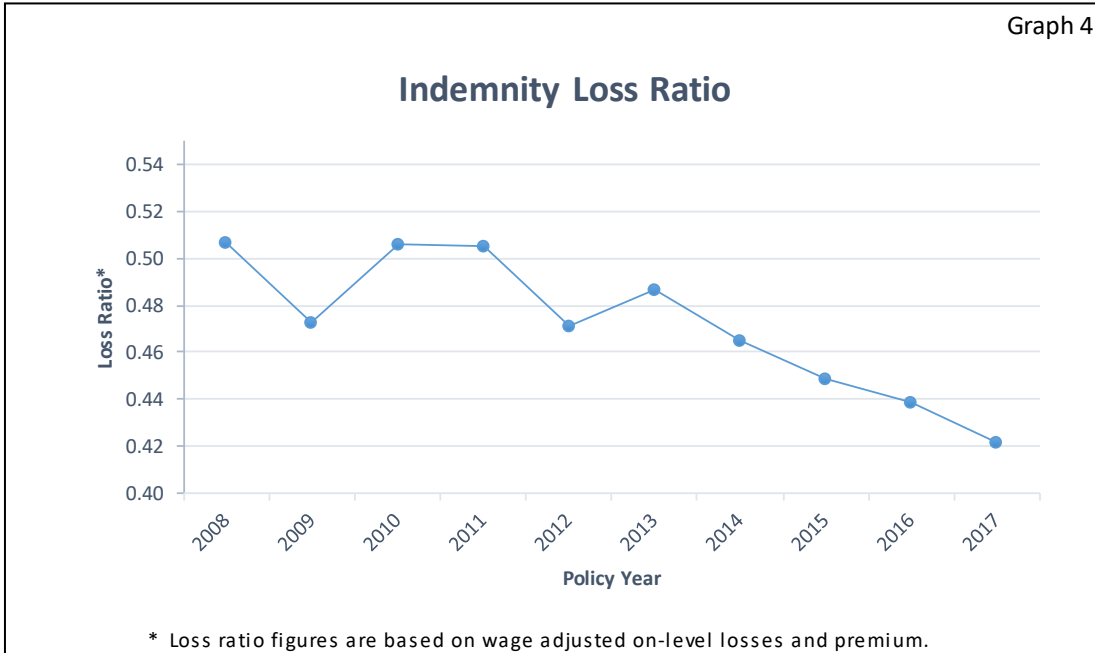


We observe that the indemnity severities are fairly consistent over policy years 2011 through 2017. After fitting exponential curves to the severities³ for various combinations of policy years, we believe the indemnity severity trend falls within a range of +0.75% to +1.00%. Combining the indemnity severity trend with a selected -3.0% frequency trend yields an indicated range of annual indemnity loss ratio trend from -2.03% to -2.27%.

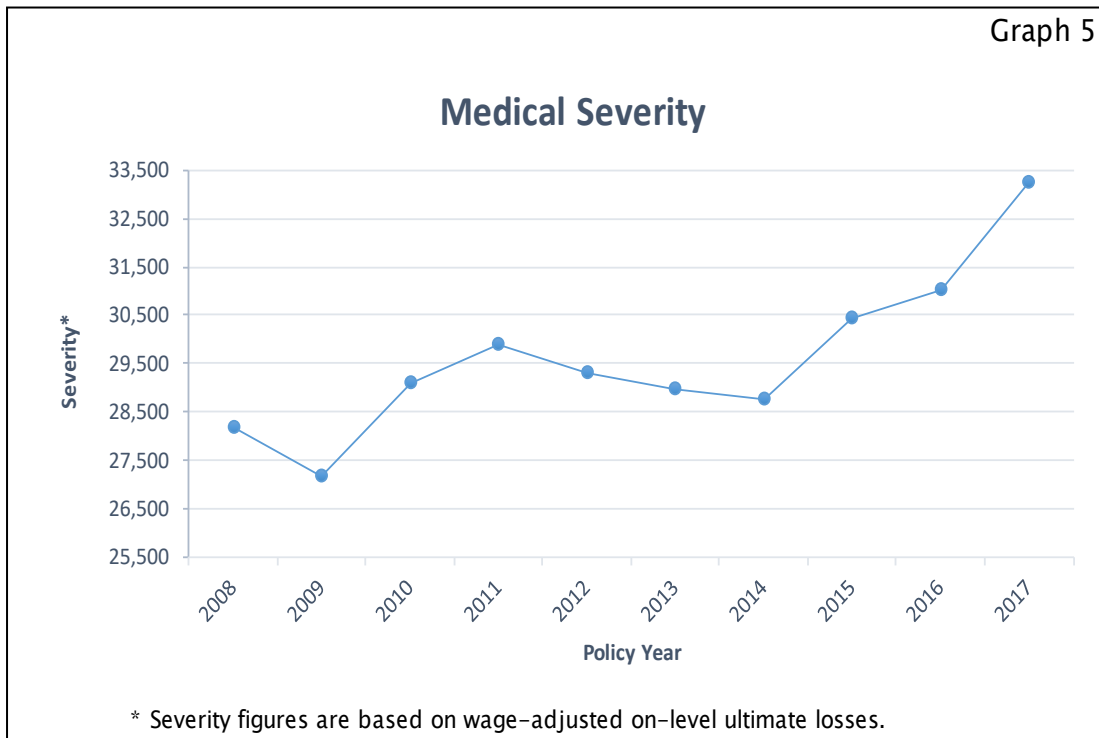
We then looked directly at indemnity loss ratios. In reviewing the historical indemnity loss ratios in Graph 4, we can see that the loss ratios have decreased fairly steadily over the last five years. Based upon a direct review of such trends,⁴ we believe an indemnity loss ratio trend for 2020 in the range of -2.5% to -2.0% to would be reasonable. Given these indemnity loss ratio trends, as well as indemnity loss ratio trends derived by combining the individually selected frequency and indemnity severity trends, we would recommend an annual indemnity loss ratio trend of -2.25%. The NCCI selected an annual indemnity loss ratio trend of -2.0% for 2020; thus, our selection is slightly more negative than the NCCI's selected annual indemnity loss ratio trend (-2.25% vs -2.00%).

³ Actuarial Solutions fit curves to indemnity severities which were calculated based upon ultimate indemnity loss which substitutes our judgmentally selected LDFs for the rule-based LDFs utilized by the NCCI.

⁴ Actuarial Solutions fit curves to indemnity loss ratios which were calculated based upon ultimate indemnity loss which substitutes our judgmentally selected LDFs for the rule-based LDFs utilized by the NCCI.

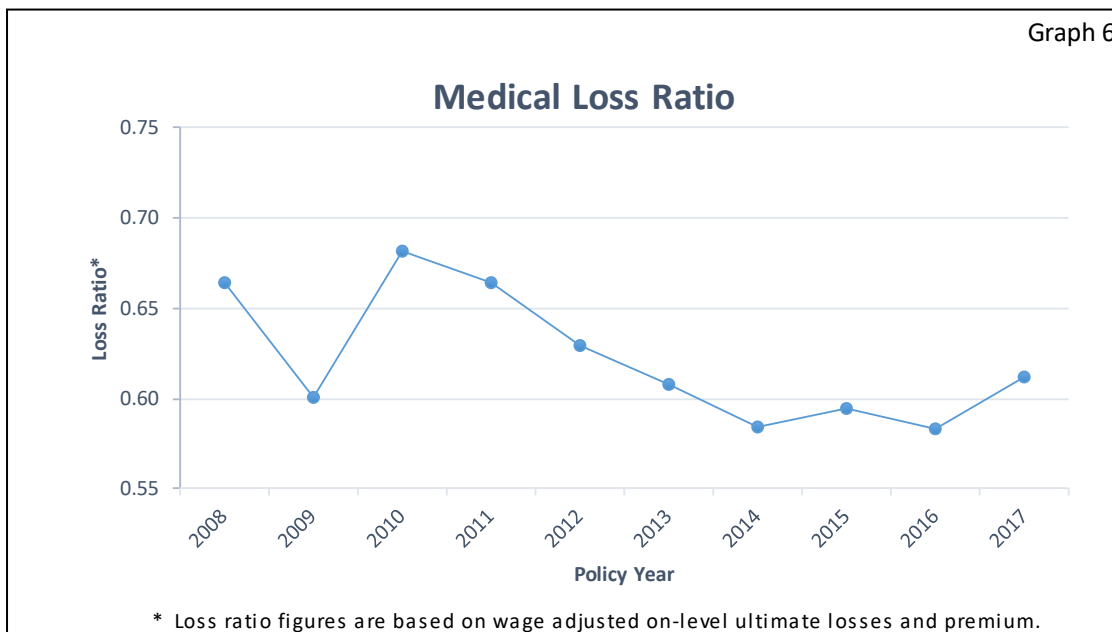


A similar analysis was conducted for medical loss. The NCCI calculated ultimate medical severities based upon ultimate medical loss produced by using an average of the paid and the paid plus case LDF projection methods, divided by ultimate claim counts. Graph 5 presents the historical medical severities for policy years 2008 through 2017.



Graph 5 shows that the medical severity has increased steadily from 2014 through 2017. From 2010 to 2014, medical severities had been relatively flat. In light of consideration of both longer term and shorter term trends, we believe an annual medical severity trend in the +2.0% to +2.5% range is supported. Combining the medical severity trend with the selected frequency trend yields a range for a medical loss ratio trend of -1.06% to -0.58%.

With regard to medical loss ratio trends, the NCCI selected an annual medical loss ratio trend of -1.0%. Graph 6 presents the medical loss ratios for policy years 2008 through 2017. As can be seen in Graph 6, the historical medical loss ratios have generally decreased over this period. Based upon our review of these medical loss ratios⁵, as well as trend results produced by fitting exponential curves to such figures, we believe a medical loss ratio trend in the -1.25% to -1.00% range is supported. After considering the medical loss ratios produced by the separate frequency and severity components, as well as direct review of the loss ratios, we recommend an annual medical loss ratio trend of -1.0%; this is equal to the NCCI's selected medical loss ratio trend.



Replacing the NCCI's filed indemnity trend with an annual -2.25% indemnity loss ratio trend, and reflecting the NCCI's annual medical loss ratio trend of -1.00%, produces a +1.4% impact due to a change in trend as seen on Exhibit 2, as compared to the change in trend reflected in the NCCI's January 1, 2020 filing of +1.8%. Thus, our review of the trend components produces an indicated loss cost change that is 0.3% lower than the NCCI filing, all else equal.

⁵ Actuarial Solutions fit curves to medical loss ratios which were calculated based upon ultimate medical loss which substituted our judgmentally selected LDFs for the rule-based LDFs utilized by the NCCI.

C. LAE Provision

The Missouri loss costs include a provision for LAE, which has two components: DCCE and AOE. DCCE includes items such as legal/defense expenses and medical exam costs. AOE encompasses general claims administration expenses such as salaries for claim adjusters. To determine the LAE provision for a given state's filing, the NCCI considers each of the DCCE and AOE components independently, analyzing the DCCE ratio to loss separately from the AOE ratio to loss.

For AOE, for which collected data is countrywide in nature, the NCCI blends its countrywide AOE ratio with the Missouri-specific AOE ratio of Missouri Employers Mutual Insurance Company (MEM)⁶. For private carriers, the NCCI selected a countrywide AOE ratio of 8.0%, equal to an average of the latest two accident years; this countrywide provision is reflected as the Missouri AOE ratio for private carriers. The AOE ratio for MEM is identified to be 9.4%. Based upon a 72% Missouri private carrier market share, these AOE ratios are weighted together to produce a weighted AOE ratio to loss of 8.4% ($8.4\% = 0.72 \times 8.0\% + 0.28 \times 9.4\%$). The NCCI selects this weighted 8.4% as the Missouri AOE ratio. After a review of the NCCI's AOE calculation, we find the NCCI's selected Missouri AOE provision of 8.4% to be reasonable.

For DCCE, the NCCI has historically first selected a countrywide DCCE ratio and then applied a state relativity⁷ to generate a state-specific DCCE ratio. The NCCI then took an approach analogous to that discussed above for AOE in order to determine the Missouri DCCE provision, weighting together the private carrier DCCE ratio and the MEM DCCE ratio. However, beginning with this January 1, 2020 filing, the NCCI has modified its approach to now derive the DCCE ratio directly from its Call for Policy Year Data, which includes state-specific private carrier and state fund loss and DCCE. We do not take exception to the NCCI's change in methodology. We further note that the NCCI has indicated that the 10.7% DCCE provision included in the January 1, 2019 filing would have been approximately 10.5% had the new approach been undertaken last year; we do not find this to be material to the indication.

The revised DCCE methodology develops ratios of DCCE-to-loss to an ultimate basis for the most recent five policy years. An average of these ultimate ratios (10.3%) is selected as the Missouri DCCE ratio. We first reviewed the ratio development factors produced by the NCCI and made alternative judgmental selections in a manner analogous to that applied in our review of indemnity and medical LDFs. We then applied our selected ratio development factors to ten years of Missouri policy year DCCE ratios. We agree with the NCCI's reflection of a five-year average ultimate DCCE ratio. Use of our alternative development yields a slightly higher DCCE ratio of 10.4%.

⁶ MEM is the competitive state fund in Missouri.

⁷ The DCCE state relativity has historically been based upon a comparison of that state's calendar year paid DCCE to paid loss ratio to an analogous countrywide DCCE ratio. Three calendar years of data have historically been used to determine the state relativity for Missouri.

Combining our alternative DCCE ratio of 10.4% with an AOE ratio of 8.4% produces an 18.8% Missouri LAE ratio, as compared to the NCCI's LAE ratio of 18.7%. Thus, substitution of our selected Missouri LAE provision for the LAE ratio included in the NCCI January 1, 2020 filing causes the indicated loss cost change to increase by 0.1% (i.e., our LAE ratio produces a 0% change whereas the NCCI's LAE ratio produces a 0.1% decrease, relative to the LAE provision included in the January 1, 2019 NCCI filing).

D. Overall Findings

Sections A through C detail the specific recommendations we have regarding the NCCI's January 1, 2020 filing as well as the individual impact of each recommendation. The combined impact of utilizing all of these recommendations is an indicated change of -1.5% in loss costs as shown in Exhibit 4; thus, our overall voluntary market loss cost change is 0.1% higher than the NCCI's indication of -1.6%.

E. Allocation of Loss Costs to Individual Classes

The NCCI's methodology for distributing the overall indication among the various classes is well documented and well supported. We do not take exception to the methodology used by the NCCI. Loss cost changes in this filing for individual classes (excluding F-classes) range from -21.08% to +19.53%.⁸

We did not review the NCCI's calculation of the effect of changes to the U.S. Longshore and Harbor Workers' Compensation Act.

F. Exclusion of Assigned Risk Experience

At our request, the NCCI calculated that exclusion of assigned risk data from the experience used in the filing would cause the loss cost indication to be -3.9%. Given the current small market share of the Missouri assigned risk market, as well as the fact that risks shift between the voluntary and assigned risk market over time, we feel that it is not inappropriate to base the indicated loss costs upon combined voluntary and assigned risk experience at this time.

⁸ This range reflects the actual loss cost changes proposed by the NCCI in its January 1, 2020 filing. However, as also indicated in the filing, the range of possible changes is -22.0% to +19.0%. We note that the largest increase observed (+19.53%) exceeds the maximum change of +19.0%; this relates to class code 2670 for which experience has been combined with code 2688, as part of a transition whereby classification 2670 will be discontinued in the future.

IV. LIMITATIONS AND DISTRIBUTION

This report reviews the data, methods and assumptions utilized by the NCCI in preparing its January 1, 2020 workers compensation voluntary market advisory loss cost filing in Missouri. Our review relied upon information provided to us by the Department and by the NCCI. Appendix C presents information supplied by the NCCI in response to interrogatories which assisted in our review. Although we have not audited this information, the NCCI's calculations have been reviewed for reasonability. If the underlying data or information is found to be inaccurate or incomplete, then our observations and conclusions may likewise be inaccurate or incomplete.

The loss costs proposed in the NCCI's filing are based upon projections of loss, LAE and premium, as well as consideration of other relevant items. Such projections of workers compensation experience, and thus our analysis and conclusions, are subject to uncertainty and reflect mathematical expectations. Further, the proposed Missouri loss costs are based upon Missouri statutes and regulations as they exist at this time, and do not consider any potential future retroactive benefit provisions or laws which ultimately may be determined to have an impact upon policies written during the effective period of these loss costs.

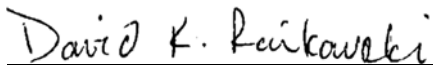
This report has been prepared solely for the use of and reliance by the Missouri Department of Commerce and Insurance in its review of the NCCI's Missouri voluntary market advisory loss cost filing effective January 1, 2020. The content within this report, as well as the materials reviewed as part of this engagement are technical in nature; it is recommended that any party receiving a copy of this report request its own actuary to review the report to ensure an understanding of all assumptions, data, limitations and conclusions reached by the NCCI in its January 1, 2020 filing and by Actuarial Solutions in the review of the filing. This report should be distributed only in its entirety.

V. SIGNATURE PAGE

This report was prepared by Kristine Fitzgerald and David Raikowski. Ms. Fitzgerald and Mr. Raikowski are Associates of the Casualty Actuarial Society and Members of the American Academy of Actuaries. The review was conducted in keeping with the Qualification Standards of the American Academy of Actuaries and the Standards of Practice published by the Actuarial Standards Board.



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VI. GLOSSARY OF TERMS

The following definitions are provided to give context to the terms used within this report and are tailored to the specifics of the filing under review.

Accident Year

A 12-month period of time for which dollars of loss are aggregated based upon those accidents occurring during the given time period. At a given moment in time the amount paid as well as the established reserves are known; the final value of all claims is not known until that time at which all such claims are closed. Loss is analyzed by accident year within some of the NCCI's calculations.

Policy Year

A policy year is comprised of all of the policies written during a particular calendar year; loss and premium is aggregated for all such policies. Since a policy written on January 1 expires December 31 of the same year, but a policy written on December 31 does not expire until the end of the following year, accidents associated with a single policy year occur over the course of two calendar years. Experience from the two most recent complete policy years (2016 and 2017) makes up the bulk of the NCCI's calculation of the indicated loss cost change for this filing.

Ultimate Loss

The estimated amount that will eventually be paid when all claims are closed.

Paid Loss

The dollars of indemnity and medical benefits paid to the injured worker or his/her dependents.

Case Reserve

An estimate made by the claims administrator of the amount which remains to be paid for each particular claim.

Incurred Loss

The sum of paid loss plus case reserves (also referred to as paid plus case loss).

Loss Development

The observed change over time in the paid or incurred loss for a particular year.

Actuarial Central Estimate

An estimate that represents an expected value over a range of reasonably possible outcomes, not all conceivable outcomes.

	[A]	[B]	[C]
<u>Premium</u>	<u>Paid</u>	<u>Paid + Case</u>	<u>Combined</u>
(1) Standard Earned Premium Valued as of 12/31/18	\$652,617,982	\$652,617,982	\$652,617,982
(2) Factor to Develop Standard Earned Premium	1.007	1.007	1.007
(3) Developed Standard Earned Premium = (1) x (2)	\$657,186,308	\$657,186,308	\$657,186,308
(4) Factor to Adjust Premium to Current Level	0.776	0.776	0.776
(5) Premium Adjusted to Current Level = (3) x (4)	\$509,976,575	\$509,976,575	\$509,976,575
<u>Indemnity Benefit and LAE Cost</u>			
(6) Indemnity Benefit Cost Valued as of 12/31/18 (First Report)	\$59,625,302	\$150,909,038	
(7) Factor to Develop Indemnity Benefit Cost	3.702	1.388	
(8) Developed Indemnity Benefit Cost = (6) x (7)	\$220,732,868	\$209,461,745	\$215,097,307
(9) Factor to Adjusted Indemnity Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(10) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(11) Composite Adjustment Factor = (9) x (10)	1.000	1.000	1.000
(12) Adjusted Indemnity Cost = (8) x (11)	\$220,732,868	\$209,461,745	\$215,097,307
(13) Indemnity Cost Ratio = (12) / (5)	0.433	0.411	0.422
(14) Trend Length	3.001	3.001	3.001
(15) Application of Proposed Indemnity Trend Factor = .980 ^ (14)	0.941	0.941	0.941
(16) Projected Limited Indemnity Cost Ratio = (13) x (15)	0.407	0.387	0.397
(17) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(18) Projected Indemnity Cost Ratio = (16) x (17)	0.411	0.391	0.401
(19) Proposed Change in Indemnity Benefits	1.000	1.000	1.000
(20) Projected Indemnity Cost Ratio Including Benefit Change = (18) x (19)	0.411	0.391	0.401
<u>Medical Benefit and LAE Cost</u>			
(21) Medical Benefit Cost Valued as of 12/31/18 (First Report)	\$201,394,199	\$297,685,959	
(22) Factor to Develop Medical Benefit Cost	1.543	1.053	
(23) Developed Medical Benefit Cost = (21) x (22)	\$310,751,249	\$313,463,315	\$312,107,282
(24) Factor to Adjusted Medical Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(25) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(26) Composite Adjustment Factor = (24) x (25)	1.000	1.000	1.000
(27) Adjusted Medical Cost = (23) x (26)	\$310,751,249	\$313,463,315	\$312,107,282
(28) Medical Cost Ratio = (27) / (5)	0.609	0.615	0.612
(29) Trend Length	3.001	3.001	3.001
(30) Application of Proposed Medical Trend Factor = .990 ^ (29)	0.970	0.970	0.970
(31) Projected Limited Medical Cost Ratio = (28) x (30)	0.591	0.597	0.594
(32) Factor to Adjust Medical Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(33) Projected Medical Cost Ratio = (31) x (32)	0.598	0.604	0.601
(34) Proposed Change in Medical Benefits	1.000	1.000	1.000
(35) Projected Medical Cost Ratio Including Benefit Change = (33) x (34)	0.598	0.604	0.601
<u>Total Benefit and LAE Cost</u>			
(36) Adjusted Cost Ratio of Policy Year 2017 = (20) + (35)	1.009	0.995	1.002

Notes: Row (7), Column [A] is taken from Row (1), Column [A] of Appendix A, Page 2.
 Row (7), Column [B] is taken from Row (1), Column [A] of Appendix A, Page 1.
 The trend factor reflected in Row (15) has been taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.
 Row (22), Column [A] is taken from Row (1), Column [B] of Appendix A, Page 2.
 Row (22), Column [B] is taken from Row (1), Column [B] of Appendix A, Page 1.
 The trend factor reflected in Row (30) has been taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.
 Rows (1), (2), (4), (6), (9), (10), (14), (17), (19), (21), (24), (25), (29), (32), and (34) have been taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.

	[A]	[B]	[C]
Premium	Paid	Paid + Case	Combined
(1) Standard Earned Premium Valued as of 12/31/18	\$653,024,823	\$653,024,823	\$653,024,823
(2) Factor to Develop Standard Earned Premium	1.000	1.000	1.000
(3) Developed Standard Earned Premium = (1) x (2)	\$653,024,823	\$653,024,823	\$653,024,823
(4) Factor to Adjust Premium to Current Level	0.738	0.738	0.738
(5) Premium Adjusted to Current Level = (3) x (4)	\$481,932,319	\$481,932,319	\$481,932,319
Indemnity Benefit and LAE Cost			
(6) Indemnity Benefit Cost Valued as of 12/31/18 (Second Report)	\$105,920,774	\$168,689,946	
(7) Factor to Develop Indemnity Benefit Cost	2.045	1.226	
(8) Developed Indemnity Benefit Cost = (6) x (7)	\$216,607,983	\$206,813,874	\$211,710,929
(9) Factor to Adjusted Indemnity Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(10) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(11) Composite Adjustment Factor = (9) x (10)	1.000	1.000	1.000
(12) Adjusted Indemnity Cost = (8) x (11)	\$216,607,983	\$206,813,874	\$211,710,929
(13) Indemnity Cost Ratio = (12) / (5)	0.449	0.429	0.439
(14) Trend Length	4.001	4.001	4.001
(15) Application of Proposed Indemnity Trend Factor = .980 ^ (14)	0.922	0.922	0.922
(16) Projected Limited Indemnity Cost Ratio = (13) x (15)	0.414	0.396	0.405
(17) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(18) Projected Indemnity Cost Ratio = (16) x (17)	0.419	0.400	0.409
(19) Proposed Change in Indemnity Benefits	1.000	1.000	1.000
(20) Projected Indemnity Cost Ratio Including Benefit Change = (18) x (19)	0.419	0.400	0.409
Medical Benefit and LAE Cost			
(21) Medical Benefit Cost Valued as of 12/31/18 (Second Report)	\$221,051,055	\$275,355,653	
(22) Factor to Develop Medical Benefit Cost	1.259	1.029	
(23) Developed Medical Benefit Cost = (21) x (22)	\$278,303,278	\$283,340,967	\$280,822,123
(24) Factor to Adjusted Medical Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(25) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(26) Composite Adjustment Factor = (24) x (25)	1.000	1.000	1.000
(27) Adjusted Medical Cost = (23) x (26)	\$278,303,278	\$283,340,967	\$280,822,123
(28) Medical Cost Ratio = (27) / (5)	0.577	0.588	0.583
(29) Trend Length	4.001	4.001	4.001
(30) Application of Proposed Medical Trend Factor = .990 ^ (29)	0.961	0.961	0.961
(31) Projected Limited Medical Cost Ratio = (28) x (30)	0.554	0.565	0.560
(32) Factor to Adjust Medical Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(33) Projected Medical Cost Ratio = (31) x (32)	0.560	0.571	0.566
(34) Proposed Change in Medical Benefits	1.000	1.000	1.000
(35) Projected Medical Cost Ratio Including Benefit Change = (33) x (34)	0.560	0.571	0.566
Total Benefit and LAE Cost			
(36) Adjusted Cost Ratio of Policy Year 2016 = (20) + (35)	0.979	0.971	0.975

Notes: Row (7), Column [A] is taken from Row (2), Column [A] of Appendix A, Page 2.
 Row (7), Column [B] is taken from Row (2), Column [A] of Appendix A, Page 1.
 The trend factor reflected in Row (15) has been taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.
 Row (22), Column [A] is taken from Row (2), Column [B] of Appendix A, Page 2.
 Row (22), Column [B] is taken from Row (2), Column [B] of Appendix A, Page 1.
 The trend factor reflected in Row (30) has been taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.
 Rows (1), (2), (4), (6), (9), (10), (14), (17), (19), (21), (24), (25), (29), (32), and (34) have been taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.

Average Cost Ratio

(1) Change in Experience, Trend and Benefits	0.989	(-1.1%)
(2) Change In Loss Adjustment Expense	0.999	(-0.1%)
(3) Overall Loss Cost Level Change: (1) x (2)	0.988	(-1.2%)

Notes: Row (1) is the average of Row (36), Column [C] of Exhibit 1, Pages 1 and 2.
Row (2) is taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.

	[A]	[B]	[C]
	Paid	Paid + Case	Combined
Premium			
(1) Standard Earned Premium Valued as of 12/31/18	\$652,617,982	\$652,617,982	\$652,617,982
(2) Factor to Develop Standard Earned Premium	1.007	1.007	1.007
(3) Developed Standard Earned Premium = (1) x (2)	\$657,186,308	\$657,186,308	\$657,186,308
(4) Factor to Adjust Premium to Current Level	0.776	0.776	0.776
(5) Premium Adjusted to Current Level = (3) x (4)	\$509,976,575	\$509,976,575	\$509,976,575
Indemnity Benefit and LAE Cost			
(6) Indemnity Benefit Cost Valued as of 12/31/18 (First Report)	\$59,625,302	\$150,909,038	
(7) Factor to Develop Indemnity Benefit Cost	3.687	1.390	
(8) Developed Indemnity Benefit Cost = (6) x (7)	\$219,838,488	\$209,763,563	\$214,801,026
(9) Factor to Adjusted Indemnity Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(10) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(11) Composite Adjustment Factor = (9) x (10)	1.000	1.000	1.000
(12) Adjusted Indemnity Cost = (8) x (11)	\$219,838,488	\$209,763,563	\$214,801,026
(13) Indemnity Cost Ratio = (12) / (5)	0.431	0.411	0.421
(14) Trend Length	3.001	3.001	3.001
(15) Application of Proposed Indemnity Trend Factor = .9775 ^ (14)	0.934	0.934	0.934
(16) Projected Limited Indemnity Cost Ratio = (13) x (15)	0.403	0.384	0.393
(17) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(18) Projected Indemnity Cost Ratio = (16) x (17)	0.407	0.388	0.397
(19) Proposed Change in Indemnity Benefits	1.000	1.000	1.000
(20) Projected Indemnity Cost Ratio Including Benefit Change = (18) x (19)	0.407	0.388	0.397
Medical Benefit and LAE Cost			
(21) Medical Benefit Cost Valued as of 12/31/18 (First Report)	\$201,394,199	\$297,685,959	
(22) Factor to Develop Medical Benefit Cost	1.536	1.050	
(23) Developed Medical Benefit Cost = (21) x (22)	\$309,341,490	\$312,570,257	\$310,955,874
(24) Factor to Adjusted Medical Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(25) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(26) Composite Adjustment Factor = (24) x (25)	1.000	1.000	1.000
(27) Adjusted Medical Cost = (23) x (26)	\$309,341,490	\$312,570,257	\$310,955,874
(28) Medical Cost Ratio = (27) / (5)	0.607	0.613	0.610
(29) Trend Length	3.001	3.001	3.001
(30) Application of Proposed Medical Trend Factor = .9900 ^ (29)	0.970	0.970	0.970
(31) Projected Limited Medical Cost Ratio = (28) x (30)	0.589	0.595	0.592
(32) Factor to Adjust Medical Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(33) Projected Medical Cost Ratio = (31) x (32)	0.595	0.602	0.599
(34) Proposed Change in Medical Benefits	1.000	1.000	1.000
(35) Projected Medical Cost Ratio Including Benefit Change = (33) x (34)	0.595	0.602	0.599
Total Benefit and LAE Cost			
(36) Adjusted Cost Ratio of Policy Year 2017 = (20) + (35)	1.002	0.990	0.996

Notes: The trend factor reflected in Row (15) has been selected by Actuarial Solutions.
 The trend factor reflected in Row (30) has been selected by Actuarial Solutions.
 Rows (1), (2), (4), (6), (7), (9), (10), (14), (17), (19), (21), (22), (24), (25), (29), (32), and (34) have been taken from the Missouri 1/1/20
 Voluntary Market Loss Cost Filing.

	[A]	[B]	[C]
<u>Premium</u>	<u>Paid</u>	<u>Paid + Case</u>	<u>Combined</u>
(1) Standard Earned Premium Valued as of 12/31/18	\$653,024,823	\$653,024,823	\$653,024,823
(2) Factor to Develop Standard Earned Premium	1.000	1.000	1.000
(3) Developed Standard Earned Premium = (1) x (2)	\$653,024,823	\$653,024,823	\$653,024,823
(4) Factor to Adjust Premium to Current Level	0.738	0.738	0.738
(5) Premium Adjusted to Current Level = (3) x (4)	\$481,932,319	\$481,932,319	\$481,932,319
<u>Indemnity Benefit and LAE Cost</u>			
(6) Indemnity Benefit Cost Valued as of 12/31/18 (Second Report)	\$105,920,774	\$168,689,946	
(7) Factor to Develop Indemnity Benefit Cost	2.028	1.228	
(8) Developed Indemnity Benefit Cost = (6) x (7)	\$214,807,330	\$207,151,254	\$210,979,292
(9) Factor to Adjusted Indemnity Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(10) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(11) Composite Adjustment Factor = (9) x (10)	1.000	1.000	1.000
(12) Adjusted Indemnity Cost = (8) x (11)	\$214,807,330	\$207,151,254	\$210,979,292
(13) Indemnity Cost Ratio = (12) / (5)	0.446	0.430	0.438
(14) Trend Length	4.001	4.001	4.001
(15) Application of Proposed Indemnity Trend Factor = .9775 ^ (14)	0.913	0.913	0.913
(16) Projected Limited Indemnity Cost Ratio = (13) x (15)	0.407	0.393	0.400
(17) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(18) Projected Indemnity Cost Ratio = (16) x (17)	0.411	0.397	0.404
(19) Proposed Change in Indemnity Benefits	1.000	1.000	1.000
(20) Projected Indemnity Cost Ratio Including Benefit Change = (18) x (19)	0.411	0.397	0.404
<u>Medical Benefit and LAE Cost</u>			
(21) Medical Benefit Cost Valued as of 12/31/18 (Second Report)	\$221,051,055	\$275,355,653	
(22) Factor to Develop Medical Benefit Cost	1.252	1.026	
(23) Developed Medical Benefit Cost = (21) x (22)	\$276,755,921	\$282,514,900	\$279,635,411
(24) Factor to Adjusted Medical Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(25) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(26) Composite Adjustment Factor = (24) x (25)	1.000	1.000	1.000
(27) Adjusted Medical Cost = (23) x (26)	\$276,755,921	\$282,514,900	\$279,635,411
(28) Medical Cost Ratio = (27) / (5)	0.574	0.586	0.580
(29) Trend Length	4.001	4.001	4.001
(30) Application of Proposed Medical Trend Factor = .9900 ^ (29)	0.961	0.961	0.961
(31) Projected Limited Medical Cost Ratio = (28) x (30)	0.552	0.563	0.557
(32) Factor to Adjust Medical Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(33) Projected Medical Cost Ratio = (31) x (32)	0.558	0.569	0.563
(34) Proposed Change in Medical Benefits	1.000	1.000	1.000
(35) Projected Medical Cost Ratio Including Benefit Change = (33) x (34)	0.558	0.569	0.563
<u>Total Benefit and LAE Cost</u>			
(36) Adjusted Cost Ratio of Policy Year 2016 = (20) + (35)	0.969	0.966	0.967

Notes: The trend factor reflected in Row (15) has been selected by Actuarial Solutions.
 The trend factor reflected in Row (30) has been selected by Actuarial Solutions.
 Rows (1), (2), (4), (6), (7), (9), (10), (14), (17), (19), (21), (22), (24), (25), (29), (32), and (34) have been taken from the Missouri 1/1/20
 Voluntary Market Loss Cost Filing.

Average Cost Ratio

(1) Change in Experience, Trend and Benefits	0.982	(-1.8%)
(2) Change In Loss Adjustment Expense	0.999	(-0.1%)
(3) Overall Loss Cost Level Change: (1) x (2)	0.981	(-1.9%)

Notes: Row (1) is the average of Row (36), Column [C] of Exhibit 2, Pages 1 and 2.
Row (2) is taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.

Section I: Selection of Missouri DCCE Provision

Policy Year	(1) NCCI Ultimate DCCE Ratio	(2) NCCI Selected Age to Ultimate Development Factor	(3) ATS Selected Age to Ultimate Development Factor	(4) ATS Ultimate DCCE Ratio (1) / (2) x (3)
2008	11.0%	0.979	0.984	11.1%
2009	10.9%	0.976	0.981	11.0%
2010	10.7%	0.975	0.980	10.8%
2011	10.7%	0.974	0.979	10.8%
2012	10.7%	0.971	0.976	10.8%
2013	10.6%	0.968	0.974	10.7%
2014	11.0%	0.971	0.977	11.1%
2015	10.2%	0.975	0.987	10.3%
2016	10.1%	0.995	1.011	10.3%
2017	9.5%	1.064	1.092	9.8%
10 Year Avg				10.7%
7 Year Avg				10.5%
5 Year Avg				10.4%
4 Year Avg				10.4%
3 Year Avg				10.1%
Selected				10.4%

Section II: Selection of Missouri AOE Provision

Accident Year	(5) Private Carriers Countrywide Ultimate AOE Ratio	(6) State Fund Missouri Ultimate AOE Ratio	(7) ATS Proposed AOE Ratio 1/1/20 Filing
2014	6.9%	9.5%	
2015	7.2%	10.0%	
2016	7.7%	9.4%	
2017	8.1%	8.7%	
2018	7.9%	9.4%	
Selected	8.0%	9.4%	8.4%
(8) Weighting	72.3%	27.7%	

Section III: Proposed Change in Missouri Loss Adjustment Expense Provision

Missouri Provisions	(9) NCCI Approved 1/1/19 Filing	(10) ATS Proposed 1/1/20 Filing	(11) Change In Provision
DCCE	10.7%	10.4%	
AOE	8.1%	8.4%	
LAE	18.8%	18.8%	(+0.0%)

Notes: Columns (1), (2), (5), (6), and (9) are either taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing, or based on information provided by NCCI.
 The weighting presented in Line (8) is based on information provided by NCCI, and is based upon the Private Carrier vs State Fund split of projected losses.
 Column (3) is taken from Lines (1) through (10) of Appendix A, Page 3.

Average Cost Ratio

(1) Change in Experience, Trend and Benefits	0.985	(-1.5%)
(2) Change In Loss Adjustment Expense	1.000	(+0.0%)
(3) Overall Loss Cost Level Change: (1) x (2)	0.985	(-1.5%)

Notes: Row (1) is taken from the Missouri 1/1/20 Voluntary Market Loss Cost Filing.
Row (2) is taken from Column (11) of Exhibit 3, Page 1.

	[A]	[B]	[C]
<u>Premium</u>	<u>Paid</u>	<u>Paid + Case</u>	<u>Combined</u>
(1) Standard Earned Premium Valued as of 12/31/18	\$652,617,982	\$652,617,982	\$652,617,982
(2) Factor to Develop Standard Earned Premium	1.007	1.007	1.007
(3) Developed Standard Earned Premium = (1) x (2)	\$657,186,308	\$657,186,308	\$657,186,308
(4) Factor to Adjust Premium to Current Level	0.776	0.776	0.776
(5) Premium Adjusted to Current Level = (3) x (4)	\$509,976,575	\$509,976,575	\$509,976,575
<u>Indemnity Benefit and LAE Cost</u>			
(6) Indemnity Benefit Cost Valued as of 12/31/18 (First Report)	\$59,625,302	\$150,909,038	
(7) Factor to Develop Indemnity Benefit Cost	3.702	1.388	
(8) Developed Indemnity Benefit Cost = (6) x (7)	\$220,732,868	\$209,461,745	\$215,097,307
(9) Factor to Adjusted Indemnity Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(10) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(11) Composite Adjustment Factor = (9) x (10)	1.000	1.000	1.000
(12) Adjusted Indemnity Cost = (8) x (11)	\$220,732,868	\$209,461,745	\$215,097,307
(13) Indemnity Cost Ratio = (12) / (5)	0.433	0.411	0.422
(14) Trend Length	3.001	3.001	3.001
(15) Application of Proposed Indemnity Trend Factor = .9775 ^ (14)	0.934	0.934	0.934
(16) Projected Limited Indemnity Cost Ratio = (13) x (15)	0.404	0.384	0.394
(17) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(18) Projected Indemnity Cost Ratio = (16) x (17)	0.408	0.388	0.398
(19) Proposed Change in Indemnity Benefits	1.000	1.000	1.000
(20) Projected Indemnity Cost Ratio Including Benefit Change = (18) x (19)	0.408	0.388	0.398
<u>Medical Benefit and LAE Cost</u>			
(21) Medical Benefit Cost Valued as of 12/31/18 (First Report)	\$201,394,199	\$297,685,959	
(22) Factor to Develop Medical Benefit Cost	1.543	1.053	
(23) Developed Medical Benefit Cost = (21) x (22)	\$310,751,249	\$313,463,315	\$312,107,282
(24) Factor to Adjusted Medical Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(25) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(26) Composite Adjustment Factor = (24) x (25)	1.000	1.000	1.000
(27) Adjusted Medical Cost = (23) x (26)	\$310,751,249	\$313,463,315	\$312,107,282
(28) Medical Cost Ratio = (27) / (5)	0.609	0.615	0.612
(29) Trend Length	3.001	3.001	3.001
(30) Application of Proposed Medical Trend Factor = .9900 ^ (29)	0.970	0.970	0.970
(31) Projected Limited Medical Cost Ratio = (28) x (30)	0.591	0.597	0.594
(32) Factor to Adjust Medical Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(33) Projected Medical Cost Ratio = (31) x (32)	0.598	0.604	0.601
(34) Proposed Change in Medical Benefits	1.000	1.000	1.000
(35) Projected Medical Cost Ratio Including Benefit Change = (33) x (34)	0.598	0.604	0.601
<u>Total Benefit and LAE Cost</u>			
(36) Adjusted Cost Ratio of Policy Year 2017 = (20) + (35)	1.006	0.992	0.999

Notes: Row (7), Column [A] is taken from Row (1), Column [A] of Appendix A, Page 2.
 Row (7), Column [B] is taken from Row (1), Column [A] of Appendix A, Page 1.
 The trend factor reflected in Row (15) has been selected by Actuarial Solutions.
 Row (22), Column [A] is taken from Row (1), Column [B] of Appendix A, Page 2.
 Row (22), Column [B] is taken from Row (1), Column [B] of Appendix A, Page 1.
 The trend factor reflected in Row (30) has been selected by Actuarial Solutions.
 Rows (1), (2), (4), (6), (9), (10), (14), (17), (19), (21), (24), (25), (29), (32), and (34) have been taken from the Missouri 1/1/20
 Voluntary Market Loss Cost Filing.

	[A]	[B]	[C]
Premium	Paid	Paid + Case	Combined
(1) Standard Earned Premium Valued as of 12/31/18	\$653,024,823	\$653,024,823	\$653,024,823
(2) Factor to Develop Standard Earned Premium	1.000	1.000	1.000
(3) Developed Standard Earned Premium = (1) x (2)	\$653,024,823	\$653,024,823	\$653,024,823
(4) Factor to Adjust Premium to Current Level	0.738	0.738	0.738
(5) Premium Adjusted to Current Level = (3) x (4)	\$481,932,319	\$481,932,319	\$481,932,319
Indemnity Benefit and LAE Cost			
(6) Indemnity Benefit Cost Valued as of 12/31/18 (Second Report)	\$105,920,774	\$168,689,946	
(7) Factor to Develop Indemnity Benefit Cost	2.045	1.226	
(8) Developed Indemnity Benefit Cost = (6) x (7)	\$216,607,983	\$206,813,874	\$211,710,929
(9) Factor to Adjusted Indemnity Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(10) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(11) Composite Adjustment Factor = (9) x (10)	1.000	1.000	1.000
(12) Adjusted Indemnity Cost = (8) x (11)	\$216,607,983	\$206,813,874	\$211,710,929
(13) Indemnity Cost Ratio = (12) / (5)	0.449	0.429	0.439
(14) Trend Length	4.001	4.001	4.001
(15) Application of Proposed Indemnity Trend Factor = .9775 ^ (14)	0.913	0.913	0.913
(16) Projected Limited Indemnity Cost Ratio = (13) x (15)	0.410	0.392	0.401
(17) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(18) Projected Indemnity Cost Ratio = (16) x (17)	0.415	0.396	0.405
(19) Proposed Change in Indemnity Benefits	1.000	1.000	1.000
(20) Projected Indemnity Cost Ratio Including Benefit Change = (18) x (19)	0.415	0.396	0.405
Medical Benefit and LAE Cost			
(21) Medical Benefit Cost Valued as of 12/31/18 (Second Report)	\$221,051,055	\$275,355,653	
(22) Factor to Develop Medical Benefit Cost	1.259	1.029	
(23) Developed Medical Benefit Cost = (21) x (22)	\$278,303,278	\$283,340,967	\$280,822,123
(24) Factor to Adjusted Medical Benefit Cost to Current Benefit Level	1.000	1.000	1.000
(25) Factor to Include Loss Based Expenses	1.000	1.000	1.000
(26) Composite Adjustment Factor = (24) x (25)	1.000	1.000	1.000
(27) Adjusted Medical Cost = (23) x (26)	\$278,303,278	\$283,340,967	\$280,822,123
(28) Medical Cost Ratio = (27) / (5)	0.577	0.588	0.583
(29) Trend Length	4.001	4.001	4.001
(30) Application of Proposed Medical Trend Factor = .9900 ^ (29)	0.961	0.961	0.961
(31) Projected Limited Medical Cost Ratio = (28) x (30)	0.554	0.565	0.560
(32) Factor to Adjust Medical Cost Ratio to an Unlimited Basis	1.011	1.011	1.011
(33) Projected Medical Cost Ratio = (31) x (32)	0.560	0.571	0.566
(34) Proposed Change in Medical Benefits	1.000	1.000	1.000
(35) Projected Medical Cost Ratio Including Benefit Change = (33) x (34)	0.560	0.571	0.566
Total Benefit and LAE Cost			
(36) Adjusted Cost Ratio of Policy Year 2016 = (20) + (35)	0.975	0.967	0.971

Notes: Row (7), Column [A] is taken from Row (2), Column [A] of Appendix A, Page 2.
 Row (7), Column [B] is taken from Row (2), Column [A] of Appendix A, Page 1.
 The trend factor reflected in Row (15) has been selected by Actuarial Solutions.
 Row (22), Column [A] is taken from Row (2), Column [B] of Appendix A, Page 2.
 Row (22), Column [B] is taken from Row (2), Column [B] of Appendix A, Page 1.
 The trend factor reflected in Row (30) has been selected by Actuarial Solutions.
 Rows (1), (2), (4), (6), (9), (10), (14), (17), (19), (21), (24), (25), (29), (32), and (34) have been taken from the Missouri 1/1/20
 Voluntary Market Loss Cost Filing.

Average Cost Ratio

(1) Change in Experience, Trend and Benefits	0.985	(-1.5%)
(2) Change In Loss Adjustment Expense	1.000	(+0.0%)
(3) Overall Loss Cost Level Change: (1) x (2)	0.985	(-1.5%)

Notes: Row (1) is the average of Row (36), Column [C] of Exhibit 4, Pages 1 and 2.
Row (2) is taken from Column (11) of Exhibit 3, Page 1.

Paid Plus Case Reserve
 Selected Loss Development Factors

			[A]	[B]
	Age-to-Age Period	Type of Factor	Indemnity	Medical
(a)	1st – 2nd	Paid Plus Case	1.132	1.023
(b)	2nd – 3rd	Paid Plus Case	1.065	0.999
(c)	3rd – 4th	Paid Plus Case	1.049	0.995
(d)	4th – 5th	Paid Plus Case	1.032	0.997
(e)	5th – 6th	Paid Plus Case	1.014	1.006
(f)	6th – 7th	Paid Plus Case	1.006	1.001
(g)	7th – 8th	Paid Plus Case	1.009	1.002
(h)	8th – 9th	Paid Plus Case	1.005	1.001
(i)	9th – 10th	Paid Plus Case	1.006	1.004
(j)	10th – 11th	Paid Plus Case	1.001	1.000
(k)	11th – 12th	Paid Plus Case	1.000	1.001
(l)	12th – 13th	Paid Plus Case	1.005	1.004
(m)	13th – 14th	Paid Plus Case	1.002	1.000
(n)	14th – 15th	Paid Plus Case	1.001	1.002
(o)	15th – 16th	Paid Plus Case	1.001	1.000
(p)	16th – 17th	Paid Plus Case	1.000	1.001
(q)	17th – 18th	Paid Plus Case	1.001	1.002
(r)	18th – 19th	Paid Plus Case	1.002	1.000
(s)	19th Report Paid Plus Case to Ultimate LDF		1.009	1.014
(1)	1st to Ultimate LDF		1.388	1.053
(2)	2nd to Ultimate LDF		1.226	1.029

Notes: Line (1) is produced by multiplying the factors in Lines (a) through (s).
 Line (2) is produced by multiplying the factors in Lines (b) through (s).

Paid Loss
 Selected Loss Development Factors

		[A]	[B]	
Age-to-Age Period	Type of Factor	Indemnity	Medical	
(a)	1st – 2nd	Paid	1.810	1.225
(b)	2nd – 3rd	Paid	1.296	1.061
(c)	3rd – 4th	Paid	1.153	1.029
(d)	4th – 5th	Paid	1.087	1.018
(e)	5th – 6th	Paid	1.055	1.015
(f)	6th – 7th	Paid	1.036	1.012
(g)	7th – 8th	Paid	1.021	1.009
(h)	8th – 9th	Paid	1.017	1.005
(i)	9th – 10th	Paid	1.017	1.007
(j)	10th – 11th	Paid	1.010	1.005
(k)	11th – 12th	Paid	1.008	1.005
(l)	12th – 13th	Paid	1.006	1.004
(m)	13th – 14th	Paid	1.008	1.004
(n)	14th – 15th	Paid	1.005	1.004
(o)	15th – 16th	Paid	1.004	1.003
(p)	16th – 17th	Paid	1.004	1.004
(q)	17th – 18th	Paid	1.003	1.002
(r)	18th – 19th	Paid	1.003	1.004
(r')	Paid to Paid Plus Case Ratio at 19th Report		0.973	0.972
(s)	19th Report Paid Plus Case to Ultimate LDF		1.009	1.014
(1)	1st to Ultimate LDF		3.702	1.543
(2)	2nd to Ultimate LDF		2.045	1.259

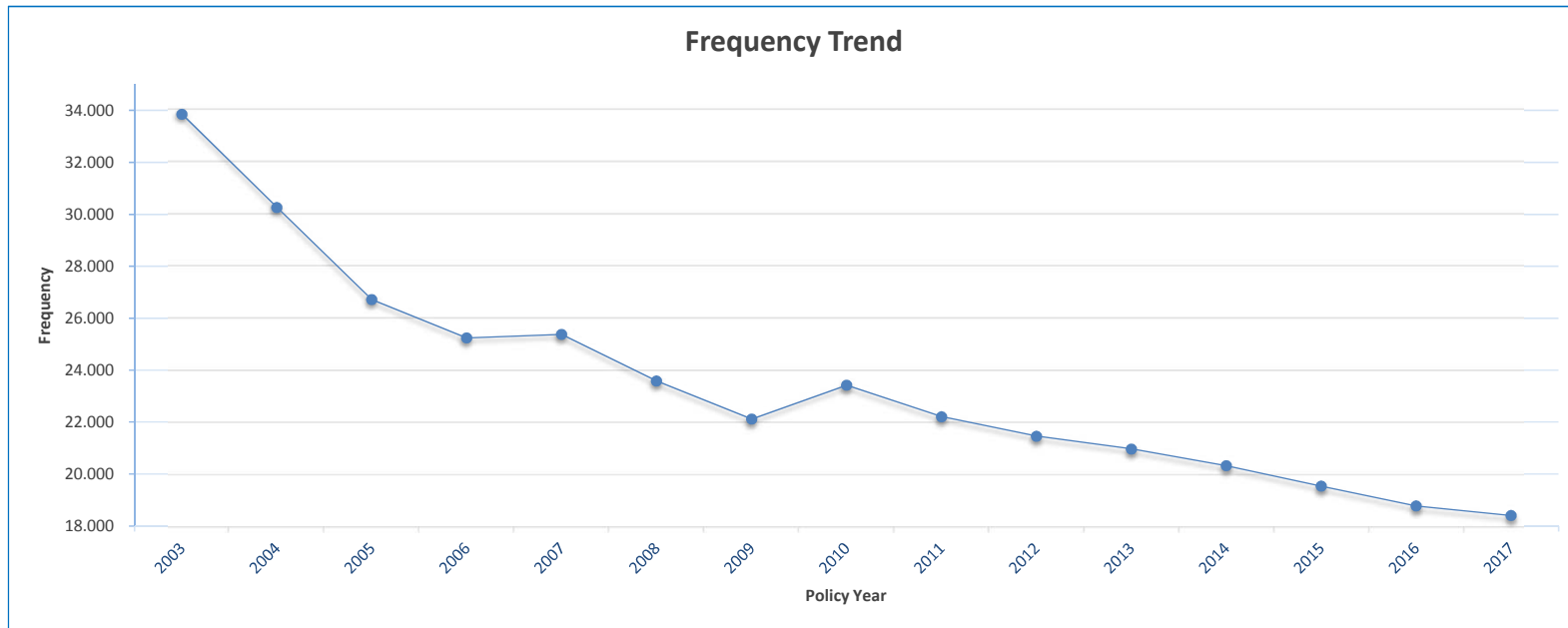
Notes: Line (1) is produced by multiplying the factors in Lines (a) through (r), dividing by Line (r') and multiplying by Line (s).

Line (2) is produced by multiplying the factors in Lines (b) through (r), dividing by Line (r') and multiplying by Line (s).

Paid DCCE to Paid Loss Ratios
 Selected Development Factors

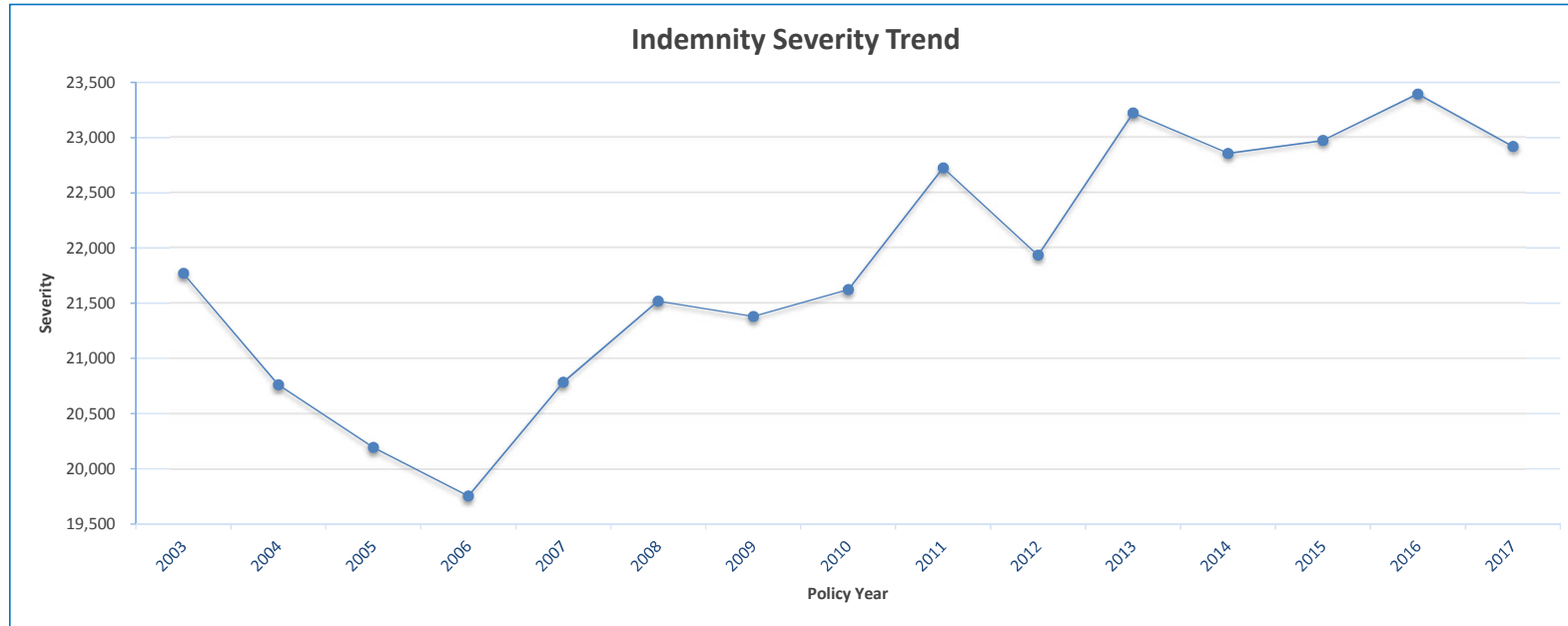
<u>Age-to-Age Period</u>	<u>Type of Factor</u>	
(a) 1st – 2nd	Paid DCCE to Paid Loss Ratio	1.080
(b) 2nd – 3rd	Paid DCCE to Paid Loss Ratio	1.024
(c) 3rd – 4th	Paid DCCE to Paid Loss Ratio	1.010
(d) 4th – 5th	Paid DCCE to Paid Loss Ratio	1.003
(e) 5th – 6th	Paid DCCE to Paid Loss Ratio	0.998
(f) 6th – 7th	Paid DCCE to Paid Loss Ratio	0.997
(g) 7th – 8th	Paid DCCE to Paid Loss Ratio	0.999
(h) 8th – 9th	Paid DCCE to Paid Loss Ratio	0.999
(i) 9th – 10th	Paid DCCE to Paid Loss Ratio	0.997
(j) 10th – 11th	Paid DCCE to Paid Loss Ratio	0.997
(k) 11th – 12th	Paid DCCE to Paid Loss Ratio	0.999
(l) 12th – 13th	Paid DCCE to Paid Loss Ratio	0.998
(m) 13th – 14th	Paid DCCE to Paid Loss Ratio	0.997
(n) 14th – 15th	Paid DCCE to Paid Loss Ratio	0.998
(o) 15th – 16th	Paid DCCE to Paid Loss Ratio	1.000
(p) 16th – 17th	Paid DCCE to Paid Loss Ratio	0.997
(q) 17th – 18th	Paid DCCE to Paid Loss Ratio	0.999
(r) 18th – 19th	Paid DCCE to Paid Loss Ratio	0.999
(s) 19th Report Paid Plus Case to Ultimate LDF		1.000
(1) 1st to Ultimate LDF		1.092
(2) 2nd to Ultimate LDF		1.011
(3) 3rd to Ultimate LDF		0.987
(4) 4th to Ultimate LDF		0.977
(5) 5th to Ultimate LDF		0.974
(6) 6th to Ultimate LDF		0.976
(7) 7th to Ultimate LDF		0.979
(8) 8th to Ultimate LDF		0.980
(9) 9th to Ultimate LDF		0.981
(10) 10th to Ultimate LDF		0.984

Notes: Line (1) is produced by multiplying the factors in Lines (a) through (s).
 Line (2) is produced by multiplying the factors in Lines (b) through (s).
 Line (3) is produced by multiplying the factors in Lines (c) through (s).
 Line (4) is produced by multiplying the factors in Lines (d) through (s).
 Line (5) is produced by multiplying the factors in Lines (e) through (s).
 Line (6) is produced by multiplying the factors in Lines (f) through (s).
 Line (7) is produced by multiplying the factors in Lines (g) through (s).
 Line (8) is produced by multiplying the factors in Lines (h) through (s).
 Line (9) is produced by multiplying the factors in Lines (i) through (s).
 Line (10) is produced by multiplying the factors in Lines (j) through (s).



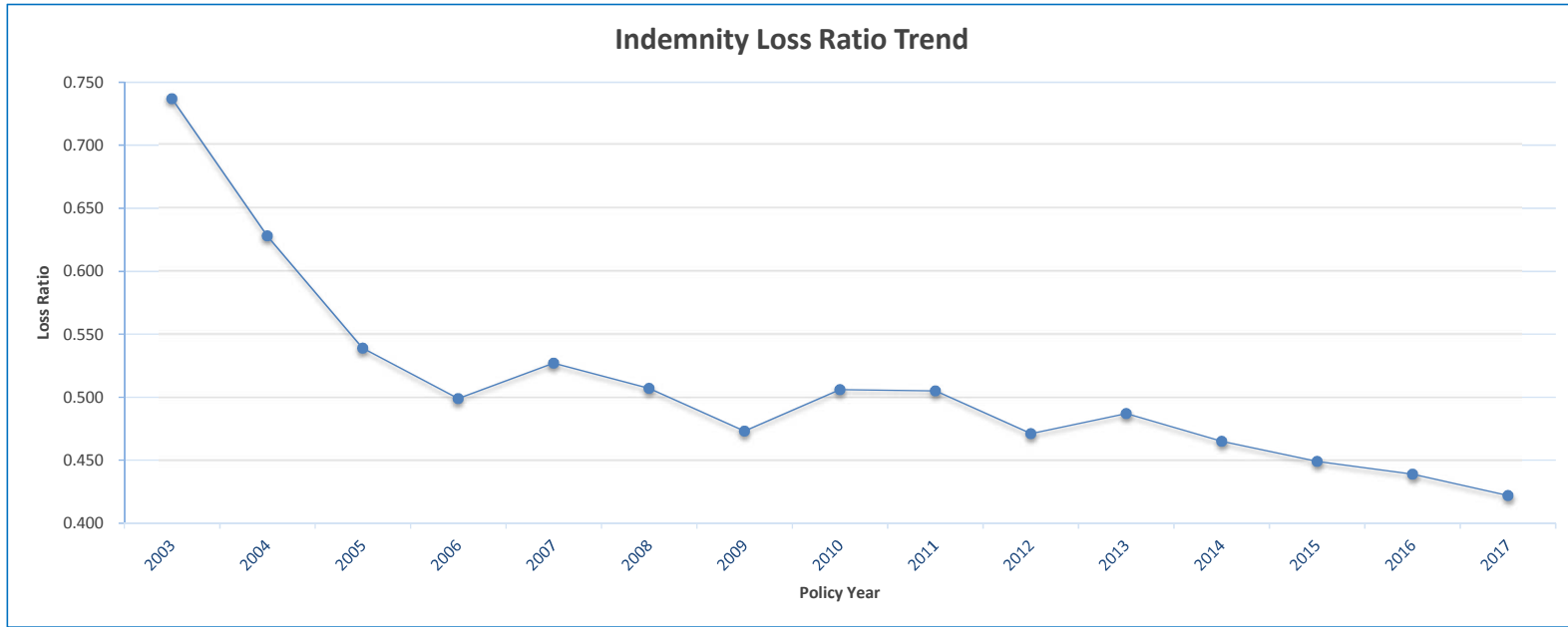
Policy Year	Frequency	Percent Change	Years Reviewed	Exclude	Exponential	
					R-Squared	Trend
2003	33.849		2003 - 2017		0.917	-3.6%
2004	30.261	-10.6%	2006 - 2017		0.956	-2.9%
2005	26.712	-11.7%	2006 - 2017	2009	0.981	-3.0%
2006	25.236	-5.5%	2006 - 2017	2010	0.965	-2.8%
2007	25.375	0.6%	2008 - 2017		0.934	-2.7%
2008	23.577	-7.1%	2008 - 2017	2010	0.952	-2.6%
2009	22.112	-6.2%	2009 - 2017		0.918	-2.8%
2010	23.416	5.9%	2009 - 2017	2010	0.928	-2.6%
2011	22.208	-5.2%	2010 - 2017		0.992	-3.3%
2012	21.458	-3.4%	2011 - 2017		0.994	-3.2%
2013	20.967	-2.3%	2013 - 2017		0.990	-3.3%
2014	20.326	-3.1%				
2015	19.532	-3.9%				
2016	18.774	-3.9%				
2017	18.403	-2.0%				

Notes: Frequency figures reflect information provided by NCCI.



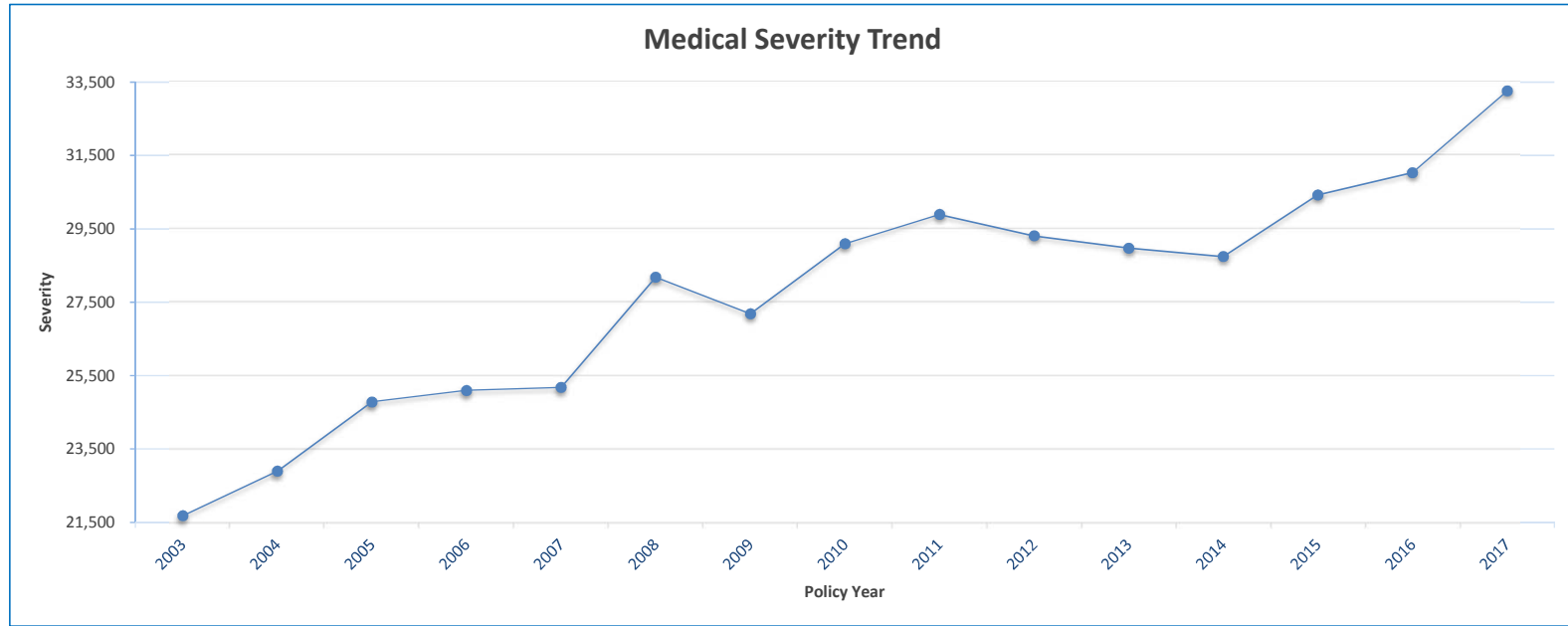
Policy Year	Severity	Percent Change	Years Reviewed	Exclude	Exponential	
					R-Squared	Trend
2003	21,771		2006 - 2016		0.853	1.5%
2004	20,760	-4.6%	2006 - 2016	2008	0.872	1.5%
2005	20,193	-2.7%	2008 - 2016		0.784	1.1%
2006	19,754	-2.2%	2009 - 2016		0.743	1.2%
2007	20,785	5.2%	2012 - 2016		0.555	1.2%
2008	21,519	3.5%	2006 - 2017		0.809	1.3%
2009	21,379	-0.7%	2006 - 2017	2008	0.821	1.4%
2010	21,623	1.1%	2008 - 2017		0.723	1.0%
2011	22,726	5.1%	2009 - 2017		0.658	1.0%
2012	21,936	-3.5%	2010 - 2017		0.517	0.8%
2013	23,223	5.9%	2010 - 2017	2011	0.636	1.0%
2014	22,857	-1.6%	2010 - 2017	2013	0.634	0.8%
2015	22,974	0.5%	2010 - 2017	2011 2013	0.842	1.1%
2016	23,395	1.8%	2011 - 2017		0.288	0.5%
2017	22,919	-2.0%	2012 - 2017		0.345	0.7%

Notes: Severity figures reflect information provided by NCCI with adjustments to recognize Actuarial Solutions' selected loss development factors.



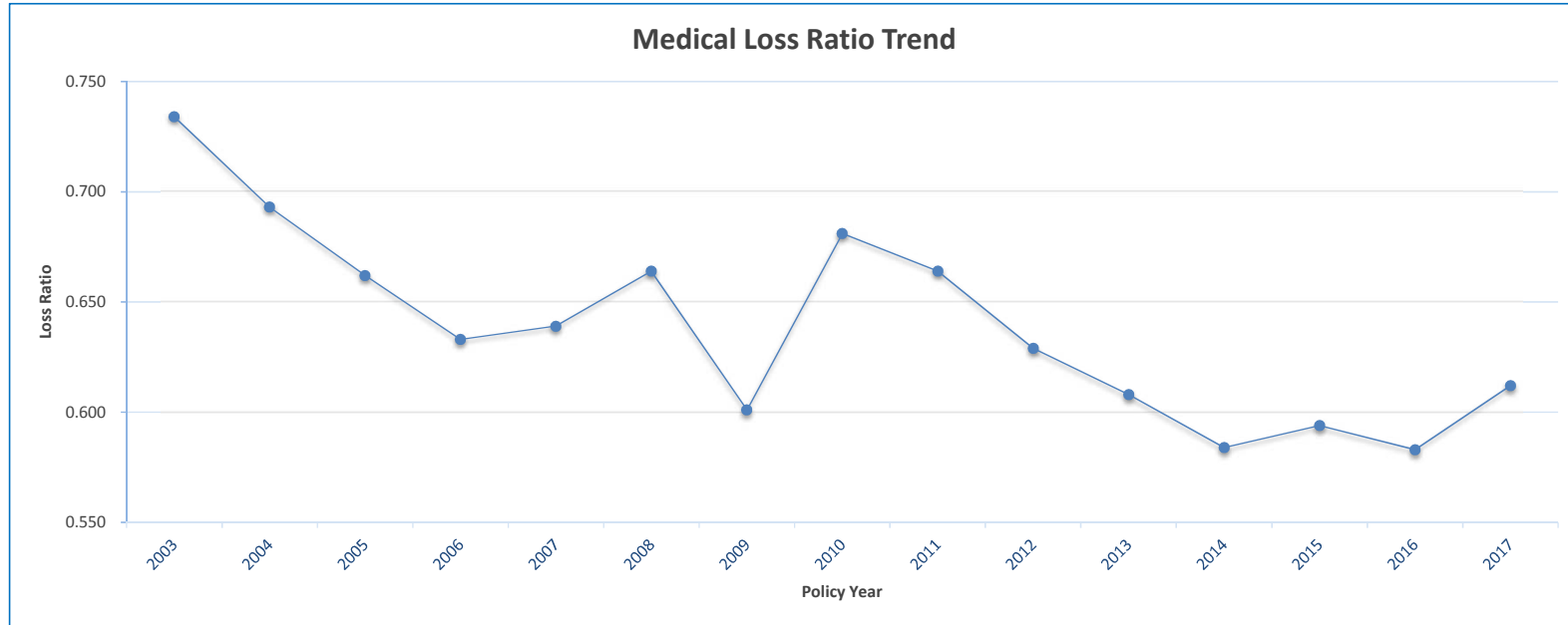
Policy Year	Loss Ratio	Percent Change	Years Reviewed	Exclude	Exponential	
					R-Squared	Trend
2003	0.737		2007 - 2017		0.807	-1.8%
2004	0.628	-14.8%	2007 - 2017	2009	0.909	-2.0%
2005	0.539	-14.2%	2007 - 2017	2012	0.810	-1.8%
2006	0.499	-7.4%	2007 - 2017	2009 2012	0.916	-2.1%
2007	0.527	5.6%	2010 - 2017		0.925	-2.5%
2008	0.507	-3.8%	2010 - 2017	2012	0.962	-2.7%
2009	0.473	-6.7%	2013 - 2017		0.988	-3.4%
2010	0.506	7.0%				
2011	0.505	-0.2%				
2012	0.471	-6.7%				
2013	0.487	3.4%				
2014	0.465	-4.5%				
2015	0.449	-3.4%				
2016	0.439	-2.2%				
2017	0.422	-3.9%				

Notes: Loss ratio figures reflect information provided by NCCI with adjustments to recognize Actuarial Solutions' selected loss development factors.



Policy Year	Severity	Percent Change	Years Reviewed	Exclude	Exponential	
					R-Squared	Trend
2003	21,680		2007 - 2016		0.667	1.6%
2004	22,894	5.6%	2009 - 2016		0.552	1.2%
2005	24,783	8.3%	2010 - 2016		0.328	0.8%
2006	25,095	1.3%	2003 - 2017		0.881	2.5%
2007	25,181	0.3%	2007 - 2017		0.749	1.9%
2008	28,179	11.9%	2007 - 2017	2008	0.788	2.1%
2009	27,184	-3.5%	2009 - 2017		0.676	1.7%
2010	29,091	7.0%	2010 - 2017		0.545	1.5%
2011	29,889	2.7%	2011 - 2017		0.547	1.7%
2012	29,306	-2.0%	2012 - 2017		0.756	2.6%
2013	28,974	-1.1%	2013 - 2017		0.891	3.6%
2014	28,743	-0.8%	2014 - 2017		0.962	4.7%
2015	30,424	5.8%				
2016	31,032	2.0%				
2017	33,256	7.2%				

Notes: Severity figures reflect information provided by NCCI with adjustments to recognize Actuarial Solutions' selected loss development factors.



Policy Year	Loss Ratio	Percent Change	Years Reviewed	Exclude	Exponential	
					R-Squared	Trend
2003	0.734		2003 - 2014		0.522	-1.3%
2004	0.693	-5.6%	2006 - 2014		0.184	-0.8%
2005	0.662	-4.5%	2008 - 2014		0.335	-1.6%
2006	0.633	-4.4%	2008 - 2014	2009	0.753	-2.4%
2007	0.639	0.9%	2010 - 2014		0.991	-3.9%
2008	0.664	3.9%	2008 - 2016		0.522	-1.6%
2009	0.601	-9.5%	2008 - 2016	2009	0.830	-2.1%
2010	0.681	13.3%	2010 - 2016		0.893	-2.7%
2011	0.664	-2.5%	2013 - 2016		0.520	-1.1%
2012	0.629	-5.3%	2008 - 2017		0.437	-1.2%
2013	0.608	-3.3%	2008 - 2017	2009	0.691	-1.7%
2014	0.584	-3.9%	2010 - 2017		0.659	-1.9%
2015	0.594	1.7%	2012 - 2017		0.196	-0.7%
2016	0.583	-1.9%	2013 - 2017		0.006	0.1%
2017	0.612	5.0%	2014 - 2017		0.488	1.2%

Notes: Loss ratio figures reflect information provided by NCCI with adjustments to recognize Actuarial Solutions' selected loss development factors.

Appendix C

NCCI Interrogatories



Missouri Loss Cost Filing 1/1/2020 Interrogatories 9/5/2019 from Actuarial & Technical Solutions, Inc.

1. For total experience (voluntary plus ARM as reflected in the filed indication), please provide extended triangles which present 10 diagonals of loss data for each of indemnity loss and medical loss (i.e., policy year paid and paid plus case reserve loss development from a 1st through a 19th report for indemnity vs. medical).

Response: Please see the following tab in the Excel file entitled "NCCI response to ATSI Interrogatories for MO 1-1-2020.xlsx": Ind Paid LDFs, Ind Paid+Case LDFs, Med Paid LDFs, Med Paid+Case LDFs.

2. Please provide the Supplemental Loss Development and Trend Information associated with the 1/1/20 filing which presents information for the latest 15 policy years.

Response: Please see the Excel file entitled "Supplemental Loss Development and Trend Information.xls."

3. Did you consider any basis for selecting loss development factors other than those shown in the filing?

Response: NCCI's standard approach is to use a longer-term average for the Paid Plus Case (P+C) method to account for the cyclical nature of P+C development factors. We are proposing a 5-year average P+C LDF, consistent with last year's filing.

NCCI's standard approach for Paid development, which typically exhibits greater stability than P+C development, is to emphasize responsiveness via a shorter-term average. We are proposing a 3-year average Paid LDF, consistent with last year's filing.

4. Related to the patterns, or shifts of experience in loss development, please provide the following:
 - ratios of policy year paid to paid plus case data at all available evaluations for indemnity vs. medical, for as many years as possible
 - case reserves per open lost-time claim for each of indemnity and medical loss by policy year
 - closed and reported lost-time claims by policy year, as well as ratios of closed-to-reported claim counts

Response: Please see the following tab in the Excel file entitled "NCCI response to ATSI Interrogatories for MO 1-1-2020.xlsx": Ind Paid to Paid+Case Ratios, Med Paid to Paid+Case Ratios, Ind Case to Open LT Claims, Med Case to Open LT Claims, Closed LT Claims, Reported LT Claims, Closed to Reported Ratios.

5. Please supply payroll by class so that we may complete the tables required for our report.

Response: Please see the Excel file entitled "MO 1-1-2020 Payroll by Class Code.xls."



Missouri Loss Cost Filing 1/1/2020 Interrogatories 9/5/2019 from Actuarial & Technical Solutions, Inc.

6. Please provide the indicated LAE provision using the DCCE methodology from the prior (1/1/19) filing, along with associated supporting documentation. Please also provide the indicated rate change based on this provision.

Response: In last year's Missouri filing, the DCCE provision of 10.7% reflected a weighted average of the selected ratios for private carriers and the state fund. Had the new approach proposed in this year's filing been adopted last year, the filed DCCE ratio would likely have been approximately 10.5%. The analysis required to produce the prior DCCE methodology is not available this year.

7. Related to Section B of Exhibit II, please provide your rationale for the AOE provision selected for Missouri.

Response: The proposed AOE provision reflects a weighting of private carrier and state fund indications, based upon NCCI's countrywide accident year loss adjustment expense data call.

8. Related to Section C of Exhibit II, please expand the presentation of ultimate DCCE ratios to include policy years 2008 through 2012.

Response: Please see the following tab in the Excel file entitled "NCCI response to ATSI Interrogatories for MO 1-1-2020.xlsx": DCCE 08-12

9. Related to Section E of Exhibit II, please provide triangles which present 10 diagonals of paid DCCE to paid loss ratio development factors from a 1st through 19th report.

Response: Please see the following tab in the Excel file entitled "NCCI response to ATSI Interrogatories for MO 1-1-2020.xlsx": DCCE Paid to Ind+Med Paid.

10. What is the 1/1/20 indication if you exclude all assigned risk experience?

Response: An indication of -3.9% results from excluding PY 2016-2017 premium and loss information as of 12/31/2018 as reported by Travelers (the designated Assigned Risk Plan Administrator) on NCCI's Financial Call for Aggregate Assigned Risk Policy Year Data (Call #3A). All other underlying components are based upon statewide data. Please see the following tab in the Excel file entitled "NCCI response to ATSI Interrogatories for MO 1-1-2020.xlsx": Vol Only Indication.

NCCI's philosophy is that, all else equal, changes in the share of the assigned risk (or residual) market from year to year should not impact the voluntary market loss cost indication. Under NCCI's standard ratemaking methodology, the voluntary market loss costs (in conjunction with the NCCI's Experience Rating plan) should be appropriate for all employers in the state. While some employers may pay higher final premiums via a residual market mechanism,



Missouri Loss Cost Filing 1/1/2020
Interrogatories 9/5/2019 from Actuarial & Technical Solutions, Inc.

others are awarded price discounts by voluntary market insurers, thus maintaining a balanced system over time.

11. Please provide supporting work papers which reflect voluntary-only data and document the underlying components of the excluding-ARM indication, such as premium development, loss development, on-level factors, LAE and trend.

Response: Please see response to question ten above.

12. For voluntary-only experience, please provide extended triangles which present 10 diagonals of loss data for each of indemnity loss and medical loss.

Response: Please see response to question ten above.

13. Please supply the derivation of the factor of 0.858 used to adjust the 19th to ultimate LDF to a limited basis as presented in Appendix A-II of the technical supplement.

Response: **Step 1** is to calculate a countrywide *uncapped* tail factor **ULDF** based on countrywide Financial Data for NCCI states.

Step 2 is to calculate a countrywide *capped* tail factor **CLDF_T**, for the state's threshold T.

$$CLDF_T = \frac{(1 - X_{ST})}{\left(\frac{1}{ULDF} - \frac{X_{ST}}{ELDF_T}\right)}$$

Where:

X_{ST} is the excess loss ratio for threshold T.

$ELDF_T$ is the excess loss development factor for threshold T

Step 3 is to calculate **F_T**, the factor to adjust the loss development factor to a limited basis, which is the ratio of the countrywide capped to uncapped tail factors.

$$F_T = (CLDF_T - 1.0) / (ULDF - 1.0)$$

Appendix A-II, Section K, line 1 shows the large loss threshold used in this year's Missouri filing (\$9,720,476). Using the terminology described above, the ULDF is 1.025, the CLDF_T at a threshold of \$9M is 1.0211 and the CLDF_T at a threshold of \$10M is 1.0216. Using the above-referenced formula for F_T at each of the \$9M and \$10M thresholds and then interpolating between those results produces the 0.858 factor corresponding to Missouri's large loss threshold.



Missouri Loss Cost Filing 1/1/2020
Interrogatories 9/5/2019 from Actuarial & Technical Solutions, Inc.

14. Please provide the overall impact of methodology changes from the prior filing.

Response: This year's methodology changes and associated impacts are listed below:

- DCEE Methodology: See response to question five
- USL&HW Coverage Factor: No impact
- Classification Swing Limits: No impact
- Reflection of Annual Changes to Maximum and/or Minimum Indemnity Benefits: No expected impact (see Additional Proposed Changes section of the filing)



Supplemental Loss Development and Trend Information Missouri January 1, 2020 Filing Introduction

Supplemental Loss Development and Trend Information provides the data underlying the frequency and severity trend graphs shown in the filing document. The data included (i.e., policy year or accident year, limited or unlimited, etc.) is consistent with the data used in the filing and can vary by state. All of the data shown is as of the latest valuation date, December 31, 2018.

The development and on-level factors shown in the Supplemental Loss Development and Trend Information exhibit can be found in the filing. The frequency and severity values provided have been adjusted to the current wage level.

Note: The information shown in the Supplemental Loss Development and Trend Information exhibit is provided for informational purposes only. NCCI makes no warranty that any of the loss development factors, on-level factors, wage adjustment factors or any other information provided is suitable for application to an individual carrier's data.



Supplemental Loss Development and Trend Information Missouri January 1, 2020 Filing Definitions

Accident Year (AY)—A loss accounting definition in which experience is summarized by the calendar year in which an accident occurred.

Calendar Year (CY)

1. The 12-month period beginning January 1 and ending December 31.
2. Method of accounting for all financial transactions occurring during a specific year.

Case Reserves—Reserves that an insurance company establishes for specific (known) claims.

DSR Premium (commonly referred to as DSR Level Premium)—The standard earned premium that would result if business were written at a common benchmark level known as the designated statistical reporting level (e.g., NCCI state-approved loss costs or rates).

Frequency—The number of workplace injuries resulting in lost-time claims per million dollars of on-leveled, wage-adjusted premium.

Incurred Claim Count—The total of all claims reported, whether open or closed, as of a given valuation date. An indemnity claim is associated with a payment or case reserve for an indemnity loss (i.e., lost work time-related benefits) and excludes claims closed without an indemnity payment.

Limited Losses—Losses that result after the application of NCCI's large loss procedure (in which individual large claims are limited to state- and year-specific large loss thresholds).

On-Level Factor—Applied to historical policy and accident year premiums and losses to adjust the historical experience to reflect approved loss cost and rate level changes as well as statutory benefit level changes implemented since that time period.

Paid+Case Losses—The sum of paid losses and case reserves. Also known as case-incurred losses.

Paid Losses—Losses that an insurance company has paid as a result of claim activity.

Policy Year

1. The one-year period beginning with the effective date or anniversary of a policy.
2. A premium and loss accounting definition in which experience is summarized for all policies with effective dates in a given calendar year period.

Severity—The average indemnity or medical cost per lost-time claim.

Ultimate Development Factor—For an aggregation of data, an estimate of the development that will occur between the data's current valuation date and the time period when all claims are closed. For example, an ultimate loss development factor applied to Policy Year 2000 reported losses represents an estimate of the Policy Year 2000 ultimate losses.

Unlimited Losses—Losses that have not been adjusted to reflect NCCI's large loss procedure (see **Limited Losses**).

Valuation Date—The date that premiums and losses are valued for reporting purposes. Premiums and losses change over time from initial estimates to final values (other than calendar year statistics). Therefore, interim snapshots have associated valuation dates.

Wage Level Adjustment Factor—Ratio of the average workers' wage during the most recent policy or accident year period to the average workers' wage during a historical time period.



Supplemental Loss Development and Trend Information
Missouri January 1, 2020 Filing
Limited-Statewide-Private Carrier + State Fund-Policy Year

Lost-Time Claim Frequency and Severity-Based on Data in Excess of Wage Inflation

(1)	(2)	(3)			(4)	(5)	(6)			(7)	(8)
Policy Year	Claim Freq Per Million On-level Premium	Indemnity Severity			Medical Severity						
		Paid	Paid + Case	Average Pd/P+C	Paid	Paid + Case	Average Pd/P+C				
2003	33.849	21,647	21,915	21,781	21,698	21,704	21,701				
2004	30.261	20,529	20,988	20,759	22,615	23,194	22,905				
2005	26.712	20,179	20,187	20,183	24,302	25,287	24,795				
2006	25.236	19,726	19,745	19,736	25,097	25,093	25,095				
2007	25.375	20,722	20,807	20,764	25,209	25,130	25,169				
2008	23.577	21,430	21,565	21,498	27,507	28,800	28,153				
2009	22.112	21,606	21,111	21,359	27,250	27,068	27,159				
2010	23.416	21,727	21,514	21,620	29,018	29,111	29,064				
2011	22.208	22,975	22,451	22,713	29,749	29,974	29,862				
2012	21.458	22,352	21,479	21,915	29,071	29,463	29,267				
2013	20.967	23,407	22,998	23,203	28,802	29,042	28,922				
2014	20.326	23,057	22,551	22,804	28,980	28,405	28,692				
2015	19.532	23,045	22,765	22,905	29,953	30,627	30,290				
2016	18.774	23,737	22,891	23,314	30,583	31,219	30,901				
2017	18.403	23,424	22,351	22,888	32,961	33,305	33,133				

(9)	(10)	(11)
Annual Percentage Change		
Claim Frequency	Indemnity Severity (Avg Pd/P+C)	Medical Severity (Avg Pd/P+C)
-10.6%	-4.7%	5.5%
-11.7%	-2.8%	8.3%
-5.5%	-2.2%	1.2%
0.6%	5.2%	0.3%
-7.1%	3.5%	11.9%
-6.2%	-0.6%	-3.5%
5.9%	1.2%	7.0%
-5.2%	5.1%	2.7%
-3.4%	-3.5%	-2.0%
-2.3%	5.9%	-1.2%
-3.1%	-1.7%	-0.8%
-3.9%	0.4%	5.6%
-3.9%	1.8%	2.0%
-2.0%	-1.8%	7.2%

Notes: (2) = (15) / [(22) / 1,000,000]
 (3) = (27) / (15)
 (4) = (31) / (15)
 (5) = (33) / (15)

(6) = (39) / (15)
 (7) = (43) / (15)
 (8) = (45) / (15)

(9) is based on (2)
 (10) is based on (5)
 (11) is based on (8)

Claim Counts

(12)	(13)	(14)	(15)
Policy Year	Incurred Lost-Time Claim Count	Ultimate Development Factor	Ultimate Incurred Lost-Time Claim Count
2003	14,268	1.000	14,268
2004	13,353	1.000	13,353
2005	12,200	1.000	12,200
2006	12,033	1.000	12,033
2007	12,715	1.000	12,715
2008	11,100	1.000	11,100
2009	10,073	1.000	10,073
2010	10,943	1.000	10,943
2011	10,344	1.000	10,344
2012	9,813	1.000	9,813
2013	9,627	1.000	9,627
2014	9,530	0.999	9,520
2015	9,488	0.998	9,469
2016	9,284	1.005	9,330
2017	8,972	1.046	9,385

Notes: (15) = (13) x (14)

Premium

(16)	(17)	(18)	(19)	(20)	(21)	(22)
Policy Year	DSR Level Premium	Ultimate Development Factor	Ultimate Premium	On-level Factor	Factor to Adjust to 2017 Wage Levels	Wage-Adj On-level Ult. Prem
2003	531,552,981	1.000	531,552,981	0.562	1.411	421,521,514
2004	571,573,892	1.000	571,573,892	0.565	1.367	441,255,045
2005	602,542,920	1.000	602,542,920	0.573	1.323	456,727,533
2006	638,307,473	1.000	638,307,473	0.585	1.277	476,815,682
2007	694,020,296	1.000	694,020,296	0.589	1.225	501,082,654
2008	603,586,235	1.000	603,586,235	0.651	1.198	470,797,263
2009	542,956,088	1.000	542,956,088	0.700	1.199	455,540,158
2010	559,686,343	1.000	559,686,343	0.709	1.178	467,338,096
2011	547,319,770	1.000	547,319,770	0.741	1.148	465,769,124
2012	523,238,642	1.000	523,238,642	0.778	1.123	457,310,573
2013	540,165,109	1.000	540,165,109	0.770	1.104	459,140,343
2014	628,684,326	1.000	628,684,326	0.694	1.073	468,369,823
2015	641,254,898	1.000	641,254,898	0.720	1.050	484,788,703
2016	653,024,823	1.000	653,024,823	0.738	1.031	496,951,890
2017	652,617,982	1.007	657,186,308	0.776	1.000	509,976,575

(19) = (17) x (18)
 (22) = (19) x [(20) x (21)]

Response to Interrogatory 2

Limited Indemnity Losses

(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)
Policy Year	Paid				Paid + Case				Average Pd/P+C		Loss On-level Factor
	Ultimate Development Losses	Ultimate Development Factor	Ultimate Losses	Wage-Adj On-level Ult. Losses	Ultimate Development Losses	Ultimate Development Factor	Ultimate Losses	Wage-Adj On-level Ult. Losses	Ultimate Losses	Wage-Adj On-level Ult. Losses	
2003	208,469,039	1.053	219,517,898	308,861,682	219,377,854	1.013	222,229,766	312,677,281	220,873,832	310,769,482	0.997
2004	190,091,176	1.058	201,116,464	274,121,740	202,979,453	1.013	205,618,186	280,257,588	203,367,325	277,189,664	0.997
2005	174,061,141	1.065	185,375,115	246,178,153	182,710,585	1.015	185,451,244	246,279,252	185,413,180	246,228,703	1.004
2006	172,337,605	1.071	184,573,575	237,361,617	181,131,587	1.020	184,754,219	237,593,926	184,663,897	237,477,772	1.007
2007	197,705,065	1.080	213,521,470	263,485,494	210,391,081	1.019	214,388,512	264,555,424	213,954,991	264,020,459	1.007
2008	180,792,293	1.091	197,244,392	237,876,737	194,593,308	1.020	198,485,174	239,373,120	197,864,783	238,624,928	1.007
2009	162,445,653	1.110	180,314,675	217,639,813	171,718,771	1.026	176,183,459	212,653,435	178,249,067	215,146,624	1.007
2010	177,404,381	1.130	200,466,951	237,753,804	192,539,193	1.031	198,507,908	235,430,379	199,487,430	236,592,092	1.007
2011	178,145,170	1.154	205,579,526	237,649,932	193,168,459	1.040	200,895,197	232,234,848	203,237,362	234,942,390	1.007
2012	162,421,633	1.194	193,931,430	219,336,447	177,996,751	1.047	186,362,598	210,776,098	190,147,014	215,056,273	1.007
2013	161,663,764	1.258	203,373,015	225,337,301	187,981,087	1.063	199,823,895	221,404,876	201,598,455	223,371,088	1.004
2014	149,975,758	1.364	204,566,934	219,500,320	182,385,583	1.097	200,076,985	214,682,605	202,321,960	217,091,463	1.000
2015	132,369,477	1.570	207,820,079	218,211,083	178,363,344	1.151	205,296,209	215,561,019	206,558,144	216,886,051	1.000
2016	105,920,774	2.028	214,807,330	221,466,357	168,689,946	1.228	207,151,254	213,572,943	210,979,292	217,519,650	1.000
2017	59,625,302	3.687	219,838,488	219,838,488	150,909,038	1.390	209,763,563	209,763,563	214,801,026	214,801,026	1.000

Notes: (26) = (24) x (25)
(27) = (26) x [(34) x (21)]

(30) = (28) x (29)
(31) = (30) x [(34) x (21)]

(32) = [0.50 x (26)] + [0.50 x (30)]
(33) = (32) x [(34) x (21)]

Limited Medical Losses

(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)
Policy Year	Paid				Paid + Case				Average Pd/P+C		Loss On-level Factor
	Ultimate Development Losses	Ultimate Development Factor	Ultimate Losses	Wage-Adj On-level Ult. Losses	Ultimate Development Losses	Ultimate Development Factor	Ultimate Losses	Wage-Adj On-level Ult. Losses	Ultimate Losses	Wage-Adj On-level Ult. Losses	
2003	209,455,423	1.058	221,603,838	309,580,562	217,751,082	1.018	221,670,601	309,673,830	221,637,220	309,627,196	0.990
2004	210,160,398	1.062	223,190,343	301,976,534	224,638,991	1.019	228,907,132	309,711,350	226,048,738	305,843,943	0.990
2005	210,864,644	1.066	224,781,711	296,487,077	229,528,098	1.019	233,889,132	308,499,765	229,335,422	302,493,422	0.997
2006	221,012,041	1.070	236,482,884	301,988,643	231,130,622	1.023	236,446,626	301,942,341	236,464,755	301,965,492	1.000
2007	243,625,819	1.074	261,654,130	320,526,309	254,722,788	1.024	260,836,135	319,524,265	261,245,133	320,025,288	1.000
2008	236,421,811	1.078	254,862,712	305,325,529	260,589,225	1.024	266,843,366	319,678,352	260,853,039	312,501,941	1.000
2009	210,799,973	1.086	228,928,771	274,485,596	221,211,800	1.028	227,405,730	272,659,470	228,167,251	273,572,534	1.000
2010	247,075,820	1.091	269,559,720	317,541,350	262,803,218	1.029	270,424,511	318,560,074	269,992,116	318,050,713	1.000
2011	243,461,387	1.101	268,050,987	307,722,533	261,962,265	1.031	270,083,095	310,055,393	269,067,041	308,888,963	1.000
2012	228,237,376	1.113	254,028,199	285,273,667	249,472,193	1.032	257,455,303	289,122,305	255,741,751	287,197,986	1.000
2013	222,262,362	1.130	251,156,469	277,276,742	243,980,320	1.038	253,251,572	279,589,735	252,204,021	278,433,239	1.000
2014	223,580,976	1.150	257,118,122	275,887,745	243,493,735	1.035	252,016,016	270,413,185	254,567,069	273,150,465	1.000
2015	228,911,840	1.180	270,115,971	283,621,770	268,935,756	1.027	276,197,021	290,006,872	273,156,496	286,814,321	1.000
2016	221,051,055	1.252	276,755,921	285,335,355	275,355,653	1.026	282,514,900	291,272,862	279,635,411	288,304,109	1.000
2017	201,394,199	1.536	309,341,490	309,341,490	297,685,959	1.050	312,570,257	312,570,257	310,955,874	310,955,874	1.000

Notes: (38) = (36) x (37)
(39) = (38) x [(46) x (21)]

(42) = (40) x (41)
(43) = (42) x [(46) x (21)]

(44) = [0.50 x (38)] + [0.50 x (42)]
(45) = (44) x [(46) x (21)]



Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
0005	18,126,404
0008	7,269,302
0016	2,231,629
0034	37,790,412
0035	19,537,454
0036	6,415,399
0037	46,708,311
0042	65,709,802
0050	13,249,739
0059	0
0065	0
0066	0
0067	0
0079	2,326,826
0083	79,113,152
0106	73,355,337
0113	893,567
0170	2,674
0251	845,422
0401	5,938,316
0771	0
0908*	3,136
0913*	4,797
0917	17,822,144
1005	1,489,389
1016	46,646
1164	62,828,188
1165	664,920
1320	616,085
1322	0
1430	17,799,416
1438	4,945,778
1452	1,531,169
1463	14,878,524
1472	20,697,715
1624	86,515,343
1642	33,838,467
1654	3,026,533
1699	7,435,667
1701	77,291,626
1710	2,546,881
1747	2,366,326
1748	0
1803	16,026,264

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
1924	8,881,985
1925	25,680,217
2002	28,633,796
2003	54,059,334
2014	69,821,254
2016	22,385,823
2021	8,476,297
2039	43,300,008
2041	6,912,732
2065	2,840,079
2070	53,198,860
2081	3,303,832
2089	198,632,051
2095	166,349,871
2105	512,169
2110	5,485,839
2111	29,831,525
2112	286,462
2114	0
2121	79,891,791
2130	17,913,832
2131	8,627,077
2143	11,421,783
2157	67,896,632
2172	398,397
2174	339,074
2211	13,123
2220	1,139,675
2286	0
2288	11,191,944
2302	0
2305	3,746,069
2361	257,335
2362	280,612
2380	983,368
2388	7,200,997
2402	123,783
2413	833,999
2416	0
2417	1,867,729
2501	107,793,655
2503	1,669,878
2570	1,835,454
2585	96,431,339

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
2586	5,829,844
2587	1,188,044
2589	21,467,982
2600	0
2623	2,894,917
2651	8,520,827
2660	19,230,654
2670	876,795
2683	1,575,892
2688	5,873,648
2701	525,626
2702	2,107,704
2709	125,962
2710	13,558,994
2714	35,339
2731	39,402,734
2735	4,233,923
2759	28,384,857
2790	3,474,644
2797	2,012,948
2799	3,630,021
2802	30,204,831
2835	1,204,363
2836	459,802
2841	4,779,410
2881	22,785,770
2883	127,383,060
2915	0
2916	494,669
2923	919,026
2960	3,238,281
3004	12,200
3018	4,961,187
3022	11,942,992
3027	1,348,503
3028	40,866,742
3030	78,505,161
3040	27,042,946
3041	1,593,844
3042	0
3064	13,165,280
3076	508,130,125
3081	10,476,031
3082	3,649,328

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
3085	64,446,116
3110	4,691,544
3111	111,840
3113	142,650,513
3114	2,970,167
3118	1,708,682
3119	4,662
3122	81,908
3126	2,651,058
3131	37,215
3132	696,079
3145	10,638,327
3146	44,504,040
3169	5,805,582
3179	164,373,344
3180	17,117,366
3188	28,011,756
3220	29,097,455
3224	0
3227	22,876,377
3240	838,622
3241	25,794,071
3255	0
3257	36,500,114
3270	13,582,912
3300	35,037,977
3303	18,923,024
3307	6,902,755
3315	1,306,558
3334	10,019,778
3336	7,559,358
3365	22,572,108
3372	24,615,191
3373	6,666,290
3383	3,265,277
3385	1,258,880
3400	132,639,203
3507	80,940,752
3515	421,918
3548	2,566,572
3559	5,724,858
3574	51,316,447
3581	8,568,518
3612	79,031,944

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
3620	52,372,913
3629	88,899,069
3632	367,966,157
3634	41,005,921
3635	5,969,704
3638	13,302,470
3642	955,712
3643	132,968,309
3647	111,084,920
3648	8,874,778
3681	244,615,371
3685	139,512,919
3719	103,944
3724	254,494,205
3726	15,905,380
3803	16,685,712
3807	21,602,012
3808	30,361,866
3821	21,843,289
3822	1,225,692
3824	77,810,580
3826	13,846,464
3827	449,542
3830	909,656,035
3851	45,712,511
3865	3,774,035
3881	18,306,620
4000	14,412,428
4018	14,406,919
4021	408,722
4034	38,287,753
4036	4,143,642
4038	939,561
4062	1,515,713
4101	6,937,664
4109	15,385,365
4110	1,304,701
4111	8,832,404
4114	30,607,629
4130	15,156,867
4131	71,455
4133	537,930
4149	15,969,640
4206	904,531

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
4207	0
4239	8,536,838
4240	7,983,731
4243	49,055,757
4244	89,762,390
4250	10,953,309
4251	11,598,412
4263	3,287,167
4273	64,428,344
4279	30,645,984
4283	23,930,450
4299	238,097,879
4304	24,175,135
4307	10,147,106
4351	3,709,415
4352	2,792,763
4361	75,703,126
4410	131,035,052
4420	5,251
4431	2,100,397
4432	0
4452	51,516,171
4459	79,372,497
4470	8,288,481
4484	400,418,571
4493	1,000,915
4511	351,298,999
4557	22,966,054
4558	44,120,671
4568	760,500
4581	1,690,588
4583	29,969,932
4611	315,772,204
4635	32,668,215
4653	397,413
4665	1,662,465
4683	614,286
4686	9,636,079
4692	28,286,407
4693	16,954,449
4703	18,541,492
4717	8,073,569
4720	117,258,045
4740	5,732,911

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Missouri

Payroll By Class Code

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Class Code	7/16 - 6/17 Payroll
4741	12,395,646
4751	5,594
4771	33,462,001
4777	1,719,610
4825	206,189,807
4828	117,002,684
4829	143,145,909
4902	12,364,015
4923	2,403,004
5020	9,775,782
5022	129,526,926
5037	590,980
5040	11,018,957
5057	32,589,433
5059	4,562,713
5102	36,835,801
5146	35,980,149
5160	42,421,090
5183	428,202,310
5188	56,289,090
5190	515,080,316
5191	346,311,233
5192	54,762,737
5213	138,999,613
5215	54,882,638
5221	268,524,568
5222	23,456,897
5223	12,615,615
5348	60,720,773
5402	634,913
5403	278,774,497
5437	130,609,792
5443	763,017
5445	180,594,040
5462	37,213,294
5472	7,800,123
5473	10,303,210
5474	193,349,800
5478	63,145,896
5479	15,486,708
5480	4,806,608
5491	2,825,793
5506	183,508,349
5507	12,268,272

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Missouri

Payroll By Class Code

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Class Code	7/16 - 6/17 Payroll
5535	100,463,766
5537	353,495,755
5551	86,760,468
5606	519,851,184
5610	10,809,013
5645	223,638,543
5703	87,892
5705	129,507
5951	9,483,833
6003	1,211,026
6005	61,075
6045	867,226
6204	11,020,097
6206	21,941
6213	86,553
6214	0
6216	1,108,978
6217	232,377,627
6229	9,909,505
6233	12,359,840
6235	129,730
6236	0
6237	401,693
6251	3,745,482
6252	2,882,841
6306	45,058,215
6319	59,760,355
6325	54,427,899
6400	19,392,164
6503	3,477,564
6504	368,615,095
6702	0
6703	0
6704	0
6824	0
6825	31,192,126
6826	5,735
6834	37,782,235
6835	20,097
6836	12,920,042
6872	295,996
6874	0
6882	0
6884	3,811

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

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Class Code	7/16 - 6/17 Payroll
7016	0
7024	138,302
7038	0
7046	0
7047	0
7050	0
7090	64,458
7098	0
7099	0
7133	2,025,002
7151	0
7152	0
7153	0
7219	1,216,668,334
7222	120,680
7225	0
7230	28,167,893
7231	42,805,065
7232	28,751,576
7309	1,302,436
7313	267,096
7317	1,310,313
7327	0
7333	0
7335	0
7337	0
7350	271,824
7360	24,956,719
7370	14,159,312
7380	466,087,897
7382	132,748,460
7390	32,198,277
7394	0
7395	36,123
7398	0
7402	832,563
7403	204,257,785
7405	83,229,791
7420	977,566
7421	31,189,026
7422	7,507,224
7425	25,371,497
7431	21,886,366
7445	0

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Missouri

Payroll By Class Code

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Class Code	7/16 - 6/17 Payroll
7453	0
7502	13,704,042
7515	33,270,500
7520	85,935,179
7538	75,914,535
7539	52,168,562
7540	828
7580	29,273,944
7590	12,185,356
7600	354,444,517
7605	93,558,044
7610	266,083,027
7705	109,546,064
7710	108,527,479
7711	15,594,988
7720	343,260,303
7855	23,620,008
8001	38,473,089
8002	68,340,323
8006	263,593,843
8008	366,706,086
8010	263,429,881
8013	139,718,759
8015	38,170,146
8017	875,050,514
8018	524,637,143
8021	39,455,298
8031	17,028,373
8032	27,753,878
8033	577,430,523
8034	18,410,747
8037	981,055,311
8039	115,238,058
8044	159,075,722
8045	454,122,659
8046	221,956,776
8047	52,127,391
8058	190,276,507
8061	177,658,882
8072	25,246,517
8102	15,095,921
8103	2,398,752
8106	46,476,557
8107	181,834,174

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
8111	70,749,796
8116	83,241,188
8203	7,736,331
8204	4,027,660
8209	444,889
8215	100,978,715
8227	112,225,877
8232	283,156,526
8233	4,113,252
8235	12,785,415
8263	4,885,387
8264	21,557,730
8265	27,705,260
8279	6,146,723
8288	15,992,856
8291	26,591,102
8292	146,586,536
8293	88,126,392
8304	28,314,727
8350	71,782,960
8353	28,297,054
8370	49,419,204
8381	7,300,112
8385	58,227,659
8387	198,232,649
8391	783,345,852
8392	32,361,390
8393	176,045,310
8500	8,329,563
8601	1,087,846,480
8602	18,426,329
8603	458,478,935
8606	143,746
8709	75,341
8719	192,897
8720	102,291,144
8721	25,240,793
8723	1,956,332,251
8725	1,896,415
8726	210,146
8728	46,319,131
8734	0
8737	0
8738	0

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
8742	6,095,071,552
8745	1,178,026
8748	321,158,602
8755	63,877,898
8799	16,531,449
8800	34,946,625
8803	1,806,504,245
8805	0
8810	25,521,134,667
8814	0
8815	0
8820	1,257,562,055
8824	129,529,215
8826	73,263,440
8831	252,635,269
8832	3,666,423,104
8833	1,860,465,101
8835	571,403,062
8855	2,507,550,958
8856	38,828,712
8861	535,853,208
8868	3,552,543,408
8869	331,882,701
8871	245,687,716
8901	1,141,492,776
9012	476,920,811
9014	471,013,676
9015	372,991,037
9016	38,520,797
9019	288,298
9033	31,451,370
9040	83,465,228
9044	253,939,817
9052	404,166,409
9058	101,612,576
9060	134,105,613
9061	31,282,269
9062	9,619,517
9063	227,163,290
9077	0
9082	1,577,962,502
9083	1,124,982,682
9084	75,961,772
9089	279,457

* Per Capita Class Codes (payroll column = number of full time employees x 10)

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Missouri

Payroll By Class Code

Note: Class codes discontinued by item filings are not included in this exhibit.

Class Code	7/16 - 6/17 Payroll
9093	23,002,888
9101	264,471,507
9102	224,886,637
9110	80,570,253
9154	93,097,933
9156	38,305,882
9170	4,225,435
9178	11,495,199
9179	8,800,227
9180	18,939,600
9182	45,063,129
9186	2,013,880
9220	16,949,602
9402	43,823,104
9403	134,273,278
9410	21,255,484
9501	21,519,712
9505	8,245,254
9516	49,668,676
9519	46,451,474
9521	17,051,423
9522	46,836,265
9534	15,134,122
9554	17,343,955
9586	158,647,705
9600	279,139
9620	54,906,687

*Per Capita Class Codes (payroll column = number of full time employees x 10)

PY

DCCE Pd to Total Pd
Ultimate Report

2008	11.0%
2009	10.9%
2010	10.7%
2011	10.7%
2012	10.7%

MISSOURI**EXHIBIT I - AVERAGE OF PAID & PAID + CASE LOSSES (ASSIGNED RISK PREMIUM AND LOSSES REMOVED)****Determination of Indicated Loss Cost Level Change****Section A - Policy Year 2017 Experience****Premium:**

(1) Standard Earned Premium Developed to Ultimate (Appendix A-II)	\$647,500,943
(2) Premium On-level Factor (Appendix A-I)	0.776
(3) Pure Premium Available for Benefit Costs = (1) x (2)	\$502,460,732

Indemnity Benefit Cost:

(4) Limited Indemnity Losses Developed to Ultimate (Appendix A-II)	\$210,848,196
(5) Indemnity Loss On-level Factor (Appendix A-I)	1.000
(6) Adjusted Limited Indemnity Losses = (4) x (5)	\$210,848,196
(7) Adjusted Limited Indemnity Cost Ratio excluding Trend and Benefits = (6) / (3)	0.420
(8) Factor to Reflect Indemnity Trend (Appendix A-III)	0.941
(9) Projected Limited Indemnity Cost Ratio = (7) x (8)	0.395
(10) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis (Appendix A-II)	1.011
(11) Projected Indemnity Cost Ratio = (9) x (10)	0.399
(12) Factor to Reflect Proposed Changes in Indemnity Benefits (Appendix C)	1.000
(13) Projected Indemnity Cost Ratio including Benefit Changes = (11) x (12)	0.399

Medical Benefit Cost:

(14) Limited Medical Losses Developed to Ultimate (Appendix A-II)	\$300,332,658
(15) Medical Loss On-level Factor (Appendix A-I)	1.000
(16) Adjusted Limited Medical Losses = (14) x (15)	\$300,332,658
(17) Adjusted Limited Medical Cost Ratio excluding Trend and Benefits = (16) / (3)	0.598
(18) Factor to Reflect Medical Trend (Appendix A-III)	0.970
(19) Projected Limited Medical Cost Ratio = (17) x (18)	0.580
(20) Factor to Adjust Medical Cost Ratio to an Unlimited Basis (Appendix A-II)	1.011
(21) Projected Medical Cost Ratio = (19) x (20)	0.586
(22) Factor to Reflect Proposed Changes in Medical Benefits (Appendix C)	1.000
(23) Projected Medical Cost Ratio including Benefit Changes = (21) x (22)	0.586

Total Benefit Cost:

(24) Indicated Change Based on Experience, Trend and Benefits = (13) + (23)	0.985
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Response to Interrogatory 10

Section B - Policy Year 2016 Experience

Premium:

(1) Standard Earned Premium Developed to Ultimate (Appendix A-II)	\$642,001,796
(2) Premium On-level Factor (Appendix A-I)	0.738
(3) Pure Premium Available for Benefit Costs = (1) x (2)	\$473,797,325

Indemnity Benefit Cost:

(4) Limited Indemnity Losses Developed to Ultimate (Appendix A-II)	\$204,838,380
(5) Indemnity Loss On-level Factor (Appendix A-I)	1.000
(6) Adjusted Limited Indemnity Losses = (4) x (5)	\$204,838,380
(7) Adjusted Limited Indemnity Cost Ratio excluding Trend and Benefits = (6) / (3)	0.432
(8) Factor to Reflect Indemnity Trend (Appendix A-III)	0.922
(9) Projected Limited Indemnity Cost Ratio = (7) x (8)	0.398
(10) Factor to Adjust Indemnity Cost Ratio to an Unlimited Basis (Appendix A-II)	1.011
(11) Projected Indemnity Cost Ratio = (9) x (10)	0.402
(12) Factor to Reflect Proposed Changes in Indemnity Benefits (Appendix C)	1.000
(13) Projected Indemnity Cost Ratio including Benefit Changes = (11) x (12)	0.402

Medical Benefit Cost:

(14) Limited Medical Losses Developed to Ultimate (Appendix A-II)	\$262,100,765
(15) Medical Loss On-level Factor (Appendix A-I)	1.000
(16) Adjusted Limited Medical Losses = (14) x (15)	\$262,100,765
(17) Adjusted Limited Medical Cost Ratio excluding Trend and Benefits = (16) / (3)	0.553
(18) Factor to Reflect Medical Trend (Appendix A-III)	0.961
(19) Projected Limited Medical Cost Ratio = (17) x (18)	0.531
(20) Factor to Adjust Medical Cost Ratio to an Unlimited Basis (Appendix A-II)	1.011
(21) Projected Medical Cost Ratio = (19) x (20)	0.537
(22) Factor to Reflect Proposed Changes in Medical Benefits (Appendix C)	1.000
(23) Projected Medical Cost Ratio including Benefit Changes = (21) x (22)	0.537

Total Benefit Cost:

(24) Indicated Change Based on Experience, Trend and Benefits = (13) + (23)	0.939
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Response to Interrogatory 10

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

(1) Policy Year 2017 Indicated Change Based on Experience, Trend, and Benefits	0.985
(2) Policy Year 2016 Indicated Change Based on Experience, Trend, and Benefits	0.939
(3) Indicated Change Based on Experience, Trend, and Benefits = $[(1)+(2)] / 2$	0.962

Section D - Application of the Change in Loss-based Expenses

(1) Indicated Loss Cost Level Change	0.962
(2) Effect of the Change in Loss-based Expenses (Exhibit II)	0.999
(3) Indicated Change Modified to Reflect the Change in Loss-based Expenses = $(1) \times (2)$	0.961

Griffin Rock

From: Jim Davis <Jim_Davis@Ncci.Com>
Sent: Monday, September 30, 2019 4:25 PM
To: Griffin Rock; Kristine Fitzgerald; Dave Raikowski
Cc: Lederer, Julie; Nelson, Angela; Cox, LeAnn; Carla Townsend; Brian Stein
Subject: RE: NCCI Missouri Loss Cost Filing: NCCI Response to inquiries
Attachments: AOE Breakdown.xlsx

Hi Griffin

The information that you have requested is shown in the chart below. Please let us know if we can provide further assistance. Jim

Accident Year	Private Carriers Countrywide AOE	State Fund Missouri AOE
2014	6.9%	9.5%
2015	7.2%	10.0%
2016	7.7%	9.4%
2017	8.1%	8.7%
2018	7.9%	9.4%
Selected Share*	8.0%	9.4%
Weighted Avg	72.3%	27.7%
*based upon the Private Carrier vs. State Fund split of projected losses in the effective period (2020).		8.4%

James R. Davis ACAS, MAAA
Executive Director and Actuary
NCCI Holdings, Inc.
561 893 3097

From: Griffin Rock <GRock@actuariesolutions.com>
Sent: Monday, September 30, 2019 3:44 PM
To: Carla Townsend <Carla_Townsend@ncci.com>; Kristine Fitzgerald <kfitzgerald@actuariesolutions.com>; Dave Raikowski <draikowski@actuariesolutions.com>
Cc: Jim Davis <Jim_Davis@Ncci.Com>; Lederer, Julie <Julie.Lederer@insurance.mo.gov>; Nelson, Angela <Angela.Nelson@insurance.mo.gov>; Cox, LeAnn <LeAnn.Cox@insurance.mo.gov>
Subject: RE: NCCI Missouri Loss Cost Filing: NCCI Response to inquiries

Good afternoon,

As a follow-up to Interrogatory 7, please provide the AOE provision for the Missouri state fund, as well as the calculation of the weightings applied to the private carrier versus state fund indications used to derive the selected Missouri AOE provision.

Thank you,