

Actuarial Committee

Meeting Agenda

Date	Time	Location	Staff Contact
February 13, 2024	9:30 AM	Microsoft Teams Webinar	Sean Cooper
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Released: February 6, 2024

To Members of the Actuarial Committee, WCIRB Members and All Interested Parties:

This meeting is Open to the Public.

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I. Approval of Minutes

Meeting held on December 5, 2023

II. Working Group Meeting Summaries

None

III. Unfinished Business

A. AC23-02-02: Clerical Telecommuting Employees Classification

IV. New Business

A. AC24-02-01: 9/1/2024 Regulatory Filing – Experience Rating Plan Values

B. AC24-02-02: Review of Expected Loss Rate Projection Methodology

V. Matters Arising at Time of Meeting

VI. Next Meeting Date: March 21, 2024

VII. Adjournment

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Item AC23-02-02

Clerical Telecommuting Employees Classification

Effective January 1, 2021, Classification 8871, *Clerical Telecommuter Employees – N.O.C.*, was established as a new Standard Exception classification applicable to clerical employees who work more than 50% of their time at their home or other office space away from any location of their employer.

At the August 4, 2020 meeting, the Committee discussed the advisory pure premium rate to be proposed for the new classification and recommended that the January 1, 2021 advisory pure premium rate for Classification 8871 be proposed at the same level as that for Classification 8810. The Committee also recommended that as soon as experience reported in Classification 8871 becomes available, it should be reviewed to assess whether a differential in advisory pure premium rates between Classifications 8810 and 8871 may be appropriate.

At the February 14, 2023 meeting, after discussing the initial unit statistical loss and payroll experience and claim characteristics reported thus far in Classification 8871 on 2021 policies, the Committee agreed to recommend establishing a different rate for Classification 8871 using a tempered approach consistent with the WCIRB's standard practice of limiting the relativity change to 25% in the classification relativities for the September 1, 2023 Regulatory Filing. As of September 1, 2023, the approved advisory pure premium rate for Classification 8810 is \$0.20 per \$100 of payroll and for Classification 8871 is \$0.16 per \$100 of payroll.

Staff has continued to review the experience reported in Classification 8871 as it becomes available. A summary of the unit statistical loss and payroll experience and claim characteristics reported in Classification 8871 on 2021 policies and those reported thus far on 2022 policies will be presented at the meeting. Draft slides summarizing staff's preliminary findings are attached for review.

01

Clerical Telecommuting Employees



III-A-2

Background and Objective

■ Background

- Classification 8871, *Clerical Telecommuter Employees – N.O.C.*, became effective January 1, 2021
 - For clerical office employees who work more than 50% of their time at their home or other office space away from any employer location
- Committee recommended reviewing 8871 experience as soon as data becomes available to assess whether a differential in advisory pure premium rate (PPR) between Classifications 8810 and 8871 may be appropriate
- PPR for Classification 8871 was the same as that for Classification 8810 in 2021 and 2022
- Based on a review of initial 8871 experience as of January 2023, the Committee agreed to recommend establishing a different rate for Classification 8871 using a tempered approach consistent with the WCIRB's standard practice of limiting the relativity change to 25%
- As of September 1, 2023, the approved PPR for:
 - 8810: \$0.20
 - 8871: \$0.16

■ Objective

- Review available Classification 8871 experience to validate the differential in PPR between Classifications 8871 and 8810 in preparation for the September 1, 2024 Regulatory Filing.

Analysis of 8871 Experience

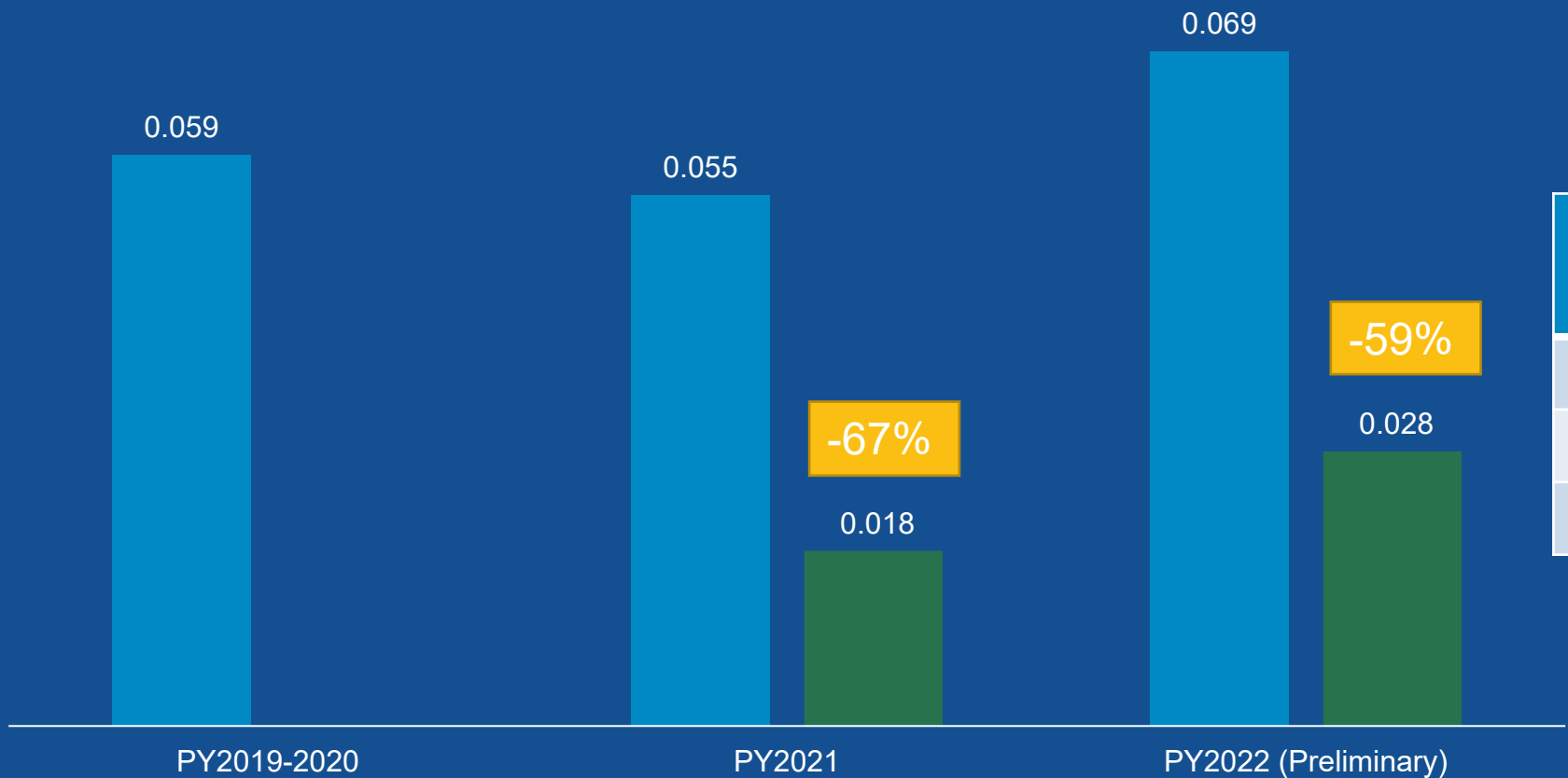
- Data source:
 - Unit Statistical Report (USR) data
 - All 2021 policies
 - 2022 policies reported as of January 15, 2024
 - WCIRB Indemnity Transaction data
 - COVID-19 claims are excluded except for statistics that explicitly include them
- Reported PY2022 experience:
 - Reflects the first few months of 2022 policy experience
 - 8810 payroll: \$95B reported (38% of PY2021 8810 experience)
 - 8871 payroll: \$9.4B reported (55% of PY2021 8871 experience)
 - 125 claims reported for 8871 (55% of PY2021 8871 claims)

Loss and Payroll Experience: 8871 vs. 8810

As of January 15, 2024

Capped Loss to Payroll Ratio at First Report Level (per \$100 of payroll)

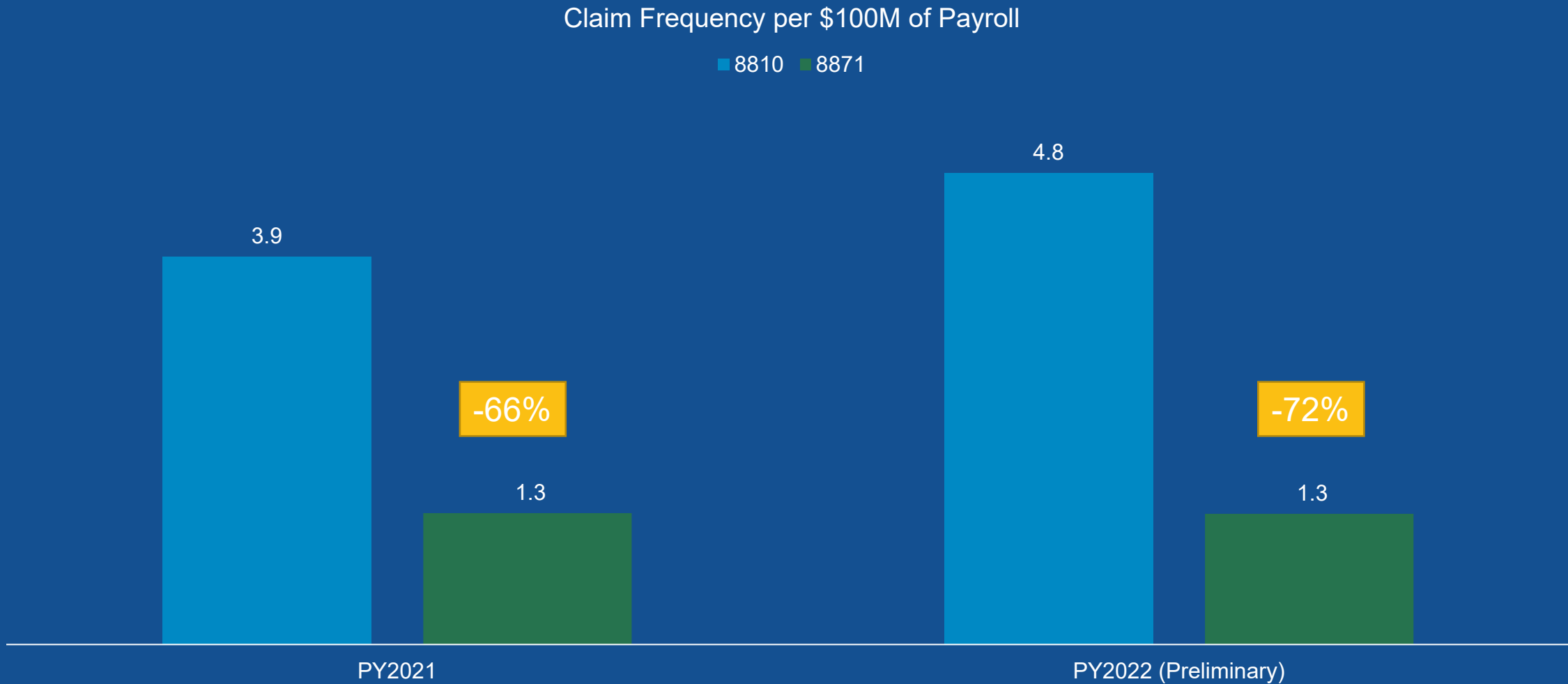
8810 8871



Classification	Loss to Payroll Ratio (PY2021-2022)
8810	0.059
8871	0.022
% difference	-63%

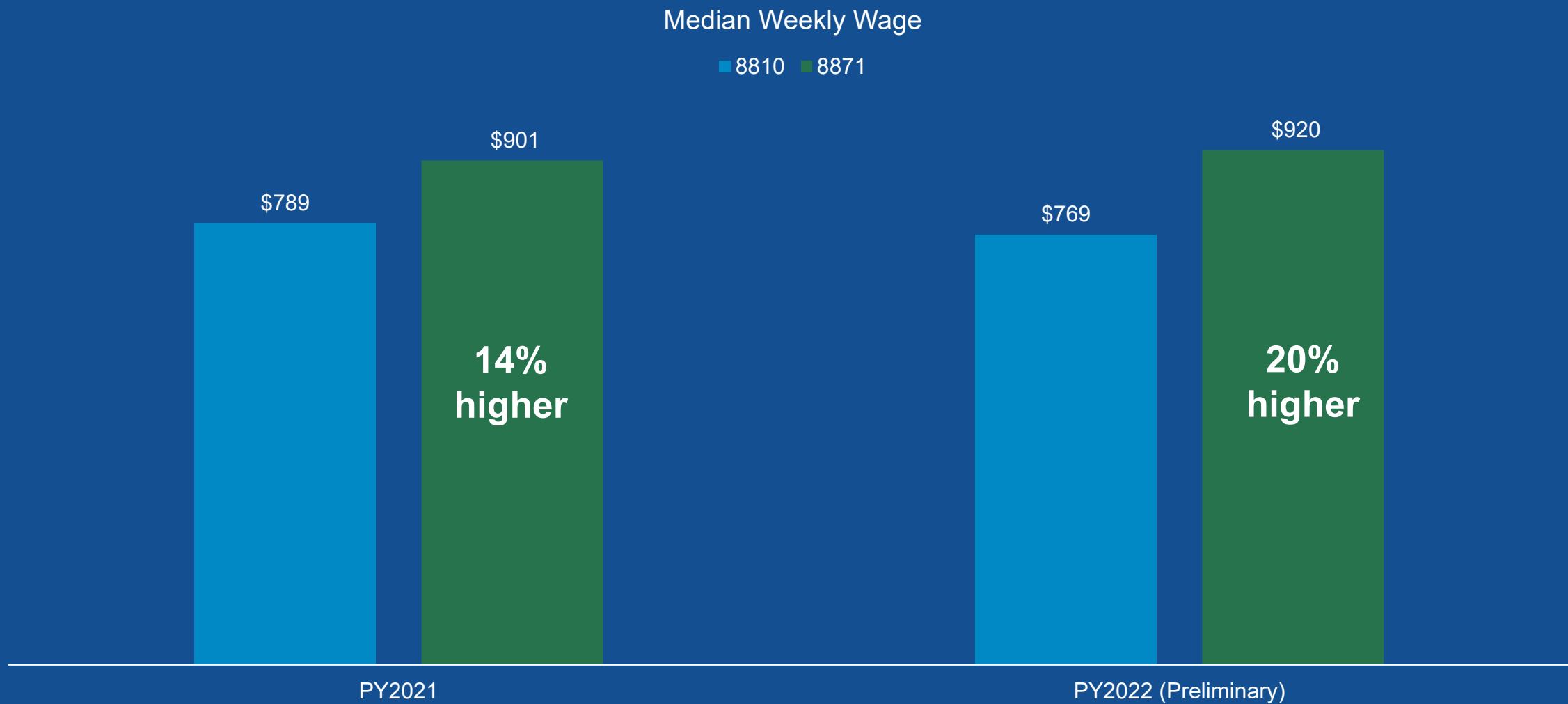
Claim Frequency: 8871 vs. 8810

As of January 15, 2024



Weekly Wage for Injured Workers: 8871 vs. 8810

As of January 15, 2024

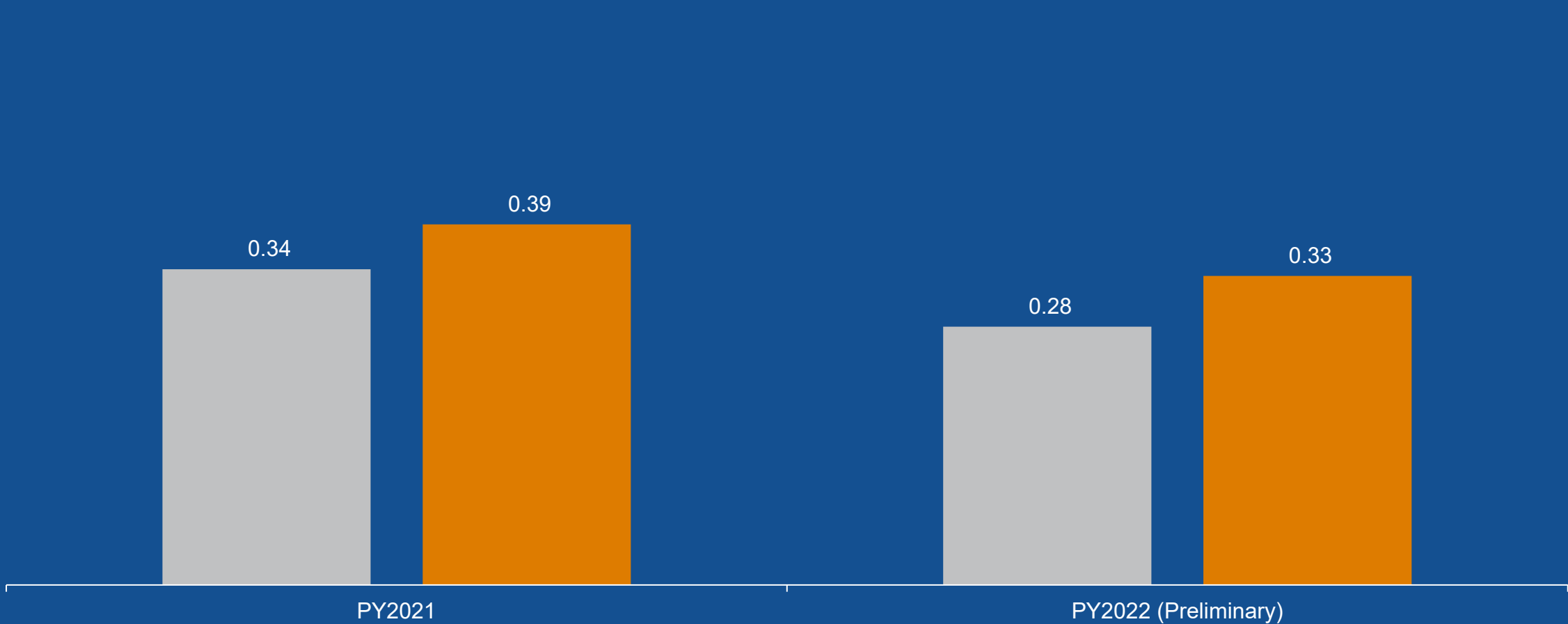


Estimated Differential in Claim Frequency: 8871 vs. 8810

As of January 15, 2024

8871 Claim Frequency Relative to 8810

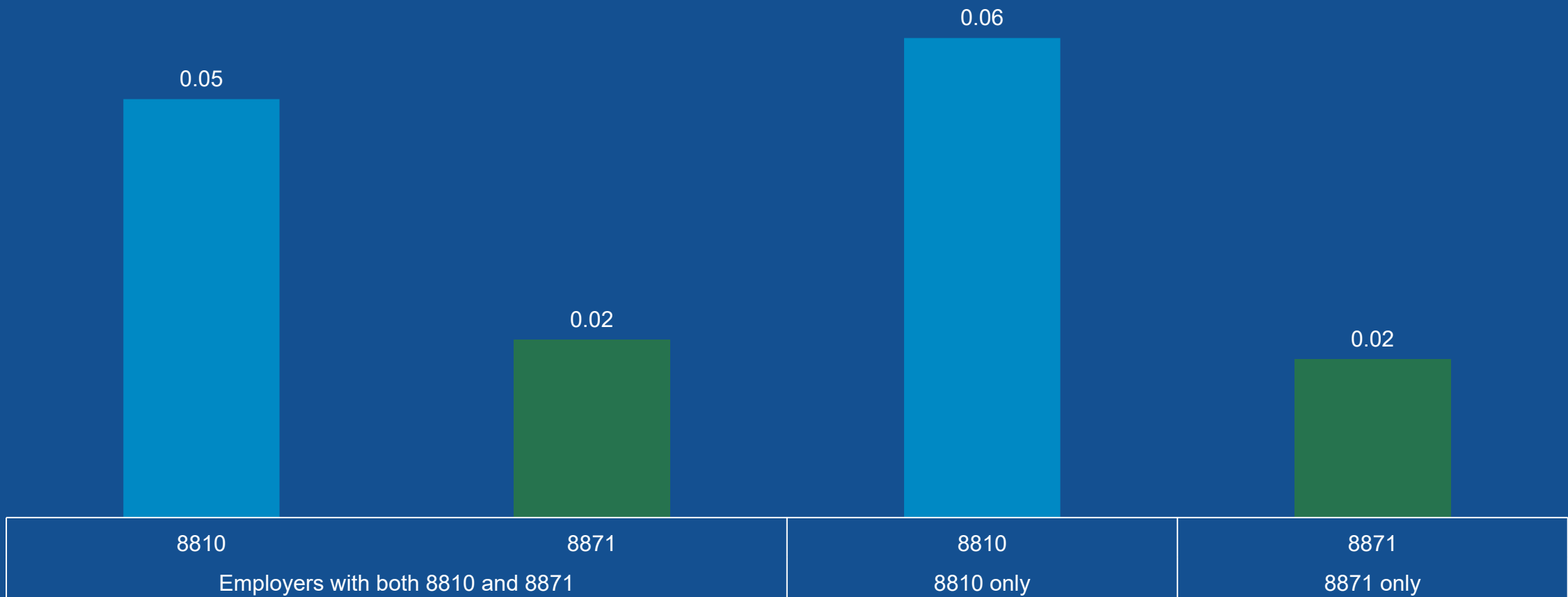
■ Before adjusting for wage differential ■ After adjusting for wage differential



Loss and Payroll Experience by Types of Employers

As of January 15, 2024

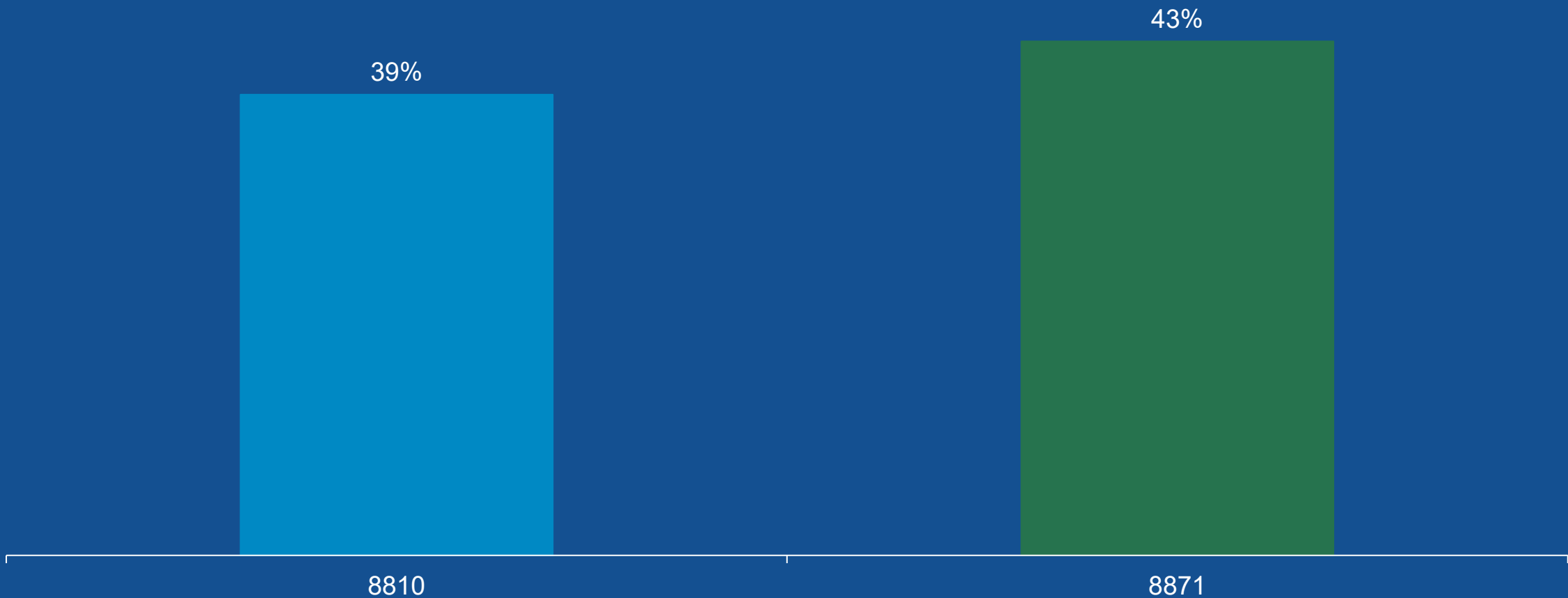
Capped Loss to Payroll Ratio (PYs 2021-2022)



Share of Indemnity Claims: 8871 vs. 8810

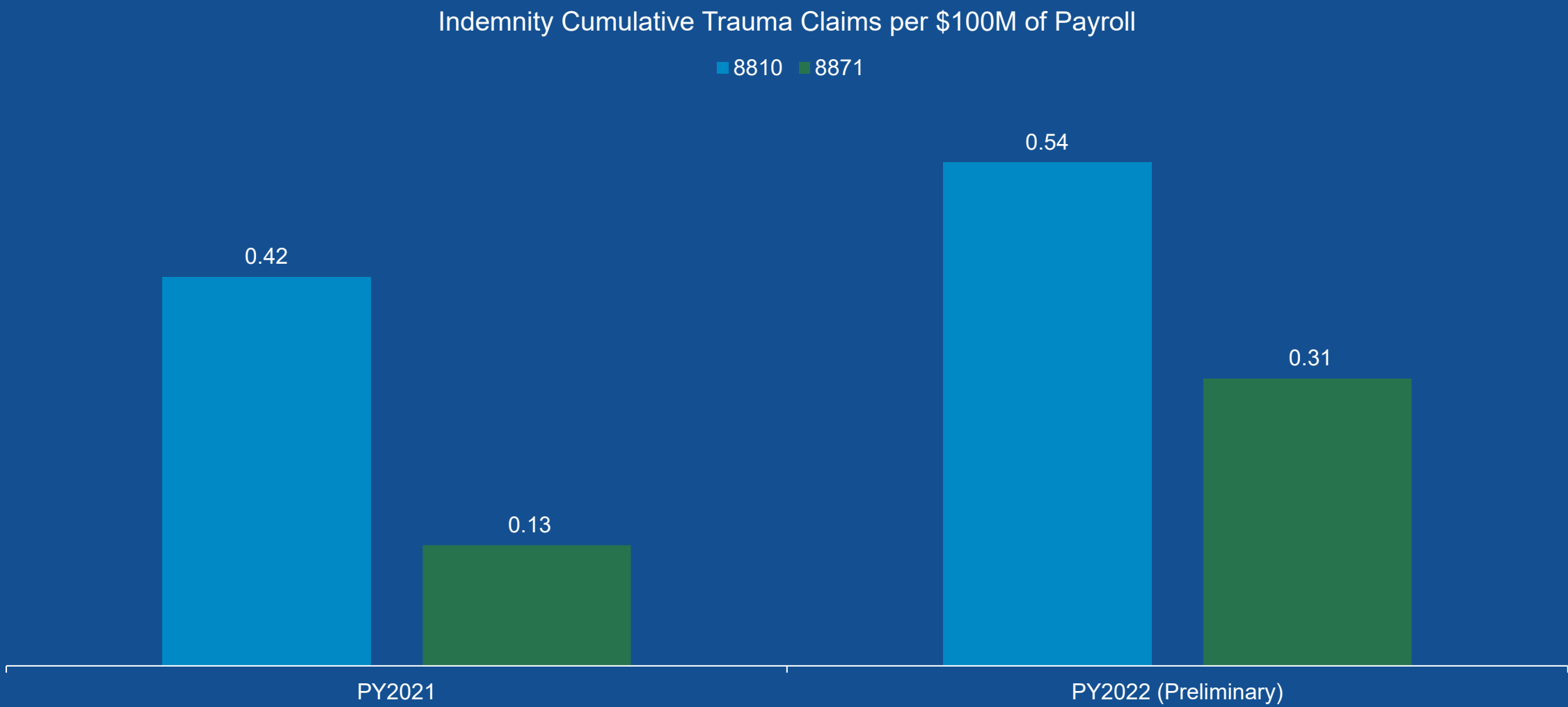
As of January 15, 2024

Share of Indemnity Claims (PYs 2021-2022)



Indemnity Claim Frequency of Cumulative Trauma Claims: 8871 vs. 8810

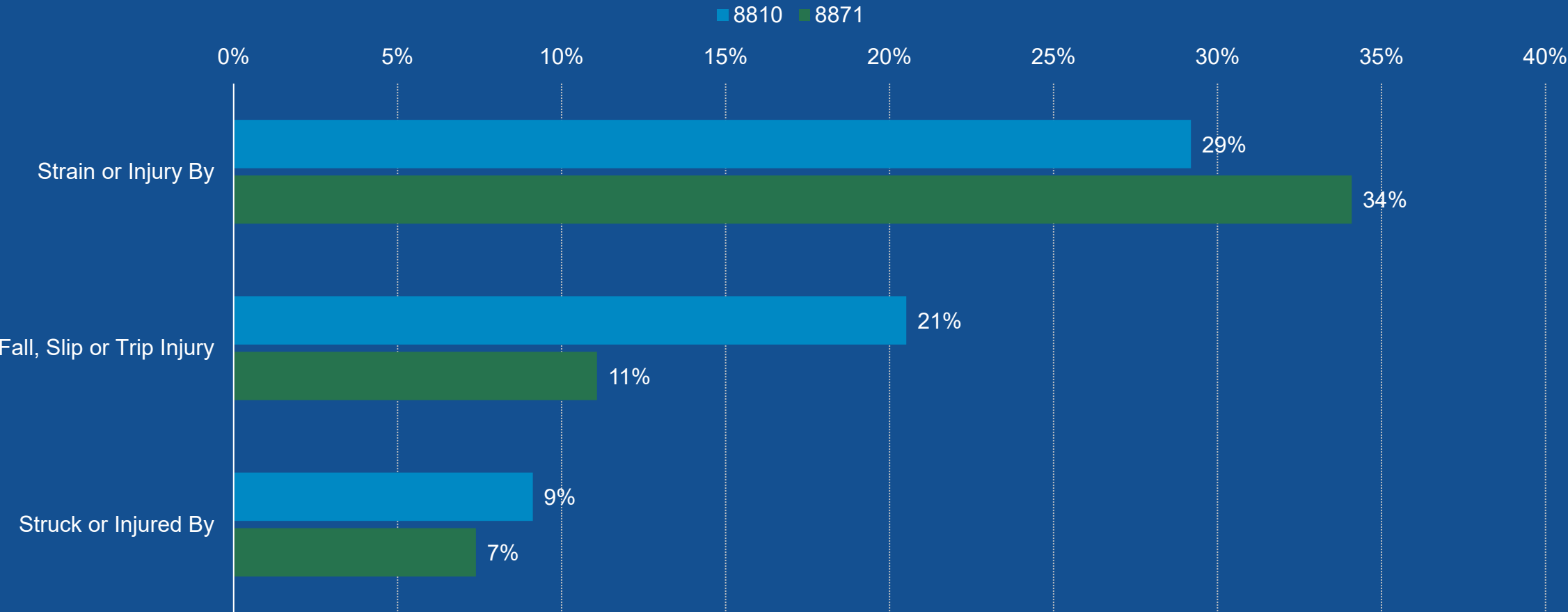
As of January 15, 2024



Distribution of Leading Causes of Injury: 8871 vs. 8810

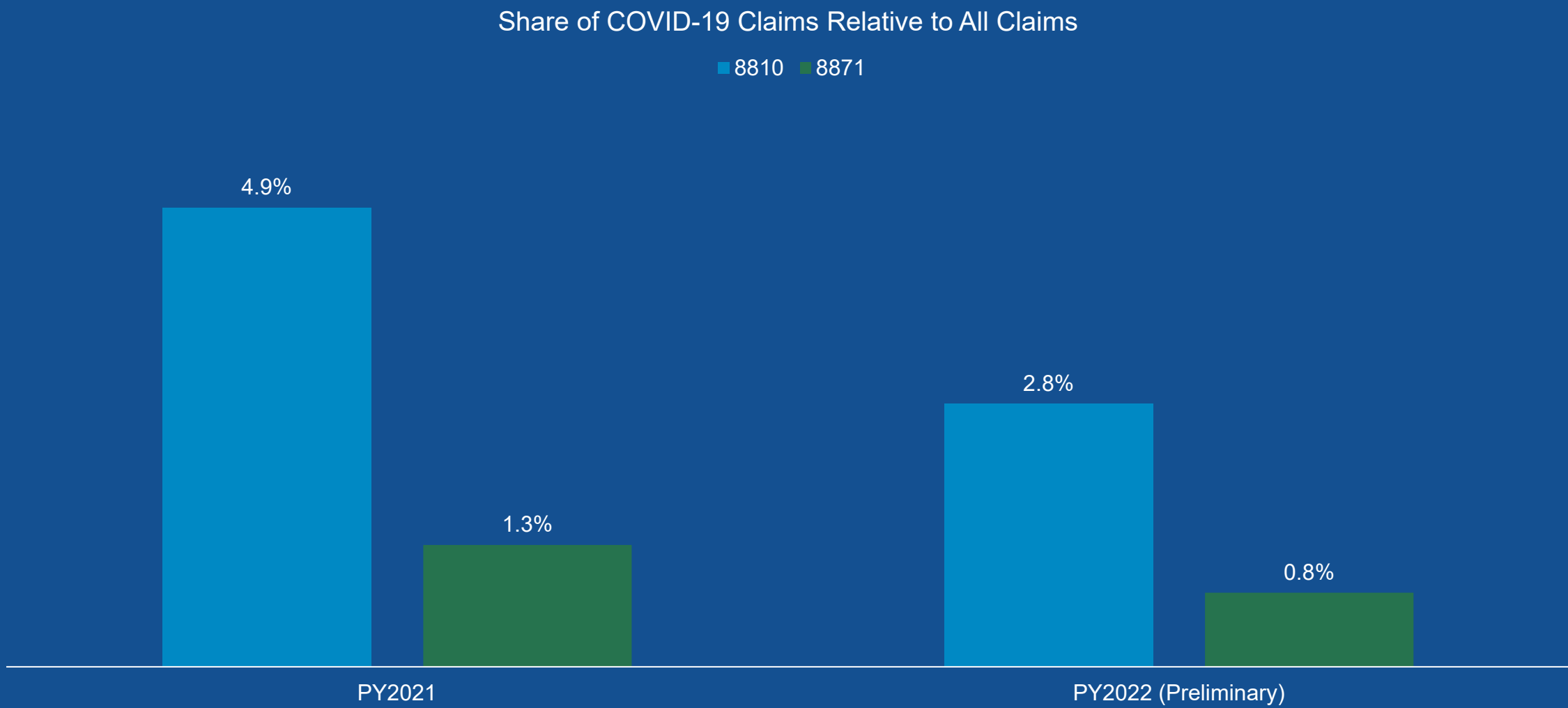
As of January 15, 2024

Share of Claims by Leading Causes of Injury
(PYs 2021-2022)



Share of COVID-19 Claims: 8871 vs. 8810

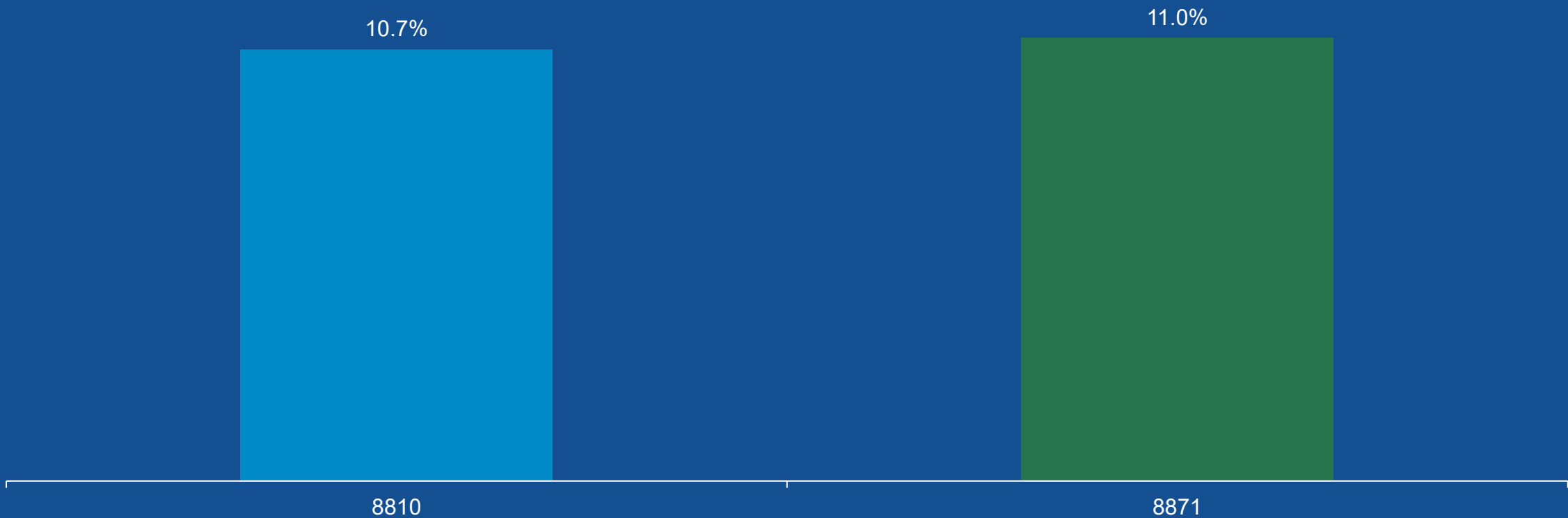
As of January 15, 2024



Denial Rate: 8871 vs. 8810

As of January 15, 2024

Share of Denied Claims Relative to All Claims (PY2021-2022)



Summary of Preliminary Findings

- Based on reported 2021 and 2022 policy data, Classification 8871 has different loss and payroll experience from Classification 8810
 - 8871 has significantly lower loss to payroll ratio than 8810 by 63%, mostly driven by lower claim frequency
 - Key characteristics of 8871 claims compared to 8810 claims:
 - Higher median weekly wage among injured workers
 - Lower frequency of cumulative trauma claims
 - Similar share of indemnity claims
 - More strain injuries for Classification 8871, while more fall injuries for Classification 8810
- The reported 8871 loss and payroll experience thus far validates the differential in the advisory PPRs between Classifications 8871 and 8810
 - Indicated relativity change for 8871 using the WCIRB standard approach on the reported data would be a decrease of 28%
- Staff recommends continuing the tempered approach consistent with WCIRB's standard practice and limiting the relativity change of Classification 8871 to 25%

Item AC24-02-01

9/1/2024 Regulatory Filing – Experience Rating Plan Values

An analysis of the indicated experience rating off-balance factor and the factors used to generate proposed expected loss rates for policies incepting between September 1, 2024 to August 31, 2025 will be presented at the meeting. The methodology to produce the indicated experience rating off-balance factor and expected loss rates effective September 1, 2024 that will be presented at the meeting is summarized below.

Off-Balance Factor

The calculation of the indicated off-balance factor is based on the average modification and average credibility assigned to the experience of all experience rated employers for recent policy years. This information is based on the WCIRB's experience modification records and reflects the actual modifications issued for each of those policy years. The most recent three policy inception periods are used in the computation of the indicated September 1, 2024 off-balance factor (September 1, 2021 to August 31, 2022, September 1, 2022 to August 31, 2023, and September 1, 2023 to August 31, 2024 (preliminary)). This information is based on the WCIRB's experience modification records and reflects the actual modifications issued for each of those policy periods. Based on this information, the ratio of actual to expected losses for experience rated employers in each of these periods is estimated.

The ratios for each of these policy periods are then adjusted by (a) the off-balance factor that was used to adjust each period's expected loss rates, (b) the adjustment that was made to the expected loss rates to produce the target off-balance factor for that period (if applicable), (c) the adjustment that was made to each historical period's expected loss rates to reflect the impact of California Insurance Code Section 11751.9 corrections based on closed claim values that are significantly below the values of the claims that were used in an experience modification computation, and (d) the hindsight correction factor to the expected losses for each of these policy periods, which is intended to adjust for any difference in projected expected loss rates and the level of losses that actually underlies a year's experience modifications.¹

The ratios, after adjustment as described above, represent the estimated ratios of actual to expected losses for experience rated employers in which the total actual losses for all employers equal the total expected losses for the experience period. The projected ratio of actual to expected losses for experience rated employers is selected as the weighted average of the three periods' adjusted ratios, with full weight given to the final and full year periods of September 1, 2021 to August 31, 2022 and September 1, 2022 to August 31, 2023, and 50% weight given to the preliminary and partial period for September 1, 2023 to August 31, 2024.² The projected average credibility for experience rated employers is selected as the average credibility for the most recent completed annual policy period of experience. In the September 1, 2024 Regulatory Filing, this represents policies incepting between September 1, 2022 and August 31, 2023.

The computation of the indicated off-balance factor is based on the projected ratio of actual to expected losses and the projected average credibility computed as described above as well as the ratio of experience rated premium to total premium. This ratio is based on a comparison of the premiums at the advisory pure premium rate level for experience rated employers with those for all employers including employers who are not experience rated based on the most recent three policy years of experience

¹ The hindsight correction factor for each period is computed as the ratio of the statewide weighted average of the promulgated expected loss rates (adjusted to remove that period's off-balance factor and its related adjustment, if any, and the adjustment to reflect the impact of California Insurance Code Section 11751.9 rerates) to the hindsight weighted average statewide ratio of losses (excluding first \$250 and limited to \$175,000) to payroll for the policy years and report levels reflected in that period's experience modifications.

² The September 1, 2023 to August 31, 2024 period is preliminary and partial in that it only reflects experience modifications for policies incepting through May 2024.

(policy years 2019 through 2021 for the September 1, 2024 Regulatory Filing). The computation of the indicated off-balance factor is derived from the relationship of the off-balance factor as the reciprocal of the average modification over all risks.³

Expected Loss Rates

The expected loss rates represent the average losses per \$100 of payroll by classification estimated to be reflected in experience rating calculations for policies incepting between September 1, 2024 and August 31, 2025. They are computed by comparing the average limited loss to payroll ratio included for each classification as computed in the WCIRB's proposed September 1, 2024 classification relativities with the average level of losses per \$100 of payroll anticipated to be used in September 1, 2024 to August 31, 2025 experience modification calculations.

The WCIRB's methodology to determine classification expected loss rates uses adjustment factors based on the experience of classifications grouped in accordance with the North American Industry Classification System (NAICS). The average adjustment factors on a statewide, all classifications combined basis are first computed to ensure that the factors computed by NAICS sector groupings balance to the statewide, all classifications combined expected loss rate level. These factors begin with the calculation of the average indicated ratio of limited losses to \$100 of payroll based on the total statewide payroll generated on policies incepting between December 1, 2018 and November 30, 2021 (the most recent three years used in the September 1, 2024 classification relativities) and the indicated limited loss to payroll ratios for each classification, segregated between the indemnity and medical components.

Next, the estimated average ratio of losses to \$100 of payroll for the time period and maturity level to be reflected in September 1, 2024 to August 31, 2025 experience modifications is computed. For the September 1, 2024 Regulatory Filing, this generally reflects policies incepting between September 1, 2020 and August 31, 2021 at third unit statistical report level, policies incepting between September 1, 2021 and August 31, 2022 at second unit statistical report level, and policies incepting between September 1, 2022 and August 31, 2023 at first unit statistical report level. These estimated ratios are determined as follows:

- The average expected ratios of indemnity and medical losses per \$100 of payroll for policies incepting between September 1, 2020 and August 31, 2021 are determined by developing the first unit statistical report level (18 months from policy inception) ratios from these policies to third unit statistical report level (42 months from policy inception).⁴ The development factors used to develop these ratios are based on the most recently available accident year experience converted to reflect the September 1, 2019 to August 31, 2020 policy inception period.⁵
- The average expected ratios of indemnity and medical losses per \$100 of payroll for policies incepting between September 1, 2021 and August 31, 2022 are determined by developing available data at first unit statistical report level (18 months from policy inception) to second unit statistical report level (30 months from policy inception).⁶ For the average expected ratios for policies incepting between September 1, 2021 and August 31, 2022, experience from policies

³ That is $OBF = 1 / (\text{Avg. Mod All Risks})$, where $\text{Avg. Mod All Risks} = (\text{Avg. Mod Rated Risks} \times \text{Premium Share of Rated Risks}) + (1.0 \times \text{Premium Share of Non-rated Risks})$, and where the formula for the average modification for rated risks is as follows: $\text{Avg. Mod Rated Risks} = [(\text{Avg. Ratio of Actual to Expected}) \times (1 / OBF) \times (\text{Avg. Credibility})] + [1.0 \times (1 - \text{Avg. Credibility})]$.

⁴ Claims arising out of a diagnosis of COVID-19 are excluded from this period as these claims are not included in the computation of experience modifications.

⁵ For development from 18 to 21 months, a weighted average based on 25% weight applied to accident year 2021 development and 75% weight applied to accident year 2022 development is used. For development from 21 to 33 months, accident year 2021 development is used. For development from 33 to 42 months, accident year 2020 development is used. See Exhibits 9.1 and 9.2 of Item AC23-12-01 of the December 5, 2023 WCIRB Actuarial Committee Agenda for the development factors used.

⁶ Claims arising out of a diagnosis of COVID-19 are excluded from this period as these claims are not included in the computation of experience modifications.

incepting between April 1, 2021 and March 31, 2022 are used and trended forward five months to reflect the period of experience underlying policies incepting between September 1, 2021 and August 31, 2022.⁷ The development factors used to develop these ratios are based on the most recently available accident year experience converted to the September 1, 2021 to August 31, 2022 policy inception period.⁸

- The average expected ratios of indemnity and medical losses per \$100 of payroll for policies incepting between September 1, 2022 and August 31, 2023 are estimated from the prior year's ratios (ratios for policies incepting between September 1, 2021 and August 31, 2022), adjusted for the change in the average accident year loss ratios estimated in the WCIRB's most recent evaluation of accident year experience⁹—with the premiums adjusted to a common basis but with the impact of projected wage inflation removed—and converted to a September 1 to August 31 policy period basis using a standard actuarial parallelogram approach to convert accident year experience to policy periods.¹⁰

The average of the expected loss to payroll ratios for each of the three years of the experience rating period computed as described above are adjusted by three additional factors: (1) the selected experience rating off-balance correction factor to be reflected in September 1, 2024 to August 31, 2025 expected loss rates, (2) the factor to reflect the individual loss limitation of \$175,000 and the elimination of the first \$250 of each claim in the experience rating calculation¹¹ and (3) the factor to reflect the estimated average impact of experience modification revisions resulting from Insurance Code Section 11751.9 rerates. The product of these factors represents the average adjustments across all NAICS Sector groupings to produce the average indicated September 1, 2024 to August 31, 2025 expected loss rates when applied to the statewide indicated limited loss to payroll ratios from the September 1, 2024 classification relativity analysis.

The computation of the adjustment factors for each of the NAICS Sector groupings is analogous to that described above on a statewide, all classifications combined basis, with the following exceptions:

- The estimated first report level ratios of indemnity and medical losses per \$100 of payroll for policies incepting between September 1, 2020 and August 31, 2021 and policies incepting between September 1, 2021 and August 31, 2022 for each NAICS Sector grouping are developed to third and second report levels, respectively, based on the latest policy year incurred development factor derived from unit statistical data for that NAICS Sector grouping.
- The estimated first report level ratios of indemnity and medical losses per \$100 of payroll for policies incepting between September 1, 2022 and August 31, 2023 for each NAICS Sector grouping are computed by adjusting the first report level ratios of indemnity and medical loss to payroll for policies incepting between September 1, 2021 and August 31, 2022 for that NAICS Sector grouping by the change in the first report level ratios of indemnity and medical loss to

⁷ The trend factors used are based on changes in accident year indemnity and medical loss ratios reflected in Item AC23-12-01 of the December 5, 2023 WCIRB Actuarial Committee Agenda, converted to a September 1 to August 31 policy period using a standard actuarial parallelogram approach to convert accident year experience to policy periods.

⁸ For development from 18 to 21 months, accident year 2022 development is used. For development from 21 to 30 months, accident year 2021 development is used. See Exhibits 9.1 and 9.2 of Item AC23-12-01 of the December 5, 2023 WCIRB Actuarial Committee Agenda for the development factors used.

⁹ See Exhibits 3.1 and 3.2 of Item AC22-12-01 of the December 6, 2022 WCIRB Actuarial Committee Agenda.

¹⁰ In the September 1, 2024 Regulatory Filing, the WCIRB is proposing that claims arising out of a diagnosis of COVID-19 with an accident date of September 1, 2024 and later be included in the computation of experience modifications. Given the experience period for September 1, 2024 to August 31, 2025 experience modifications substantially reflect claims arising before September 1, 2024, the impact of this change on the computation of September 1, 2024 to August 31, 2025 experience modifications is immaterial.

¹¹ This factor is based on utilizing the latest available unit statistical data and de-trending the \$175,000 and \$250 loss limits from the average level underlying the data used to compute September 1, 2024 to August 31, 2025 experience modifications to the average level of the latest available unit statistical data.

payroll for that NAICS Sector grouping from the latest available unit statistical data,¹² with individual claims limited to \$500,000.

- In total, the average statewide expected loss rate determined by separate adjustments by NAICS Sector grouping should be equal to that based on the statewide, all classification data. The indemnity and medical expected loss rate factors computed at the NAICS Sector grouping level are adjusted to balance to the statewide, all classifications combined expected loss rate factors.
- The change in a classification's expected loss rate relativity to the statewide average expected loss rate from the prior year's expected loss rate relativity is limited to 15%. A factor is applied to each NAICS Sector grouping's adjustment factor to reflect the cost of redistributing the impact of the capped classifications' net expected losses above (or below) the 15% limitation among the remaining uncapped classifications.

The factors by NAICS Sector grouping, computed as described above, are applied to the indicated limited loss to payroll ratios for indemnity and medical that are computed in the September 1, 2024 classification relativity analysis. Each indemnity and medical loss to payroll ratio is adjusted by the appropriate factor based on the NAICS Sector grouping to which that classification is assigned. The adjusted indemnity and medical ratios for each classification are then added together to generate the expected loss rate for that classification proposed to be effective September 1, 2024 with each classification's expected loss rate change in relativity limited to a 15% change from the classification's relativity underlying the September 1, 2023 expected loss rates.

Effective September 1, 2022, annual payroll limitations are applied to employees in seven additional classifications, including 8601, *Engineers/Oil or Gas Geologists or Scouts/Forest Engineers*; 8741, *Real Estate Agencies*; 8749, *Mortgage Bankers*; 8801, *Credit Unions*; 8808, *Banks*; 8822, *Insurance Companies*; and Classification 8874, *Instrument Mfg. – electronic/Computer or Computer Peripheral Equipment Mfg./Telecommunications Equipment Mfg./Audio/Video Electronic Products Mfg./Integrated Circuit and Semiconductor Wafer Mfg.* Effective September 1, 2024, annual payroll limitations are being applied to employees in six additional classifications, including 4297, *Electronic Pre-press/Graphic Design*; 4512, *Biomedical Research Laboratories*; 8807, *Newspaper, Magazine or Book Publishing*; 8834, *Physicians' Practices and Outpatient Clinics*; 8839, *Dental or Orthodontia Practices*; and 9043, *Hospitals*. In order to appropriately reflect the payroll limitation in the expected loss rates for these classifications for which the experience period includes payroll experience from policies in which the maximum payroll limitations do not apply, the expected loss rates for these classifications are adjusted to reflect the payrolls that will not be limited in the experience rating computation. The factors used to adjust the expected loss rates for these classifications are consistent with those used to adjust the classification relativities. The factor estimated for each classification's expected loss rate are shown in Table 1.¹³

¹² Policies incepting between April 1, 2020 and March 31, 2021 compared to policies incepting between April 1, 2022 and March 31, 2023.

¹³ For the five classifications with annual payroll maximums applied starting January 1, 2020, no adjustment to expected loss rates is needed as the experience period does not include any data prior to the maximum payroll limit being applied.

Table 1 – Adjustments for Payroll Limitations to Expected Loss Rates

Classification	Effective Date	Full Adjustment	Proportion of Limited Payroll in Experience Period ¹⁴	Factor to Apply to Expected Loss Rate ¹⁵
8601	9/1/2022	14%	33.3%	0.91
8741	9/1/2022	30%	33.3%	0.80
8749	9/1/2022	27%	33.3%	0.82
8801	9/1/2022	22%	33.3%	0.85
8808	9/1/2022	22%	33.3%	0.85
8822	9/1/2022	19%	33.3%	0.87
8874	9/1/2022	20%	33.3%	0.87
4297	9/1/2024	13%	0.0%	0.87
4512	9/1/2024	12%	0.0%	0.88
8807	9/1/2024	20%	0.0%	0.80
8834	9/1/2024	35%	0.0%	0.65
8839	9/1/2024	18%	0.0%	0.82
9043	9/1/2024	17%	0.0%	0.83

D-Ratios

A classification's D-ratio represents the proportion of the expected losses in the classification that is estimated to be primary. The D-ratio for each classification and each primary threshold included in the Experience Rating Plan is calculated based on the proportion of that classification's own claim costs which is primary. The data used is based on WCIRB unit statistical data for the most recent three years available (policies incepting between December 1, 2018 and November 30, 2021), adjusted to the experience period cost level underlying policies incepting between September 1, 2024 and August 31, 2025 (generally policies incepting between September 1, 2020 and August 31, 2021 at third unit statistical report level, policies incepting between September 1, 2021 and August 31, 2022 at second unit statistical report level, and policies incepting between September 1, 2022 and August 31, 2023 at first unit statistical report level).¹⁶

The formula for a classification's D-ratio credibility is: $N / (N + K)$, where N equals the number of indemnity claims for the three-year experience period and K is a credibility constant that is determined by the relationship between the in-group and between-group variance of the threshold being evaluated. The complement of credibility is the D-ratio for the classification's retro hazard group.

¹⁴ For classifications with maximum payroll limitations effective September 1, 2022, the payroll limitations apply to 12 out of 36 months of the experience period. For classifications with maximum payroll limitations effective September 1, 2024, the payroll limitations do not apply to any of the experience period.

¹⁵ Equal to $1.0 - [\text{Full Adjustment}] * (1.0 - [\text{Proportion of Limited Payroll in Experience Period}])$. These factors will bring the loss to payroll ratios underlying the classification relativities which are on a fully payroll limited basis to the basis underlying the experience period for September 1, 2024 to August 31, 2025 experience modifications.

¹⁶ Beginning with the January 1, 2019 Experience Rating Plan, the first \$250 of each claim is eliminated from the experience rating calculation. In deriving the D-ratio for each classification, the first \$250 of each claim is eliminated from both the expected losses and the primary component of expected losses.

Item AC24-02-02

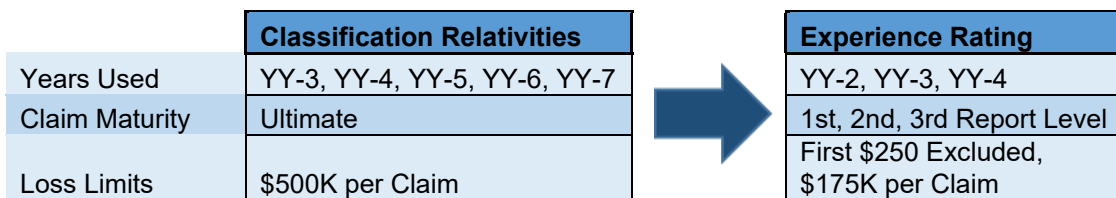
Review of Expected Loss Rate Projection Methodology

In the annual regulatory filing, the WCIRB promulgates expected loss rates (ELRs) by classification to be used in the computation of experience modifications for the upcoming policy period. The methodology to compute the ELRs is based on the classification relativities used in the pure premium rate filing as well as WCIRB aggregate financial and unit statistical data.¹ Given that a comprehensive review of the ELR methodology has not been undertaken for many years, staff has begun a multi-year review of the methodology for potential enhancements.² The first part of this review focuses on the appropriate groupings of classifications for the analysis.

Overview of Current Methodology

The current methodology to compute the ELR for each classification is based on applying adjustment factors to the “indicated limited loss to payroll ratio” (ILLPR) from the classification relativities analysis. The adjustment factors are intended to adjust the ILLPR, which is based on the years used to compute the classification relativities, is at an ultimate cost level, and where individual losses are limited to \$500,000, to the level of losses used in experience rating.³ Figure 1 summarizes this process graphically.

Figure 1 – ELR Adjustment for Filing Effective Year YY



The adjustment factors are first computed at a statewide, all-classifications level. In addition to the statewide ILLPR, this computation includes:

- The loss to payroll ratio based on unit statistical data for YY-4 at first report level, developed to third report level using loss development factors based on aggregate financial data.
- The loss to payroll ratio based on unit statistical data for the latest available rolling 12-month period at first report level,⁴ trended to YY-3 based on aggregate financial data and developed to second report level using loss development factors based on aggregate financial data.
- The loss to payroll ratio for YY-2 at first report level, which is based on trending the loss to payroll ratio computed for YY-3 at first report level to YY-2 using trend factors computed from aggregate financial data.
- The selected experience rating off-balance factor, which is computed separately.
- An adjustment to reflect the removal of the first \$250 of each loss and the per loss limit of \$175,000 for experience rating, which is based on the latest available policy years of unit statistical data and de-trending the loss limits to reflect the years of data used.⁵

¹ See Part A, Section C, Appendix A of the WCIRB's September 1, 2023 Regulatory Filing as well as Item AC24-02-01 of this Agenda for a detailed description of the ELR methodology.

² The last comprehensive review of the ELR methodology was conducted in 2008 (Actuarial Committee Agenda Item AC08-03-03).

³ For filing effective year YY (September 1, YY), this is generally experience from YY-4 at first report level, YY-3 at second report level, and YY-2 at first report level, with individual losses limited to \$175,000 and excluding the first \$250.

⁴ This is generally based on policies incepting between April 1, YY-3 to March 31, YY-2 used as the basis for experience from policies incepting between September 1, YY-3 to August 31, YY-2 (resulting in a lag of approximately 5 months).

⁵ This is generally from policies incepting in YY-4, YY-5, and YY-6.

- An adjustment to reflect the impact of Insurance Code Section 11751.9 rerates on experience rating.⁶

The individual adjustment factors applied to each classification's ILLPR are computed on a group basis. The current groupings are based on the North American Industrial Classification System (NAICS) sector assigned to each classification. The process to compute the adjustment factors for each NAICS sector grouping is similar to the process to compute them at a statewide level with the following differences:

- The reported loss to payroll ratios for YY-4 and YY-3 at first report level as well as the loss development, trend, and loss limitation factors are based on unit statistical data from the NAICS sector grouping rather than the statewide level.
- An additional balance factor is applied to ensure that the weighted average of the NAICS adjustment factors balances to that computed at the statewide all-classification level.

The adjustment factors are applied to each classification's ILLPR based on its NAICS sector grouping to compute the indicated ELR for the classification. The change in the classification's ELR relativity is then limited to a 15% change up or down to mitigate the impact of large swings in the data on experience modifications. The net impact of these swing limits is spread across all classification ELRs.

Data and Assumptions

Data Sources

WCIRB unit statistical data was primarily used in this review, though some statewide factors are based on aggregate financial data. Ten filing years were reviewed retrospectively (2013 through 2022). At the time of generating the ELRs for a given filing year YY, the historical unit statistical data is available up through year YY-3. Staff re-computed the ELR factors for each grouping using data that most closely matched the data available at that time. The expected losses computed using the resulting ELRs were retrospectively compared to the actual losses that emerged for the experience period for that filing year.

Limitations in the Historical Data

There were several situations where it was necessary to modify the calculations or methodology for consistency or simplicity.

- Staff selected 464 classifications (out of a current of over 490) that are shared across all years and best represented the overall system over the time period studied. For example, Classification 8871, *Clerical Telecommuter Employees*, did not exist for all necessary policy years and was therefore excluded from the study. In addition, per capita classifications were excluded.
- For some statewide factors, it was not practical to retrospectively re-compute them for each filing year.⁷ In those cases, the factors reflected in that filing were used. As such, the results do not perfectly align with the ELRs computed in that filing. However, as these factors are at a statewide level, they should have the same impact regardless of the groupings selected.
- Although the WCIRB's current regulatory filings are effective on September 1, filings prior to September 1, 2021 were effective on January 1. For simplicity, all years were reviewed based on a January 1 effective date. As a result, the timing of the data used in the study compared to the data available for a filing may differ slightly. However, this is not expected to significantly impact the *relative* differences among classification groupings, which is the focus of this phase of the review.

⁶ Insurance Code Section 11751.9 allows for experience modifications to be revised downward when a claim closes for a significantly lower value than was used in the modification.

⁷ For example, de-trended loss limitations for the \$175,000 per claim adjustment.

- The data for each classification is based on what was reported at that time and does not reflect changes in classification definitions that have occurred over time.
- For most groupings (NAICS sector, retro hazard group, loss development group), each of the 464 classifications is assigned the most recent grouping.⁸ Changes in these groupings occur occasionally, which may impact some of the results using that grouping. However, staff does not believe this significantly impacts the overall analysis of the appropriate groupings for the ELR factor generation.
- Maximum payroll limitations apply to all employees in five classifications starting January 1, 2020. The experience period for the 2022 filing year includes some data after January 1, 2020. Although staff made some adjustments to ensure the comparison of actual and expected loss rates are consistent for these classifications, the results for 2022 may be less consistent compared to the other years reviewed.

Review of Groupings for Adjustment Factors

Staff retrospectively reviewed several groupings of classifications to compute the ELR adjustment factors, which are summarized below. Some of these are based on groupings developed for other purposes and some were developed in the course of this study.

NAICS Sector

This is the current approach used by the WCIRB. Some smaller NAICS sectors, such as Mining, are grouped with a larger NAICS sector (Agriculture) to improve the credibility. In total, 18 NAICS sector groupings are used.

NAICS Sector with Loss Development Groups (LDG) for Development

The indemnity and medical LDGs are used to compute the loss development factors used in classification ratemaking. This approach uses the LDG (indemnity or medical) assigned to each classification as the basis to compute the 1st-to-2nd and 2nd-to-3rd development factors used in the ELR factor computation. For all other purposes, the NAICS sector is used.

Retrospective Rating Hazard Group (RHG)

The RHGs are developed as part of the *California Retrospective Rating Plan* based on the classification size of loss distributions and used to develop the losses excess \$500,000 in classification ratemaking.

Cluster Analysis by Actual Loss Rate (ALR)

Cluster Analysis by ALR Factor

Staff reviewed several clustering approaches to assign classifications to groupings for the ELR factor computation. Separate clustering analyses were performed using the actual loss rate (ALR) for the classification (the actual losses for the experience period divided by the payroll for the experience period) and the hindsight “ALR factor” (the ALR divided by the ILPPR) for the classification. Several different measures of ALRs and ALR factors were reviewed, such as indemnity separately, medical separately, indemnity and medical combined, the mean of the indemnity and medical combined excluding the highest and lowest observations, and others. The indemnity and medical combined was selected as it showed the greatest stability in this approach.

The Elbow and Silhouette methods were utilized to determine the optimal number of clusters in each approach. Four to five clusters were generally indicated in this approach. The results from the five-cluster approach are shown in Exhibits 1 to 4. Taking the recommended optimal number of clusters, K-means

⁸ Retro hazard groups are the 2023 groups and are prior to the most recent update.

clustering was then performed to assign classifications to clusters based on their feature similarities. The algorithm works by iteratively refining cluster centroids, with data points assigned to the cluster whose centroid is the closest.

Kruskal-Wallis (KW) Bifurcation

Kruskal-Wallis bifurcation is a rank-based approach to separate classifications into groups using the Kruskal-Wallis test. For each classification, the ten years of ALR factors (indemnity and medical combined) are ranked and sorted. The median rank is used as the basis for the Kruskal-Wallis test. The test statistic H is computed for each bifurcation of classifications, with the first statistic computed using the two lowest ALR factor classifications compared to the remaining 462 classifications and the final statistic computed using the first 462 lowest ALR factor classifications and the remaining two classifications. The point at which the H statistic is largest is selected as the first bifurcation point to create two groups of classifications. This process is then repeated on the two groups of classifications (to create four groups and so on) until the test statistic H no longer has statistical significance at a 0.05 significance level. In applying this approach to the ten years of ALR factors, five groups were indicated.

Retrospective Analysis Results

Exhibit 1.1 shows the retrospective accuracy of the ELRs computed using the current approach of grouping based on NAICS sector. For each NAICS sector, the aggregate expected losses for the sector is compared to the actual losses for the experience period. The statewide error is similarly shown in Exhibit 1.1 as the total statewide expected losses compared to the actual losses for the experience period. As shown at the bottom of Exhibit 1.1, the statewide error in this review is consistently high. That is, the ELRs computed in this review produced expected losses that were on average higher than the actual experience period losses that emerged. Staff believes this is related to the timing of the data, some of the statewide adjustments used, and system reforms that have been implemented during this period. Staff plans to explore the statewide ELR factor computation and adjustments in a future phase of this review. However, as the ELR factors for each group are balanced to the statewide average in every approach, this should not impact the *relative* accuracy among the groupings in the approaches reviewed.

The error for each NAICS sector is rebalanced to remove the impact of the statewide estimation error in Exhibit 1.2. This is done in a similar way for all the other groupings reviewed. (The statewide error for each year is the same for all groupings since, as discussed above, the ELR factor for the group is always balanced to the statewide average.)

Exhibits 2.1 through 2.6 show, graphically, the ELR factor computed for each grouping and filing year based on the different grouping methods. As shown in Exhibit 2.1, the factors for the NAICS sector groupings show some differentiation but cross over in many places as the number of groupings is large. Other grouping methods have a smaller number of groupings but also show some volatility and crossover. As shown in Exhibit 2.6, the factors for the KW bifurcation groupings show the most differentiation and the least crossover, in large part due to the groupings being designed to segregate this measure.

Exhibits 3.1 through 3.3 show the rebalanced estimation error for each grouping method. The results are summarized by NAICS sector for consistency of review. The straight average across all NAICS sectors is shown at the bottom of Exhibit 3.3. The root mean square error (RMSE) is shown across the ten years reviewed. In addition, the bias is shown as the [count of years with positive error] less [count of years with negative error]. A bias count of zero implies that the number of positive and negative errors were equal across the ten years. The groupings based on NAICS sectors consistently show the smallest RMSE and generally lower bias. Including the LDG in the development for the NAICS sector grouping approach does not consistently improve the accuracy over the current (and less complex) NAICS grouping method.

Given that the results in Exhibits 3.1 through 3.3 are summarized by NAICS sector, staff reviewed other groupings of the results to ensure they are not biased to the NAICS sector method. Exhibits 4.1 and 4.2

show the results grouped by classification deciles, which ranked the classifications based on the ten-year average ALR, excluding the highest and lowest observations, and grouped them by 46 or 47 classifications in each decile. These exhibits also show the NAICS sector method to have among the smallest rMSE and among the smallest bias. This approach also shows the KW bifurcation method to have relatively lower rMSE but a much higher bias than the current NAICS sector method.

Conclusions and Next Steps

Based on this review, none of the alternative methods tested performed significantly better than the current approach of using the NAICS groupings. Staff has some concerns with the current use of these groupings given that there is a significant number of groups and some of them are small. Staff plans to continue to review the NAICS groupings to determine if any can be further combined for this analysis.

Staff also plans to review the statewide estimation error in the next phase of this study. Other areas of the ELR methodology staff plans to review in future phases of this study include:

- The years of data used and input adjustment factors (such as the factor for the 11751.9 rerates)
- Swing limit for a classification's ELR relativity (currently 15% compared to 25% for pure premium ratemaking)
- The impact of reforms or large system changes (which may impact the statewide estimation)
- The off-balance factor methodology

ELR Retrospective Accuracy Using Current (NAICS Sector) Method

NAICS	NAICS Description	Experience Period for Projection Year:									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
11 & 21	Agriculture & Mining	5.5%	16.1%	14.6%	13.2%	10.9%	16.4%	20.1%	18.1%	17.3%	3.1%
22 & 23	Utilities & Construction	11.4%	20.6%	15.2%	13.7%	18.0%	27.5%	26.2%	20.2%	16.2%	4.7%
31	Manufacturing	16.5%	18.5%	17.3%	18.5%	16.6%	25.9%	24.6%	21.3%	21.7%	9.0%
42	Wholesale	14.1%	20.4%	20.4%	17.5%	21.0%	21.4%	20.4%	19.3%	11.5%	7.3%
44	Retail	22.2%	17.7%	20.9%	18.3%	21.5%	21.7%	24.8%	17.1%	17.3%	11.0%
48	Transportation & Warehousing	11.0%	21.8%	13.7%	18.1%	20.7%	28.4%	19.8%	19.1%	15.0%	4.7%
51	Information	8.3%	18.0%	21.3%	11.7%	16.2%	14.5%	17.0%	8.6%	13.2%	8.2%
52	Finance & Insurance	19.9%	25.7%	29.0%	23.5%	23.8%	27.2%	10.4%	9.1%	36.9%	39.1%
53	Real Estate	6.7%	28.0%	23.3%	16.6%	17.2%	26.4%	18.0%	14.4%	22.7%	15.0%
54	Professional Services	20.8%	24.1%	23.6%	20.5%	17.7%	26.7%	25.7%	27.5%	29.8%	20.2%
56	Administrative	15.4%	20.1%	13.4%	21.5%	27.9%	20.6%	25.2%	18.0%	22.2%	11.6%
61	Education	5.7%	21.8%	18.6%	18.7%	17.7%	16.9%	15.1%	19.6%	23.6%	12.6%
62	Health	17.2%	17.2%	19.3%	22.1%	19.1%	22.7%	22.8%	18.1%	23.9%	8.2%
71	Arts & Entertainment	11.4%	13.1%	24.9%	23.3%	18.9%	16.4%	27.5%	21.3%	21.7%	-0.5%
72	Hospitality	13.4%	16.8%	21.0%	24.0%	22.2%	25.4%	26.6%	16.8%	15.2%	8.6%
81	Other	9.7%	16.2%	21.3%	22.7%	19.6%	22.2%	21.1%	10.9%	15.6%	11.8%
8742	Outside Sales	11.4%	21.8%	12.0%	19.9%	12.0%	26.4%	18.9%	23.1%	26.9%	16.3%
92 & 8810	Clerical & Public Admin	16.0%	14.4%	24.1%	25.6%	22.1%	27.1%	22.5%	15.0%	34.6%	31.8%
Total		15.4%	19.5%	18.9%	19.3%	19.4%	23.3%	24.2%	19.8%	20.8%	10.5%

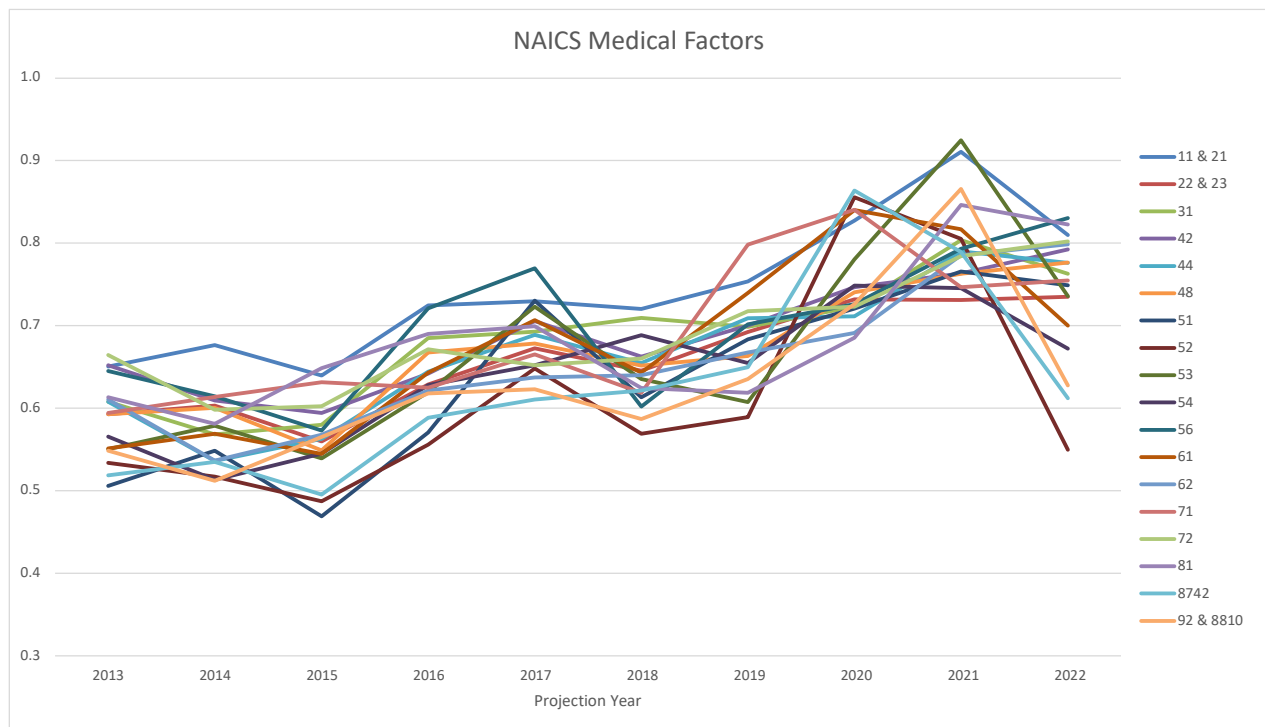
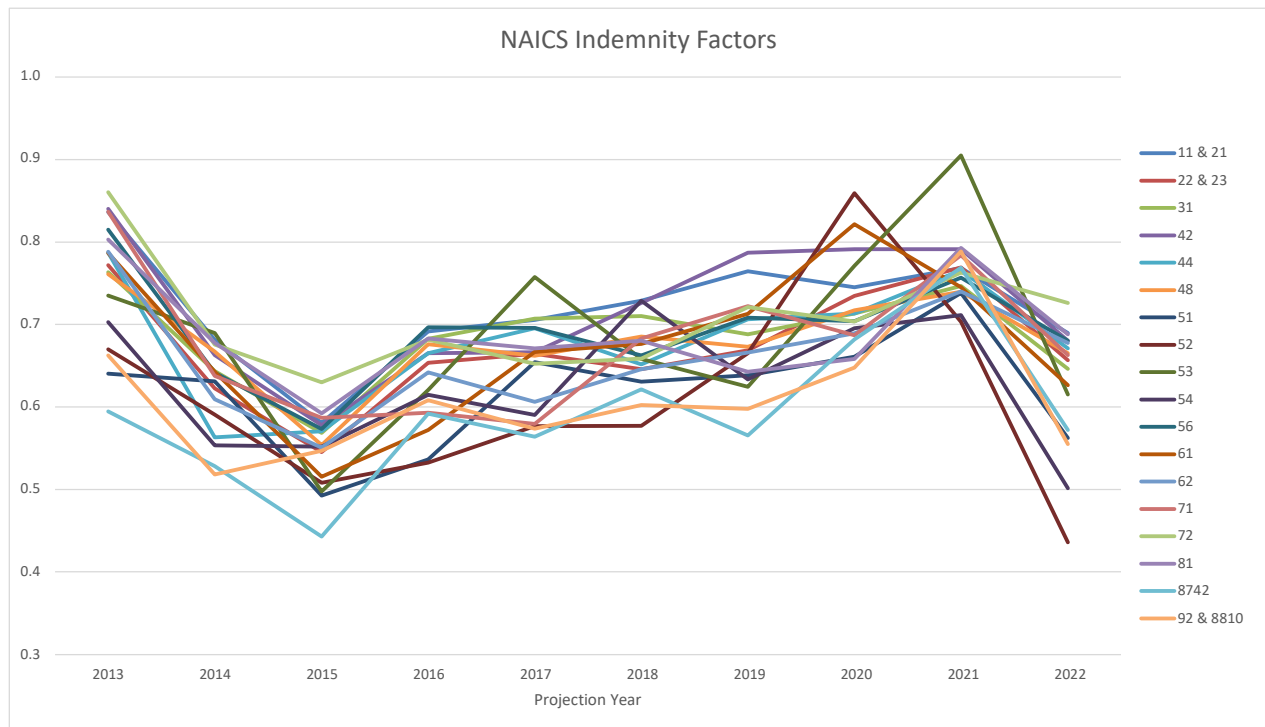
Source: WCIRB unit statistical data. Each figure represents the estimated expected losses for the three year experience period compared to the actual losses for that period.

**ELR Retrospective Accuracy Using Current (NAICS Sector) Method
Rebalanced to Remove Statewide ELR Error**

NAICS		Experience Period for Projection Year:									
NAICS	Description	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
11 & 21	Agriculture & Mining	-8.7%	-2.8%	-3.6%	-5.1%	-7.1%	-5.6%	-3.4%	-1.4%	-2.9%	-6.7%
22 & 23	Utilities & Construction	-3.5%	1.0%	-3.1%	-4.7%	-1.2%	3.4%	1.6%	0.4%	-3.8%	-5.3%
31	Manufacturing	0.9%	-0.8%	-1.3%	-0.6%	-2.4%	2.1%	0.3%	1.3%	0.8%	-1.4%
42	Wholesale	-1.1%	0.8%	1.3%	-1.5%	1.3%	-1.6%	-3.1%	-0.4%	-7.7%	-2.9%
44	Retail	5.8%	-1.5%	1.7%	-0.9%	1.7%	-1.3%	0.4%	-2.3%	-2.8%	0.4%
48	Transportation & Warehousing	-3.8%	1.9%	-4.4%	-1.0%	1.0%	4.1%	-3.5%	-0.5%	-4.8%	-5.3%
51	Information	-6.2%	-1.2%	2.0%	-6.4%	-2.7%	-7.2%	-5.8%	-9.3%	-6.2%	-2.1%
52	Finance & Insurance	3.9%	5.2%	8.5%	3.5%	3.7%	3.2%	-11.1%	-8.9%	13.4%	25.9%
53	Real Estate	-7.6%	7.1%	3.7%	-2.3%	-1.8%	2.5%	-5.0%	-4.5%	1.6%	4.0%
54	Professional Services	4.6%	3.9%	4.0%	1.0%	-1.5%	2.7%	1.2%	6.5%	7.5%	8.7%
56	Administrative	0.0%	0.6%	-4.6%	1.9%	7.0%	-2.2%	0.8%	-1.5%	1.2%	1.0%
61	Education	-8.4%	2.0%	-0.2%	-0.5%	-1.5%	-5.2%	-7.4%	-0.1%	2.3%	1.9%
62	Health	1.5%	-1.9%	0.3%	2.4%	-0.3%	-0.5%	-1.2%	-1.4%	2.6%	-2.1%
71	Arts & Entertainment	-3.5%	-5.3%	5.1%	3.4%	-0.4%	-5.6%	2.6%	1.3%	0.8%	-10.0%
72	Hospitality	-1.8%	-2.2%	1.8%	3.9%	2.3%	1.7%	1.9%	-2.5%	-4.6%	-1.7%
81	Other	-5.0%	-2.7%	2.0%	2.8%	0.1%	-0.9%	-2.6%	-7.4%	-4.2%	1.1%
8742	Outside Sales	-3.5%	2.0%	-5.8%	0.5%	-6.2%	2.5%	-4.3%	2.8%	5.0%	5.2%
92 & 8810	Clerical & Public Admin	0.5%	-4.3%	4.4%	5.3%	2.2%	3.1%	-1.4%	-3.9%	11.5%	19.2%
Total		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pre-Rebalanced Total		15.4%	19.5%	18.9%	19.3%	19.4%	23.3%	24.2%	19.8%	20.8%	10.5%

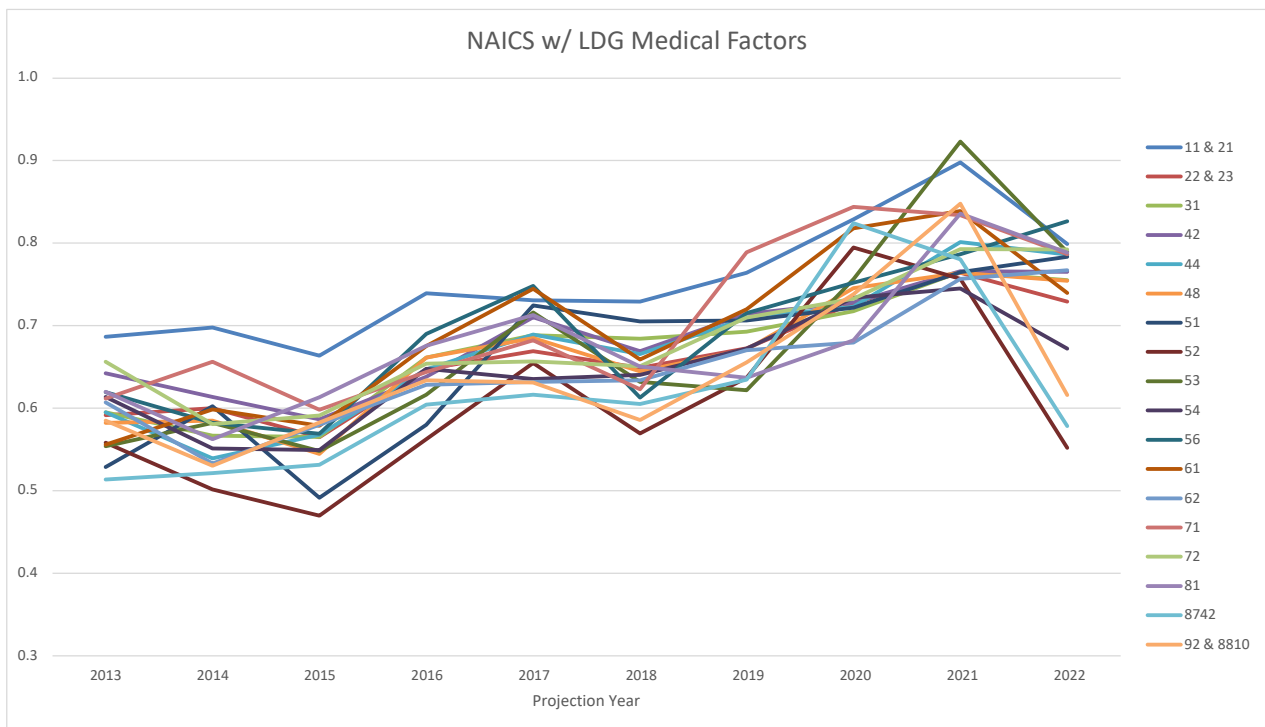
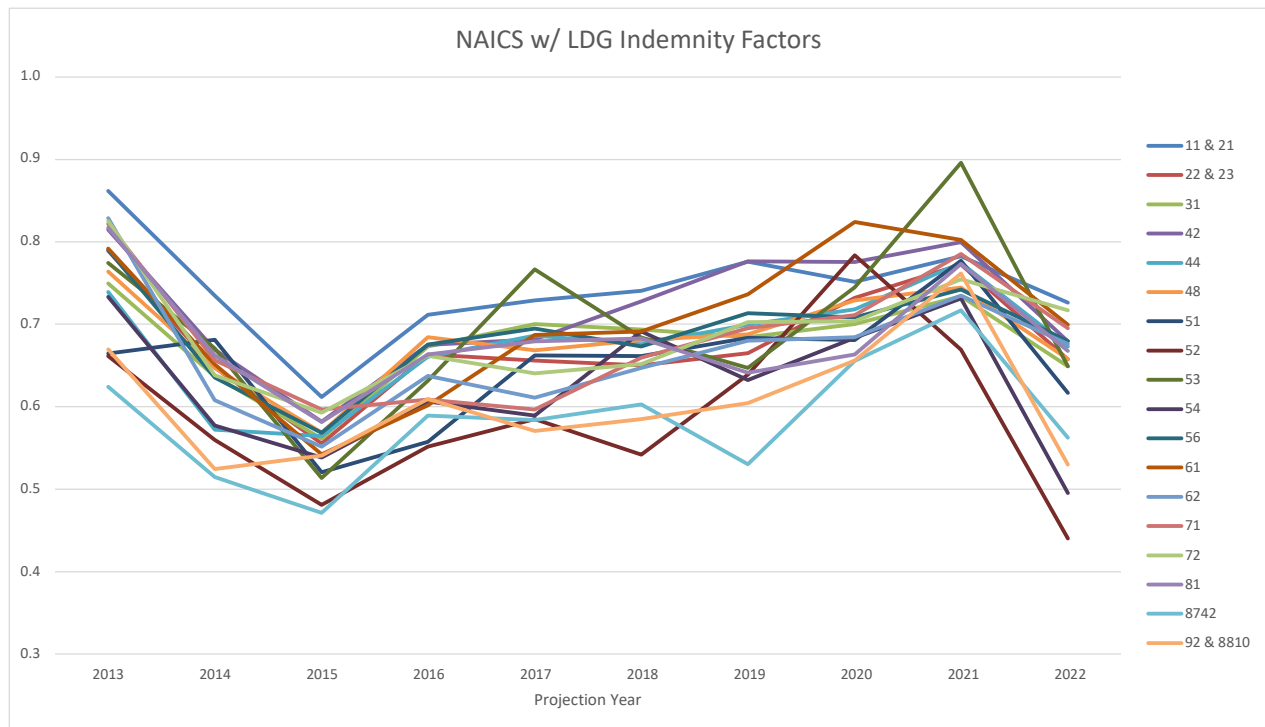
Source: WCIRB unit statistical data. Each figure represents the estimated expected losses for the three year experience period compared to the actual losses for that period. The statewide error is removed from the error for each NAICS Sector.

Computed ELR Factors Using NAICS



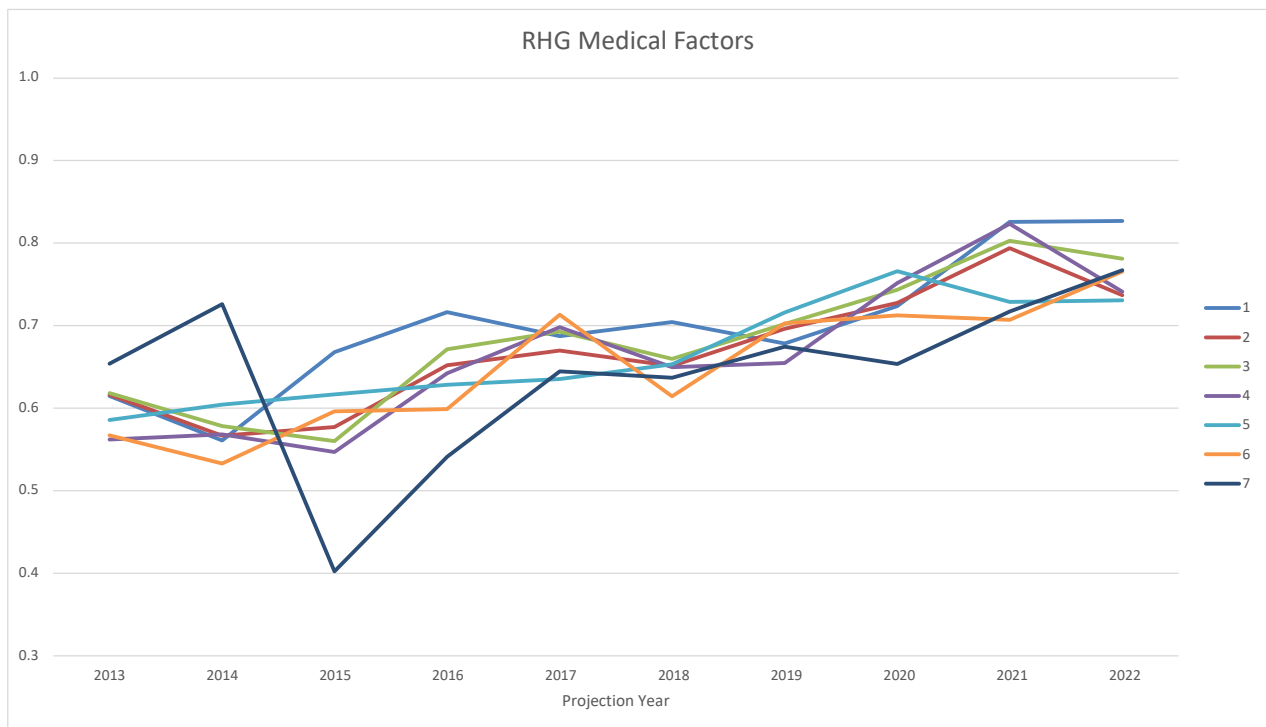
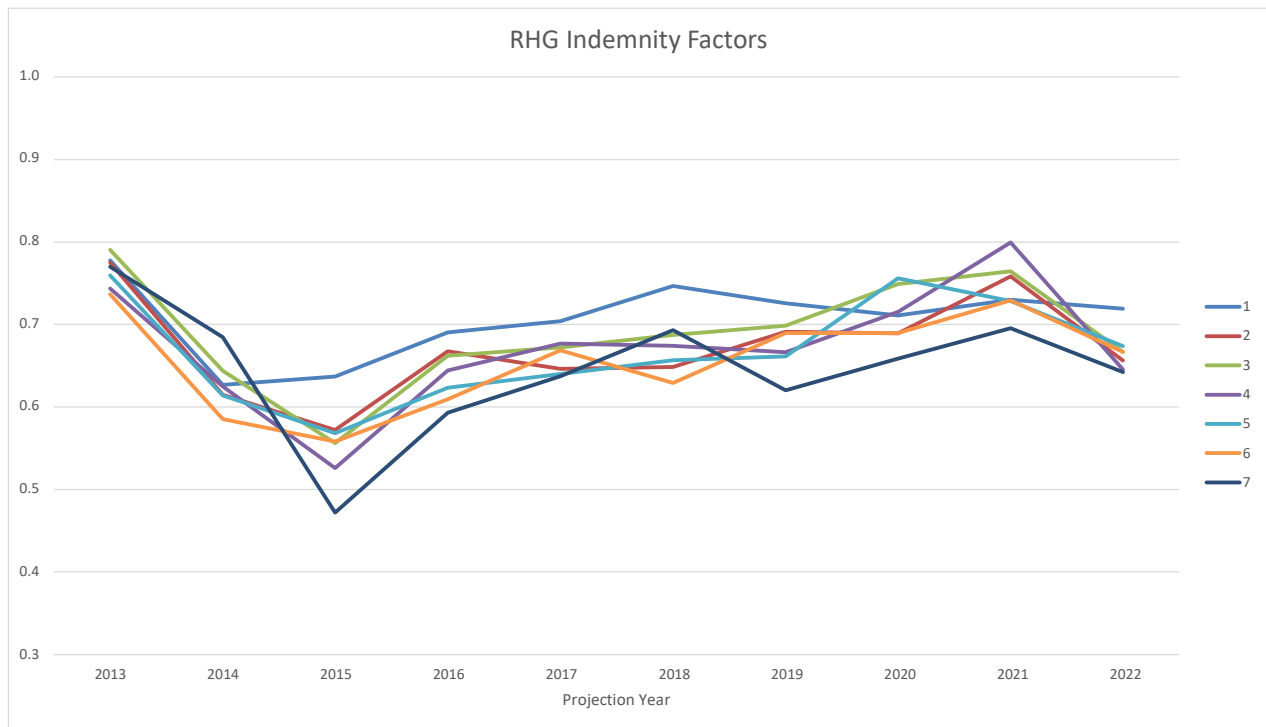
Source: WCIRB unit statistical data. Each graph shows the computed factor to convert a classification's indicated limited loss to payroll ratio to an expected loss rate for that grouping.

Computed ELR Factors Using NAICS with LDG for Development



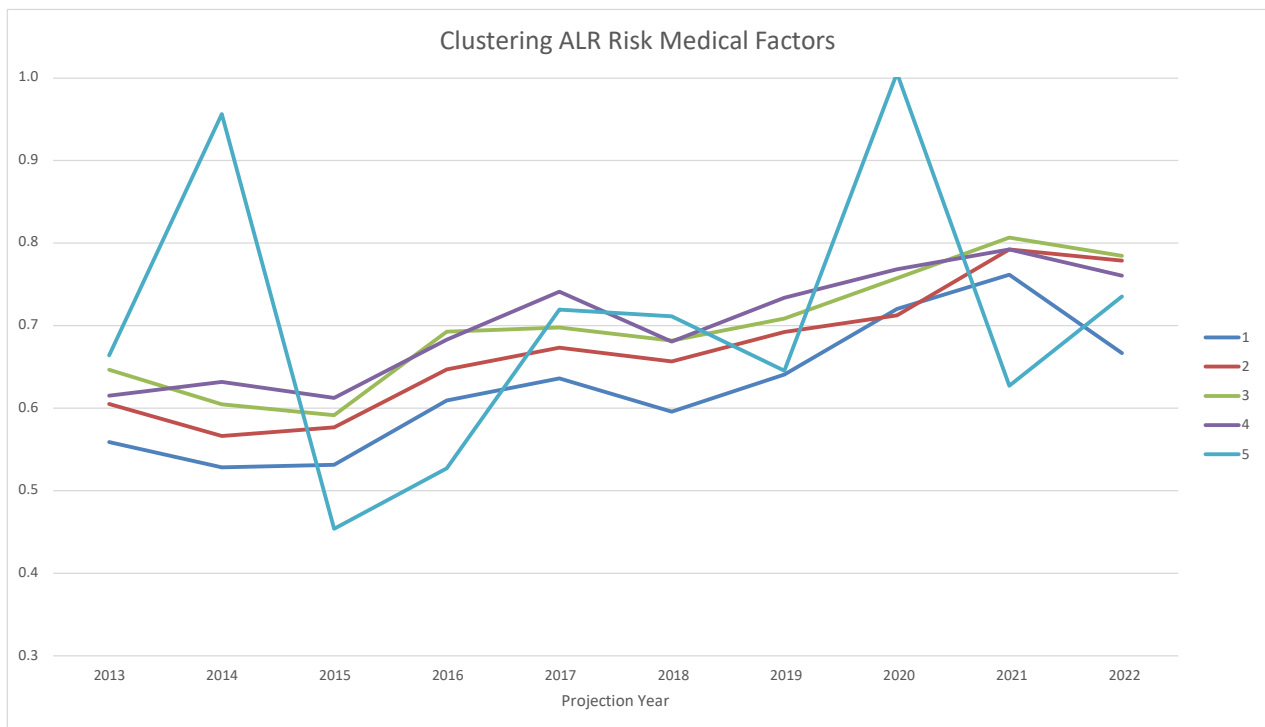
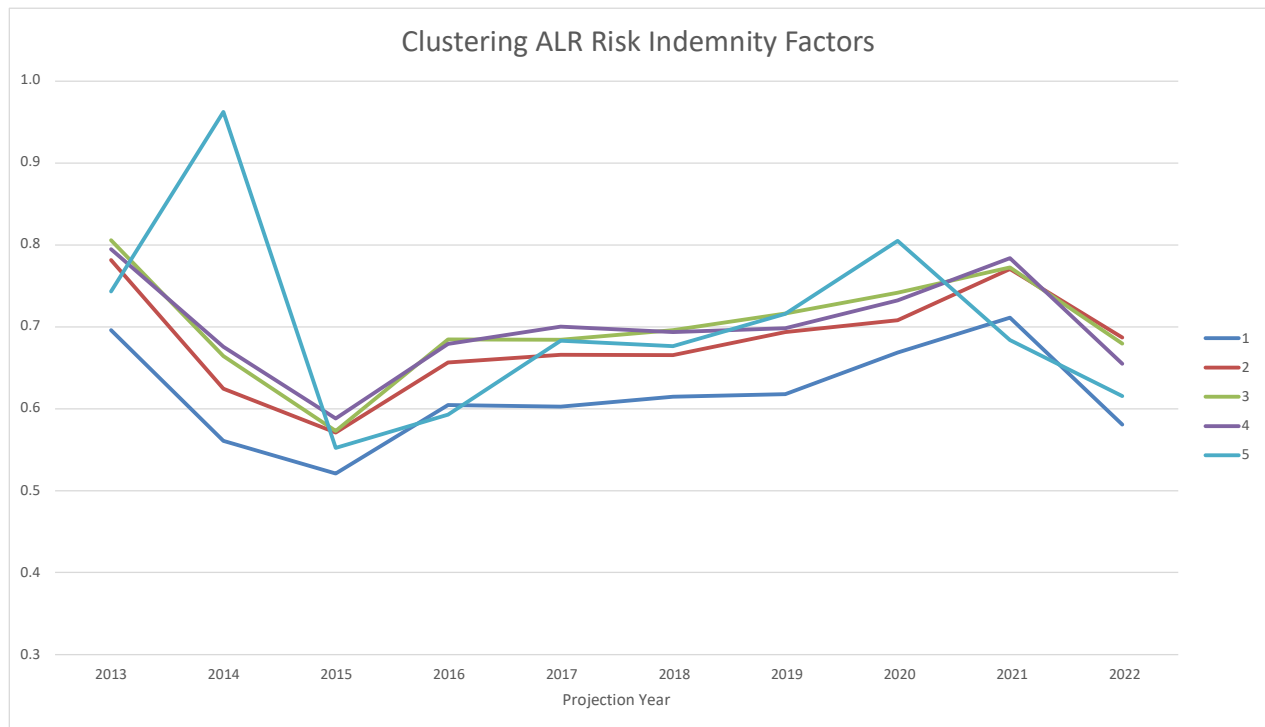
Source: WCIRB unit statistical data. Each graph shows the computed factor to convert a classification's indicated limited loss to payroll ratio to an expected loss rate for that grouping.

Computed ELR Factors Using RHG (Retrospective Rating Hazard Groups)



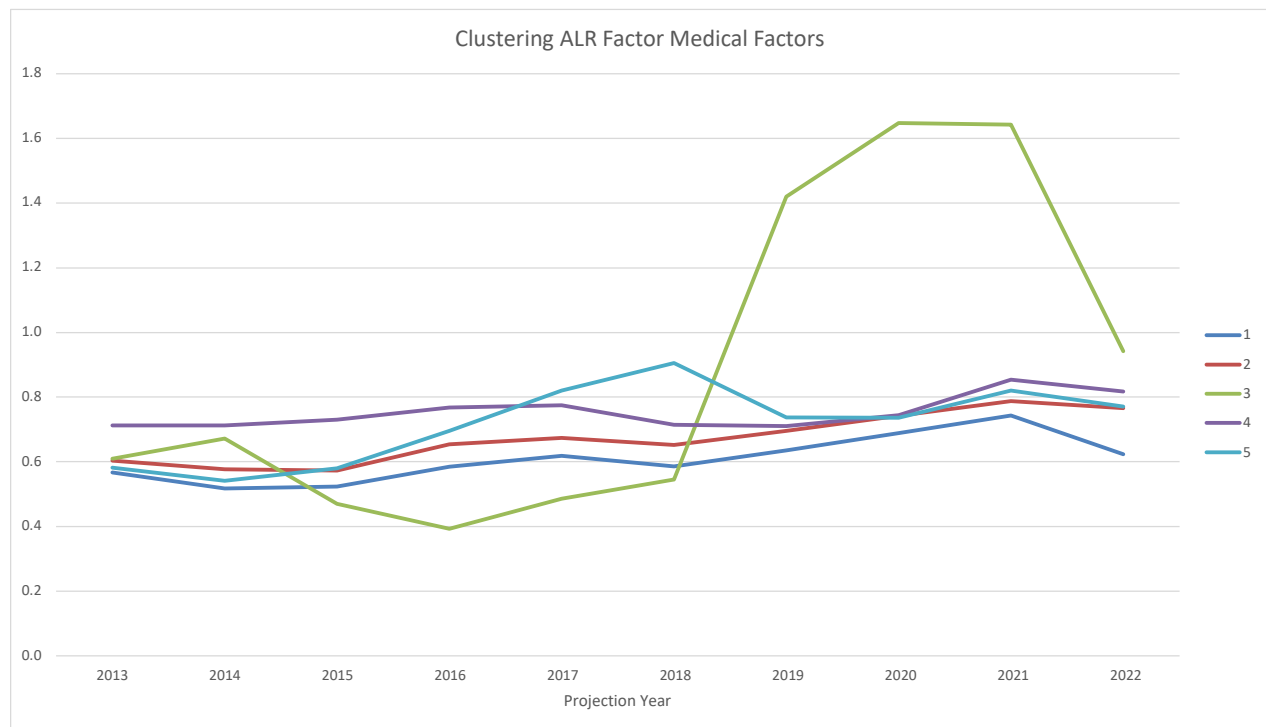
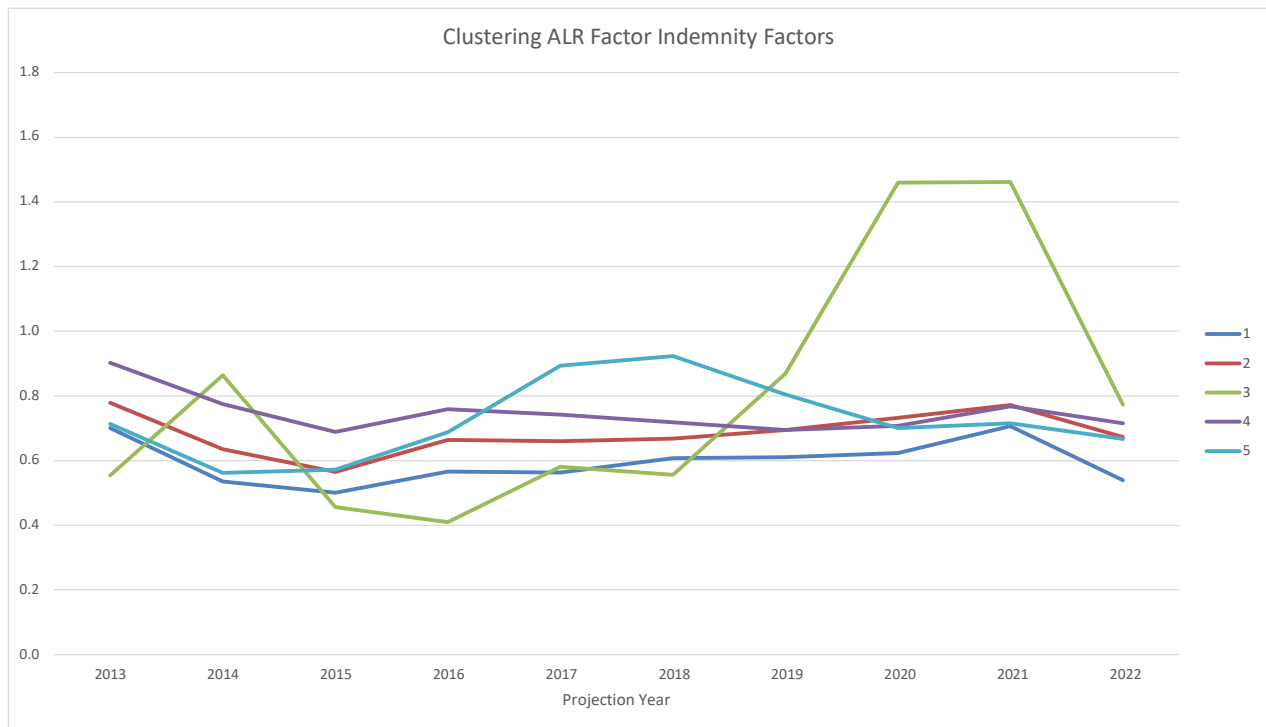
Source: WCIRB unit statistical data. Each graph shows the computed factor to convert a classification's indicated limited loss to payroll ratio to an expected loss rate for that grouping.

Computed ELR Factors Using ALR (Actual Loss Rate) Risk Cluster



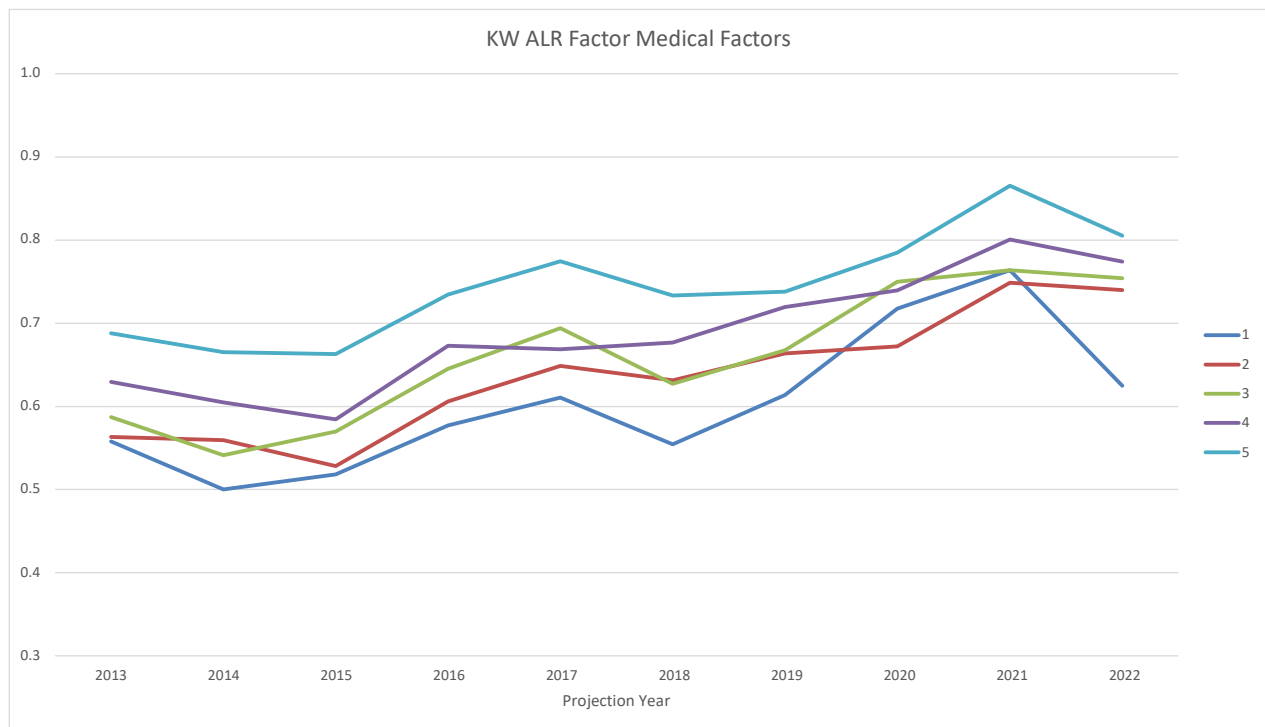
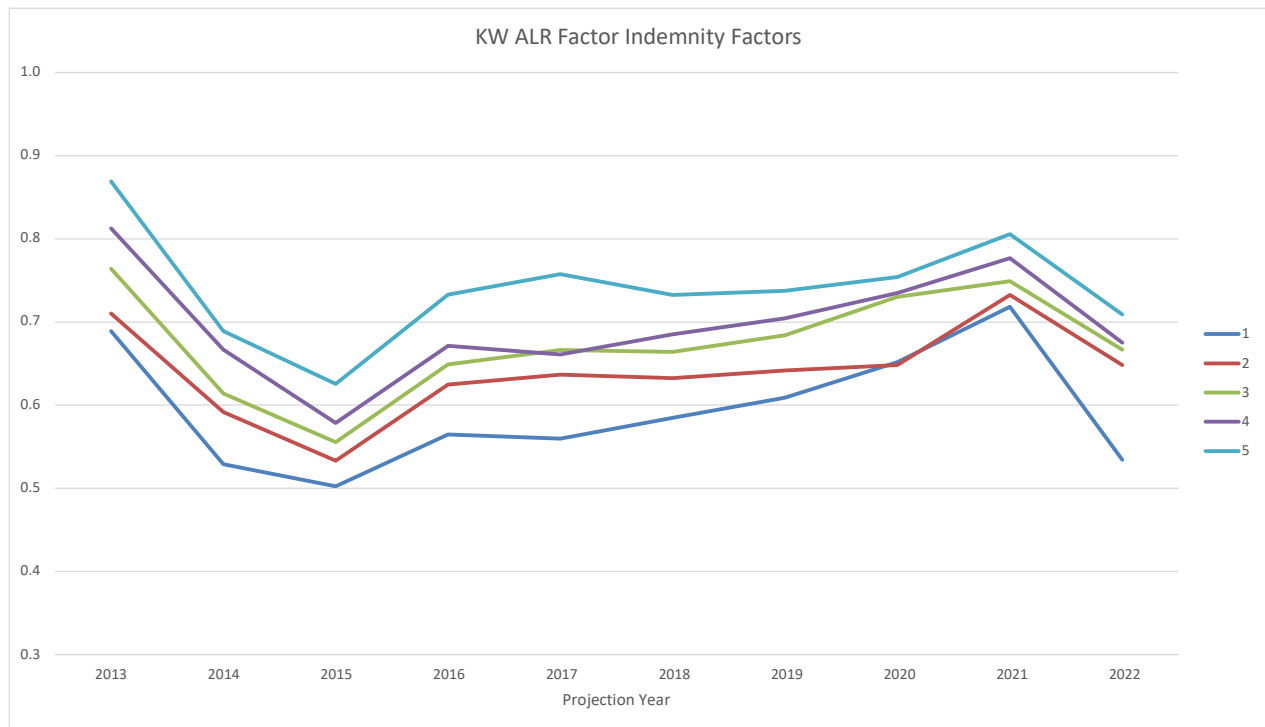
Source: WCIRB unit statistical data. Each graph shows the computed factor to convert a classification's indicated limited loss to payroll ratio to an expected loss rate for that grouping.

Computed ELR Factors Using ALR (Actual Loss Rate) Factor Cluster



Source: WCIRB unit statistical data. Each graph shows the computed factor to convert a classification's indicated limited loss to payroll ratio to an expected loss rate for that grouping.

Computed ELR Factors Using ALR Factor Kruskal-Wallis Bifurcation



Source: WCIRB unit statistical data. Each graph shows the computed factor to convert a classification's indicated limited loss to payroll ratio to an expected loss rate for that grouping.

ELR Retrospective Accuracy Using Different Methods
Rebalanced to Remove Statewide ELR Error
Results Summarized by NAICS Sector

NAICS 11 & 21 - Agriculture & Mining

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-9%	-3%	-4%	-5%	-7%	-6%	-3%	-1%	-3%	-7%	5.2%	-10
NAICS w/ LDG	-5%	0%	0%	-3%	-6%	-4%	-2%	-1%	-3%	-5%	3.6%	-6
RHG	-14%	-13%	-9%	-12%	-13%	-13%	-12%	-9%	-10%	-11%	11.7%	-10
Clustering ALR Risk	-12%	-10%	-9%	-10%	-11%	-11%	-10%	-7%	-9%	-9%	9.9%	-10
Clustering ALR Factor	-5%	-2%	2%	-1%	-4%	-7%	-10%	-9%	-7%	-6%	5.9%	-8
KW ALR Factor	-6%	-5%	-1%	-4%	-4%	-6%	-7%	-4%	-5%	-7%	5.2%	-10

NAICS 22 & 23 - Utilities & Construction

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-4%	1%	-3%	-5%	-1%	3%	2%	0%	-4%	-5%	3.2%	-2
NAICS w/ LDG	-3%	2%	-2%	-3%	-2%	4%	0%	0%	-2%	-5%	2.7%	-4
RHG	-5%	0%	-2%	-7%	-1%	4%	2%	-1%	-4%	-4%	3.7%	-4
Clustering ALR Risk	-2%	1%	1%	-2%	1%	7%	4%	0%	0%	-3%	2.8%	2
Clustering ALR Factor	-3%	-1%	-1%	-3%	-2%	5%	3%	0%	-1%	-4%	2.6%	-6
KW ALR Factor	-3%	0%	1%	-2%	-1%	6%	4%	0%	0%	-4%	2.8%	-4

NAICS 31 - Manufacturing

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	1%	-1%	-1%	-1%	-2%	2%	0%	1%	1%	-1%	1.3%	0
NAICS w/ LDG	-1%	-1%	-3%	-3%	-3%	-1%	0%	0%	-2%	-1%	1.9%	-8
RHG	1%	-1%	-2%	-4%	-5%	-3%	0%	3%	2%	0%	2.6%	-4
Clustering ALR Risk	2%	-1%	-2%	-3%	-5%	-3%	0%	3%	1%	0%	2.6%	0
Clustering ALR Factor	1%	-2%	-2%	-3%	-3%	-2%	1%	2%	1%	0%	1.8%	0
KW ALR Factor	2%	0%	-2%	-3%	-5%	-3%	0%	2%	1%	0%	2.3%	-2

NAICS 42 - Wholesale

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-1%	1%	1%	-1%	1%	-2%	-3%	0%	-8%	-3%	2.9%	-4
NAICS w/ LDG	-3%	2%	1%	-1%	2%	-1%	-3%	-3%	-7%	-3%	3.0%	-4
RHG	-7%	-3%	-2%	0%	0%	-5%	-8%	-3%	-8%	-4%	4.9%	-8
Clustering ALR Risk	-4%	0%	1%	4%	2%	-2%	-7%	-3%	-6%	-3%	3.7%	-2
Clustering ALR Factor	-7%	-3%	-1%	1%	0%	-5%	-8%	-5%	-7%	-3%	4.9%	-8
KW ALR Factor	-4%	-2%	0%	1%	1%	-3%	-6%	-3%	-6%	-3%	3.6%	-6

NAICS 44 - Retail

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	6%	-1%	2%	-1%	2%	-1%	0%	-2%	-3%	0%	2.4%	0
NAICS w/ LDG	2%	0%	2%	-1%	1%	1%	0%	-1%	-1%	1%	1.3%	2
RHG	6%	6%	3%	1%	-1%	0%	-1%	-1%	-2%	-2%	3.1%	0
Clustering ALR Risk	5%	6%	3%	-1%	-2%	-1%	-2%	-2%	-3%	1%	3.0%	-2
Clustering ALR Factor	5%	8%	2%	0%	-1%	0%	-1%	1%	-3%	0%	3.2%	0
KW ALR Factor	3%	5%	0%	-2%	-1%	-2%	-4%	-3%	-5%	-1%	2.9%	-4

NAICS 48 - Transportation & Warehousing

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-4%	2%	-4%	-1%	1%	4%	-4%	-1%	-5%	-5%	3.5%	-4
NAICS w/ LDG	-4%	-1%	-4%	-1%	2%	3%	-2%	0%	-4%	-7%	3.4%	-4
RHG	-4%	-3%	-4%	-3%	2%	3%	-1%	-1%	-1%	-7%	3.4%	-6
Clustering ALR Risk	0%	3%	2%	0%	6%	6%	2%	1%	-1%	-6%	3.5%	6
Clustering ALR Factor	-2%	-2%	-2%	-3%	1%	3%	0%	0%	-1%	-5%	2.5%	-2
KW ALR Factor	-1%	-2%	-1%	-2%	2%	4%	0%	1%	-2%	-5%	2.5%	-2

NAICS 51 - Information

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-6%	-1%	2%	-6%	-3%	-7%	-6%	-9%	-6%	-2%	5.5%	-8
NAICS w/ LDG	-3%	5%	4%	-5%	-2%	0%	-4%	-8%	-5%	4%	4.3%	-2
RHG	8%	0%	9%	10%	-3%	-1%	-4%	-5%	-4%	6%	6.0%	-2
Clustering ALR Risk	4%	-4%	6%	8%	-6%	-4%	-7%	-6%	-7%	4%	5.8%	-2
Clustering ALR Factor	7%	0%	8%	9%	-5%	-2%	-4%	-6%	-5%	6%	5.7%	0
KW ALR Factor	7%	-3%	7%	8%	-6%	-2%	-5%	-7%	-6%	6%	6.0%	-2

Source: WCIRB unit statistical data. Each figure represents the estimated expected losses for the three year experience period compared to the actual losses for that period. The statewide error is removed from the error for each NAICS Sector.

**ELR Retrospective Accuracy Using Different Methods
Rebalanced to Remove Statewide ELR Error
Results Summarized by NAICS Sector**

NAICS 52 - Finance & Insurance

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	4%	5%	9%	4%	4%	3%	-11%	-9%	13%	26%	11.0%	6
NAICS w/ LDG	6%	1%	5%	5%	5%	0%	-10%	-9%	10%	26%	10.4%	6
RHG	15%	14%	23%	23%	13%	16%	-6%	-11%	15%	62%	24.8%	6
Clustering ALR Risk	9%	5%	15%	13%	5%	9%	-11%	-13%	13%	43%	17.2%	6
Clustering ALR Factor	10%	3%	12%	9%	1%	8%	-11%	-17%	12%	37%	15.2%	6
KW ALR Factor	9%	1%	13%	9%	2%	5%	-11%	-14%	13%	38%	15.1%	6

NAICS 53 - Real Estate

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-8%	7%	4%	-2%	-2%	3%	-5%	-4%	2%	4%	4.5%	0
NAICS w/ LDG	-6%	6%	6%	-2%	-2%	4%	-3%	-7%	2%	6%	4.8%	0
RHG	-5%	3%	9%	2%	-7%	4%	2%	-9%	-5%	5%	5.7%	2
Clustering ALR Risk	-4%	1%	13%	2%	-9%	3%	5%	-12%	-7%	6%	7.3%	2
Clustering ALR Factor	-5%	2%	13%	4%	-7%	6%	6%	-9%	-7%	6%	6.9%	2
KW ALR Factor	-4%	0%	13%	3%	-7%	4%	4%	-9%	-8%	6%	6.5%	2

NAICS 54 - Professional Services

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	5%	4%	4%	1%	-1%	3%	1%	7%	8%	9%	4.9%	8
NAICS w/ LDG	11%	9%	3%	2%	-3%	-1%	2%	5%	9%	9%	6.3%	6
RHG	11%	13%	8%	3%	6%	0%	5%	6%	13%	23%	10.6%	8
Clustering ALR Risk	4%	6%	1%	-1%	-2%	-7%	0%	4%	9%	14%	6.3%	4
Clustering ALR Factor	9%	11%	4%	0%	2%	-3%	4%	3%	11%	20%	9.0%	6
KW ALR Factor	9%	13%	4%	0%	2%	-3%	3%	5%	11%	20%	9.2%	8

NAICS 56 - Administrative

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	0%	1%	-5%	2%	7%	-2%	1%	-1%	1%	1%	2.9%	2
NAICS w/ LDG	-2%	-3%	-5%	-2%	5%	-1%	2%	1%	0%	1%	2.8%	0
RHG	-3%	-4%	-6%	-5%	-2%	2%	-1%	0%	2%	-2%	3.3%	-6
Clustering ALR Risk	-2%	1%	-2%	-3%	2%	5%	2%	3%	3%	-1%	2.5%	2
Clustering ALR Factor	-1%	-1%	-1%	-3%	1%	4%	0%	0%	2%	-1%	2.0%	-2
KW ALR Factor	-2%	-3%	-3%	-4%	1%	4%	0%	2%	2%	-1%	2.5%	0

NAICS 61 - Education

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-8%	2%	0%	-1%	-1%	-5%	-7%	0%	2%	2%	4.1%	-4
NAICS w/ LDG	-8%	6%	6%	5%	3%	-3%	-8%	0%	7%	11%	6.2%	2
RHG	-4%	1%	8%	6%	-5%	-6%	-10%	-11%	1%	8%	6.7%	0
Clustering ALR Risk	-11%	-5%	1%	0%	-9%	-10%	-16%	-14%	-2%	0%	8.7%	-6
Clustering ALR Factor	-4%	3%	7%	6%	-4%	-5%	-10%	-9%	2%	11%	6.8%	0
KW ALR Factor	-6%	-1%	5%	4%	-4%	-6%	-12%	-10%	0%	8%	6.6%	-2

NAICS 62 - Health

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	2%	-2%	0%	2%	0%	0%	-1%	-1%	3%	-2%	1.6%	-2
NAICS w/ LDG	3%	-2%	2%	3%	0%	-1%	0%	-2%	1%	-4%	2.2%	-2
RHG	1%	3%	1%	7%	8%	3%	3%	4%	5%	-6%	4.7%	8
Clustering ALR Risk	1%	0%	-1%	4%	4%	-1%	-1%	1%	3%	-8%	3.3%	0
Clustering ALR Factor	0%	3%	1%	5%	6%	1%	2%	3%	4%	-6%	3.7%	8
KW ALR Factor	-1%	2%	0%	4%	7%	0%	0%	1%	3%	-6%	3.3%	6

NAICS 71 - Arts & Entertainment

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-3%	-5%	5%	3%	0%	-6%	3%	1%	1%	-10%	4.7%	0
NAICS w/ LDG	-2%	-1%	3%	6%	1%	-6%	1%	2%	7%	-7%	4.4%	2
RHG	-4%	-9%	2%	12%	6%	-4%	-6%	-2%	4%	-8%	6.4%	-2
Clustering ALR Risk	-7%	-10%	-1%	8%	4%	-4%	-6%	-4%	2%	-9%	6.2%	-4
Clustering ALR Factor	-6%	-10%	-1%	10%	8%	-4%	-6%	-3%	2%	-10%	6.8%	-4
KW ALR Factor	-4%	-7%	0%	10%	6%	-4%	-6%	-3%	2%	-9%	5.9%	-4

Source: WCIRB unit statistical data. Each figure represents the estimated expected losses for the three year experience period compared to the actual losses for that period. The statewide error is removed from the error for each NAICS Sector.

**ELR Retrospective Accuracy Using Different Methods
Rebalanced to Remove Statewide ELR Error
Results Summarized by NAICS Sector**

NAICS 72 - Hospitality

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-2%	-2%	2%	4%	2%	2%	2%	-2%	-5%	-2%	2.6%	0
NAICS w/ LDG	-4%	-6%	-2%	1%	2%	1%	0%	-2%	-4%	-3%	2.9%	-2
RHG	-10%	-9%	-4%	2%	4%	1%	-2%	-3%	-4%	-10%	5.7%	-4
Clustering ALR Risk	-10%	-7%	-4%	2%	6%	3%	-1%	-2%	-3%	-6%	5.0%	-4
Clustering ALR Factor	-11%	-6%	-5%	1%	5%	2%	-1%	1%	-4%	-7%	5.3%	-2
KW ALR Factor	-7%	-2%	-4%	3%	4%	5%	1%	0%	-3%	-7%	4.2%	0

NAICS 81 - Other

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-5%	-3%	2%	3%	0%	-1%	-3%	-7%	-4%	1%	3.5%	-2
NAICS w/ LDG	-4%	-5%	-1%	1%	2%	1%	-1%	-7%	-5%	-1%	3.5%	-4
RHG	-9%	-7%	-5%	-1%	-1%	2%	5%	0%	-8%	-3%	4.9%	-4
Clustering ALR Risk	-7%	-7%	-5%	-2%	-2%	0%	5%	-1%	-8%	-4%	4.8%	-6
Clustering ALR Factor	-5%	-4%	-5%	-1%	-1%	1%	6%	0%	-7%	-3%	4.1%	-6
KW ALR Factor	-5%	-5%	-4%	0%	1%	2%	7%	1%	-7%	-2%	4.2%	0

NAICS 8742 - Outside Sales

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-4%	2%	-6%	1%	-6%	3%	-4%	3%	5%	5%	4.2%	2
NAICS w/ LDG	-2%	-1%	1%	2%	-4%	0%	-8%	-1%	1%	2%	3.2%	-2
RHG	11%	13%	7%	10%	10%	0%	-3%	9%	23%	11.1%	11.1%	6
Clustering ALR Risk	8%	4%	5%	4%	-1%	0%	-1%	-8%	-1%	11%	5.4%	0
Clustering ALR Factor	9%	1%	2%	-2%	-5%	-2%	-2%	-13%	-2%	3%	5.5%	-2
KW ALR Factor	9%	10%	6%	5%	3%	4%	0%	-12%	0%	23%	9.7%	4

NAICS 92 & 8810 - Clerical & Public Admin

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	0%	-4%	4%	5%	2%	3%	-1%	-4%	11%	19%	7.7%	4
NAICS w/ LDG	5%	-2%	6%	7%	3%	2%	1%	-2%	9%	19%	7.6%	6
RHG	1%	-4%	4%	5%	2%	3%	-1%	-4%	11%	19%	7.7%	4
Clustering ALR Risk	4%	1%	-1%	4%	6%	5%	1%	-3%	-1%	23%	8.0%	4
Clustering ALR Factor	5%	-2%	-4%	-1%	1%	4%	0%	-8%	-2%	20%	7.2%	-2
KW ALR Factor	4%	-4%	-4%	-1%	0%	-1%	-2%	-4%	0%	20%	6.8%	-2

NAICS Sector Average

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-2%	0%	1%	0%	0%	0%	-2%	-2%	1%	2%	4.2%	-14
NAICS w/ LDG	-1%	1%	1%	1%	0%	0%	-2%	-2%	1%	2%	4.2%	-14
RHG	-1%	0%	2%	3%	1%	1%	-2%	-3%	1%	5%	7.1%	-16
Clustering ALR Risk	-1%	-1%	1%	1%	-1%	0%	-2%	-3%	-1%	3%	5.9%	-10
Clustering ALR Factor	0%	0%	2%	2%	0%	0%	-2%	-4%	-1%	3%	5.5%	-20
KW ALR Factor	0%	0%	2%	2%	0%	0%	-2%	-3%	-1%	4%	5.5%	-12

Source: WCIRB unit statistical data. Each figure represents the estimated expected losses for the three year experience period compared to the actual losses for that period. The statewide error is removed from the error for each NAICS Sector.

**ELR Retrospective Accuracy Using Different Methods
Rebalanced to Remove Statewide ELR Error
Results Summarized by Classification Decile¹**

Decile 1

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	2%	2%	6%	5%	2%	2%	-2%	1%	11%	16%	6.9%	8
NAICS w/ LDG	4%	3%	7%	7%	3%	1%	-1%	1%	10%	17%	7.2%	8
RHG	10%	10%	11%	12%	9%	6%	4%	1%	10%	28%	12.1%	10
Clustering ALR Risk	3%	2%	3%	4%	2%	-1%	-3%	-2%	5%	16%	5.8%	4
Clustering ALR Factor	5%	3%	4%	4%	2%	1%	-1%	-4%	5%	18%	6.6%	6
KW ALR Factor	4%	2%	3%	3%	2%	-1%	-3%	-3%	6%	20%	6.9%	4

Decile 2

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	2%	2%	-2%	-3%	2%	6%	4%	2%	-2%	-3%	3.1%	2
NAICS w/ LDG	2%	3%	-2%	-3%	1%	6%	5%	1%	-2%	-3%	3.3%	2
RHG	3%	5%	-1%	-2%	3%	9%	6%	4%	-1%	-1%	4.2%	2
Clustering ALR Risk	-1%	-5%	-7%	-9%	-3%	-1%	-2%	1%	-5%	-12%	5.8%	-8
Clustering ALR Factor	3%	2%	-1%	-2%	3%	6%	6%	3%	-1%	-4%	3.6%	2
KW ALR Factor	3%	4%	-1%	-2%	2%	8%	6%	3%	-1%	-3%	3.9%	2

Decile 3

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	9%	8%	8%	3%	2%	4%	3%	0%	-3%	-3%	5.1%	6
NAICS w/ LDG	9%	9%	7%	3%	2%	4%	3%	0%	-3%	-2%	5.1%	6
RHG	9%	9%	10%	4%	2%	4%	2%	0%	-3%	-2%	5.7%	4
Clustering ALR Risk	8%	7%	7%	2%	0%	2%	2%	-2%	-2%	-2%	4.4%	4
Clustering ALR Factor	9%	9%	7%	4%	3%	3%	3%	1%	-2%	-2%	5.1%	6
KW ALR Factor	6%	7%	6%	2%	1%	1%	0%	-2%	-4%	-4%	3.9%	4

Decile 4

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	2%	-1%	0%	1%	1%	0%	2%	0%	-1%	-2%	1.2%	2
NAICS w/ LDG	0%	-1%	-2%	0%	1%	1%	1%	1%	0%	-1%	1.0%	0
RHG	-1%	0%	-2%	0%	0%	0%	0%	0%	-1%	-6%	2.2%	-6
Clustering ALR Risk	-2%	-1%	-2%	-1%	1%	0%	0%	-1%	0%	-2%	1.2%	-6
Clustering ALR Factor	-2%	1%	-3%	0%	1%	1%	0%	3%	-1%	-4%	2.0%	-2
KW ALR Factor	-3%	1%	-4%	-1%	0%	0%	-1%	0%	-2%	-5%	2.3%	-6

Decile 5

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	0%	1%	1%	1%	1%	2%	0%	0%	2%	-4%	1.7%	4
NAICS w/ LDG	1%	1%	1%	1%	1%	2%	0%	-1%	2%	-4%	1.8%	6
RHG	-1%	1%	0%	1%	2%	4%	1%	1%	2%	-5%	2.3%	4
Clustering ALR Risk	0%	0%	2%	1%	1%	3%	2%	-1%	3%	-3%	2.0%	2
Clustering ALR Factor	-2%	1%	1%	1%	0%	3%	2%	1%	1%	-5%	2.2%	6
KW ALR Factor	-2%	-1%	2%	1%	2%	2%	1%	1%	0%	-5%	2.1%	4

Decile 6

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-3%	-1%	0%	2%	0%	1%	-1%	-4%	-5%	-3%	2.7%	-2
NAICS w/ LDG	-3%	-1%	1%	2%	0%	2%	-1%	-5%	-5%	-4%	2.7%	-2
RHG	-4%	-3%	0%	-1%	-3%	-1%	-2%	-6%	-7%	-4%	3.6%	-8
Clustering ALR Risk	-3%	-3%	1%	0%	-2%	-1%	-1%	-8%	-5%	-1%	3.4%	-8
Clustering ALR Factor	-2%	0%	2%	3%	1%	2%	-1%	-5%	-5%	-2%	2.8%	-2
KW ALR Factor	-1%	1%	2%	2%	-1%	2%	0%	-5%	-5%	-3%	2.7%	-2

¹Classifications are grouped into deciles based on their ten-year average actual loss rate, excluding the highest and lowest observations.

**ELR Retrospective Accuracy Using Different Methods
Rebalanced to Remove Statewide ELR Error
Results Summarized by Classification Decile¹**

Decile 7

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-7%	-3%	-3%	-2%	-5%	-5%	-6%	-2%	-2%	-7%	4.6%	-10
NAICS w/ LDG	-7%	-2%	-2%	-2%	-5%	-4%	-6%	-3%	-1%	-13%	5.6%	-10
RHG	-10%	-7%	-4%	-4%	-7%	-7%	-9%	-4%	-3%	-7%	6.6%	-10
Clustering ALR Risk	-5%	-3%	-3%	0%	-5%	-5%	-7%	-2%	-1%	-6%	4.3%	-10
Clustering ALR Factor	-6%	-2%	0%	0%	-4%	-6%	-2%	-4%	-1%	-6%	4.5%	-8
KW ALR Factor	-4%	-3%	0%	1%	-2%	-4%	-6%	-2%	0%	-6%	3.5%	-8

Decile 8

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-4%	-2%	-1%	-2%	-1%	-2%	-2%	-2%	-6%	-3%	2.8%	-10
NAICS w/ LDG	-5%	-1%	-1%	-2%	-1%	-2%	-2%	-3%	-6%	-2%	3.0%	-10
RHG	-6%	-3%	-2%	-1%	-2%	-3%	-4%	-2%	-4%	-3%	3.3%	-10
Clustering ALR Risk	-2%	1%	1%	3%	0%	-1%	-1%	0%	-4%	-1%	1.8%	-4
Clustering ALR Factor	-5%	-3%	-1%	-1%	-2%	-3%	-3%	-2%	-5%	-2%	2.9%	-10
KW ALR Factor	-3%	-1%	1%	1%	-1%	-2%	-2%	-1%	-4%	-2%	2.1%	-6

Decile 9

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-7%	7%	4%	-2%	-2%	3%	-5%	-4%	2%	4%	4.4%	0
NAICS w/ LDG	-8%	-5%	-5%	-2%	0%	1%	-2%	-3%	-6%	-6%	4.5%	-8
RHG	-9%	3%	9%	2%	-7%	4%	2%	-9%	-5%	5%	6.1%	2
Clustering ALR Risk	-6%	1%	13%	2%	-9%	3%	5%	-12%	-7%	6%	7.4%	2
Clustering ALR Factor	-7%	2%	13%	4%	-7%	6%	6%	-9%	-7%	6%	7.1%	2
KW ALR Factor	-6%	-5%	-2%	-1%	1%	3%	0%	-1%	-4%	-6%	3.6%	-4

Decile 10

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-8%	-6%	-4%	-2%	-3%	-4%	-2%	0%	-1%	0%	3.9%	-8
NAICS w/ LDG	-8%	-6%	-4%	-2%	-3%	-4%	-2%	0%	0%	1%	4.0%	-6
RHG	-10%	-10%	-4%	-7%	-7%	-5%	-3%	-3%	-2%	-1%	6.0%	-10
Clustering ALR Risk	-8%	-2%	-1%	-3%	1%	0%	0%	3%	1%	-1%	2.9%	-2
Clustering ALR Factor	-8%	-7%	-4%	-3%	-4%	-2%	-2%	0%	1%	1%	4.2%	-6
KW ALR Factor	-7%	-8%	-3%	-3%	-4%	-2%	-1%	0%	1%	1%	3.9%	-4

Decile Average

Method	Experience Period for Projection Year:										rMSE	Bias
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
NAICS	-1%	1%	1%	0%	0%	1%	-1%	-1%	0%	-1%	3.6%	-8
NAICS w/ LDG	-1%	0%	0%	0%	0%	1%	-1%	-1%	-1%	-2%	3.8%	-14
RHG	-2%	0%	2%	0%	-1%	1%	0%	-2%	-1%	0%	5.2%	-22
Clustering ALR Risk	-2%	0%	2%	0%	-2%	0%	-1%	-2%	-2%	-1%	3.9%	-26
Clustering ALR Factor	-1%	0%	2%	1%	-1%	1%	0%	-2%	-1%	0%	4.1%	-6
KW ALR Factor	-1%	0%	0%	0%	0%	1%	-1%	-1%	-1%	-1%	3.5%	-16

¹Classifications are grouped into deciles based on their ten-year average actual loss rate, excluding the highest and lowest observations.