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WCIRB Actuarial Committee Meeting

December 11, 2020

Agenda

1. AC20-12-04: Experience Rating Eligibility
2. AC02-03-03: Experience of Large Deductible Policies
3. AC17-12-02: Legislative Cost Monitoring
4. AC19-12-02: Review of ULAE Projection Methods
5. AC20-12-03: Classification Ratemaking Loss Development
6. AC20-12-06: Potential Applications of Indemnity Transaction Data

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1

Experience Rating Eligibility

Current Eligibility Threshold for Experience Rating

- Approved eligibility threshold for 2021 is $9,900 in expected losses
- In the PY 2017 Experience Period ($10,100 eligibility threshold), there were 652,000 insureds
- During PY 2017, 460,000 of them had exposure
- 19% of insureds were eligible for experience rating accounting for 92% of expected losses
- 83% of employers below this threshold were claim free during the experience period
- If there is predictiveness to the experience of employers below this threshold, we could expand the program so that the incentive for safety applies to more employers
- Eligibility threshold adjusted annually for wage and expected loss rate inflation
- Many years since threshold comprehensively reviewed (review previously deferred pending other changes)

Considerations and Approach

- Volatility of experience for smaller employers leads to more volatile swings in modifications from year to year
  - Modifications calculated using 5 years of experience did not consistently predict better than 3 years of experience
  - Count based caps show promise in mitigating the impact of large swings while also allowing for the safety incentive
- Expanded existing PY 2017 database to include 250,000 additional insureds
- Optimized primary thresholds for insureds who do not currently qualify for experience rating
- Calculated experience mods as if they had qualified for modifications in 2017

Conditional Distributions of Projection Period Claim Counts

Experience Period Count	Percent of Risks	Projection Period Claim Counts 0	1	2	3	4+
0	50.3%	83%	13%	3%	1%	0%
1	24.1%	74%	19%	5%	2%	1%
2	11.9%	66%	21%	8%	3%	2%
3	6.0%	60%	25%	9%	3%	3%
4+	7.7%	47%	24%	13%	7%	9%

Expected Loss in [10100, 30000]

Experience Period Count	Percent of Risks	Projection Period Claim Counts 0	1	2	3	4+
0	83.0%	94%	5%	1%	0%	0%
1	12.3%	86%	11%	2%	1%	0%
2	3.1%	79%	15%	4%	1%	1%
3	0.9%	71%	20%	5%	2%	2%
4+	0.7%	59%	22%	11%	4%	4%

Expected Loss in [1000, 10100]

Conditional Distributions of Projection Period Loss Ratios

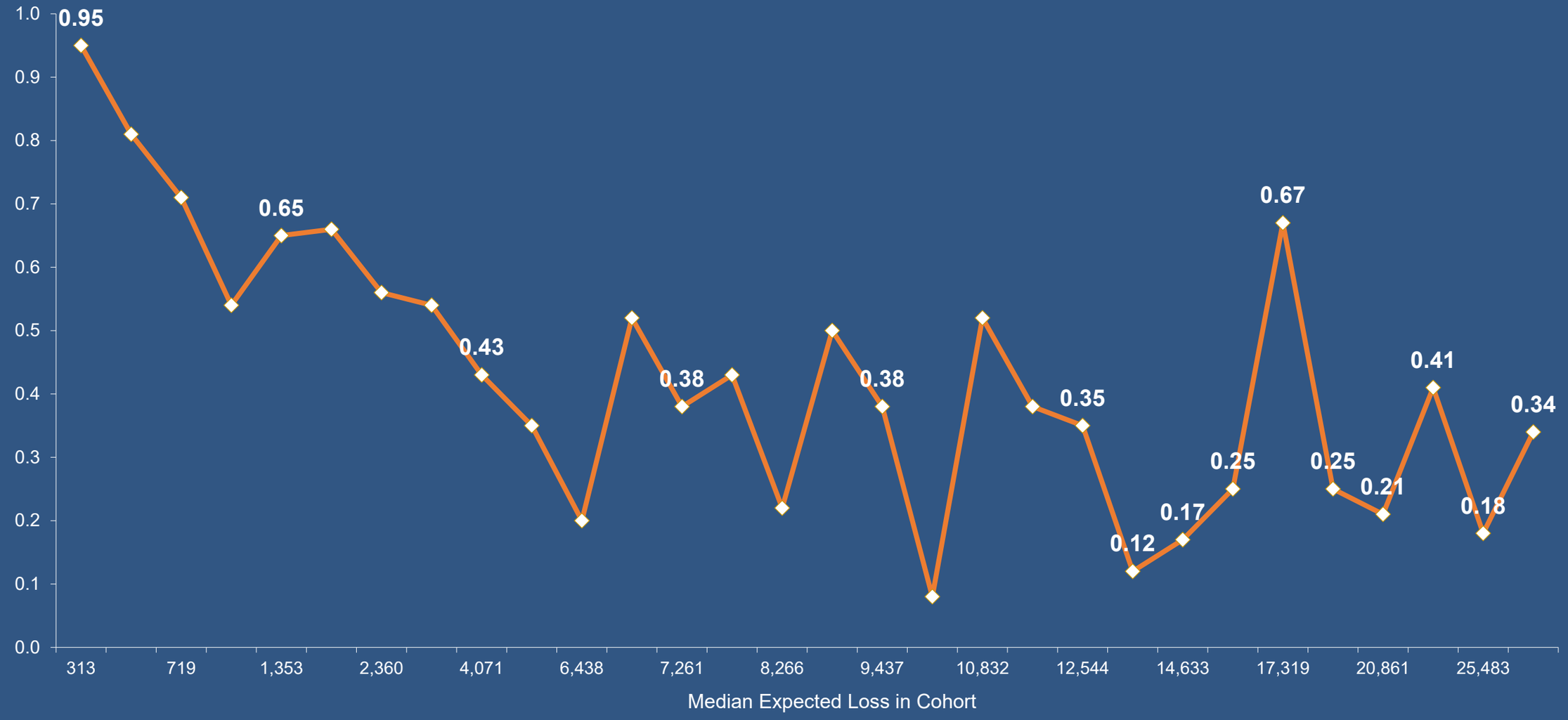
Experience Period Count	Percent of Risks	Average Loss Ratio	Average Experience Modification	Average Modified Loss Ratio
0	50.3%	0.74	0.79	0.94
1	24.1%	0.98	0.97	1.08
2	11.9%	1.15	1.13	1.03
3	6.0%	1.27	1.25	1.03
4+	7.7%	1.68	1.51	1.13

Expected Loss in [10100, 30000]

Experience Period Count	Percent of Risks	Average Loss Ratio	Average Experience Modification	Average Modified Loss Ratio
0	83.0%	0.89	0.89	1.00
1	12.3%	1.42	1.20	1.37
2	3.1%	1.76	1.47	1.21
3	0.9%	1.74	1.69	0.98
4+	0.7%	3.30	2.05	1.57

Expected Loss in [1000, 10100]

Variance Ratio for Employers near the Eligibility Threshold



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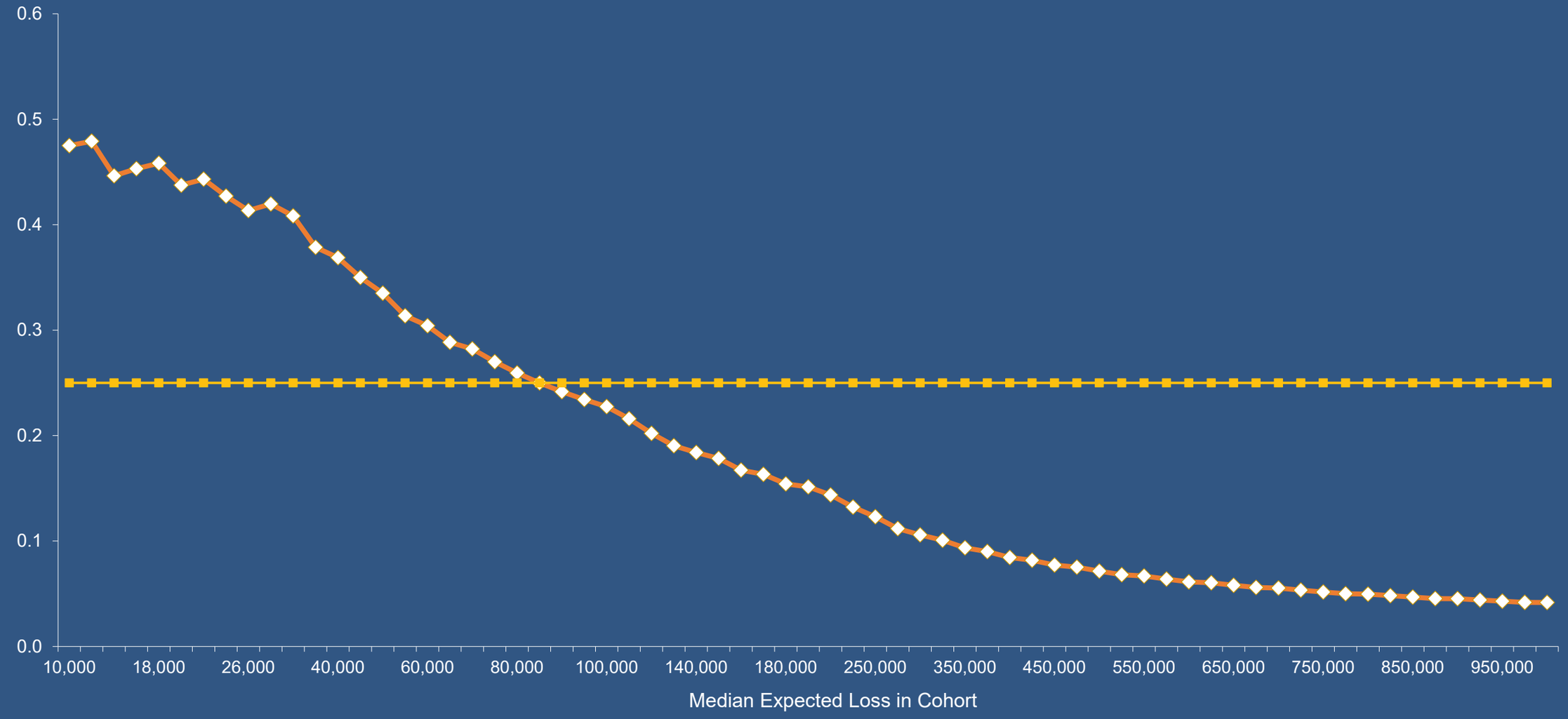
Capped Impact from a Single Loss Implied by Primary Thresholds



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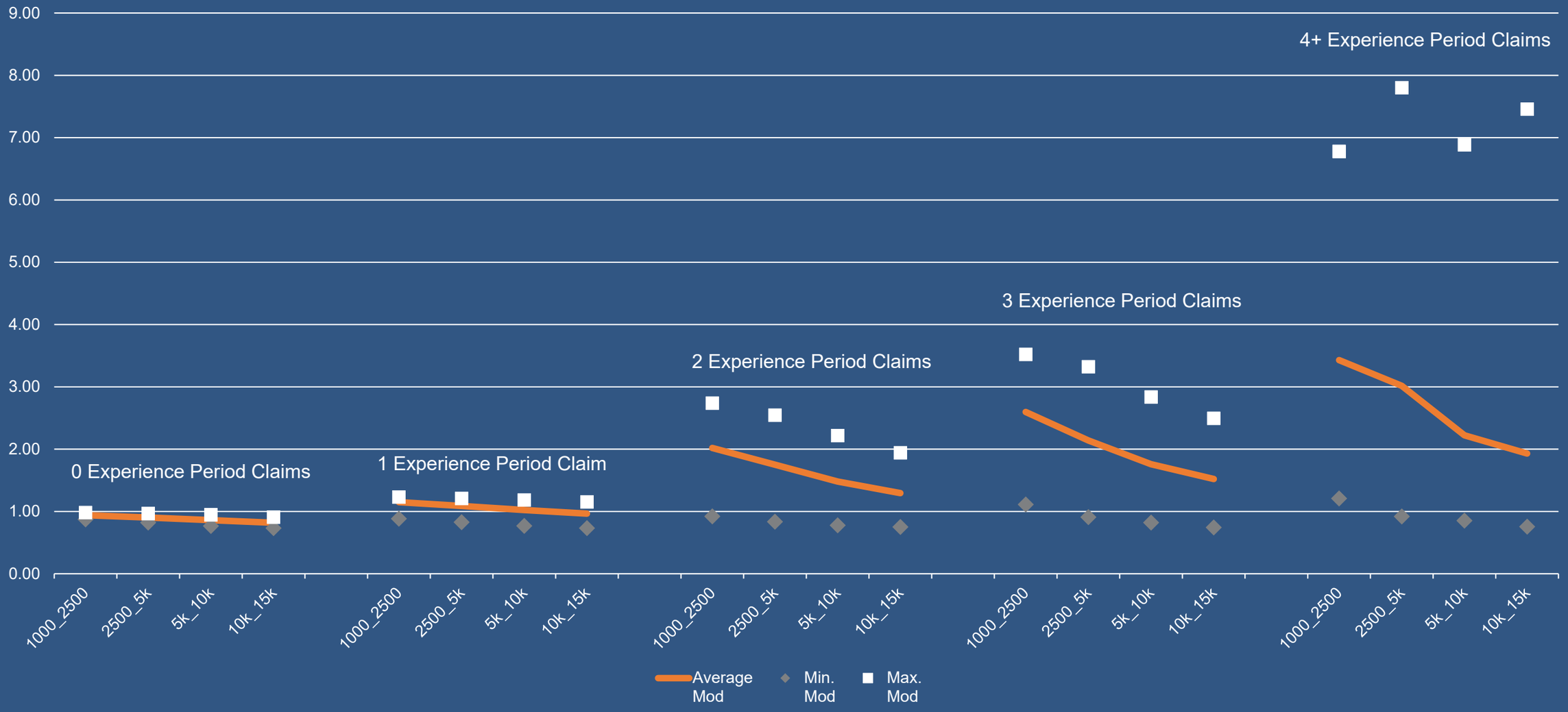
Average Modifications by Experience Period Claim Count and Expected Loss



Average, minimum, and maximum PY 2017 modifications calculated for employers below or just above the threshold. Used to help guide the selection of the maximum marginal impact of additional claims for the proposed caps.

Staff Proposed Caps

- Larger employers have a lower implicit cap to changes in their experience modifications due to a single claim
- While employers who had claims in the experience period are significantly more likely to have claims in the projection period, there are many small employers in this group who do not have claims in the projection period
- Large swings in experience modifications year over year are can be challenging for employers
- Propose caps based on the number of claims in the experience period with the maximum marginal impact of the claim increases for higher experience period counts

Experience Period Claim Count	Proposed Cap
0	0.95
1	1.20
2	1.50
3	1.85
4+	.4*Count + .65

Summary and Next Steps

- Incorporate Committee feedback into proposal
- Solicit feedback from the Classification and Rating Committee at 2/2/2021 meeting
- Comprehensive outreach program to other stakeholders to solicit feedback
- Work with internal WCIRB teams to understand the effort needed to administer any resulting proposals
- Based on stakeholder feedback develop potential implementation plan

2

Experience of Large Deductible Policies

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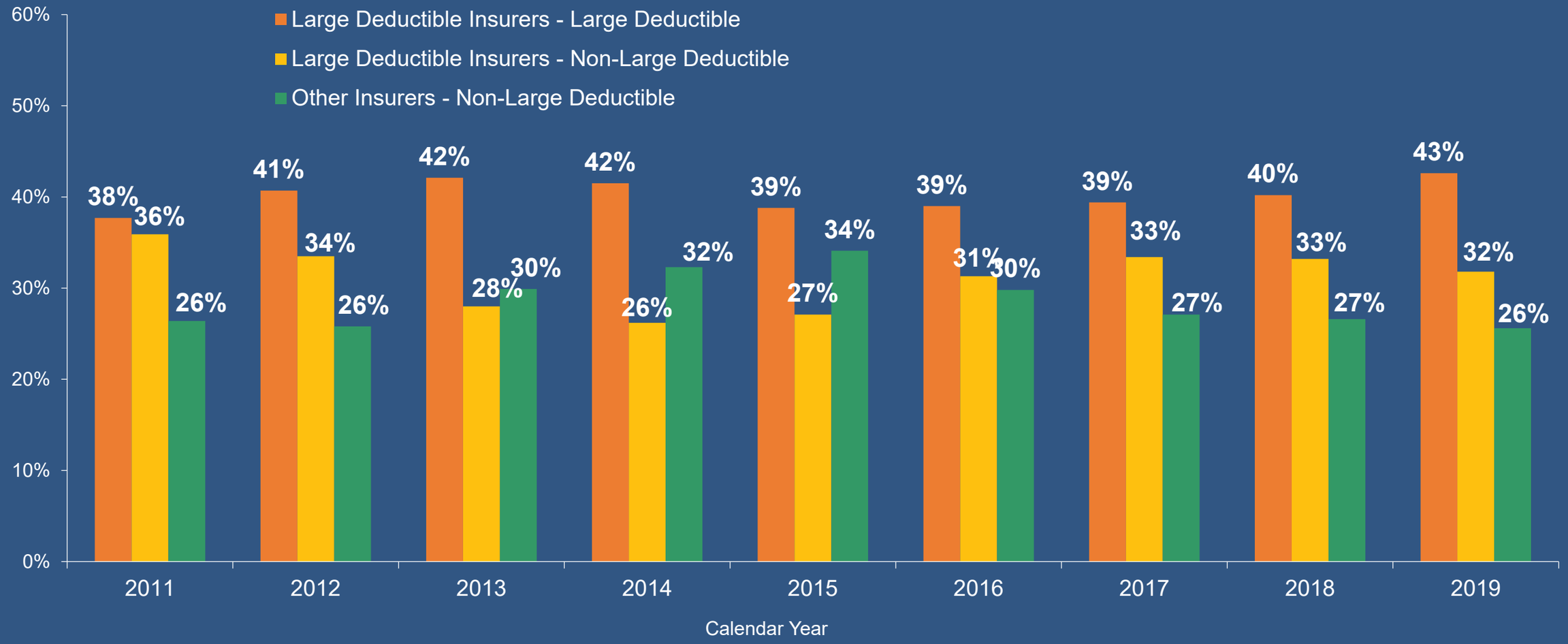
Experience of Large Deductible Policies

- Annually the Actuarial Committee reviews the experience of large deductible policies (December 31 Experience)
- Findings in prior Actuarial Committee evaluations:
  - Large deductible market proportion relatively stable
  - Paid development patterns are generally similar to non-large deductible policies
  - Impact of excluding large deductible experience from the rate level computation is relatively modest
  - No adjustment to rate level computation needed

Distribution of Calendar Year Premiums
Written Premium at Pure Premium Rate Level (Exhibit 1.1)

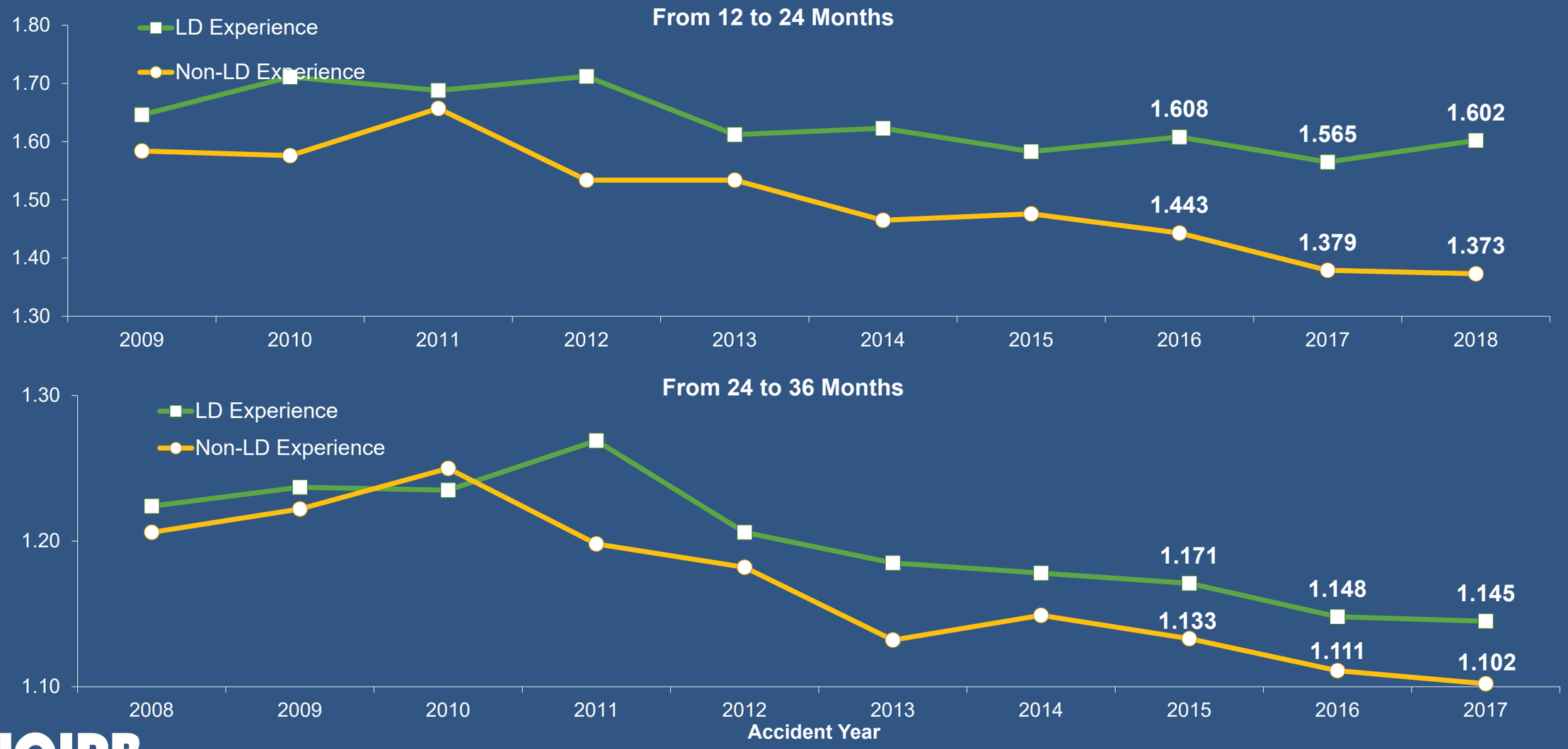
As of December 31, 2019



Source: WCIRB aggregate financial data

Incurred Medical Development (Exhibit 3.2)

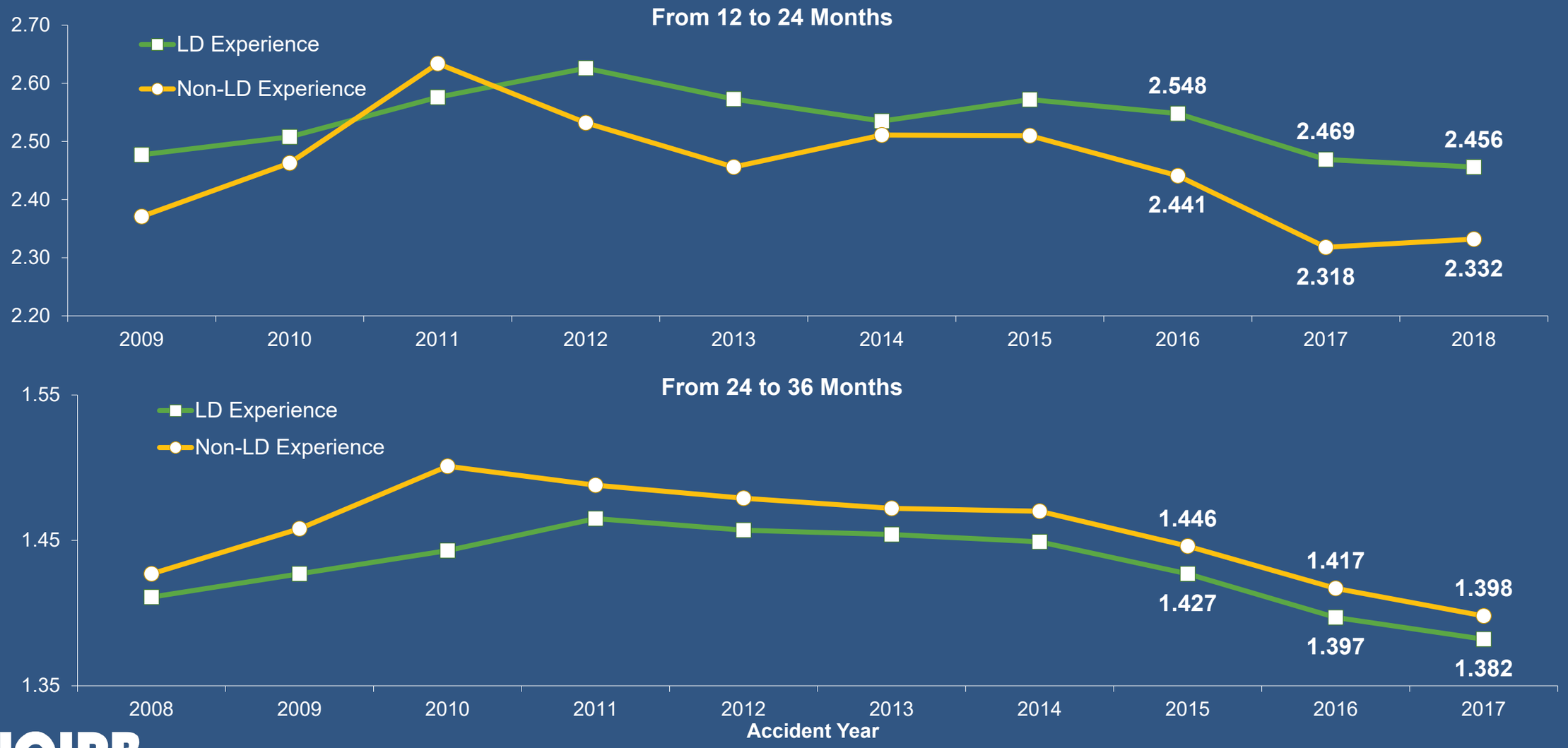
As of December 31, 2019



Source: WCIRB aggregate financial data. MCCP included in medical for 2011 and prior.

Paid Medical Development (Exhibit 3.4)

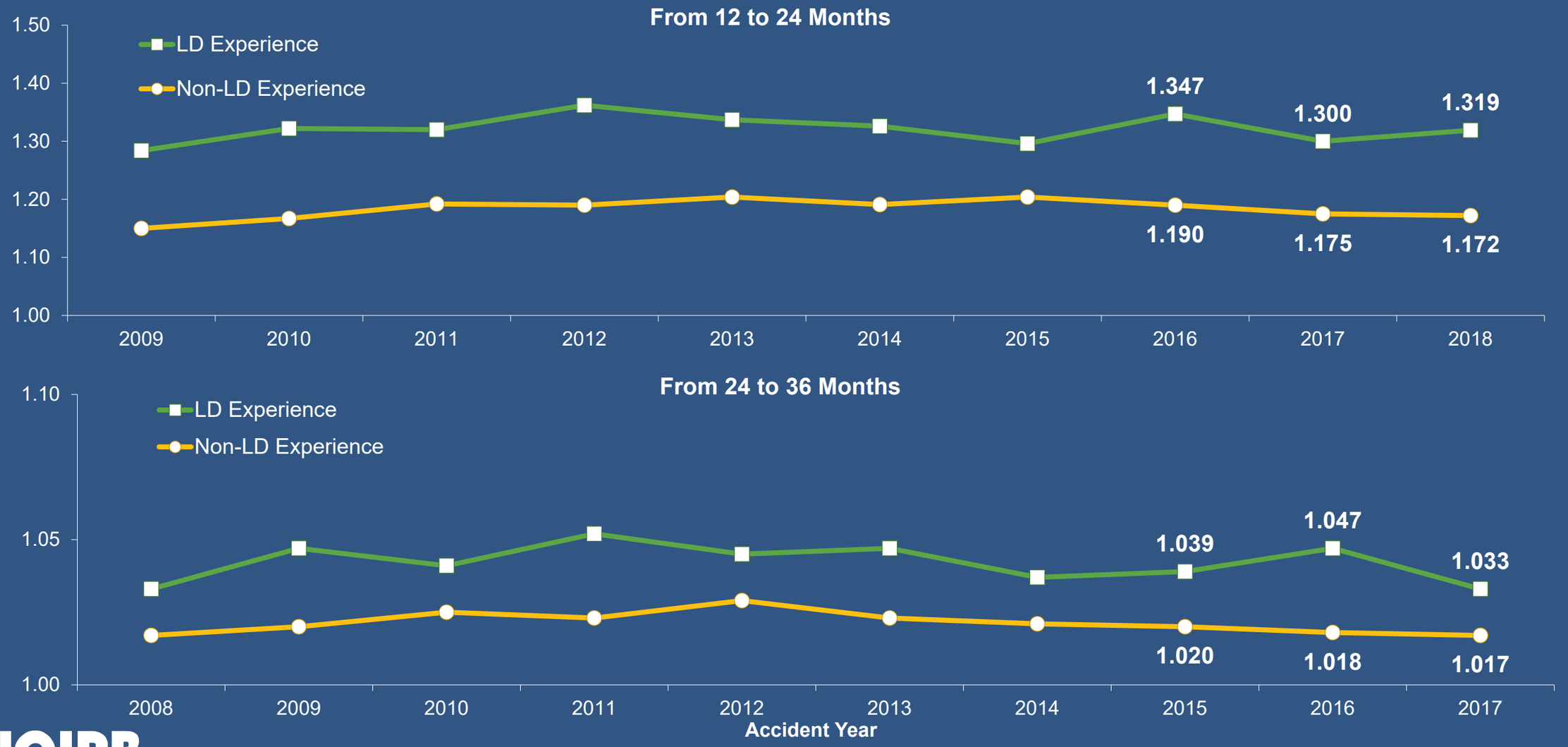
As of December 31, 2019



Source: WCIRB aggregate financial data. MCCP included in medical for 2011 and prior.

Reported Indemnity Claim Count Development (Exhibit 6.1)

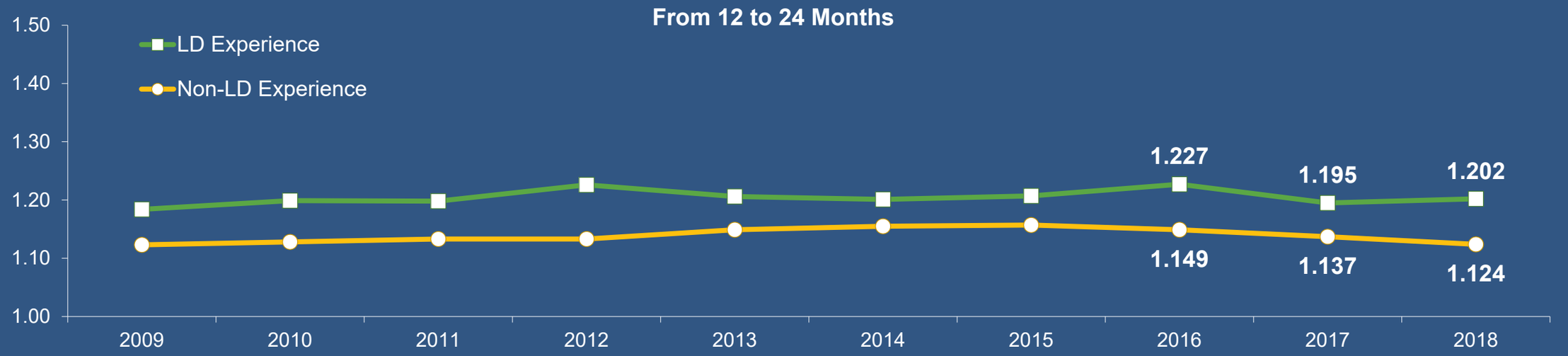
As of December 31, 2019

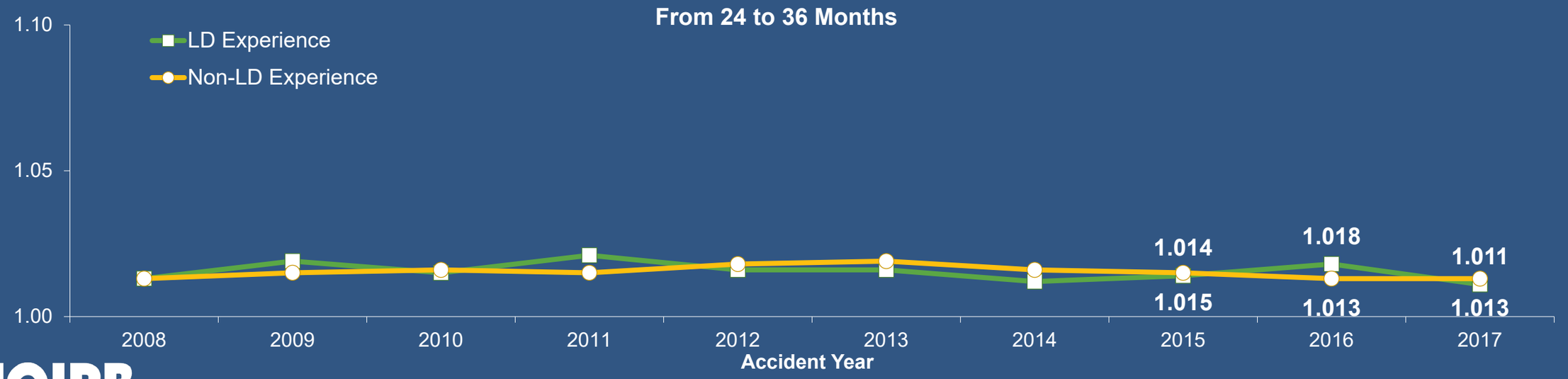


Source: WCIRB aggregate financial data

Reported Total Claim Count Development (Exhibit 6.2)

As of December 31, 2019





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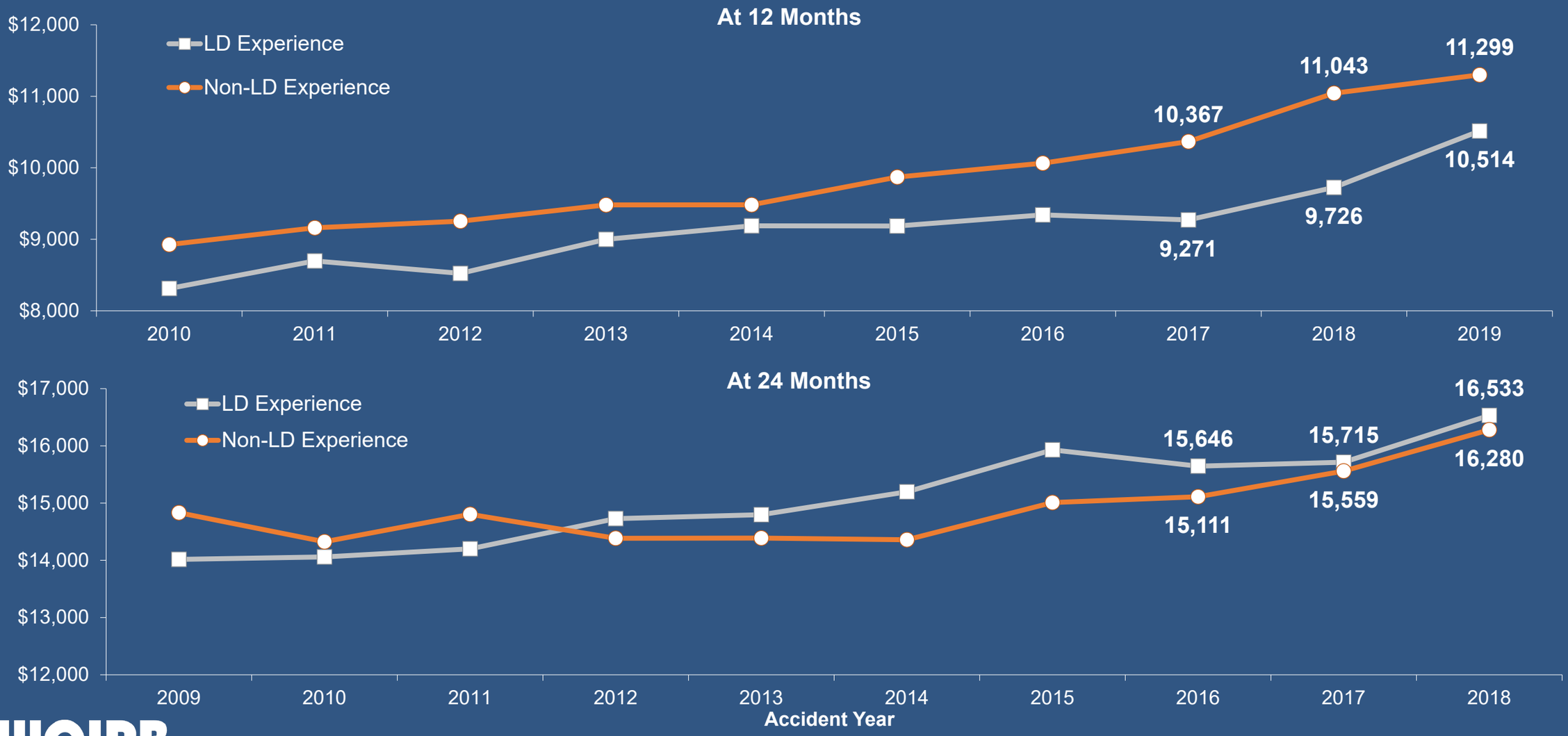
Source: WCIRB aggregate financial data

Average Incurred Indemnity per Indemnity Claim (Exhibit 4.1)

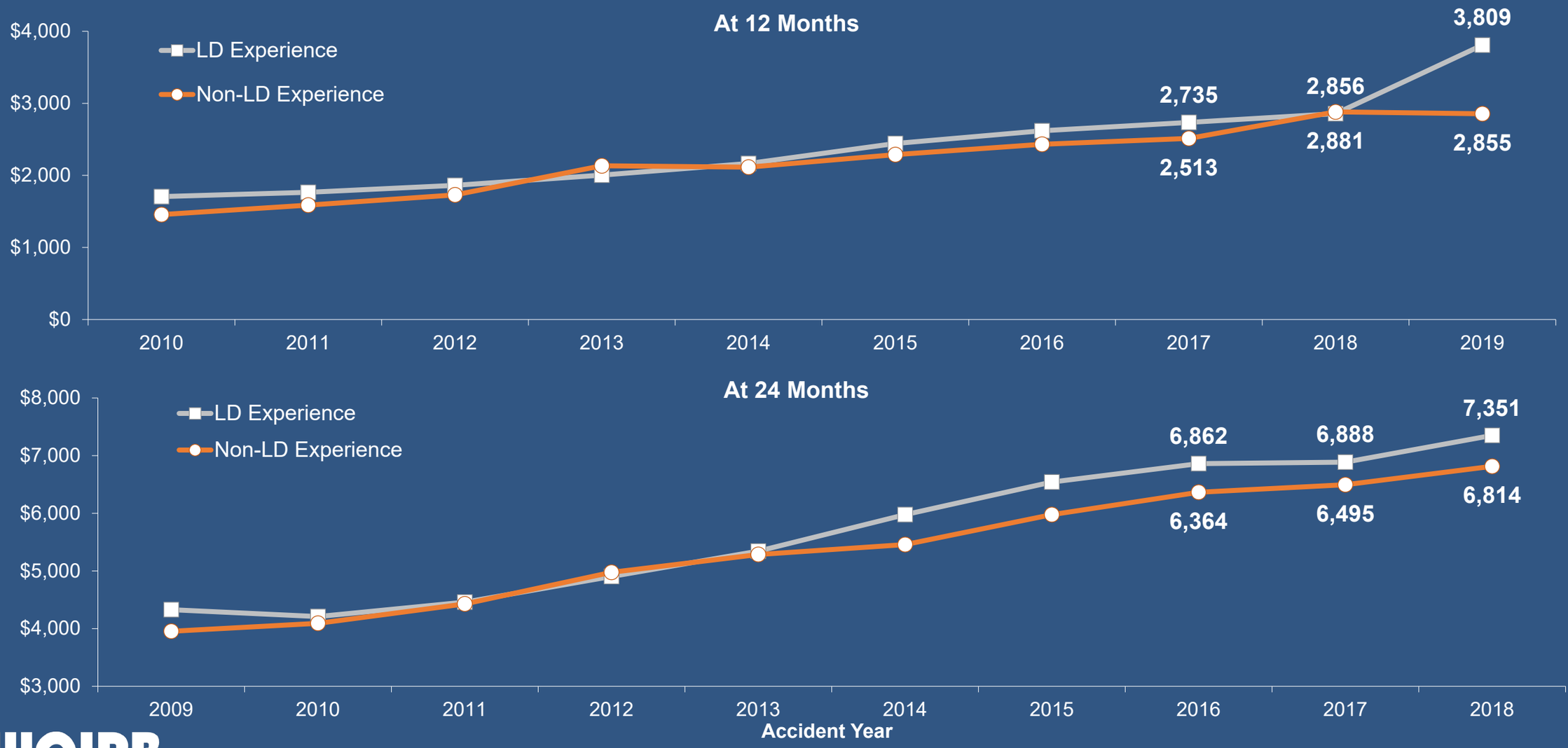
As of December 31, 2019



Source: WCIRB aggregate financial data

Average Paid Indemnity per Closed Claim (Exhibit 4.3)

As of December 31, 2019



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Source: WCIRB aggregate financial data

3

Legislative Cost Monitoring

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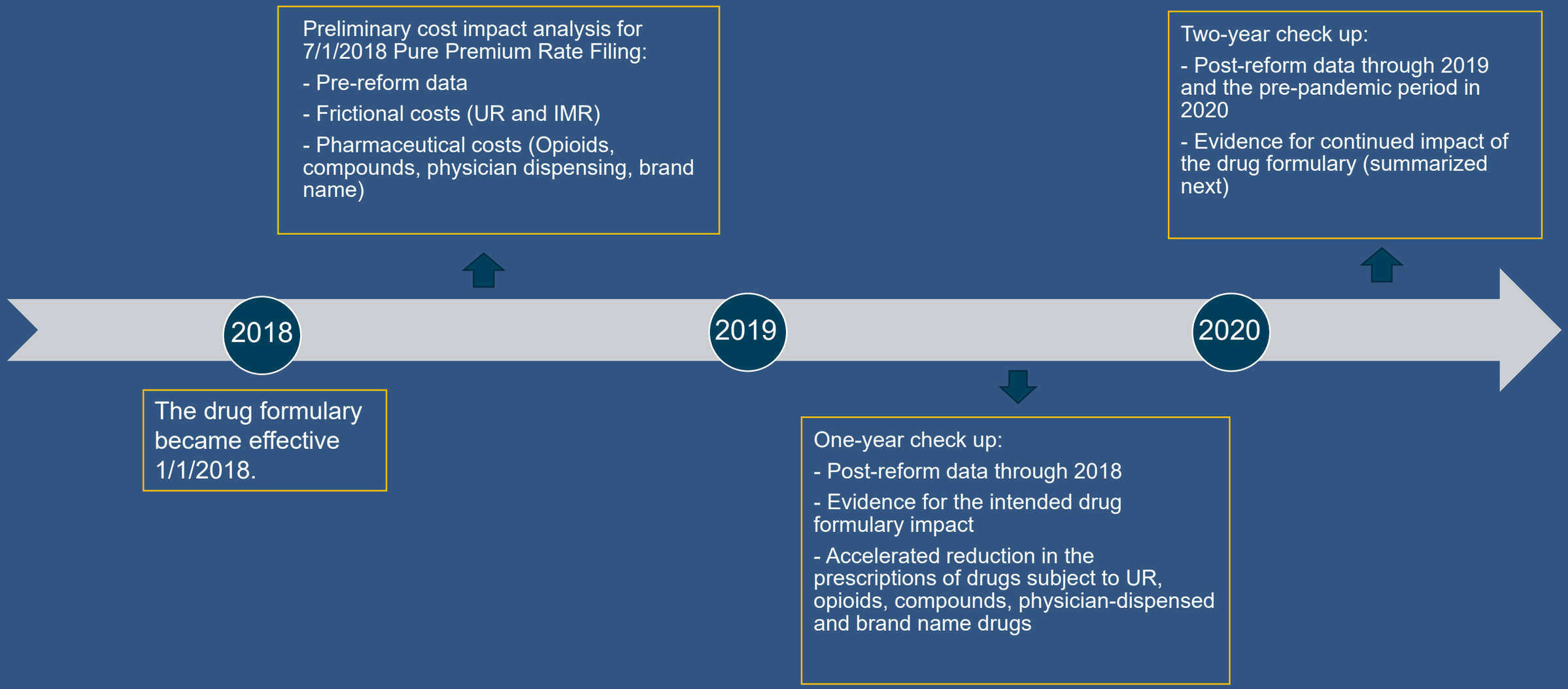
WCIRB's Approach for the Cost Impact Analysis of the Drug Formulary



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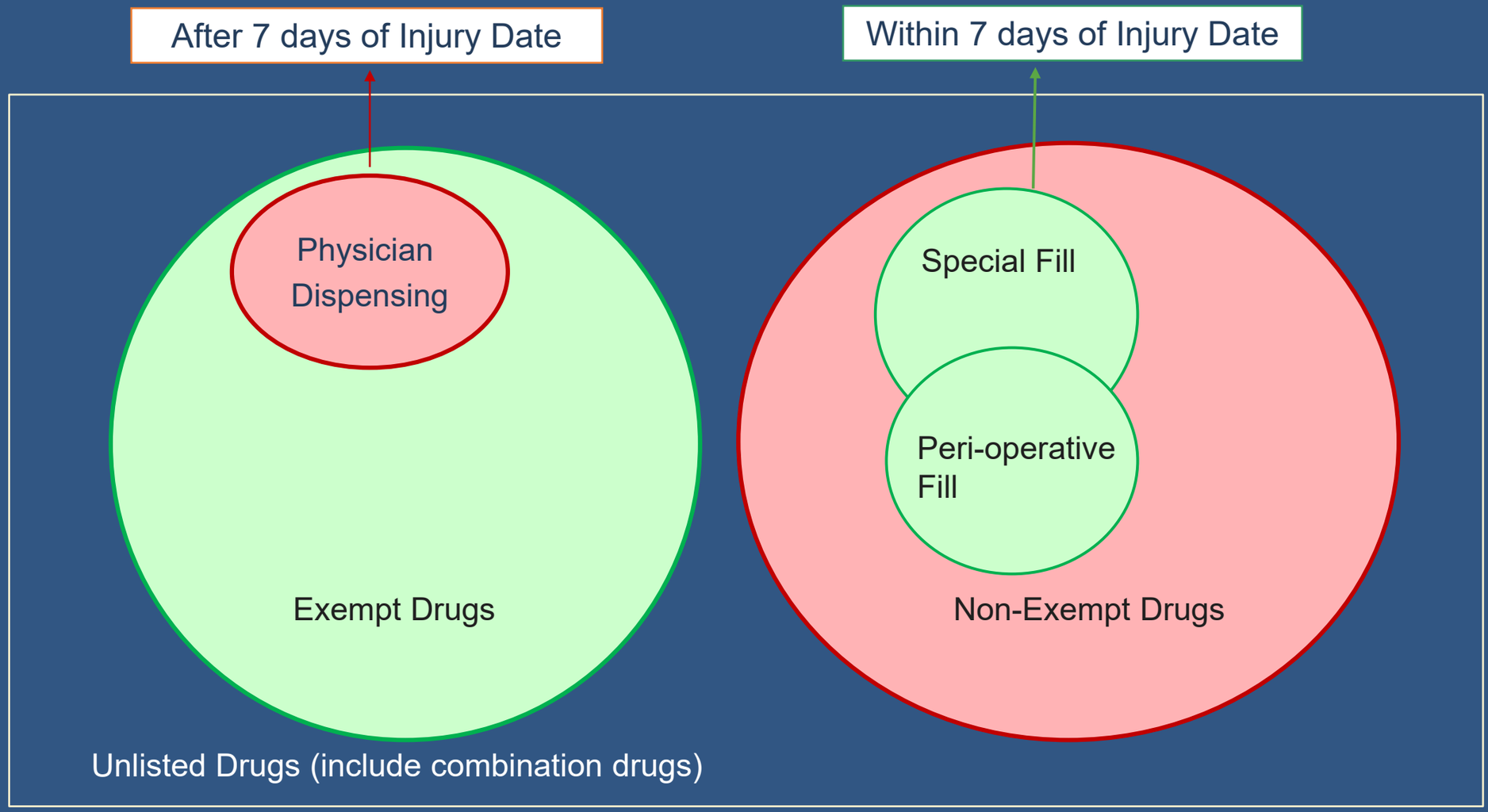
Source: Section B, Appendix A of the WCIRB's July 1, 2018 Pure Premium Rate Filing submitted on April 9, 2018.
California's New Drug Formulary – One-Year Checkup, WCIRB Research Brief, August 2019.

Summary of Findings – Evaluation of Drug Formulary based on Experience through First Quarter of 2020

- Updated data:
  - Based on medical transaction data through the pre-pandemic period in 2020
  - Incorporated updates to the MTUS drug list, which was mapped to the medical data
- Key findings:
  - <u>Impact on prescription drugs exempt from prospective UR</u>
    - The prescription share for drugs not subject to prospective UR in accordance with the formulary continued to increase through the pre-pandemic period in 2020, while that of drugs subject to UR continued to decline.
  - <u>Impact on key costly prescribing patterns</u>
    - The share of pharmaceutical payments to opioids, compounds and brand-name drugs with generic alternatives dropped sharply in 2018 and continued to drop at a similar rate in 2019.
    - The payment share for physician-dispensed drugs dropped sharply after the implementation of the formulary but started to increase toward the end of 2019.
    - While pharmaceutical costs had been declining prior to the formulary, the decline was accelerated in 2018 and continued through the pre-COVID-19 period in 2020.

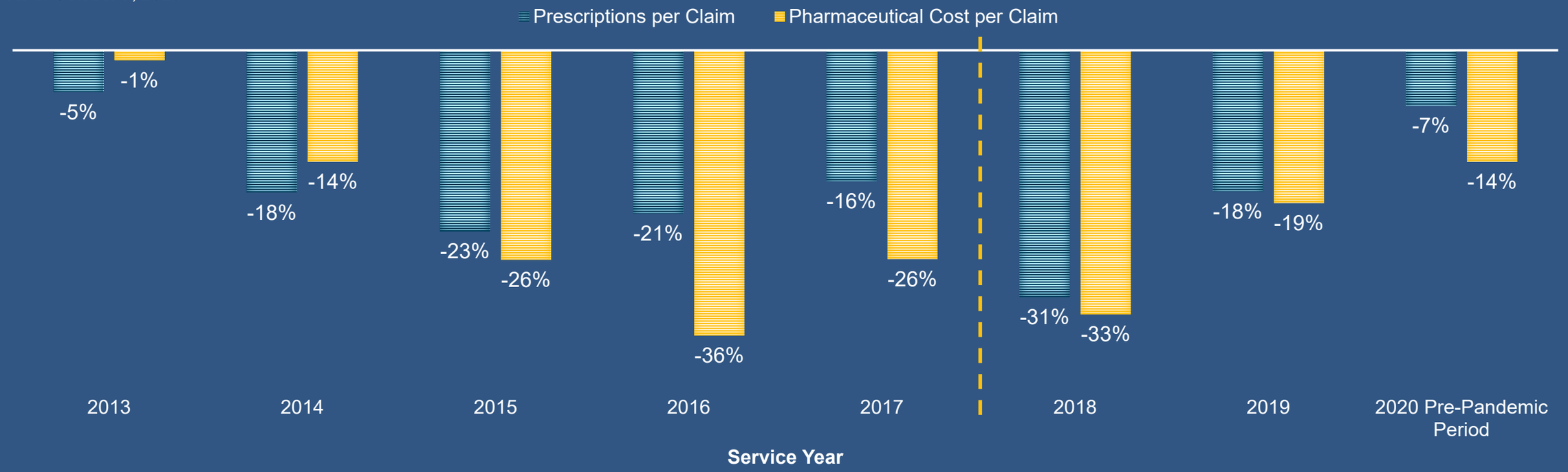
Medical Treatment Utilization Schedule (MTUS) Drug List



Source: California Labor Code Sections 4600.1, 4600.2, 5307.27, 5307.28 and 5307.29

Percent Change in Pharmaceutical Utilization and Cost per Claim

As of October 7, 2020



Drivers of Pharma Cost Reduction Prior to the Formulary:

- Senate Bill No.863
- Use of the Statewide Prescription Drug Monitoring Program (CURES)
- Adoption of Federal Upper Limit pricing levels
- Anti-fraud efforts

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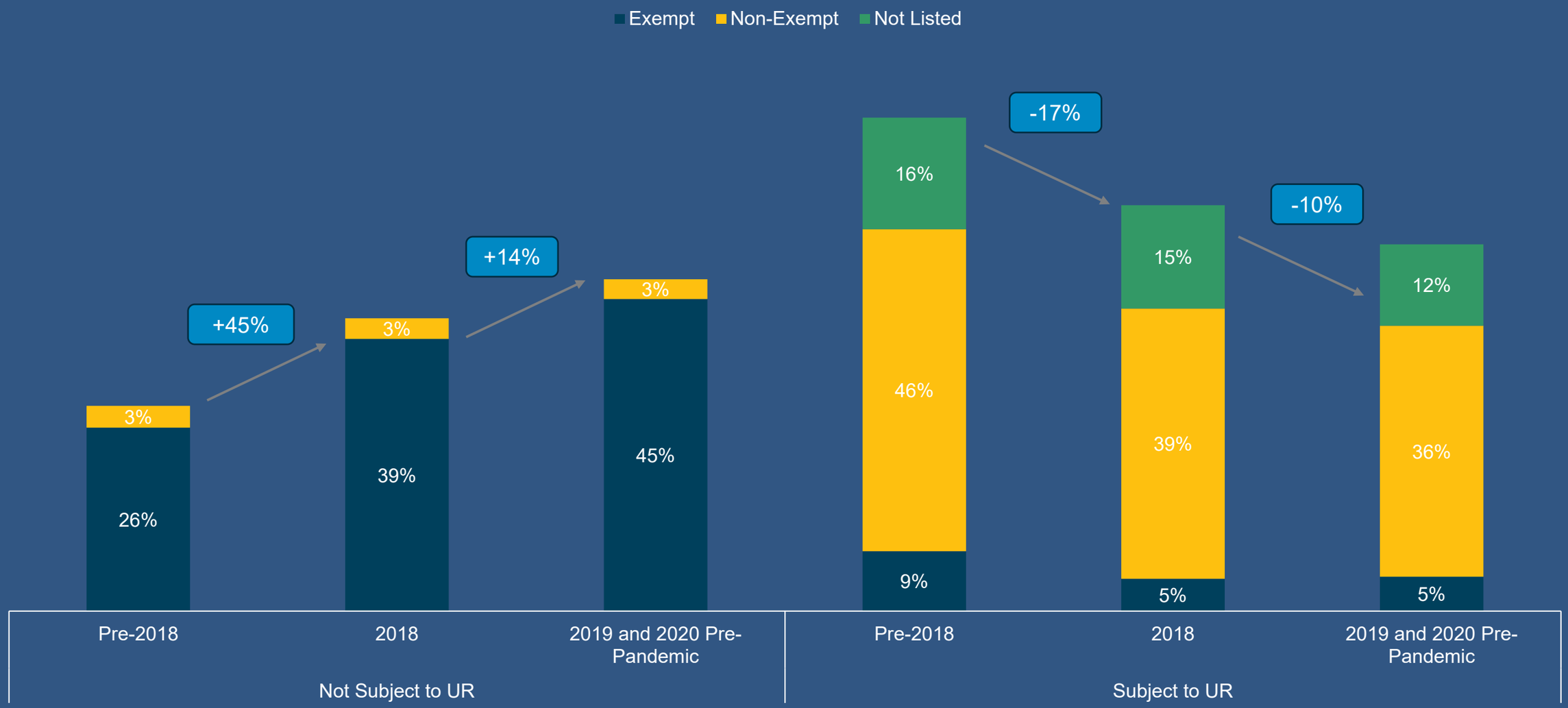
Source: WCIRB medical transaction data collected beginning in the third quarter of 2012.

Share of Pharmaceutical Transactions by the Drug Formulary Category, Pre-Reform vs. Post-Reform

As of October 7, 2020



Source: WCIRB's Medical Transaction Data
Pre-2018: drug prescriptions with a service date between 7/1/2015 and 12/31/2017.
2018: drug prescriptions with a service date between 1/1/2018 and 12/31/2018.
2019 and 2020 Pre-Pandemic: drug prescriptions with a service date between 1/1/2019 and 3/14/2020.

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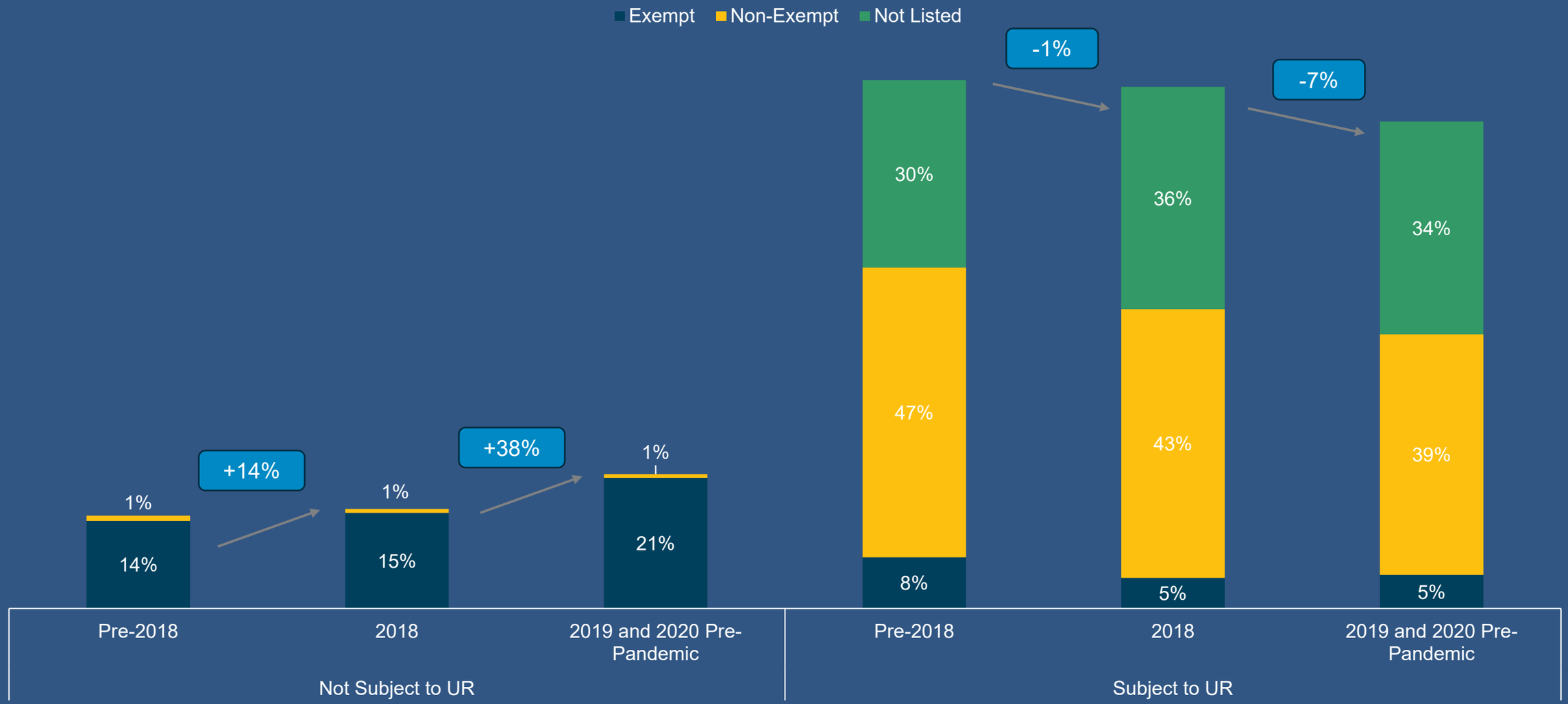
Share of Pharmaceutical Payments by the Drug Formulary Category, Pre-Reform vs. Post-Reform

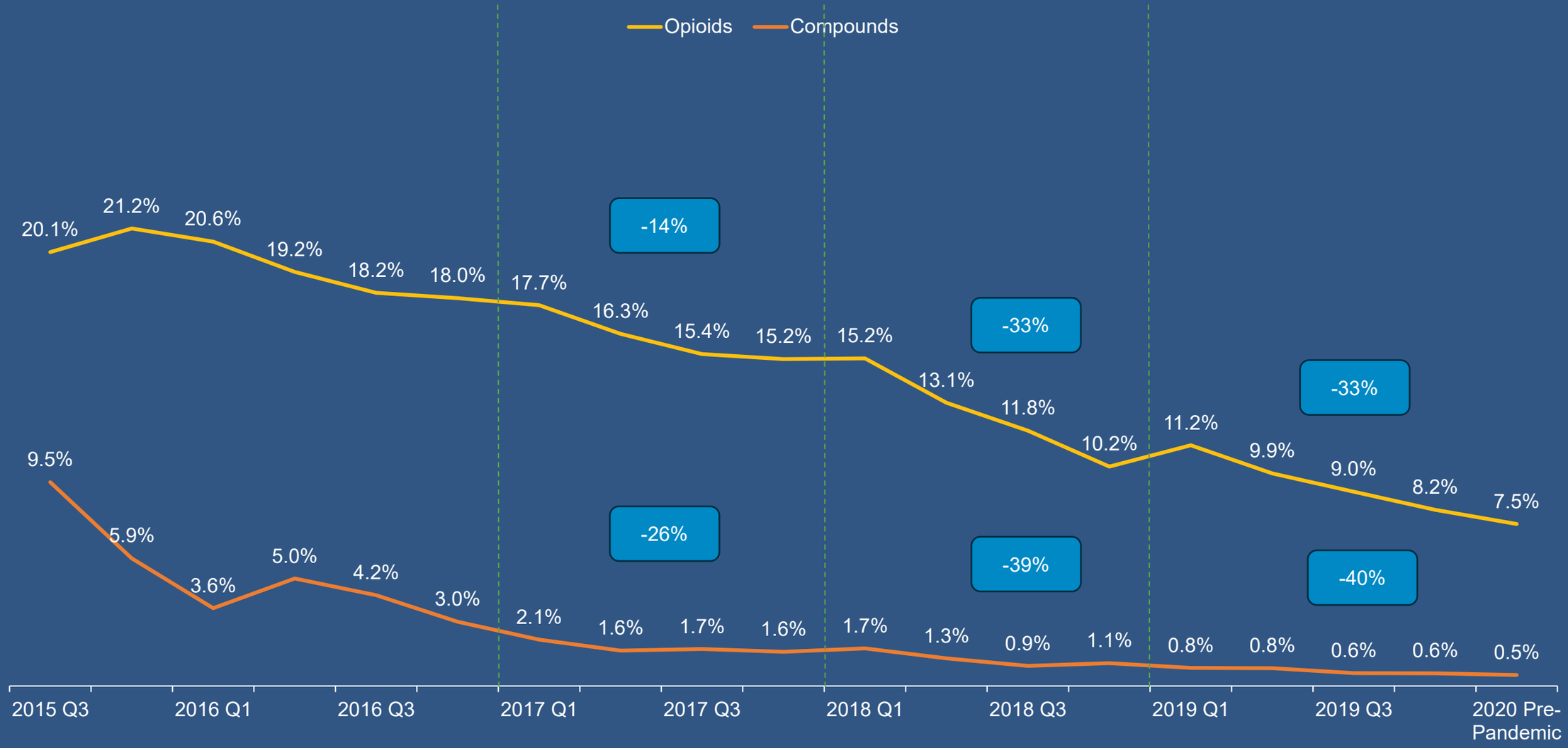
As of October 7, 2020



Source: WCIRB's Medical Transaction Data
Pre-2018: drug prescriptions with a service date between 7/1/2015 and 12/31/2017.
2018: drug prescriptions with a service date between 1/1/2018 and 12/31/2018.
2019: drug prescriptions with a service date between 1/1/2019 and 12/31/2019.
2019 and 2020 Pre-Pandemic: drug prescriptions with a service date between 1/1/2019 and 3/14/2020.

Share of Pharmaceutical Payments to Opioids and Compounds*

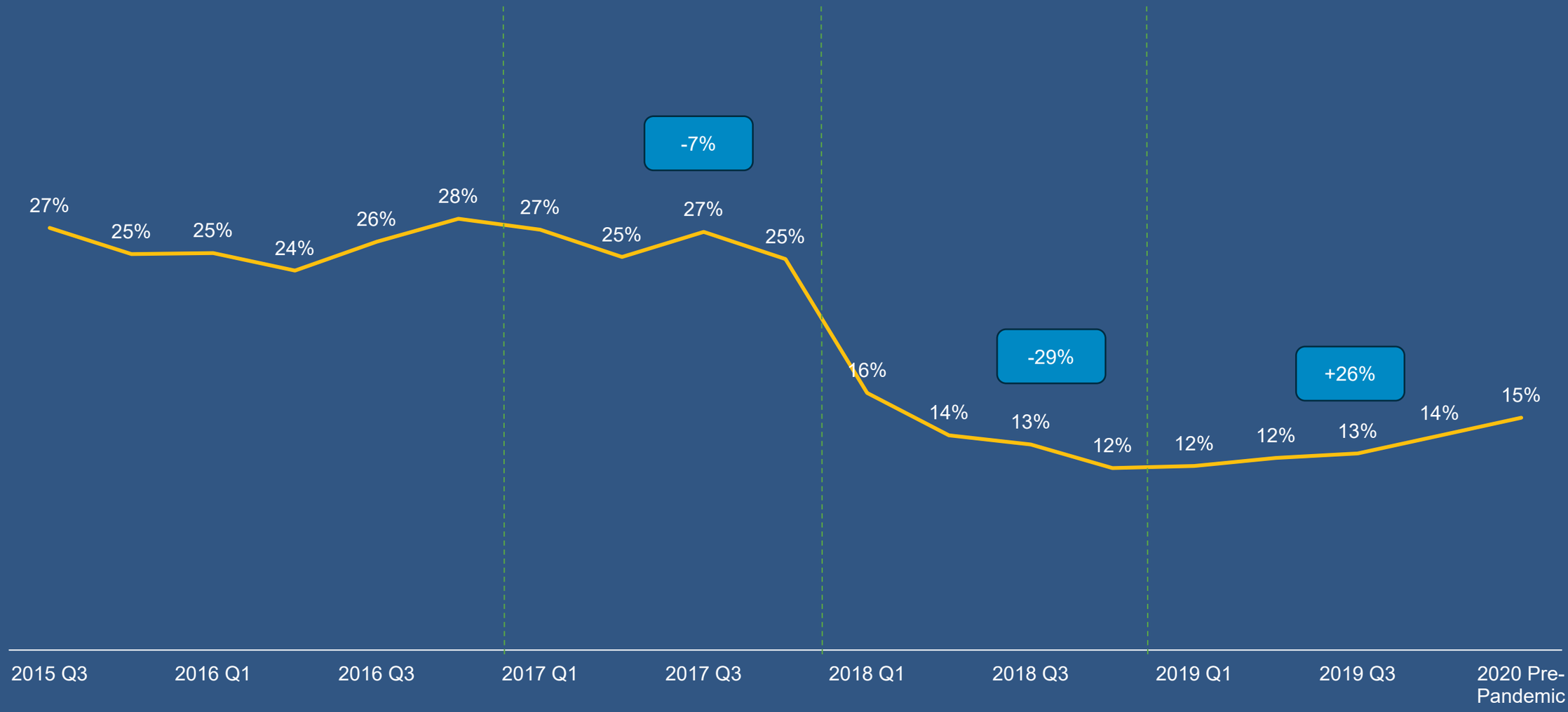
As of October 7, 2020



Source: WCIRB's Medical Transaction Data
The compounds shown in the graph do not include opioids.

Share of Pharmaceutical Payments to Physician-Dispensed Drugs*

As of October 7, 2020



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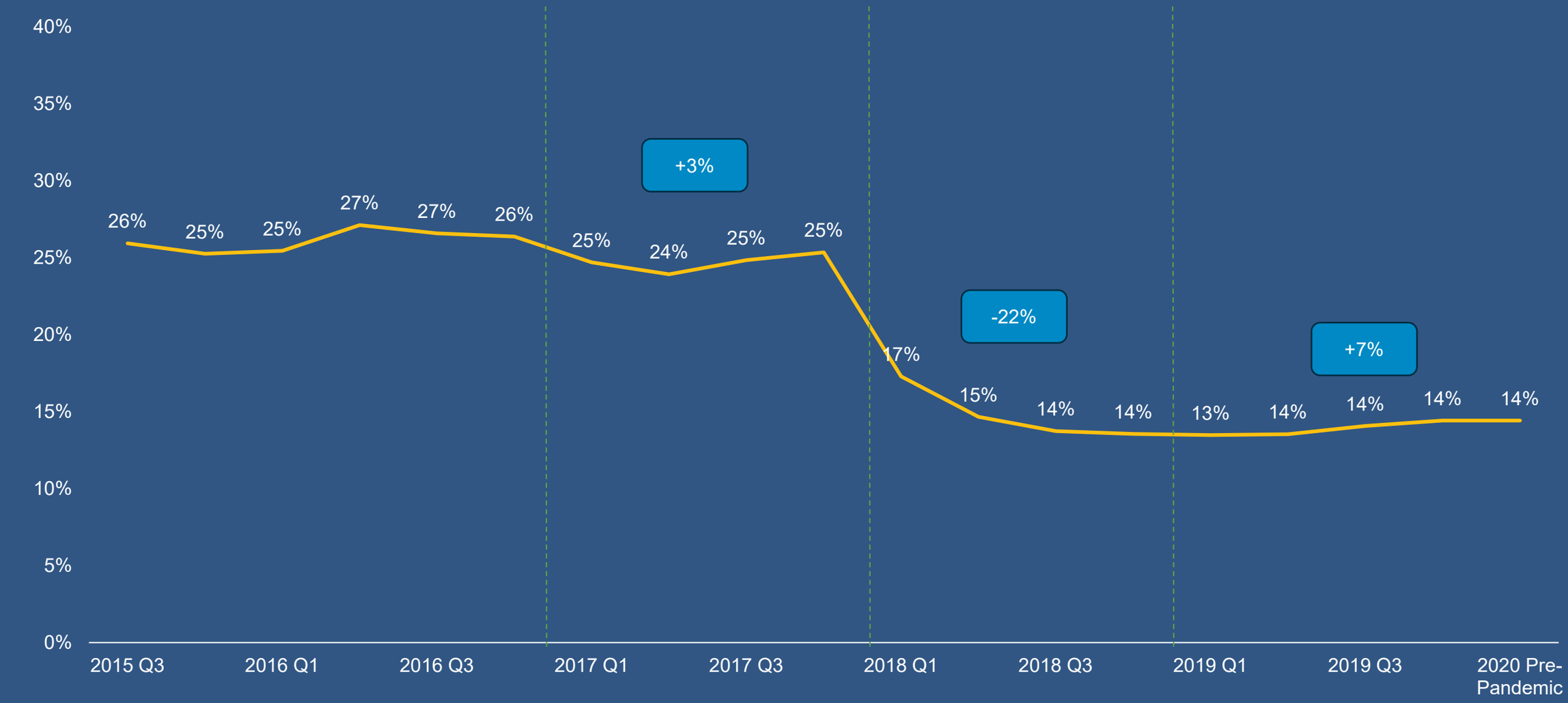
Source: WCIRB's Medical Transaction Data
*These include exempt drugs dispensed by physicians after 7 days from the date of injury, non-exempt drugs and unlisted drugs, and do not include opioids or compounds.

Share of Pharmaceutical Prescriptions to Physician-Dispensed Drugs*

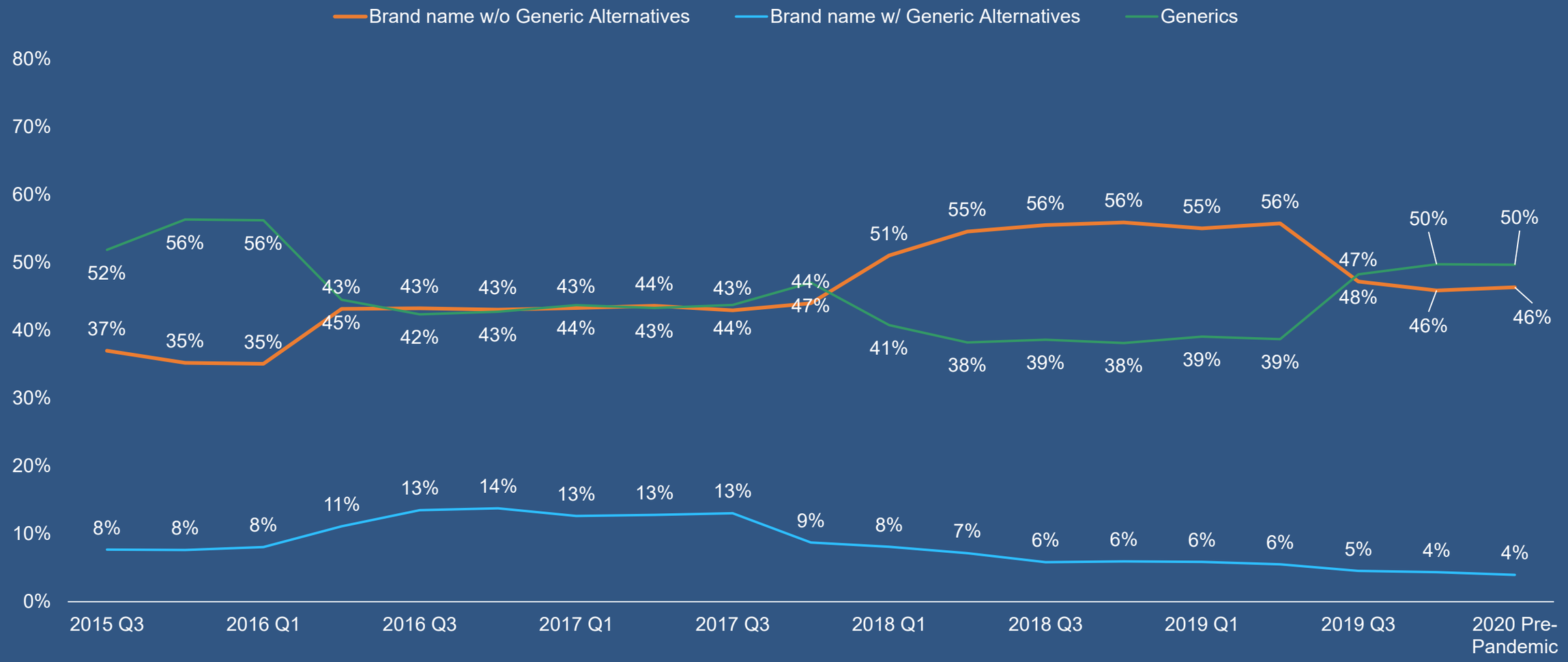
As of October 7, 2020



Source: WCIRB's Medical Transaction Data
*These include exempt drugs dispensed by physicians after 7 days from the date of injury, non-exempt drugs and unlisted drugs, and do not include opioids or compounds.

Share of Pharmaceutical Payments to Brand Name vs. Generics

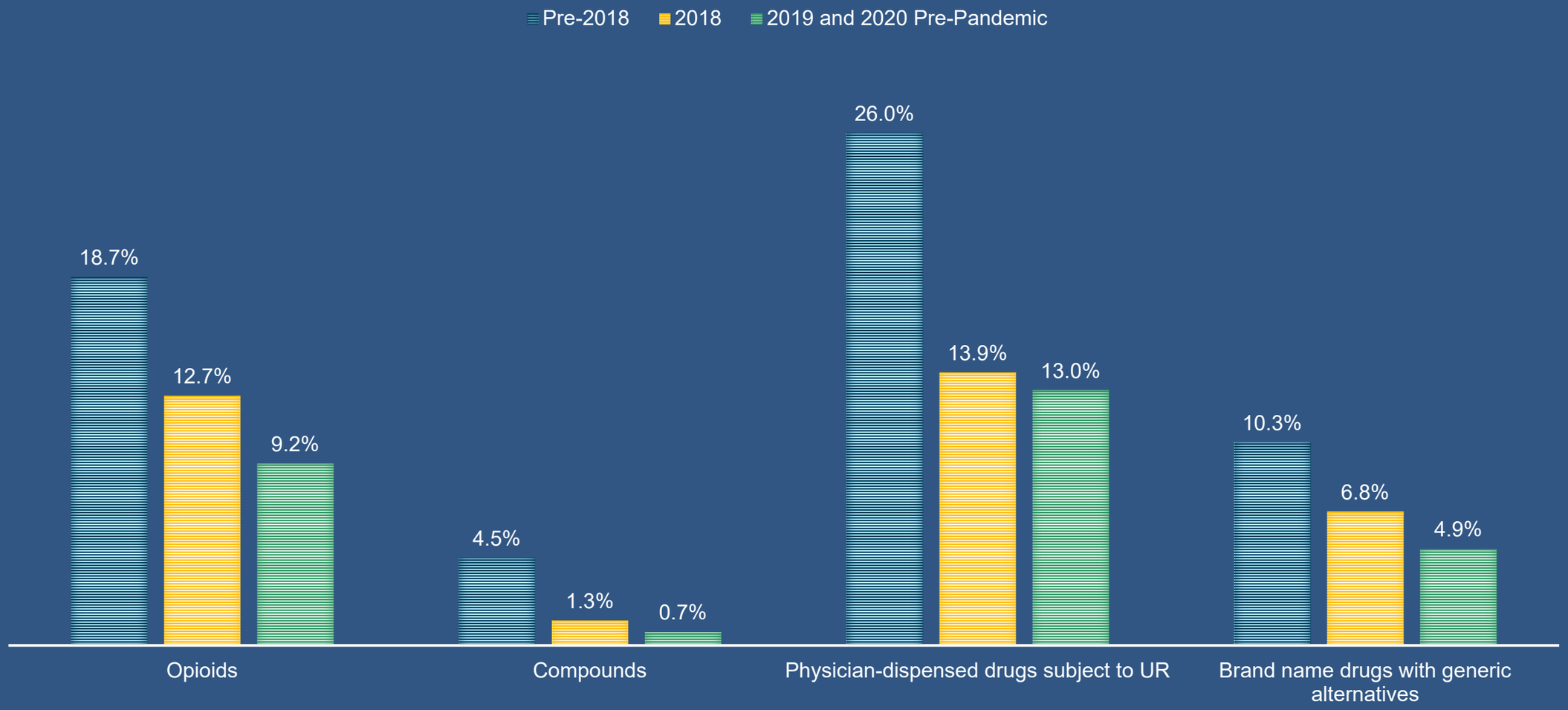
As of October 7, 2020



Source: WCIRB's Medical Transaction Data

Summary of Share of Total Drug Payments by Prescribing Component

As of October 7, 2020



Source: WCIRB's Medical Transaction Data
Pre-2018: drug prescriptions with a service date between 7/1/2015 and 12/31/2017.
2018: drug prescriptions with a service date between 1/1/2018 and 12/31/2018.
2019: drug prescriptions with a service date between 1/1/2019 and 12/31/2019.
2019 and 2020 Pre-Pandemic: drug prescriptions with a service date between 1/1/2019 and 3/14/2020.

4

Review of ULAE Projection Methods

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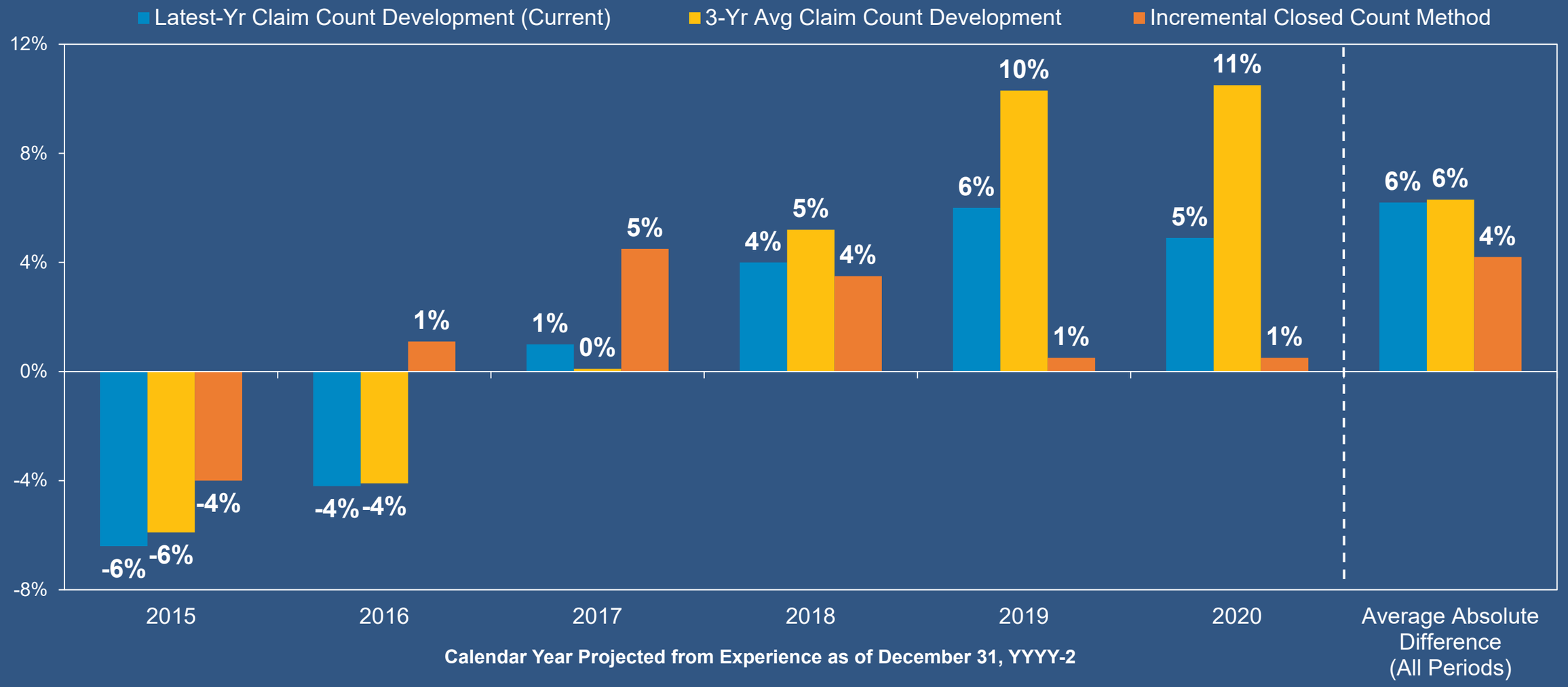
Background

- Changes made to Expense Call in 2015 and 2017 to collect data to more appropriately apportion countrywide ULAE amounts to California
- Current ULAE projection methods primarily based on paid ULAE as a function of:
  - Open indemnity claim counts (Open Count Method)
  - Paid loss amounts (Paid Loss Method)
- Initial review of ULAE projection methodology presented at 12/5/2019 meeting
- Committee recommended follow-up analysis using additional year of data with new Expense Call adjustments

Overview of Open Count Method

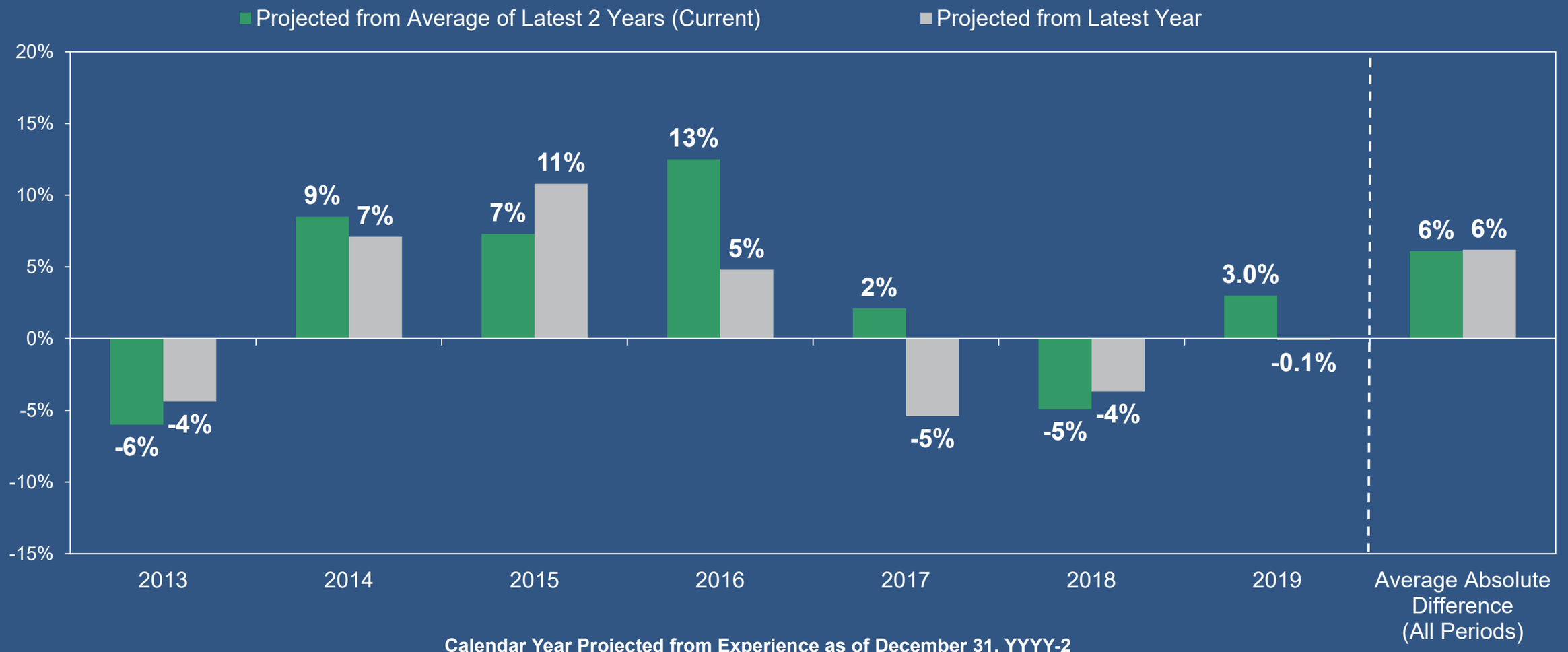
- Open Indemnity Claims at Beginning of Calendar Year
  - Ultimate number of indemnity claims by AY projected using latest year development factor
  - Future AY ultimate counts projected using WCIRB claim frequency forecasts
  - Number of open claims at each CY estimated using [latest year open %] X [ultimate number of indemnity claims]
- Calendar Year Paid ULAE per Open Indemnity Claim
  - Uses private insurers only
  - Projections based on blend of UCLA Anderson and CA Department of Finance average wage level changes
- Projected Policy Year ULAE
  - Trend to future CYs based on average of latest two CYs
  - (# of open indemnity claims) X (paid ULAE per open indemnity claim)
  - Paid ULAE per open claim trended to approx. average ULAE payment date on projection period policies

Comparison of % Error in Projected Number of Open Claims at Beginning of the Calendar Year (Exhibit 1)



Source: WCIRB aggregate financial data

Comparison of % Error in Projected CY Paid ULAE per Open Indemnity Claim (Exhibit 2.1)



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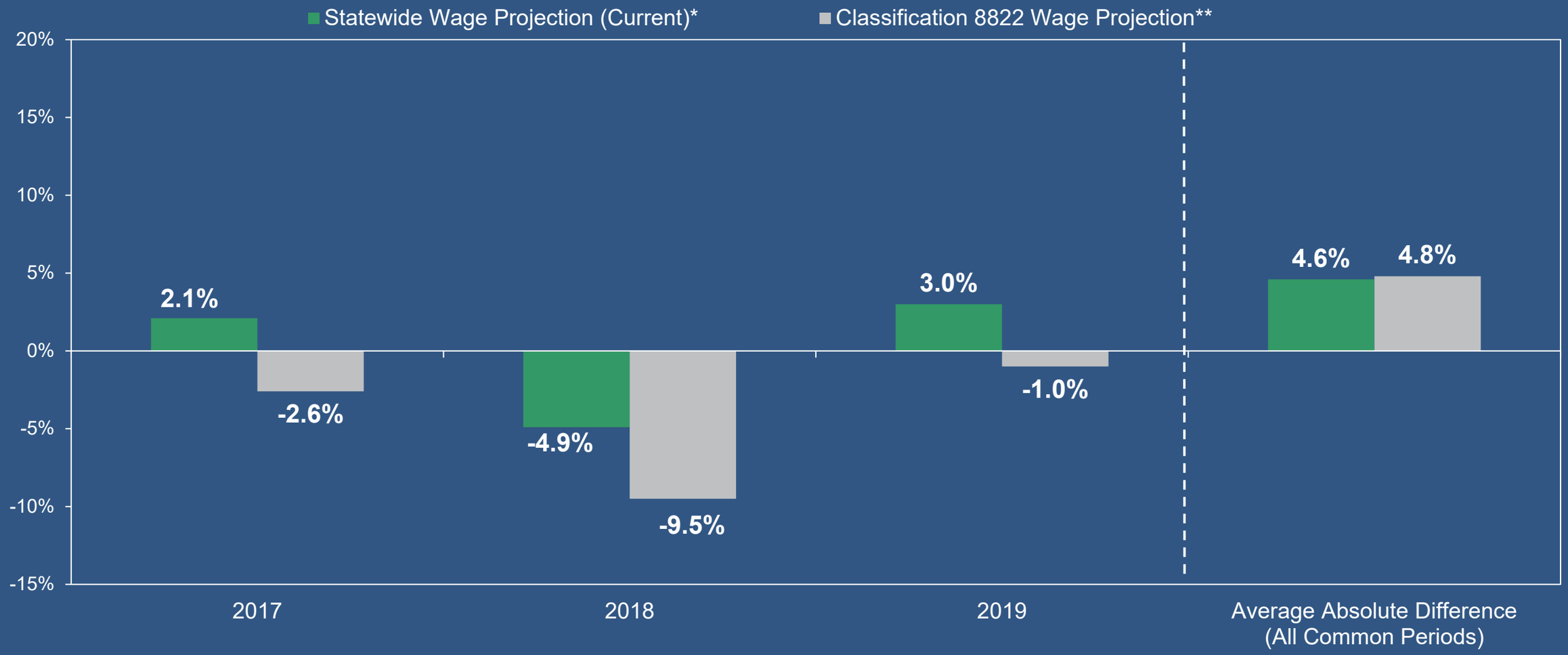
Source: WCIRB aggregate financial data for private insurers only

Comparison of % Error in Projected CY Paid ULAE per Open Indemnity Claim (Exhibit 2.2)



Calendar Year Projected from Experience as of December 31, YYYY-2

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Source: WCIRB aggregate financial data for private insurers only
*Based on average of UCLA Anderson School of Business and California Department of Finance forecasts
**Based on WCIRB wage and payroll report projection for Classification 8822, Insurance Companies using a time series analysis

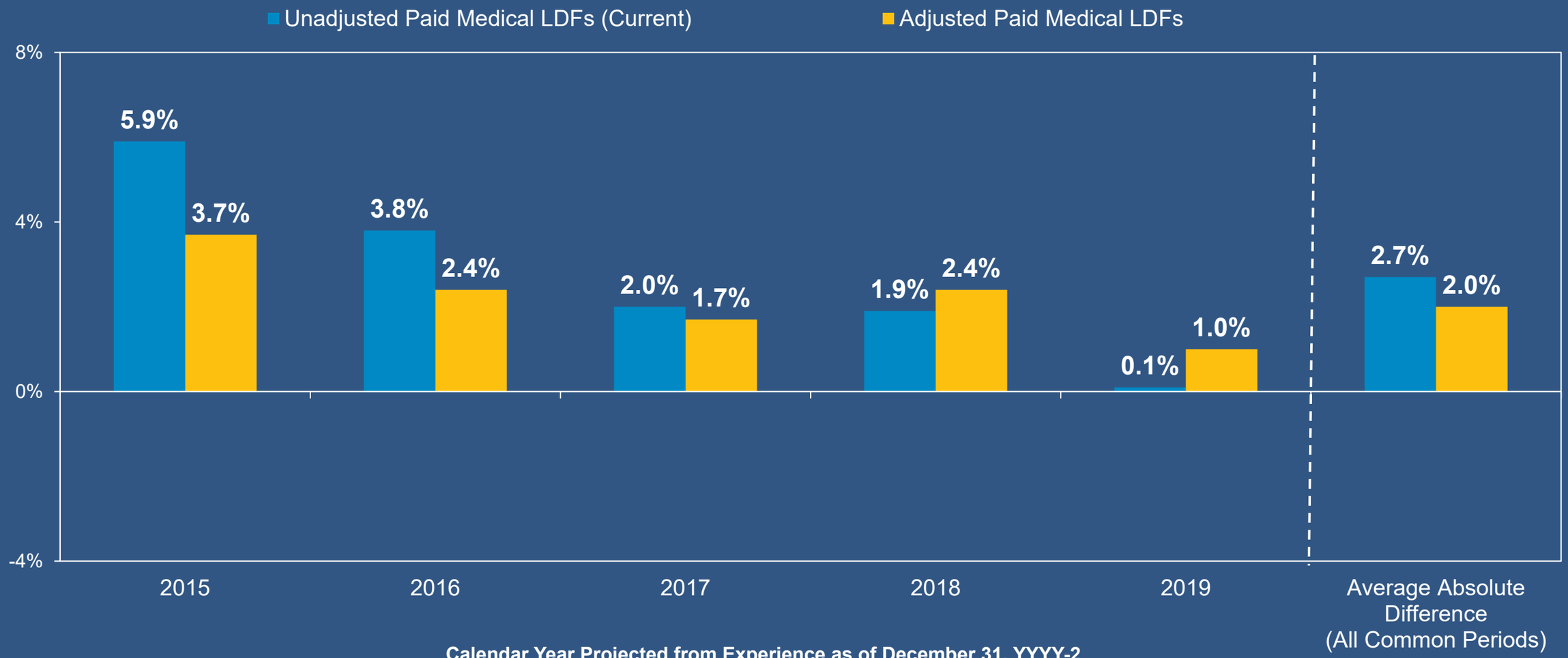
Open Count Method – Other Factors Reviewed

- Claim frequency projection
  - Claim frequency trends exclude adjustments for changes in exposure levels
  - However, premium used to generate projected losses in ULAE-to-loss ratio also based on latest CY and not trended
- Trend to average ULAE payment date
  - Current approach uses average of 50th percentile of indemnity and medical payment patterns (approx. 3.0 years)
  - Staff reviewed individual loss components and paid ALAE patterns, which were generally consistent with current approach

Overview of Paid Loss Method

- Paid ULAE to Paid Loss Ratio
  - Uses private insurers only
  - Projected using average of latest two CYs (no trend applied)
- Paid Loss to Premium Ratio
  - Projected using latest year unadjusted paid loss development
  - Future AYs projected using current ultimate loss ratio projections
- Projected Policy Year ULAE to Loss Ratio
  - Projected ULAE ratio to premium = [paid ULAE to paid loss ratio] X [paid loss to premium ratio]
  - Final projection = Average of ratios for (CY=PY, CY=PY+1)

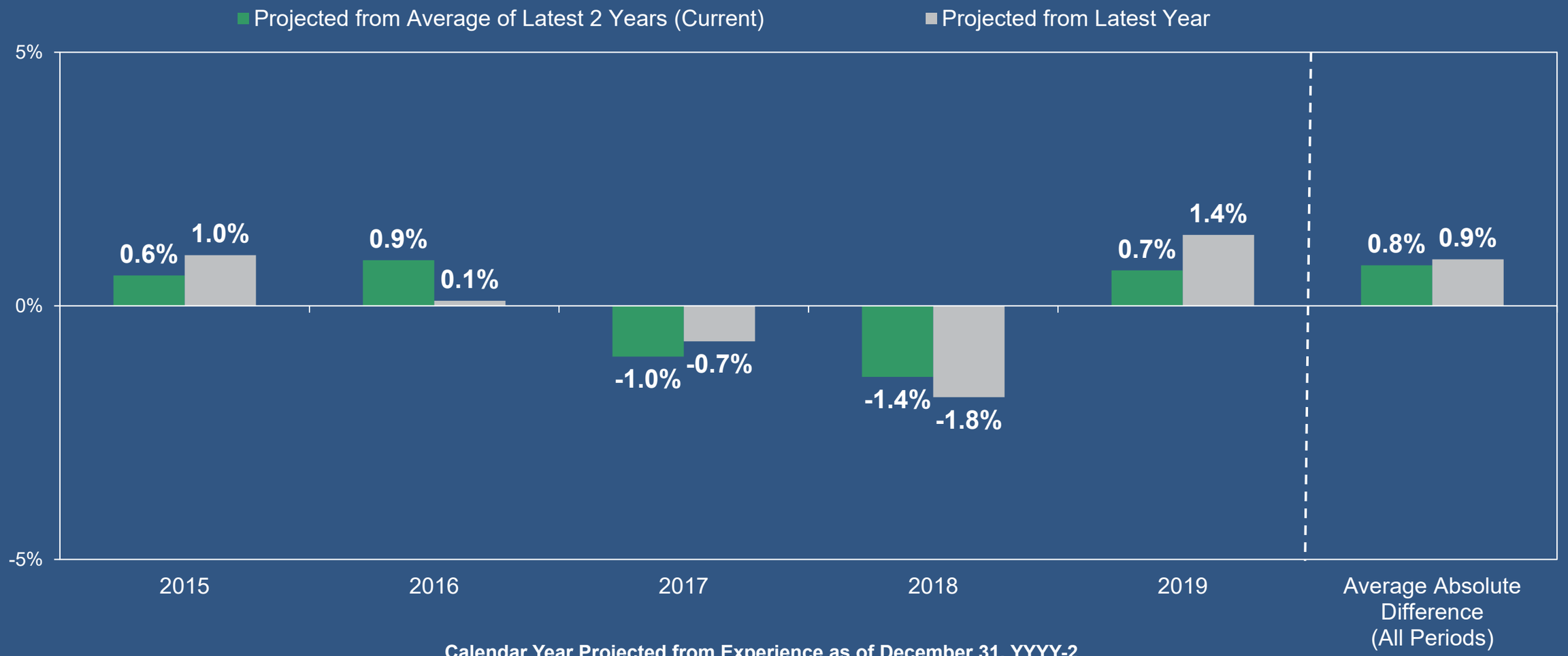
Comparison of % Error in Projected Calendar Year Medical Paid Loss Ratios – With Adjusted Development Factors (Exhibits 3.1 and 3.2)



Calendar Year Projected from Experience as of December 31, YYYY-2

Source: WCIRB aggregate financial data

Comparison of % Difference in Projected Calendar Year ULAE to Loss Ratios (Exhibit 4)

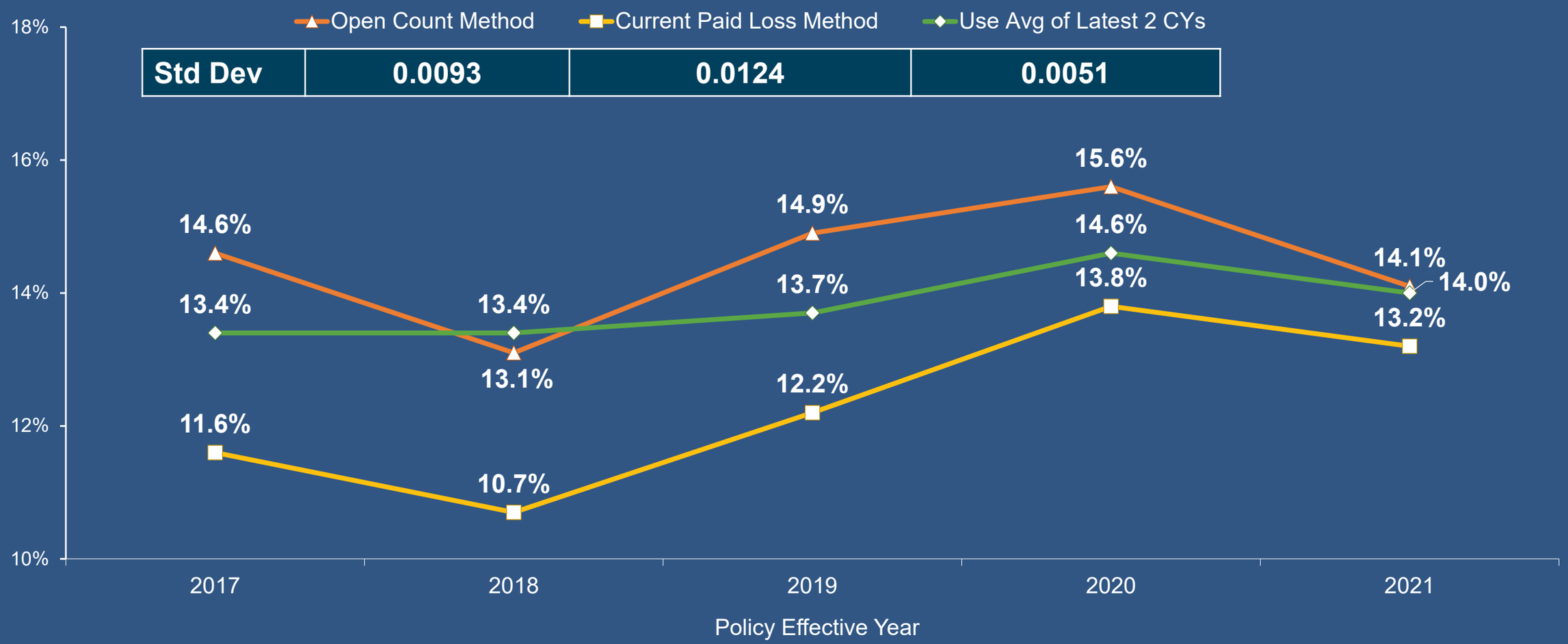


Calendar Year Projected from Experience as of December 31, YYYY-2

Source: WCIRB aggregate financial data for private insurers only

Adjusted Ratios of Paid ULAE to Paid Losses

As of December 31, 2018



Source: WCIRB aggregate financial data for private insurers only and pure premium rate filings
Pure premium rate filing projections for 2017-2018 adjusted to the current data reporting basis based on the proportion to the unadjusted paid to paid ratios.

Summary and Recommendations

- Open Count Method
  - **Recommend** projecting open counts incrementally rather than based on estimated ultimate number of claims
  - Using two-year average continues to be appropriate
  - No alternative ULAE severity projection was more viable than the current statewide wage projection method
  - Trending to average ULAE payment date based on loss development projection still reasonable
- Paid Loss Method
  - **Recommend** using adjusted medical LDFs (in current method)
  - Current method less stable and an outlier compared to open count method and recent CY ULAE ratios
  - **Recommend** using projection based on CY paid-to-paid ratios in lieu of current paid loss method
    - Simpler, more stable, and more transparent
- 9/1/2021 Filing will be based on ULAE data through CY 2019 (similar to 1/1/2021 Filing)

5

Classification Ratemaking Loss Development

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Introduction

- Loss development is one of several adjustments applied to create the Adjusted Losses shown in classification relativity review sheets
- Empirical age-to-age development factors are calculated to 10th report level by loss development group for indemnity and medical losses separately
- Loss development groups are determined using historic classification development relativities from recent policy years
- Indemnity and medical development factors from 10th to ultimate is uniform across all classifications
- Development factors are calculated using unadjusted, unlimited data
  - Selected development factors are the geometric mean of the two latest observations
- Claims are limited to $500,000 after development and other adjustments

Updated Analysis

- Based on feedback from March 3, 2020 ARWG meeting, this update uses limited development
- All data was adjusted for trend and benefit on-leveling before limiting to $500,000
- Development relativities to statewide were used to compare alternatives
  - This normalized errors for years with different overall levels of development
  - This also reflects the fact that development differences between classifications are more important in the relativity computation than the overall level
- Accuracy was measured based on how well past years could predict a future year
  - This reflects the way development factors are used in practice
- Development was tailored to the data that will be developed in the ratemaking process
  - e.g., if using claim status to differentiate claims at USR second report level, development triangles from 2nd-to-10th would be constructed based on claim status at second report level

Current Development Group Methodology

- Current LDGs were selected using a Kruskal-Wallis bifurcation of classification development relativities
  - The bifurcation is based on the Kruskal-Wallis test, which is a non-parametric analysis of variance using variable ranks
- 1st to 10th development relativities were calculated for each classification for the most recent five calendar year diagonals
- Classes were sorted using the median development relativity
- Each possible division of classifications into two groups was examined using the Kruskal-Wallis test
  - The division with the maximum test statistic was selected
  - This process can be iterated recursively on selected subgroups to divide classes into any number of groups
    - Four groups are currently used
    - Prior updates had divided classes into as many as eight groups
    - In hindsight, these groups were too refined and differentiation between groups deteriorated

Kruskal-Wallis Bifurcation Example

Class	Year	Relativity	Sorted Median Relativity	Relativity Rank	Avg. Rank Up to	Above	Test Statistic H	Chi-Sq 1 d.f. p-value
C	1	1.407	0.722	3				
C	2	0.722	0.722	22				
C	3	0.536	0.722	27				
C	4	0.611	0.722	24				
C	5	1.013	0.722	16	18.400	14.920	0.651	0.4197
A	1	0.822	0.822	20				
A	2	0.792	0.822	21				
A	3	0.532	0.822	28				
A	4	1.168	0.822	13				
A	5	0.996	0.822	17	19.100	13.700	2.508	0.1132
F	1	1.051	1.051	15				
F	2	1.404	1.051	4				
F	3	1.471	1.051	2				
F	4	0.511	1.051	30				
F	5	0.720	1.051	23	17.667	13.333	1.817	0.1776
E	1	1.235	1.174	10				
E	2	1.174	1.174	12				
E	3	0.976	1.174	18				
E	4	1.266	1.174	9				
E	5	0.936	1.174	19	16.650	13.200	1.024	0.3116
D	1	1.369	1.216	6				
D	2	1.294	1.216	8				
D	3	1.216	1.216	11				
D	4	0.596	1.216	25				
D	5	0.526	1.216	29	16.480	10.600	1.859	0.1728
B	1	1.101	1.304	14				
B	2	1.401	1.304	5				
B	3	0.547	1.304	26				
B	4	1.483	1.304	1				
B	5	1.304	1.304	7				

Option 1: Current Loss Development Groups

- Selected using unlimited development
- Selected using development from all claims
- Groups generally differentiated development between classes
  - Differentiation between groups has deteriorated
  - There was crossover between groups

Median Increase in Indemnity CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	10.2%	5.9%	3.0%	1.8%	1.3%
LDG 3 vs. LDG 2	4.5%	4.2%	2.9%	2.6%	1.7%
LDG 4 vs. LDG 3	10.8%	5.7%	3.5%	1.4%	0.7%

Median Increase in Medical CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	9.7%	6.9%	5.3%	5.1%	3.9%
LDG 3 vs. LDG 2	12.4%	8.7%	5.9%	2.6%	2.3%
LDG 4 vs. LDG 3	5.0%	1.9%	-0.3%	-0.3%	-1.0%

Option 2: Re-optimized LDGs Using Open Claims

- Selected using limited development
- Selected using development from open claims only
- Closed claims were developed using class groups determined by open claims
- Groups were well differentiated
  - No crossover for indemnity groups
  - A few crossovers at later report levels for medical groups

Median Increase in Indemnity CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	16.0%	9.1%	5.3%	3.0%	1.8%
LDG 3 vs. LDG 2	10.8%	6.3%	3.7%	2.3%	1.4%
LDG 4 vs. LDG 3	19.5%	11.6%	7.1%	4.9%	3.6%

Median Increase in Medical CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	14.3%	9.3%	5.8%	2.7%	2.0%
LDG 3 vs. LDG 2	13.5%	8.7%	5.7%	3.9%	2.6%
LDG 4 vs. LDG 3	15.2%	9.7%	6.0%	3.8%	2.4%

Option 3: Re-optimized LDGs Using Open Claims Closed Claims Developed Separately

- Selected using limited development
- Selected using development from open claims only
  - Groups are the same as Option 2
- Closed claims from all classes were developed using the same development factors
- Groups were well differentiated
  - A few crossovers at later report levels for both indemnity and medical groups

Median Increase in Indemnity CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	16.6%	9.0%	5.0%	2.5%	1.4%
LDG 3 vs. LDG 2	10.7%	6.0%	3.5%	2.2%	1.3%
LDG 4 vs. LDG 3	21.6%	12.0%	6.7%	4.8%	3.5%

Median Increase in Medical CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	17.7%	10.9%	6.5%	2.9%	2.2%
LDG 3 vs. LDG 2	14.2%	9.1%	6.6%	4.4%	3.0%
LDG 4 vs. LDG 3	21.7%	13.3%	7.4%	4.8%	3.2%

Decision Trees

- Decision trees are a supervised learning method
- Groups are determined using the Gini Index as a measure of the homogeneity of a group
- Process is repeated in a recursive manner on subgroups to obtain final groups
- Cost complexity pruning is used to determine the optimal number of groups
- All decision tree results are based on the development of individual claims

Option 4: Re-optimized LDGs Using Decision Tree on Open Claims

- This option is analogous to Option 2, but uses a decision tree to determine groups
  - Three groups were indicated for both indemnity and medical
- Groups were well differentiated
  - No crossover for indemnity or medical groups

Median Increase in Indemnity CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	18.6%	10.4%	5.9%	3.4%	2.2%
LDG 3 vs. LDG 2	24.6%	14.6%	8.9%	6.1%	4.3%

Median Increase in Medical CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	24.2%	15.6%	9.6%	5.3%	3.6%
LDG 3 vs. LDG 2	19.9%	12.9%	8.1%	5.4%	3.6%

Option 5: Re-optimized LDGs Using Decision Tree on Open Claims Closed Claims Developed Separately

- This option is analogous to Option 3, but uses a decision tree to determine groups
  - Three groups were indicated for both indemnity and medical
- Groups were well differentiated
  - No crossover for indemnity or medical groups

Median Increase in Indemnity CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	19.1%	10.4%	5.8%	3.3%	2.1%
LDG 3 vs. LDG 2	27.1%	14.6%	9.0%	6.2%	4.3%

Median Increase in Medical CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
LDG 2 vs. LDG 1	29.1%	18.2%	11.0%	6.1%	4.2%
LDG 3 vs. LDG 2	26.5%	16.4%	9.7%	6.5%	4.5%

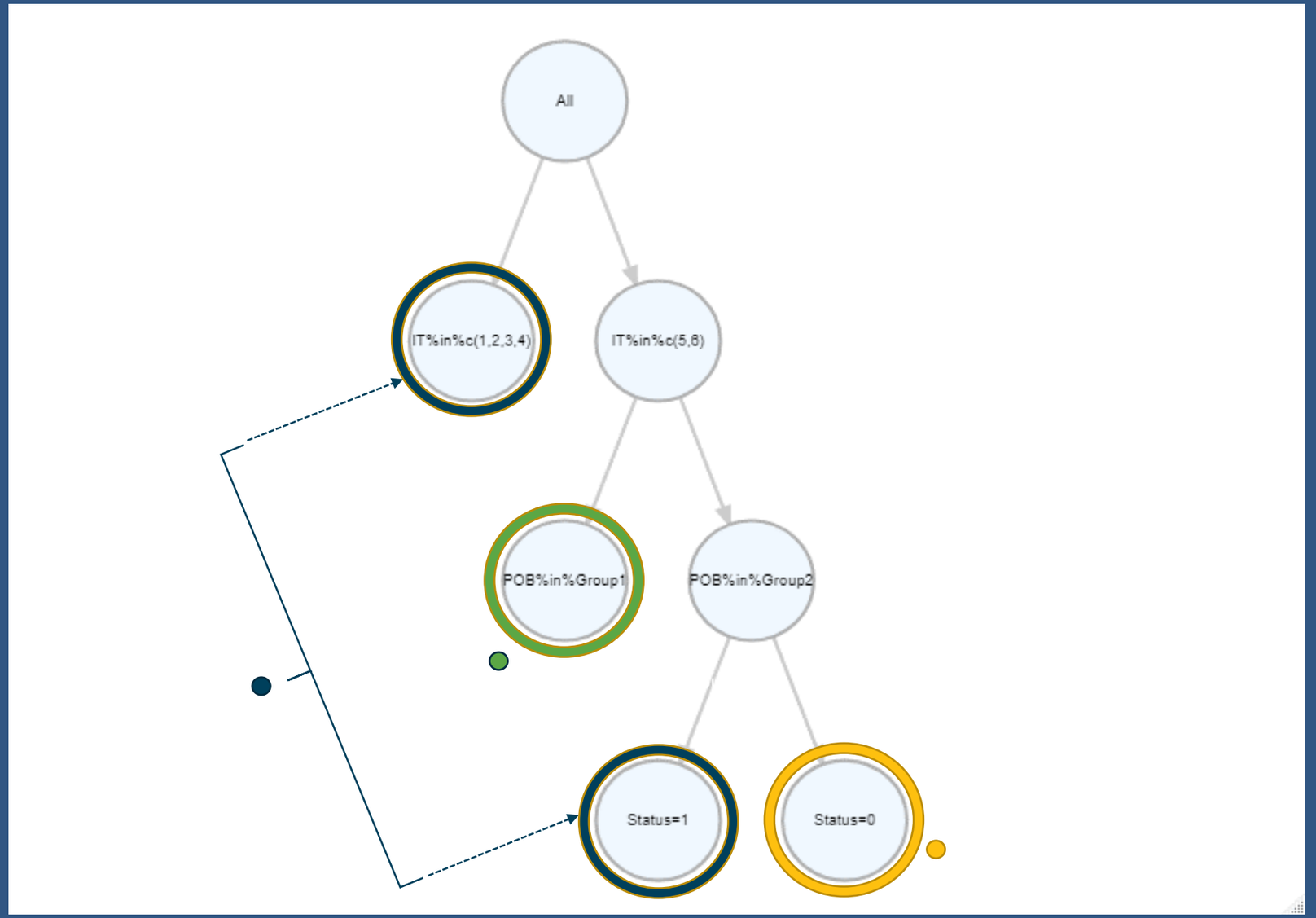
Option 6: Groups Developed Using Decision Tree with Part of Body, Injury Type, and Claim Status

- Groups were selected using a decision tree with part of body, injury type, cumulative trauma, and claim status
  - Results were aggregated by class to compare accuracy with other alternatives
  - Three groups were indicated for indemnity development and two for medical development
  - Presence of cumulative trauma did not factor into any selected groups
- Selected using limited development
- Groups were well differentiated
  - Very few crossovers for either indemnity or medical groups

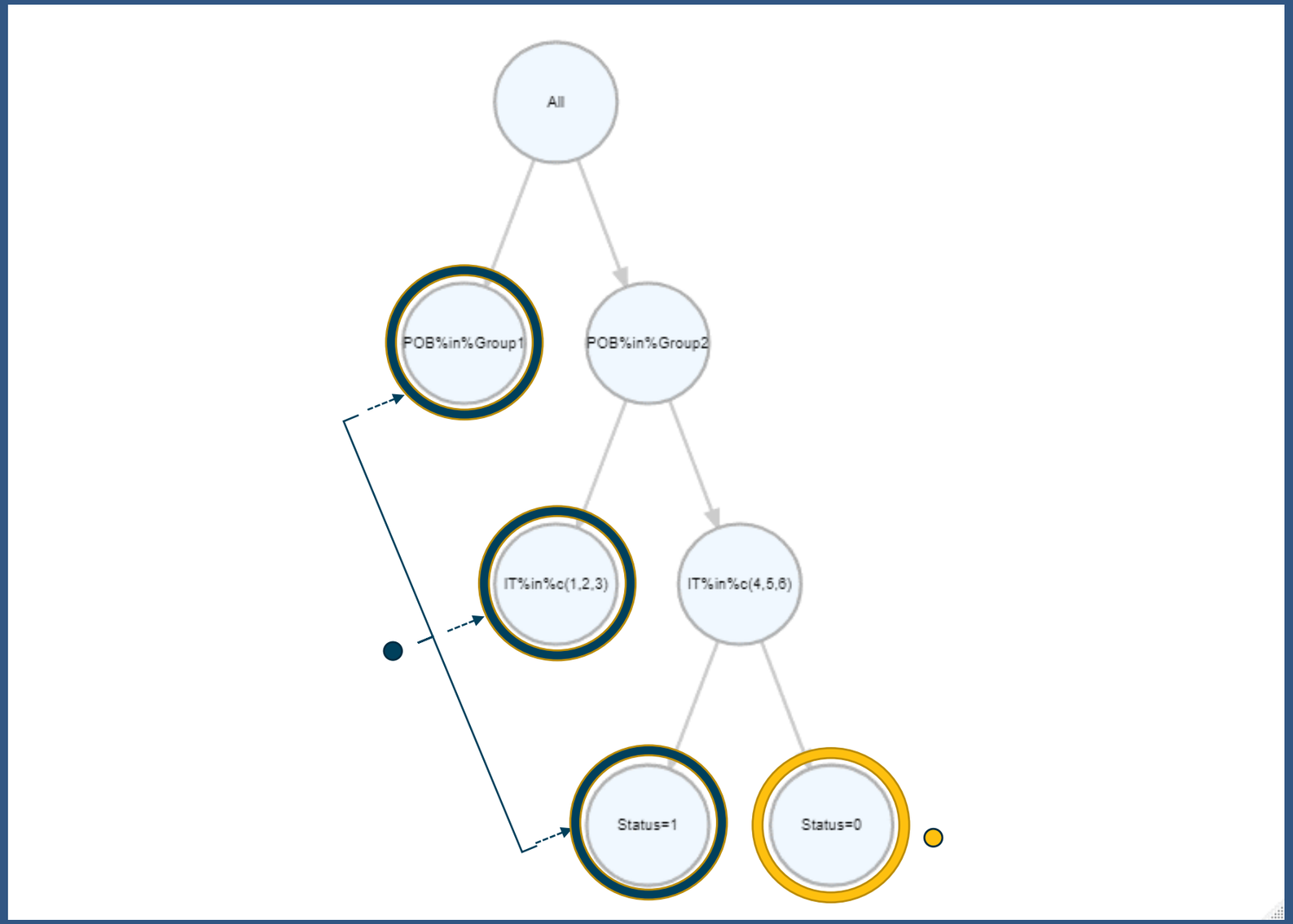
Median Increase in Indemnity CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
Medium vs. Low	46.6%	20.9%	10.2%	5.7%	3.1%
High vs. Medium	38.4%	13.4%	6.8%	3.8%	2.3%

Median Increase in Medical CDF Relativity					
Comparison	1st-to-10th	2nd-to-10th	3rd-to-10th	4th-to-10th	5th-to-10th
High vs. Low	49.2%	23.0%	13.4%	9.0%	5.9%

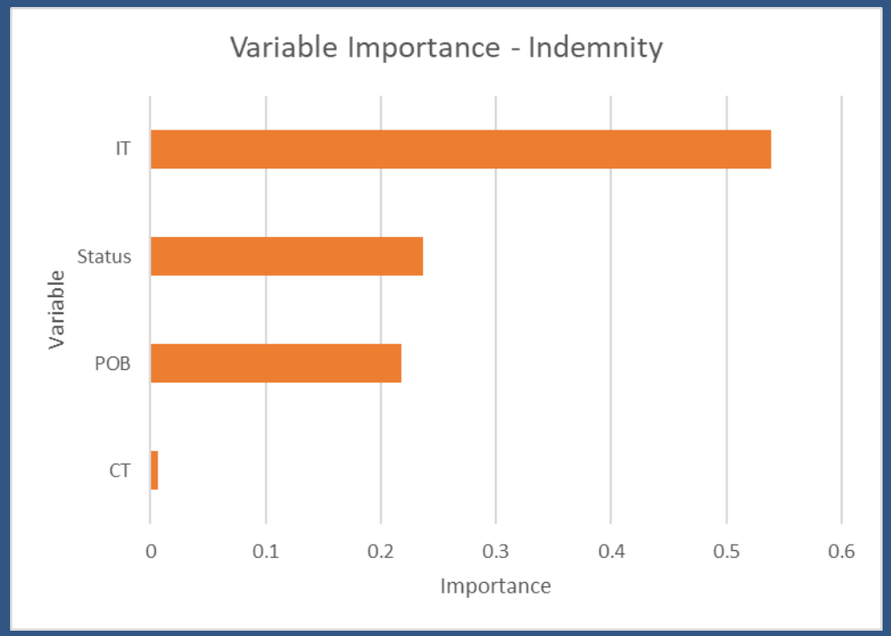
Tree Output – Indemnity Losses

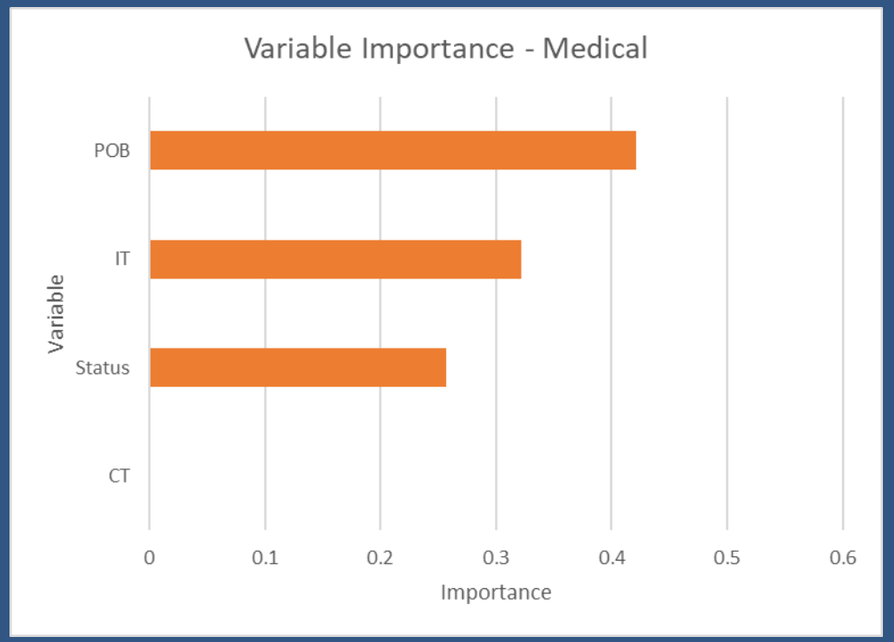


Tree Output – Medical Losses

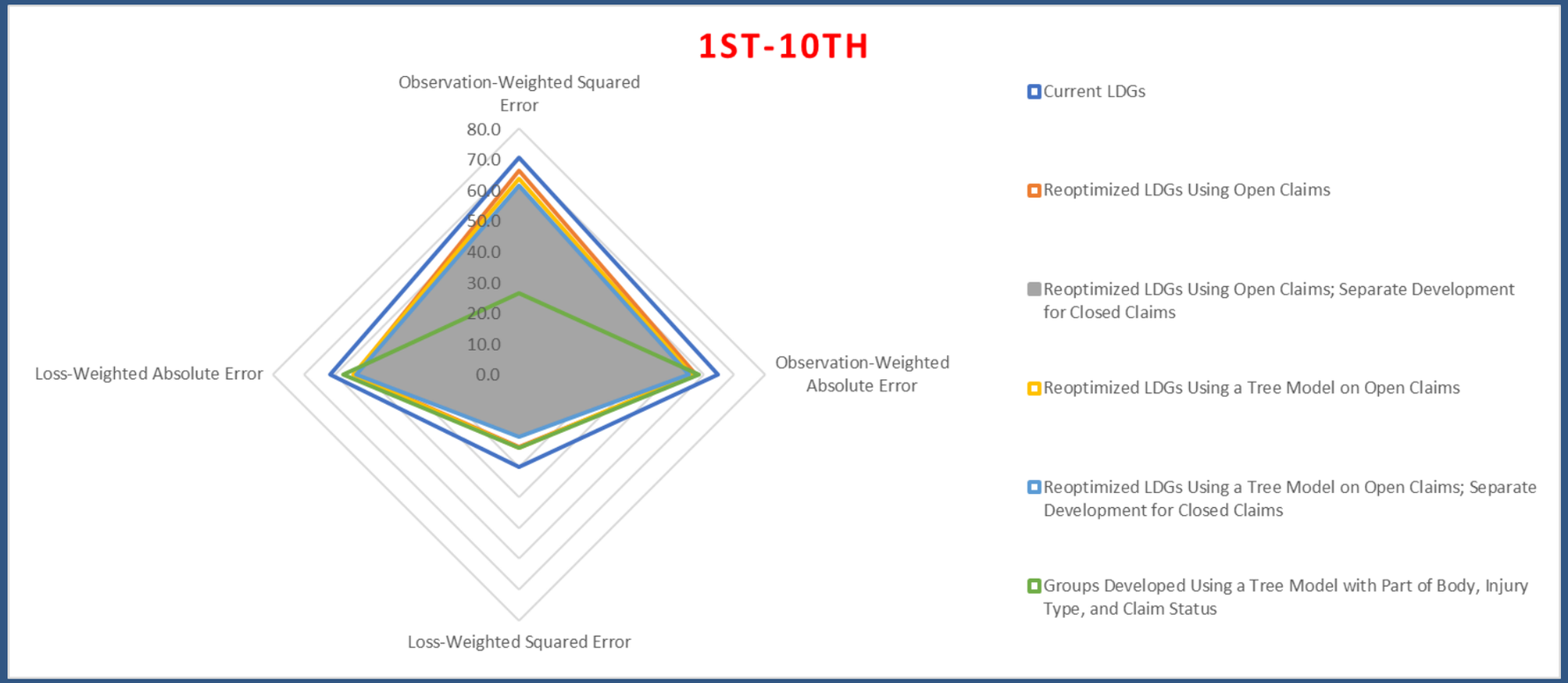


Tree Output – Variable Importance

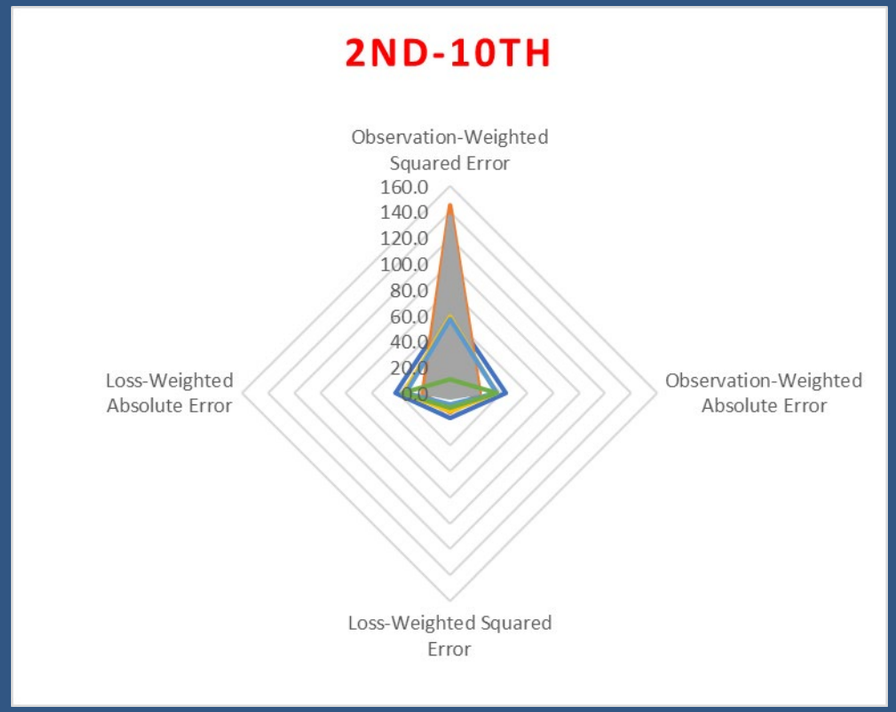




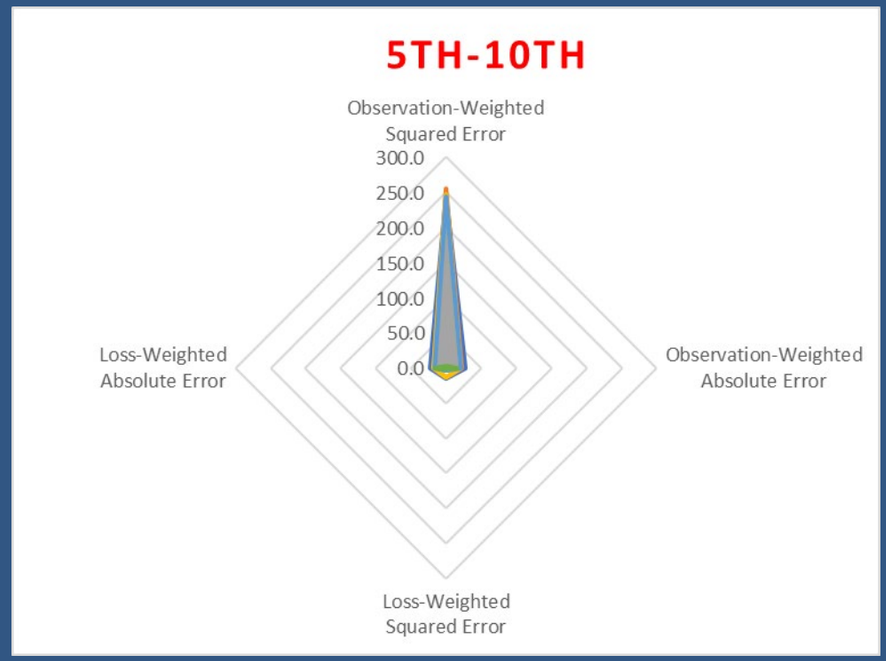
Performance Visualization - Indemnity



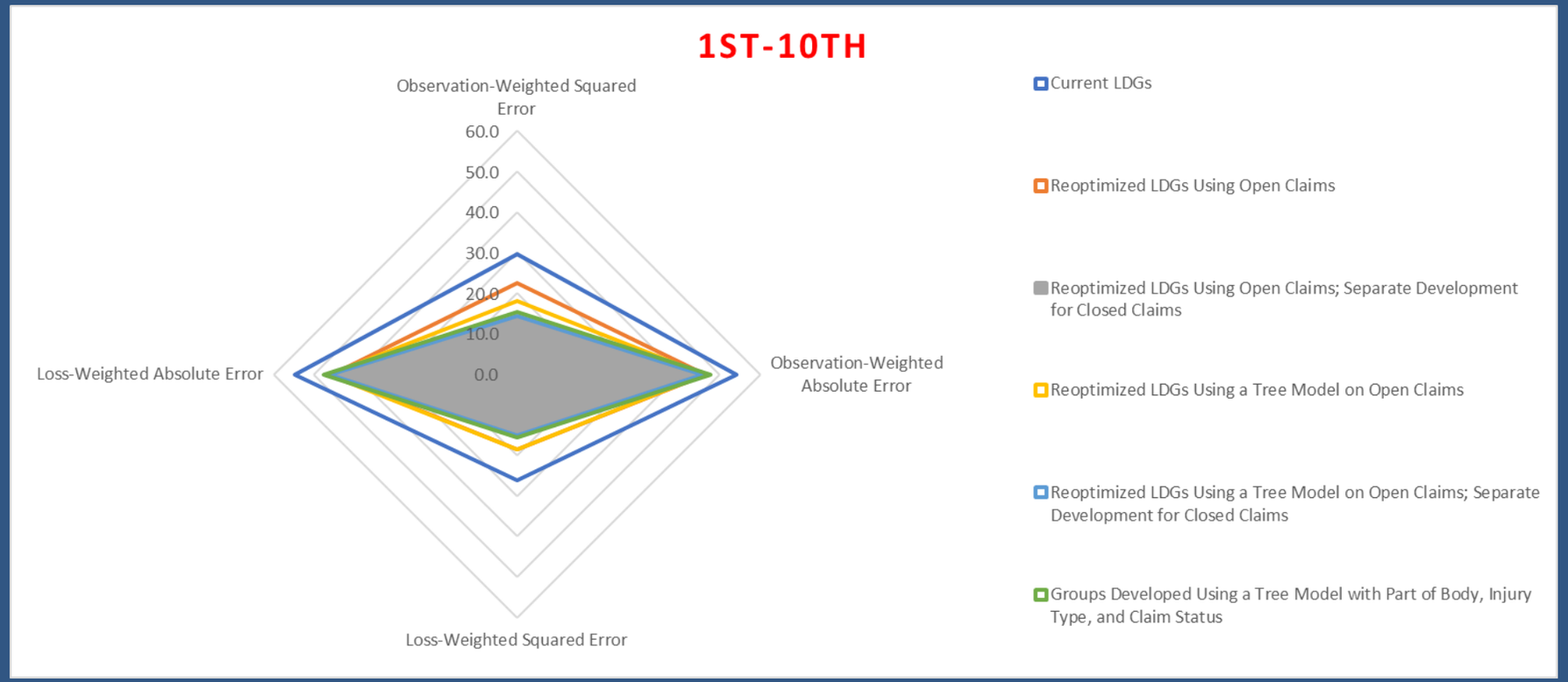
Performance Visualization - Indemnity



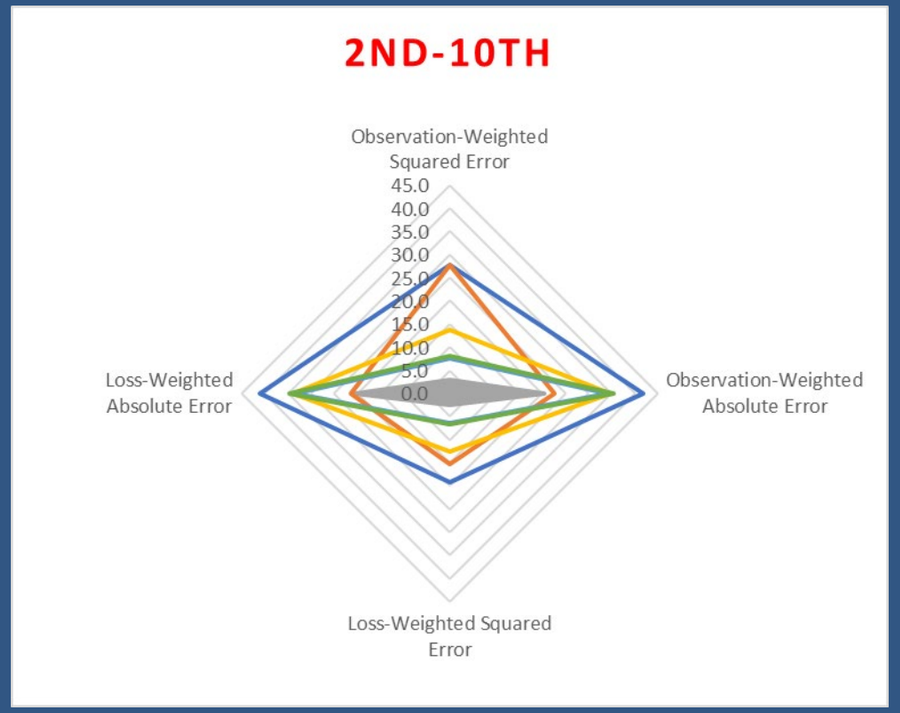
Performance Visualization - Indemnity

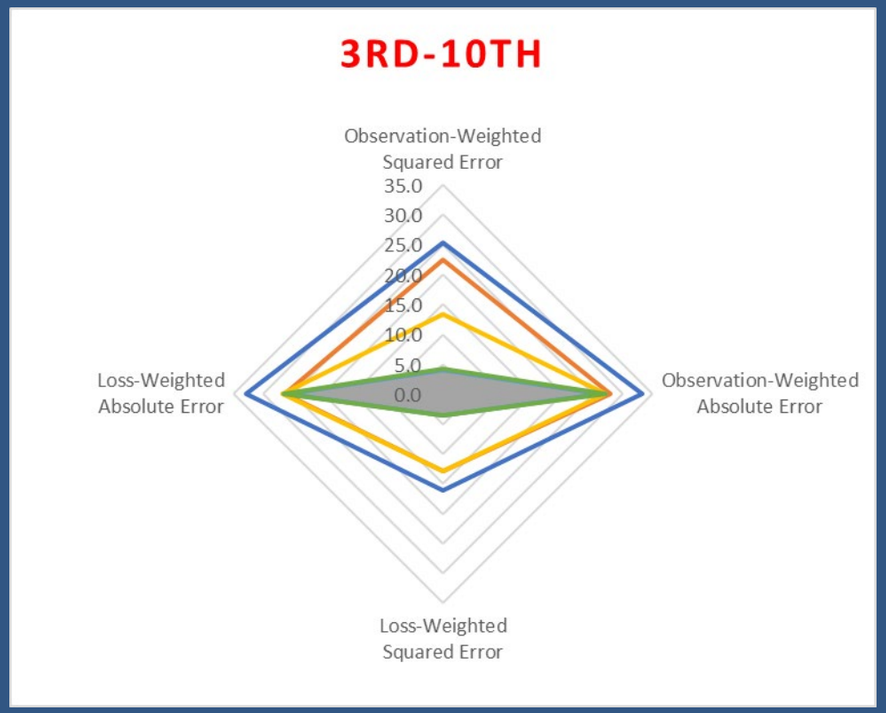


Performance Visualization - Medical



Performance Visualization - Medical





Performance Visualization - Medical

Classification Grouping Comparison

	Tree ILDG1	Tree ILDG2	Tree ILDG3
KW ILDG1	109		
KW ILDG2	42	98	
KW ILDG3		126	
KW ILDG4		4	102

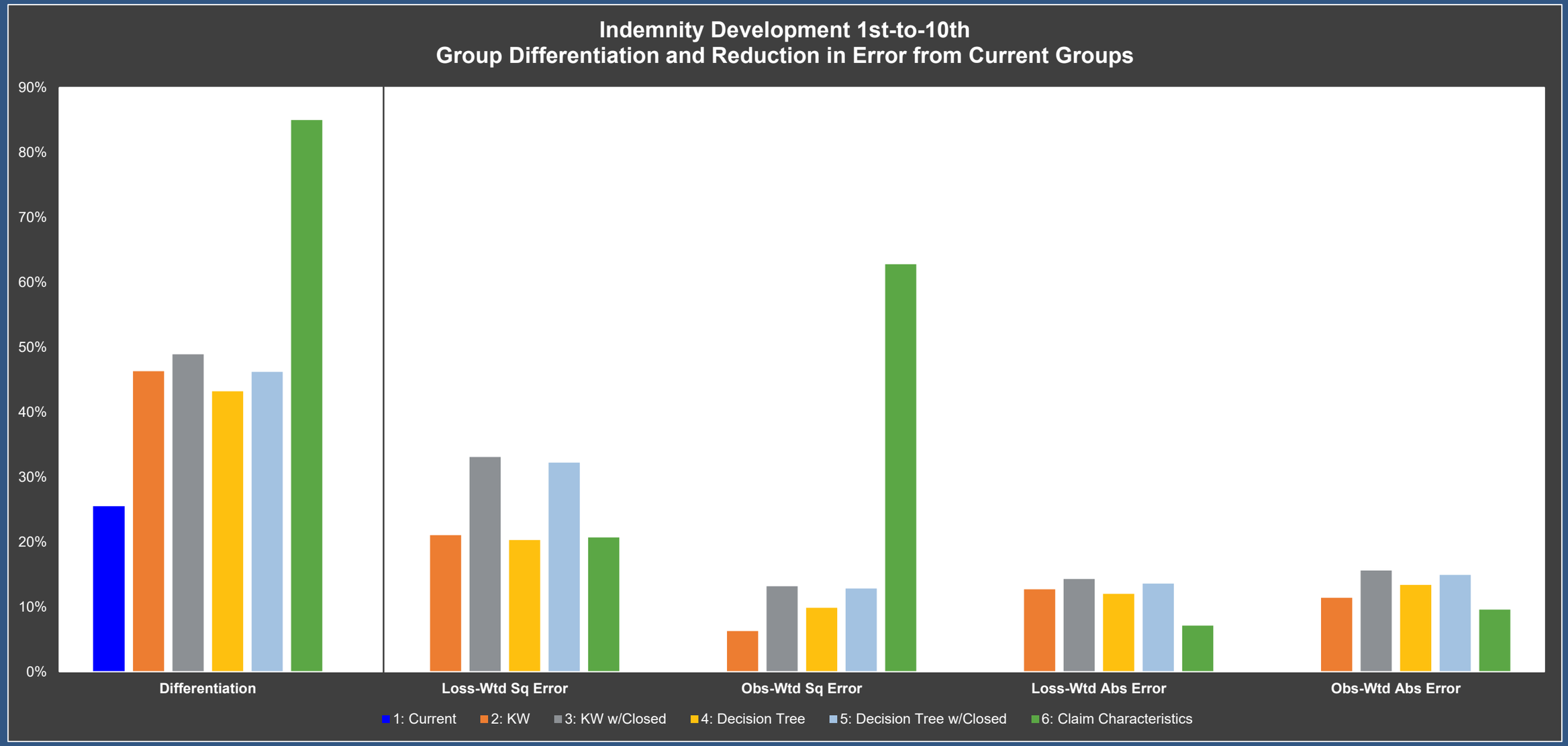
	Tree MLDG1	Tree MLDG2	Tree MLDG3
KW MLDG1	109	3	
KW MLDG2		127	
KW MLDG3		129	12
KW MLDG4			101

- Classifications are in the same group for both KW models (options 2 & 3), as well as both tree models (options 4 & 5).
- These options differ in the development of claims by open/closed status.

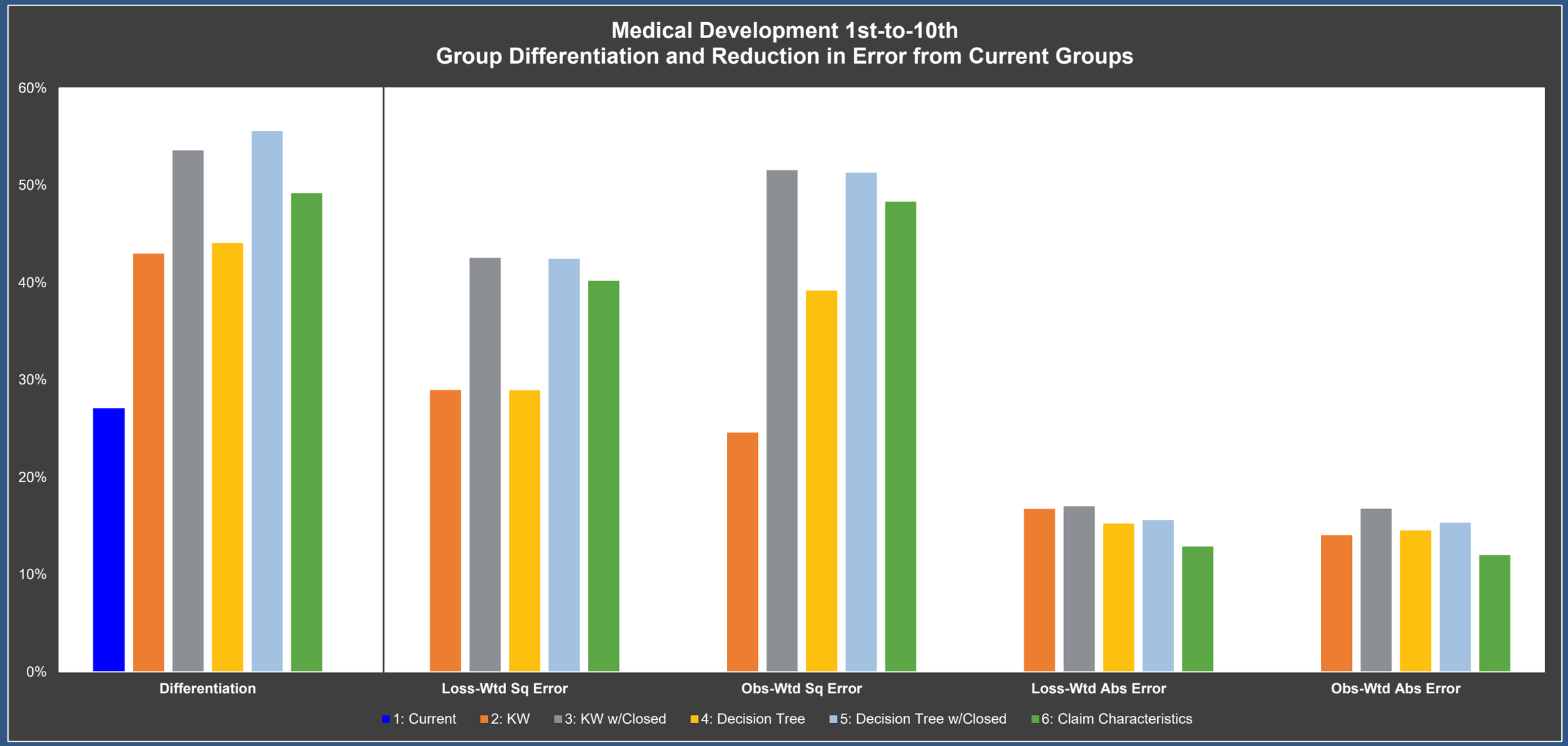
Model Selection

- Selection was based on a combination of group differentiation, predictive accuracy, and model complexity
- Filing complexity
  - Using claim characteristics that can change, particularly status, requires multiple triangles per group
  - The USR claims to be developed have known characteristics at report levels 1 through 5
  - A separate triangle would be necessary for development to 10th based on claim status at each report level
    - Using classification only requires a single triangle per development group
    - Introducing claim status requires additional triangles representing claims open at RL1, open at RL 2, etc.
    - This complexity grows with the refinement of claim characteristics used
- Consistency of data reporting
  - Methods using claim characteristics are subject to inconsistencies over time and/or across carriers
  - Characteristics based on billing, such as diagnostic groupers, may be preferable when more data is available
- Staff proposes using Option 3
  - LDGs developed using Kruskal-Wallis bifurcation
  - Closed claims developed as a single group

Model Selection



Model Selection



Summary

- Tested methodologies can be fit into two basic categories
  - Aggregate development with groups determined using Kruskal-Wallis tests
  - Development on individual claims with groups determined using decision trees
- All tested methodologies used limited development
- Classification-based groups were developed using both methods
  - Classifications groupings were very similar using both methods
  - Accuracy and differentiation of loss development were improved by separating open and closed claims using both methods
- Decision trees were also used to create development groups relying on claim characteristics
  - Open/closed status, part of body, injury type, and cumulative trauma indicators were used
  - This method performed particularly well at identifying outliers in indemnity development for small classifications
  - This method shows promise and will be revisited when diagnostic groupers from MDC data are available for a longer time period
- Staff proposes using classification-based groups determined using Kruskal-Wallis tests
  - Open and closed claims would be developed separately

6

Potential Applications of Transactional Indemnity Data

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Drill downs from Aggregate Financial Data

Temporary vs Permanent Disability

- Currently we review data on indemnity counts and payments on a quarterly basis from the aggregate financial data
- We collect limited information on a lagged basis about the number of weeks of paid TD as well as PD ratings from other sources
- Indemnity transaction data will enable us to drill down into the components of TD and PD (such as number of weeks of TD or PD ratings) as well as the timing of payments

Claims Characteristics

- The indemnity transaction data contains information about claims characteristics such as claim status, industry, classification code, location and litigation status
- We plan to explore drill downs based on these characteristics

Claim Level Analysis before Unit Stat Reporting

- The first Unit Statistical report is received 20 months after policy inception while indemnity transaction data is available within two months of the initiation of payments
- Indemnity transaction data will allow us to drill down from the total indemnity dollars reported in unit statistical reports as well as provide more current information about payments
- Indemnity transaction data contains information about claims characteristics and will allow us to track changes in cumulative trauma claims faster than unit stat reporting
- This data also contains more detailed information which is not available via unit stat such as litigation status, return to work and information about claim reopening

Improving our Geolocation Protocols for Claims and Exposure

- Region is a significant differentiating factor in claim costs in California
- Our current geolocation protocol for claims relies on the billing zip codes from the medical transaction data to estimate a center of medical services
- Our current geolocation protocol for exposures relies on the locations reported on the policy and the number of employees by location within the D&B Hoovers data
- The indemnity transaction data contains information about the employer location, the zip code for the injury site and the zip code for the employee
- We plan to use this information to enhance our current geolocation protocols

Other Potential Uses

- Emerging Claim Types:
  - The data is received on a near contemporaneous basis which facilitates analysis of emerging claim types or changes in claim filings
  - It has been very useful in beginning to understand COVID-19 claims and the changes in claim filings during the resulting economic downturn
- More Refined Triangles:
  - Transaction level data will facilitate development of triangles for metrics such as claim counts, paid indemnity ad settlement rates on a monthly basis or by more refined characteristics such as region, litigation status and part/nature/cause
- Analyzing Claim Frequency changes:
  - The timeliness will allow analyses based on actual claim filings sooner than other data sets
  - We plan to investigate potential uses as part of the review of the comprehensive Indemnity Frequency model review

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