Background

- Last major Experience Rating Plan (ERP) change was in 2004.
- Changed from a variable "maximum value" or "split point" to a single maximum value methodology.
- This maximum value is $42,500 for all risk sizes.
- The first $42,500 of every claim is referred to as "primary losses" and count 100% in the mod calculation.
- Added a capping rule that restricts mod change to a maximum swing of +/-25% compared to the previous mod.

Goal of the Research

The goal of this research was to enhance plan performance through improved predictive accuracy that incentivizes workplace safety.

PCRB conducted a comprehensive review of its methodology, which included examining all the components of the current program.

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Summary of Filed Changes

	Current	Proposed
Plan	Single Split Point	Variable Split Point
Formula	$$\frac{Ap \times C + E \times C \times L + E(1.000 - C)}{E}$$ Ap = Actual Primary Loss, E = Expected Loss, C = Credibility, and L = Limitation Charge	
Eligibility	$10,000	$5,000
Credibility	0.283 - 0.938	0.690 - 0.974
Expected Loss Range	10,706 - 5,806,852	5,000 - 4,338,871
Split Points	Single (1): $42,500	Variable (88): $10,000 – $300,000
Med-Only Claims	100%	100%
Capping %	+-25%	Max Mod and 40% swing limit (2-year Transition Period*)
Secondary Capping	Yes (Rule #2)	Eliminate (After Transition Period*)

* Transition Period: The new Max Mod will apply, however the current capping rules (+/-25% swing limits and secondary capping) will also apply for a 2-year period to ensure mod stability during the transition to the new plan.

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Current Plan - Key Findings

- Performance testing showed declines in predictive accuracy since the last major update.

- Variable Split Point (or Maximum Value) plan outperforms Single Split Point plans.

- Assigns too little credibility to most risks.

- Inadequately promotes workplace safety.

- Transition between the Merit Rating and ERP plans for small risks can be a large change.

Picture of Ideal Plan Performance

An ideal plan results in the same loss ratios for all quintiles after the application of the mod.
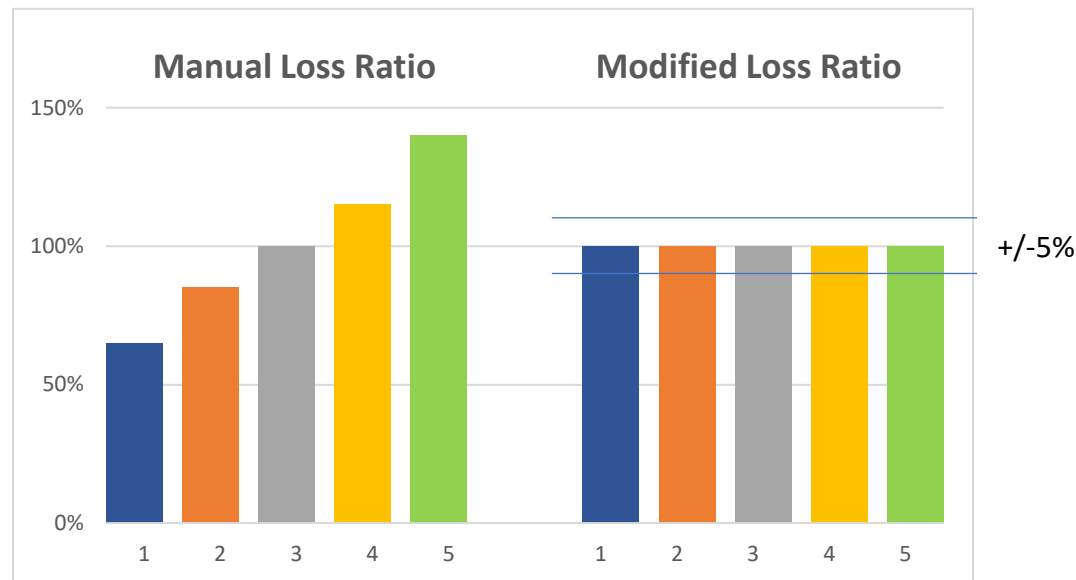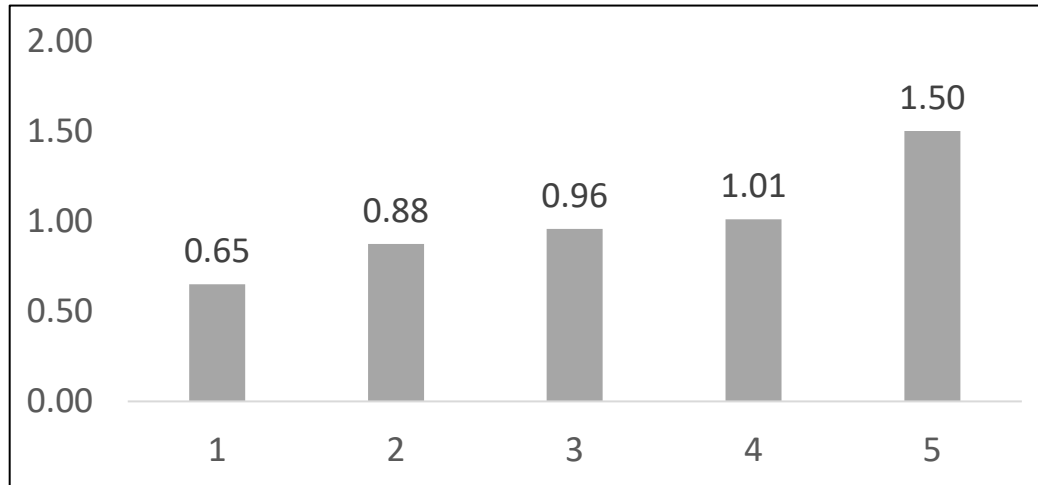

Our target deviation from 100% modified loss ratio is +/- 5%.
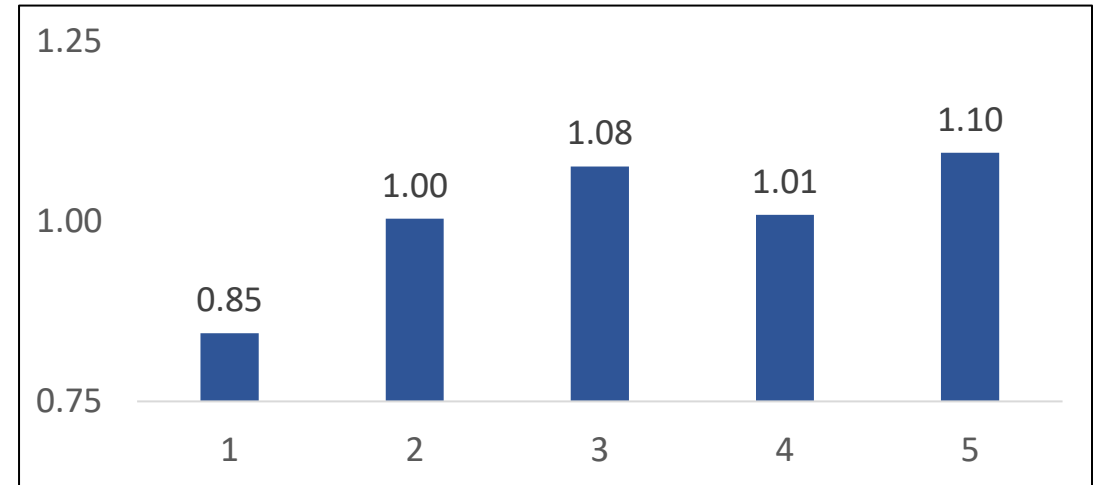
Current ERP Performance Test

2015 - 2017

Manual Loss Ratios

Modified Loss Ratios

Note: Expected loss is normalized to ensure overall loss ratios achieve a unity loss ratio

Optimization Process

Simultaneously Optimize Four Key Components: Credibility, Split Points, Limit Charge and Expected Loss Ranges

1. Used data for Policy Years 2015, 2016, 2017 and 2018.
   - Optimization process built using years 2015-2017 and tested using the 2018 holdout year.

2. Risks grouped into cohorts by risk size with groupings also by expected losses ranges for an experience period.

3. Examine each cohort using an array of split points at a given credibility.
   - Compute test statistic to find the maximum dispersion in the manual loss ratio and the minimum dispersion in the modified loss ratio.

   - Test Statistic = $\dfrac{Variance(Modified\ Loss\ Ratio)}{Variance\ (Manual\ Loss\ Ratio)}$

Optimization Results

Credibility Increased:

- Smaller risks receive markedly higher credibility.

- Larger risks receive nominally increased credibility.

Split Points Vary:

- Split Points for smaller risks are lower.

- Split Points for larger risks are higher.

Other Results:

- The efficiency test indicates very good results with deviations of less than 5% from unity.
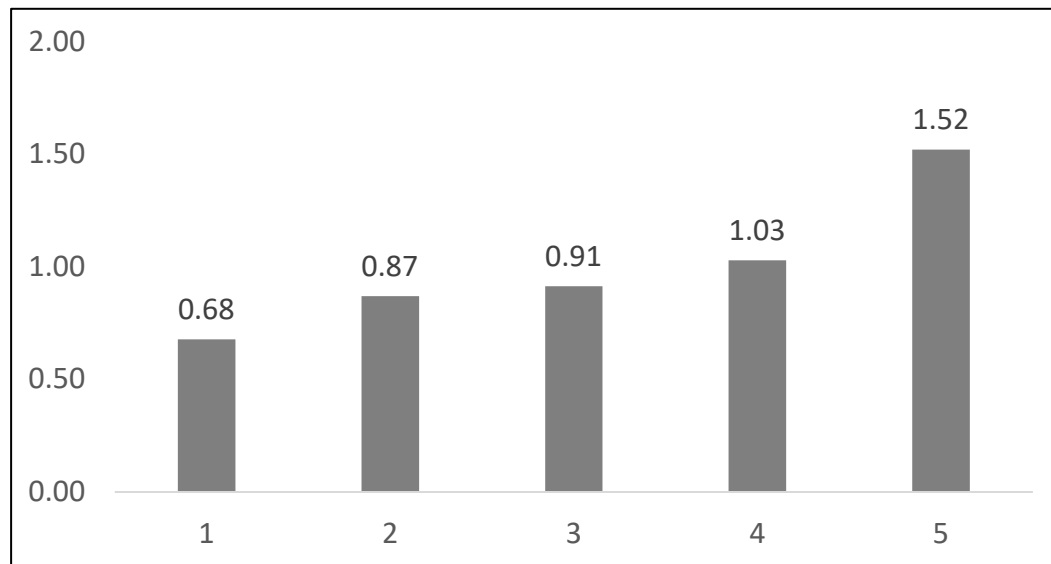
- Fewer Expected Loss ranges.
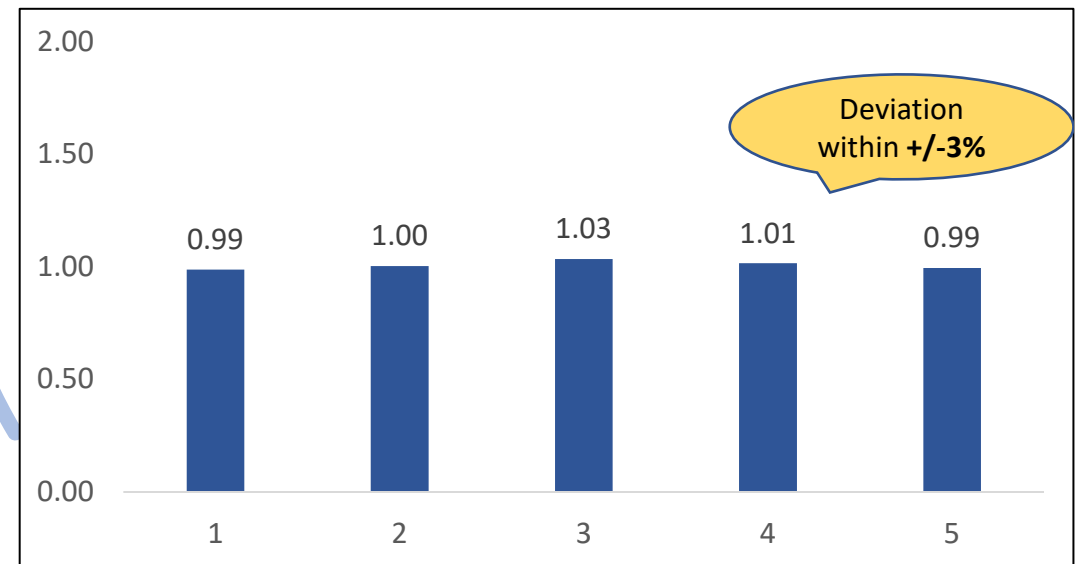
Proposed ERP Performance Test

The following lift charts are produced using the optimized elements.

2015 – 2018
Eligibility = $5,000

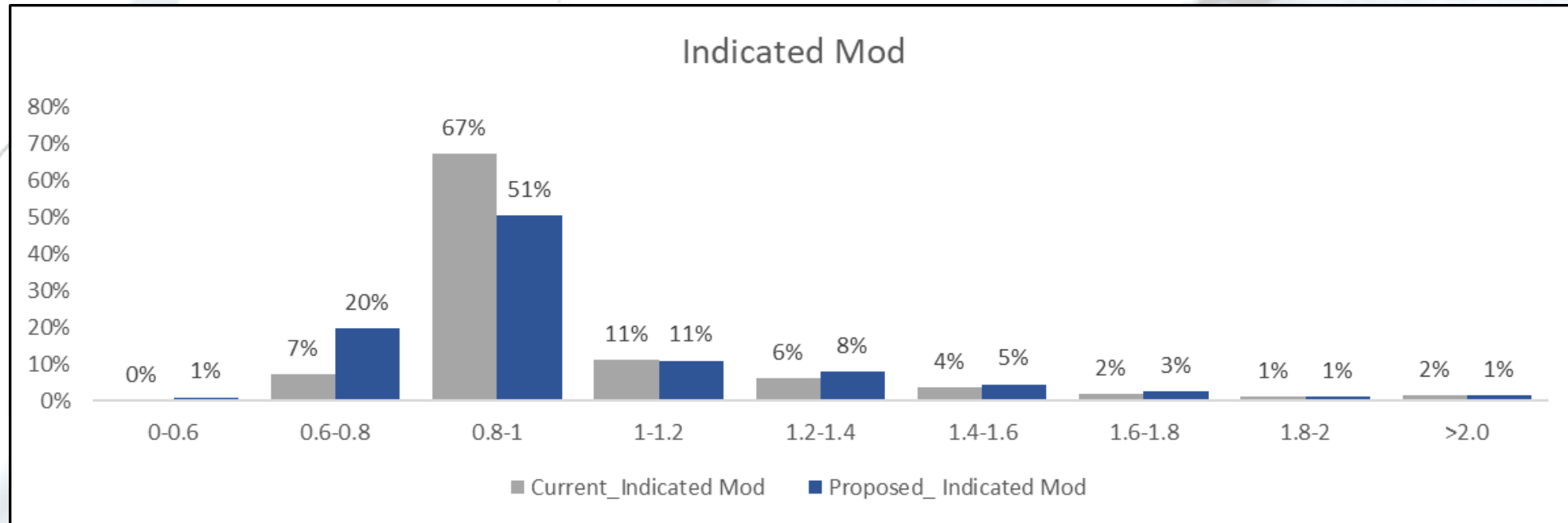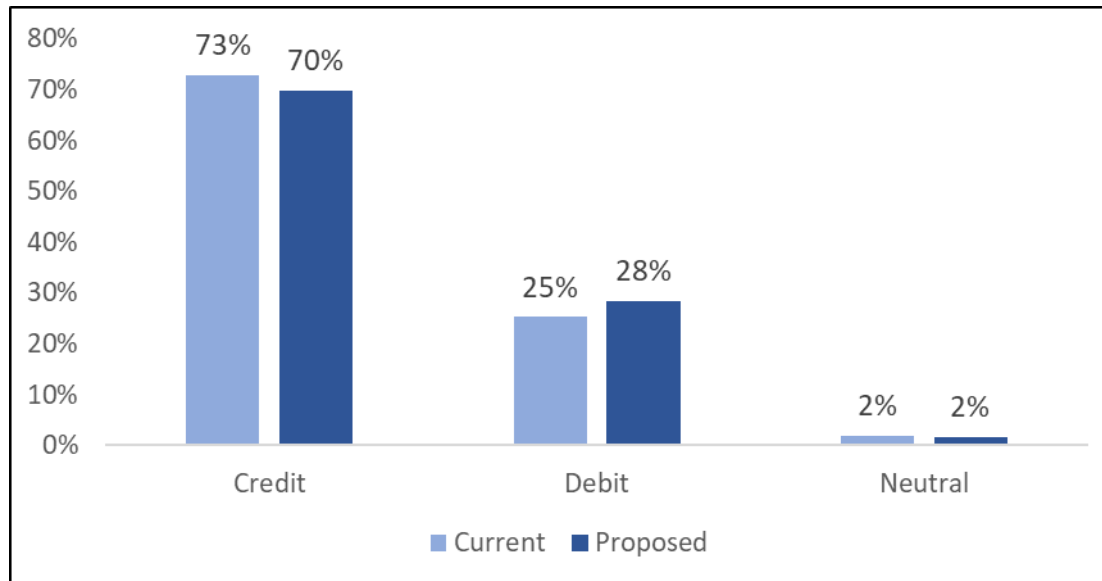**Manual Loss Ratios**

Modified Loss Ratios

Deviation within **+/-3%**

Distribution of Current and Proposed Mods

Policy Count and Premium Distribution
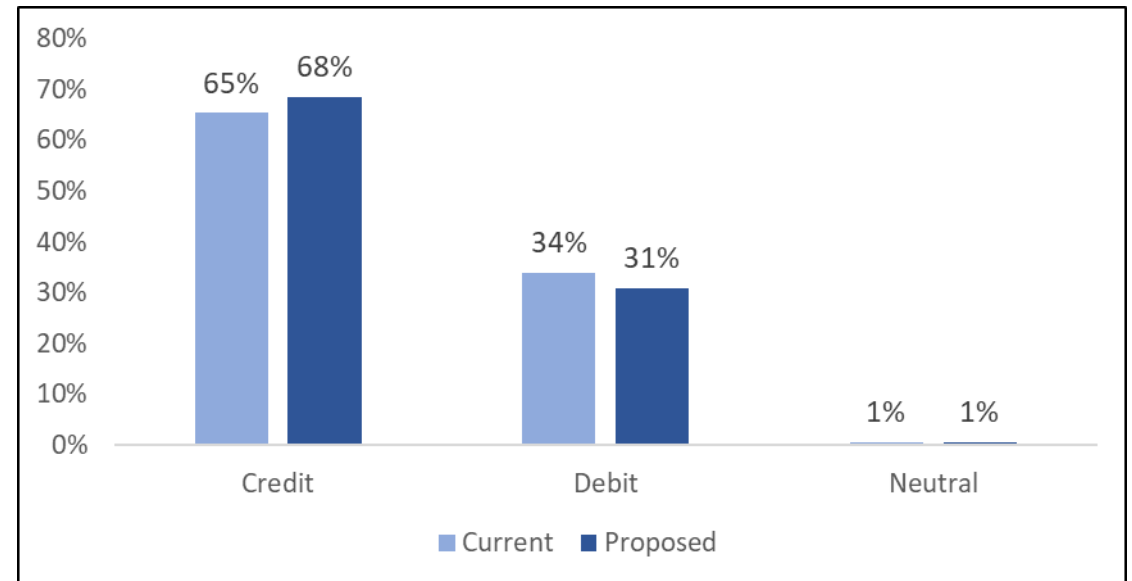
Note: Based on PY 2018 data

Change in Mod Type
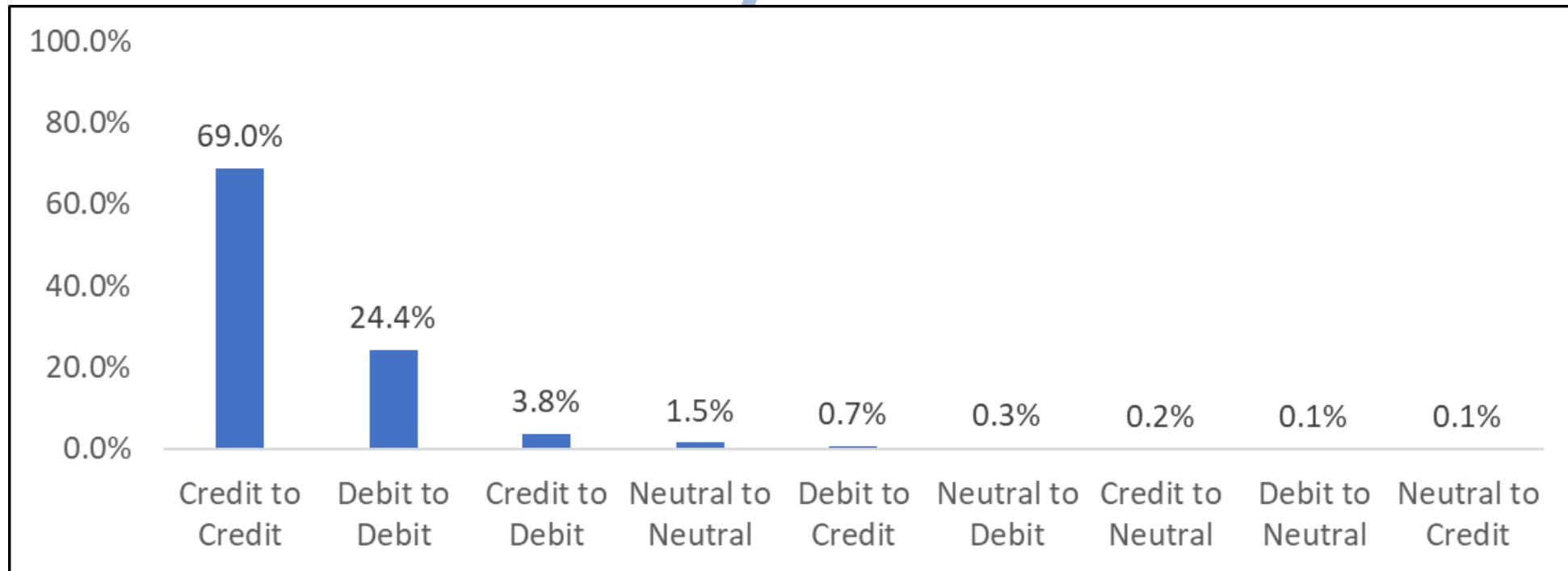
Note: Based on PY 2018 data

Capping and Eligibility Summary

Capping

Necessary to maintain a form of capping, particularly for smaller risks, to promote mod stability.

Most states use a Maximum Mod approach to limit the upside volatility primarily on smaller risks.

The Maximum Mod helps prevent the mod from becoming excessively high due to one or more large losses that may not accurately reflect overall loss experience.

The Maximum Mod approach primarily benefits small risks while swing limits provides stability for all risks.

Eligibility

Analyzed to address the transition between the Merit Plan and ERP plan for smaller risks.

Results show that the use of a Maximum Mod formula and potentially a lower eligibility amount improve the transition between the two plans.

Lowering the eligibility to $5,000 results 11% more risks being experience rated.

Distribution of Policies

Premium	Count	Percent
Prem < 5,000	124,549	63%
5,000< Prem <7,500	13,630	7%
7,500< Prem <10,000	9,334	4%
10,000< Prem <15,000	11,916	6%
Prem > 15,000	43,223	20%
Total	202,651	

Note: Distribution is based on the average number of risks in policy years 2017 and 2018.

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Current Capping Rules

1. Final Modification Capped to +/- 25% of Prior Modification.

2. If the indicated modification is less than unity (1.000) and the capped modification is greater than unity (1.000), then the final modification shall be set equal to unity (1.000).
   - This rule is referred to as "Secondary Capping" or the "Double Swing Cap".

Example

Rule	Prior Mod	Indicated Mod	Capped Mod	Final Capped Mod
2	1.563	0.827	1.172	1.000

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Proposed Capping Rules

- Introduction of a Maximum Mod formula for capping, which also includes a +40% cap to limit larger annual upward movements. This will replace the current +/-25% swing limits and the secondary capping.

- The current capping rules (+/-25% swing limits and secondary capping) will also be kept for a two-year period to ensure mod stability as we transition to the new plan.

Maximum Modification Factors

Max Mod = 1.10 + 0.0004 (E/G)

Exp Loss	0	5,000	10,000	25,000	50,000	250,000	500,000	1M
Max Mod (G=10)	1.10	1.30	1.50	2.10	3.10	11.10	21.10	41.10
Loss Free Mod	0.85	0.85	0.84	0.79	0.76	0.59	0.50	0.36
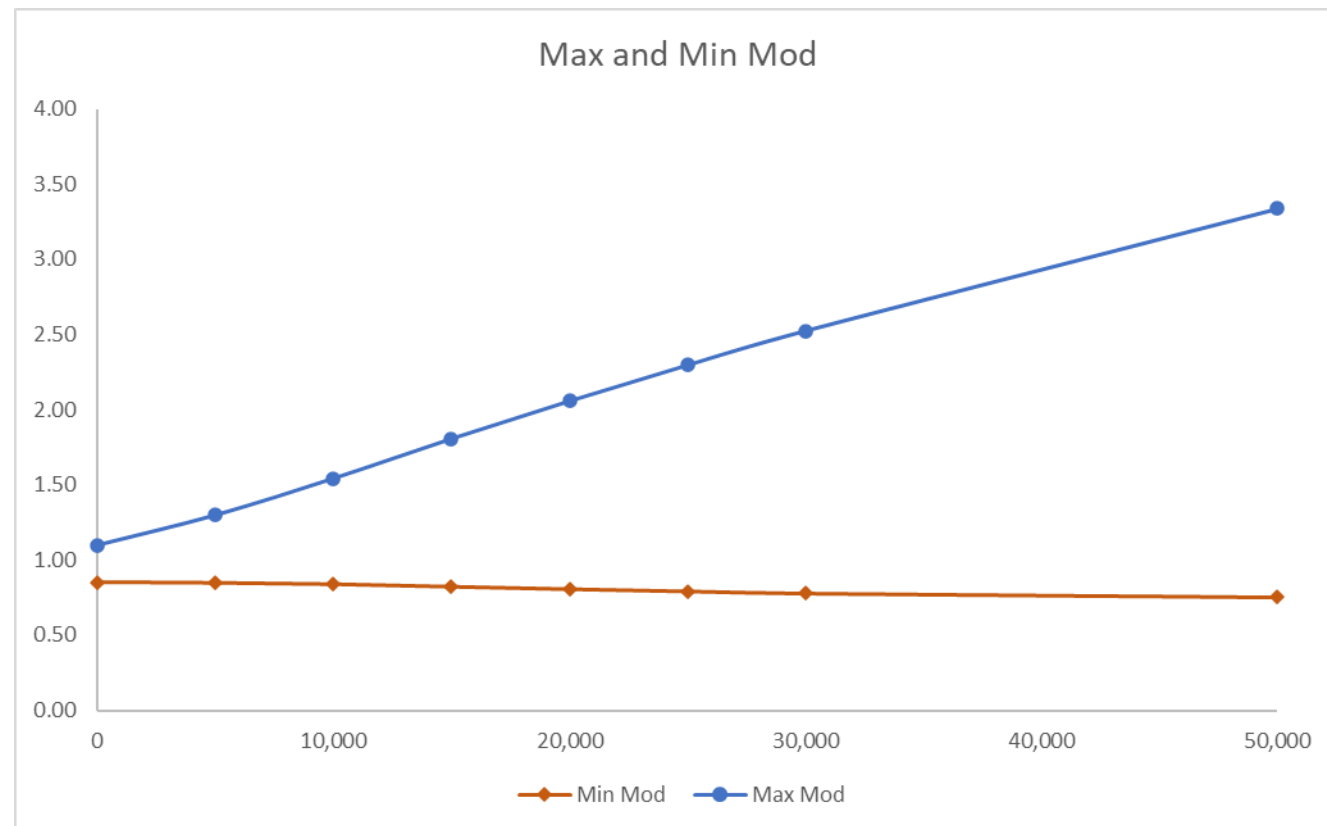
Example - Capping

Max Mod = 1.10 + 0.0004 (E/G)

Exp Loss	5,000	10,000	25,000	50,000	250,000	500,000	1M
Max Mod(G=10)	1.30	1.50	2.10	3.10	11.10	21.10	41.10

Current +/-25% Capping

Expected Loss	Prior Mod	Indicated	Final Capped Mod YR 1	Final Capped Mod YR 2	Final Capped Mod YR 3
$10,000	1.02	2.50	1.28	1.60	2.00
			=1.02x 125%	=1.28 x 125%	=1.60 x 125%

Updated Plan

Scenario	Expected Loss	Prior Mod	Indicated	Capped Mod	Max Mod	Final Capped Mod YR 1	Final Capped Mod YR 2
Transition	$10,000	1.02	2.50	1.28 (+25%)	1.50	1. 28	1.50
After Transition	$10,000	1.02	2.50	1.43 (+40%)	1.50	1. 43	1.50

Min (Max Mod, Capped Mod)

Policies Capped by Various Capping Approaches

Eligibility	$10,000	$5,000	$5,000
Expected Loss	**Current Plan**	**Max Mod**	**Max Mod & +40% Cap**
<10,000	1%	3.7%	3.8%
10,000<=EL<=25,000	5%	1.4%	2.6%
25,000<EL<=50,000	3%	0.046%	0.9%
50,000<EL<=250,000	3%	0.002%	0.5%
> =250,000	0.27%	0.000%	0.1%
Total	**12%**	**5%**	**8%**

The +40% capping measure is estimated to impact about 3% of the risks

* Based on Policy Years 2017 and 2018

Policy Capping During and After Transition
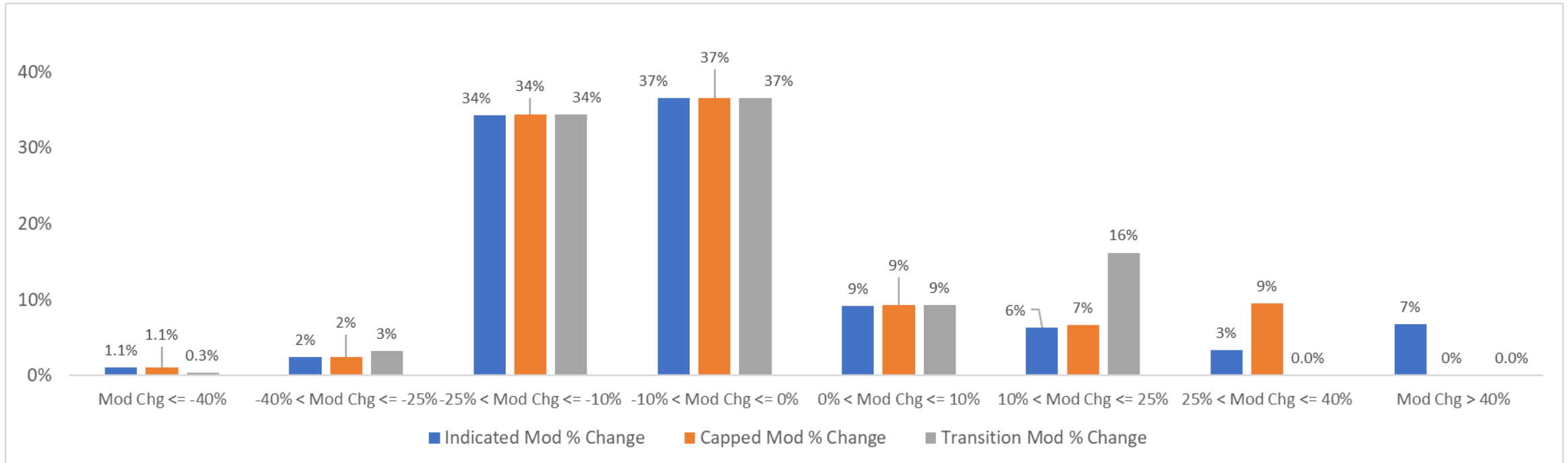
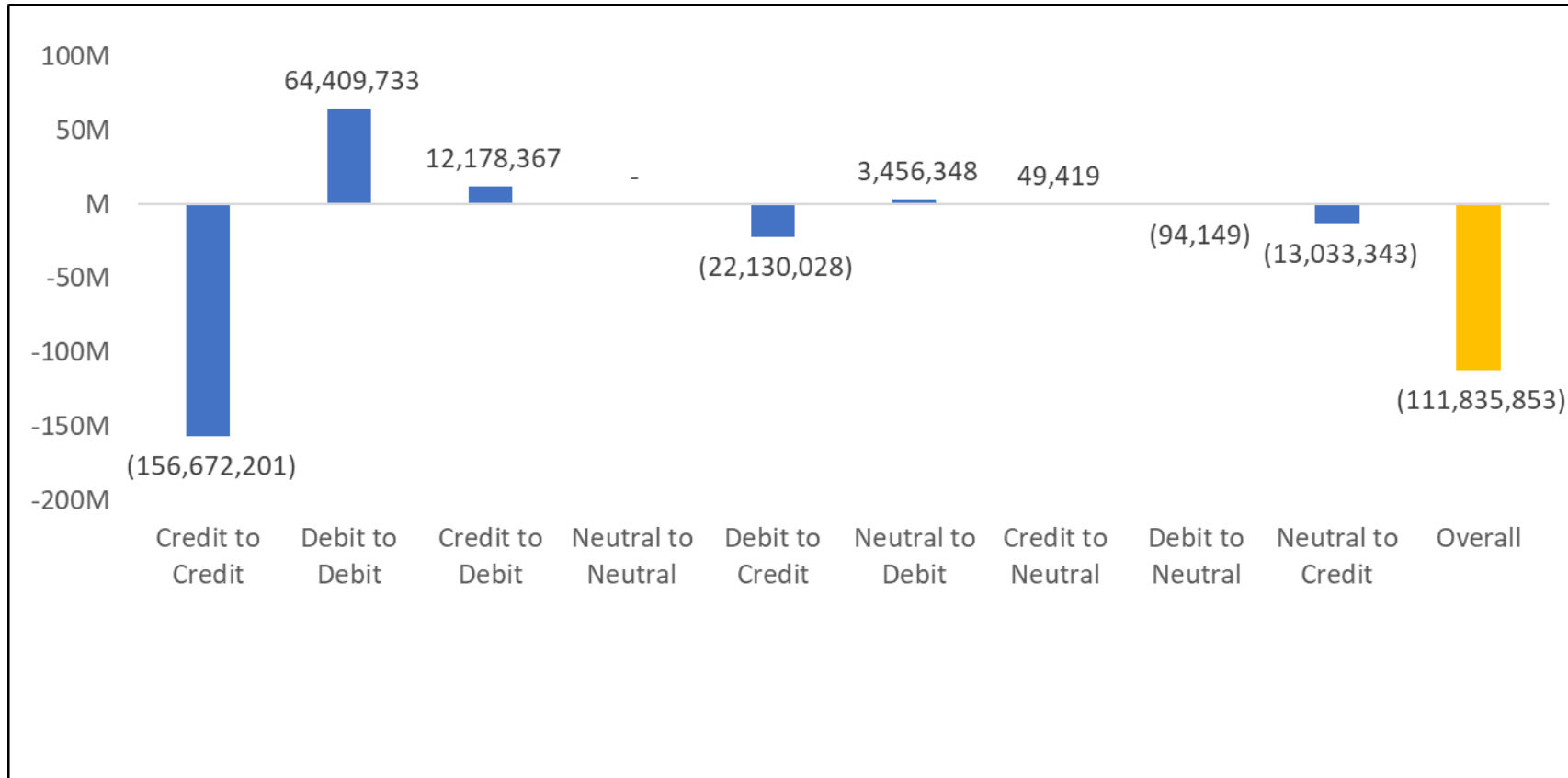Note: "Capped Mod" is calculated using Policy Year 2018 data and incorporates the application of the Max Mod formula along with a +40% capping measure. "Transition Mod" uses both Max Mod and +/-25% swing limit capping used during the transition period.

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Impact on Premium

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Expected Loss Range	10,706 - 5,806,852	5,000 - 4,338,871
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Med-Only Claims	100%	100%
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ERP Information, Tools and Reports

- Experience Rating Website Page
  - News Items with links to the filing circular and exhibits
  - Webinar presentation and recording
  - ERP Factsheet
  - FAQ
  - Pamphlet (including new Mod Worksheet)
  - Links to ERP tools and Reports
    - Experience Modification Calculator
    - Carrier Reports
      - Mod Comparison Report
      - 3Yr Ratings Report
  - Need Help, Contact Us at
    - (215) 568-2371
    - centralsupport@pcrb.com

Q & A

Appendix

Change in Modified Premium by Size
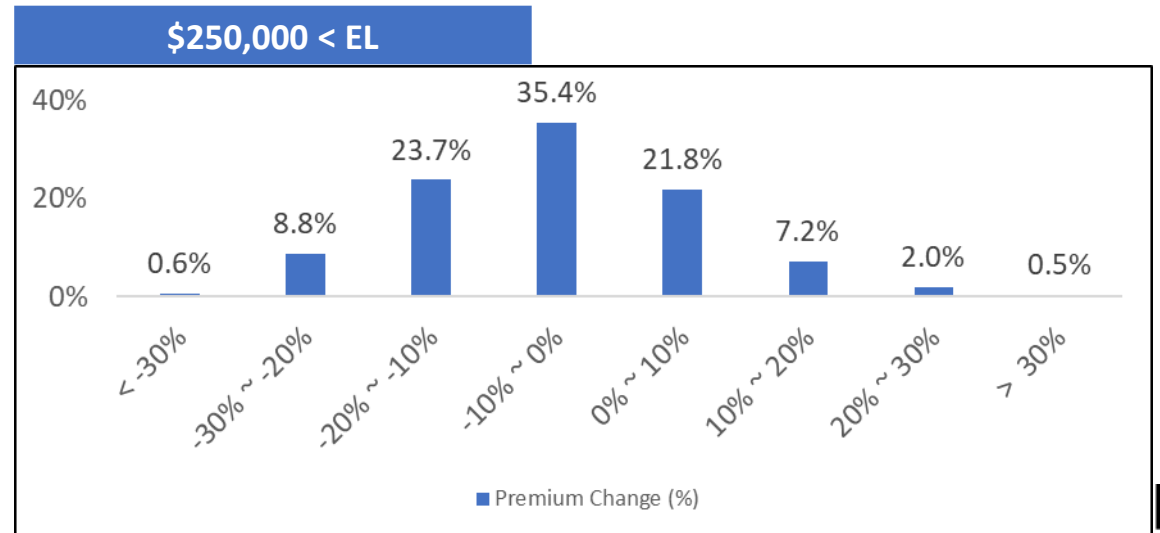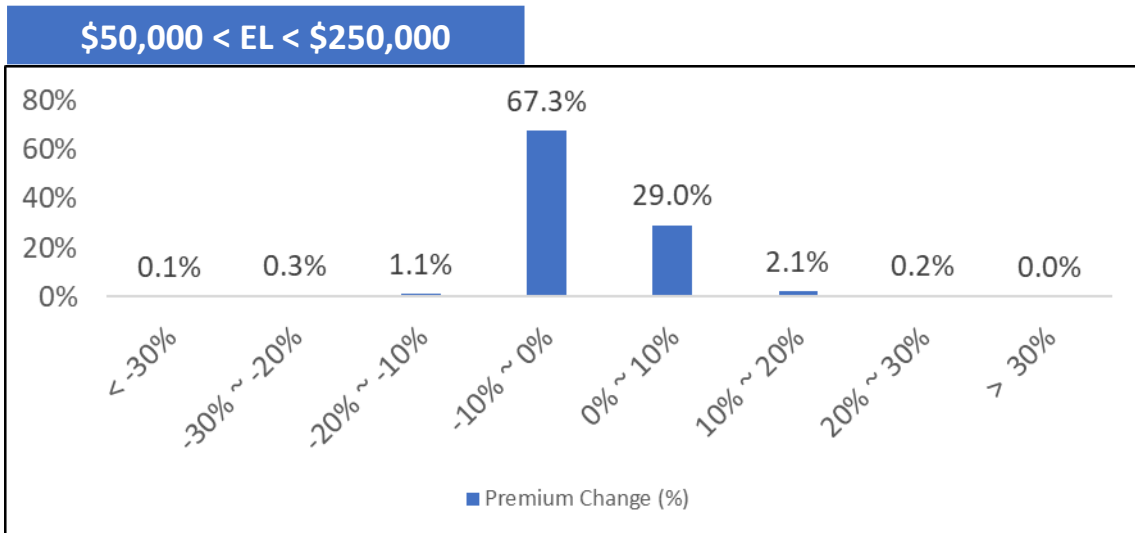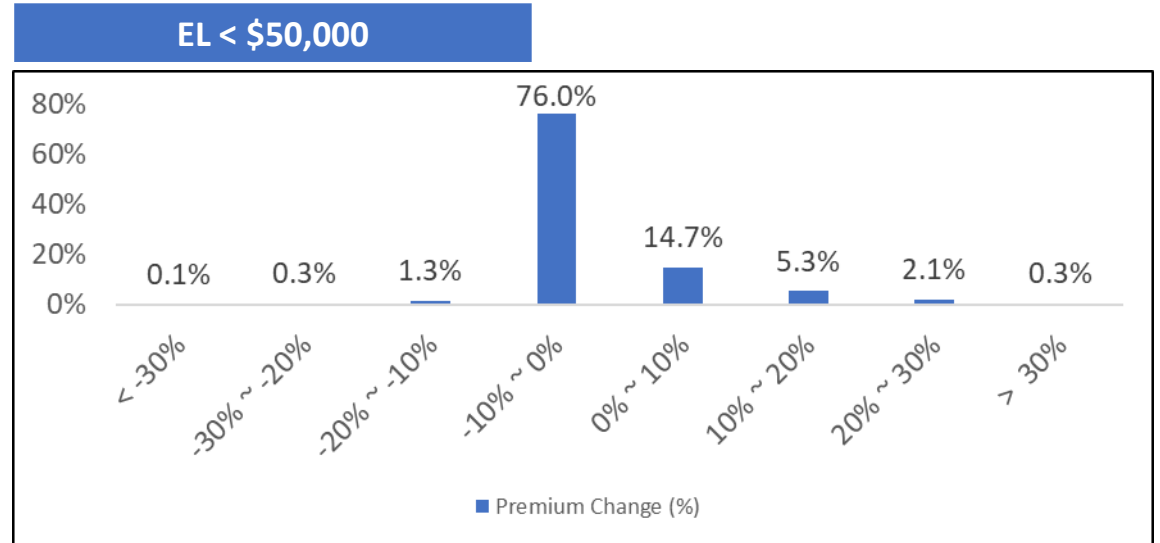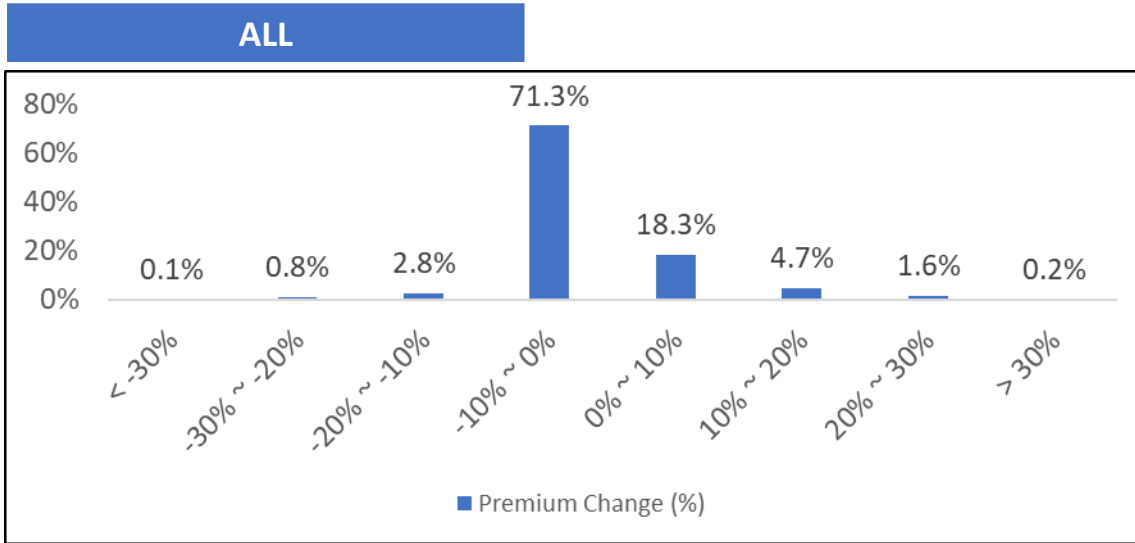
* Based on PY 2018 data. Premium based on mods after swing limits are applied.

Calculation of G value

Policy Year	2019	2018	2017	2016	2015
Undeveloped Loss	1,453,983,232	1,635,608,758	1,494,926,313	1,463,998,013	1,451,688,278
Undeveloped Counts including Med-Only	135,089	154,286	156,162	156,423	150,796
State Average Cost Per Case	10,763	10,601	9,573	9,359	9,627
G	11	11	10	9	10

Selected 'G' value = 10 (Average of five policy years)

Credit to Debit Movements
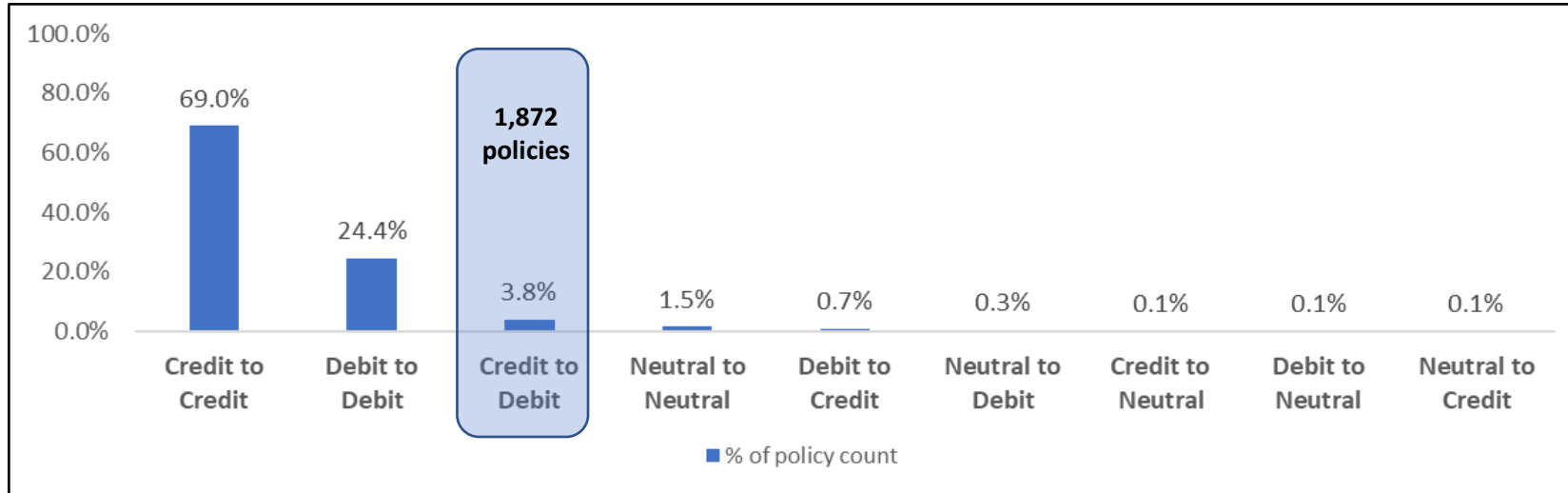
Under the updated plan, expected loss at $42,500 split point is around $150,000.

EL < 150,000	1,816
EL > 150,000	56

Current Plan	
< 0.9	10
0.9 < Mod < 0.95	403
0.95 < Mod < 0.975	770
0.975 < Mod < 1.0	689
Credit to Debit	1,872

Updated Plan	
1 < Mod < 1.05	1,017
1.05 < Mod < 1.1	625
1.1 < Mod < 1.15	216
1.15 < Mod < 1.2	12
> 1.2	2
Credit to Debit	1,872

IG	Count
1	254
2	364
3	1,254
TOTAL	1,872

* Based on PY 2018 data

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Distribution of Small Risks

Mod Range	Indicated	Capped
0.75-0.95	18,714	
0.95-1	504	
1-1.05	293	
1.05-1.25	610	57
1.25-1.5	347	183
1.5-1.75	208	208
1.75-2	477	477
> 2.0	972	972
Total	22,125	1,897

Merit Rated Risks (5,000 < Premium < 10,000)
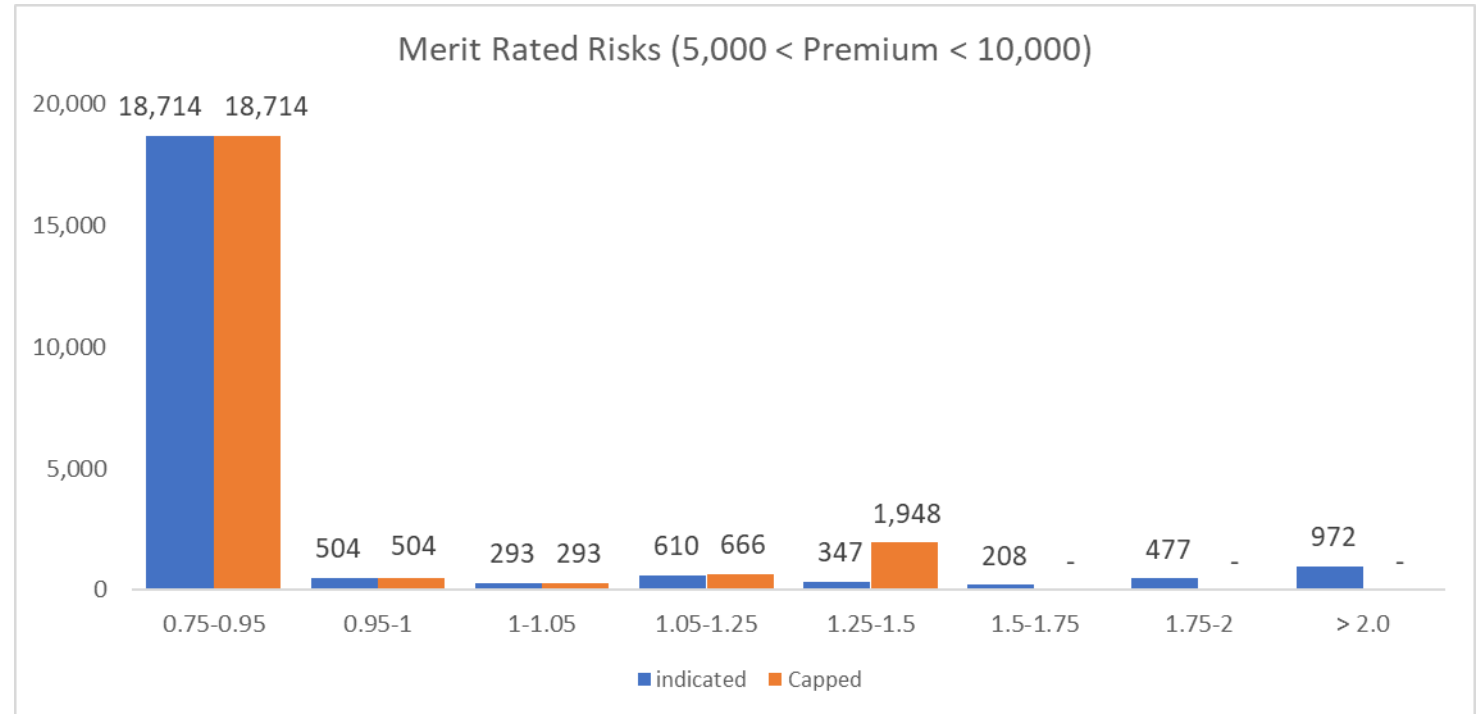
Note: 1,897 current merit rated risks would be capped to max mod between 1.1 and 1.5.

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Policies Capped

Mod Category	Current Plan (+/-25%)	Updated Plan (+/-25%)	Proposed Plan (Max Mod & +40%)
Credit	2%	3%	0%
Debit	8%	11%	8%
Neutral	1.5%	1.6%	0%
Total	**12%**	**16%**	**8%**

Most capped risks are smaller risks that are below $25,000.

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Distribution of Mod Change and Premium

% Change from 2017 Mod to 2018 Mod
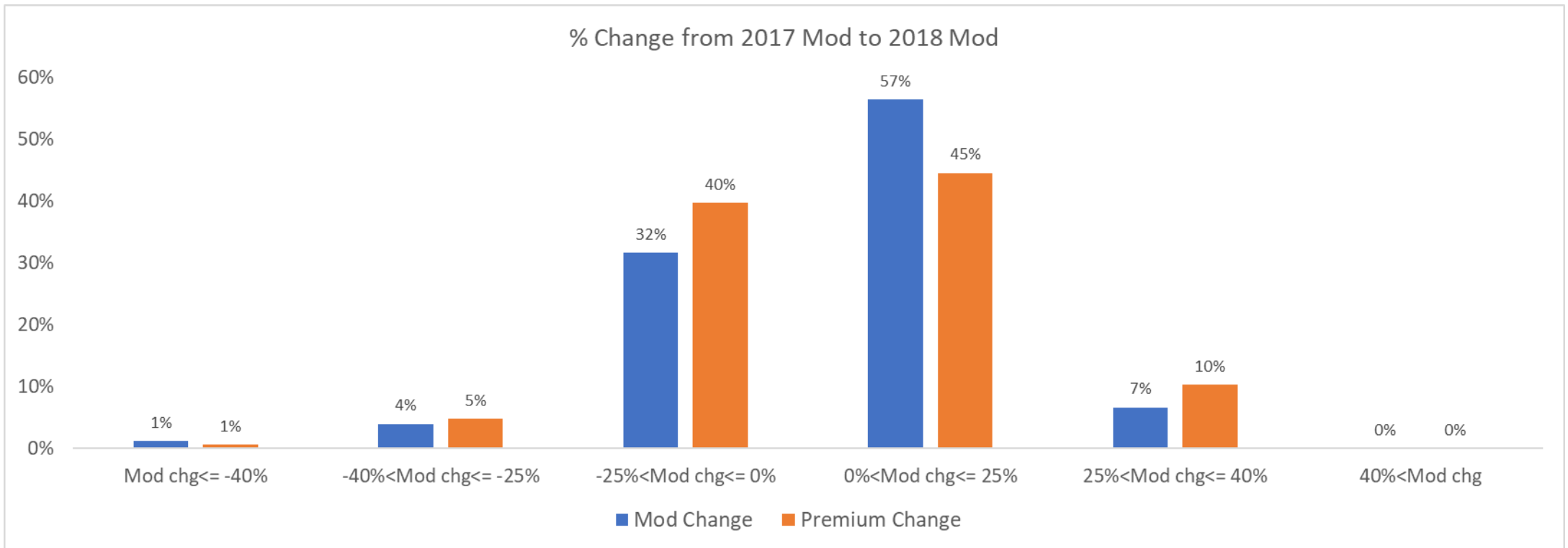
- The percentage change is calculated from the 2017 <u>capped</u> mod to the 2018 <u>capped</u> mod, based on the new plan's mod calculation method.

ERP Credibility: Current vs. Proposed

Current Credibility
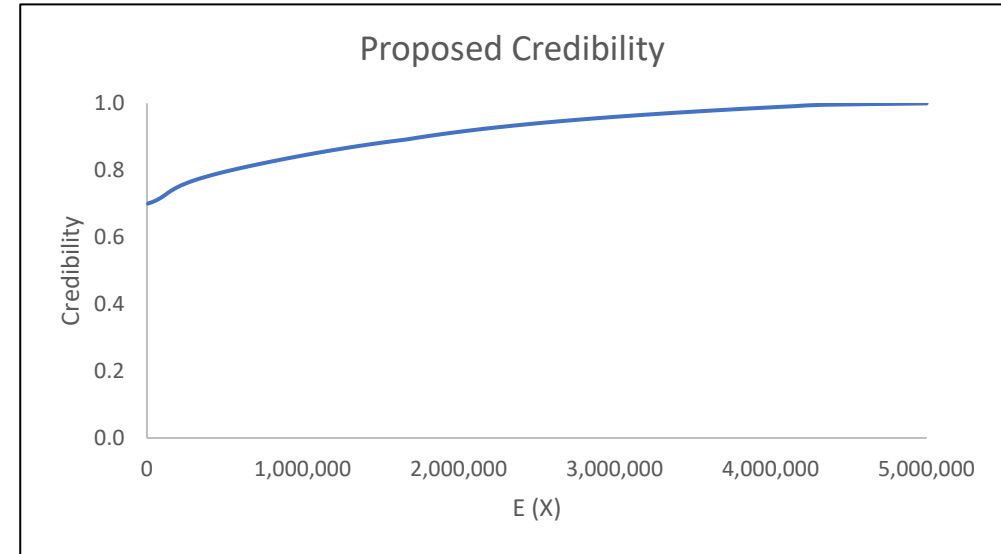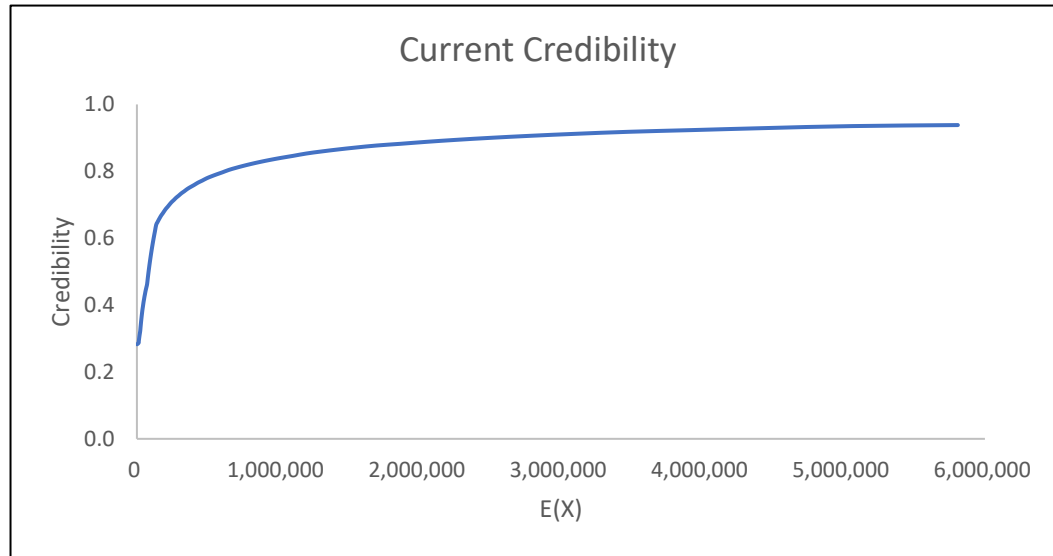
Under the current plan, the credibility curve starts at 28.3% and the maximum credibility is 93.8%.

The revised credibility curve starts at around 70% and the maximum credibility is around 97%.

The new variable split points by size of risk resulted in higher credibility values during the optimization process.

Table B: Credibilities and Maximum Values

Expected Losses Low	High	Credibility*	Split Point*	Expected Losses Low	High	Credibility	Split Point	Expected Losses Low	High	Credibility	Split Point
-	5,000	0.690	10,000	382,034	405,008	0.785	73,000	1,422,700	1,467,472	0.881	190,000
5,000	11,097	0.692	11,000	405,008	428,814	0.788	75,000	1,467,472	1,513,704	0.884	194,000
11,097	17,683	0.694	13,000	428,814	453,416	0.791	77,000	1,513,704	1,561,526	0.887	198,000
17,683	23,953	0.697	15,000	453,416	478,780	0.794	80,000	1,561,526	1,611,076	0.890	202,000
23,953	29,924	0.699	17,000	478,780	504,867	0.797	83,000	1,611,076	1,662,502	0.893	206,000
29,924	35,614	0.701	19,000	504,867	531,643	0.800	86,000	1,662,502	1,715,957	0.896	210,000
35,614	41,041	0.703	21,000	531,643	559,072	0.803	89,000	1,715,957	1,771,606	0.899	215,000
41,041	55,902	0.706	23,000	559,072	587,119	0.806	92,000	1,771,606	1,829,621	0.902	220,000
55,902	68,958	0.711	25,000	587,119	615,751	0.809	95,000	1,829,621	1,890,183	0.905	225,000
68,958	80,590	0.715	27,000	615,751	644,938	0.812	98,000	1,890,183	1,953,479	0.908	230,000
80,590	91,141	0.718	29,000	644,938	674,652	0.815	102,000	1,953,479	2,019,709	0.911	235,000
91,141	100,920	0.722	31,000	674,652	704,871	0.818	106,000	2,019,709	2,089,078	0.914	240,000
100,920	110,201	0.725	33,000	704,871	735,573	0.821	110,000	2,089,078	2,161,801	0.917	245,000
110,201	119,228	0.728	35,000	735,573	766,742	0.824	114,000	2,161,801	2,238,101	0.920	250,000
119,228	128,218	0.731	37,000	766,742	798,366	0.827	118,000	2,238,101	2,318,210	0.923	255,000
128,218	137,358	0.734	39,000	798,366	830,440	0.830	122,000	2,318,210	2,402,367	0.926	260,000
137,358	146,813	0.737	41,000	830,440	862,961	0.833	126,000	2,402,367	2,490,821	0.929	265,000
146,813	156,724	0.740	43,000	862,961	895,933	0.836	130,000	2,490,821	2,583,829	0.932	270,000
156,724	167,212	0.743	45,000	895,933	929,367	0.839	134,000	2,583,829	2,681,655	0.935	275,000
167,212	178,379	0.746	47,000	929,367	963,278	0.842	138,000	2,681,655	2,784,572	0.938	280,000
178,379	190,306	0.749	49,000	963,278	997,690	0.845	142,000	2,784,572	2,892,863	0.941	285,000
190,306	203,062	0.752	51,000	997,690	1,032,631	0.848	146,000	2,892,863	3,006,815	0.944	290,000
203,062	216,698	0.755	53,000	1,032,631	1,068,138	0.851	150,000	3,006,815	3,126,727	0.947	295,000
216,698	231,254	0.758	55,000	1,068,138	1,104,253	0.854	154,000	3,126,727	3,252,905	0.950	300,000
231,254	246,756	0.761	57,000	1,104,253	1,141,026	0.857	158,000	3,252,905	3,385,661	0.953	300,000
246,756	263,220	0.764	59,000	1,141,026	1,178,516	0.860	162,000	3,385,661	3,525,316	0.956	300,000
263,220	280,654	0.767	61,000	1,178,516	1,216,788	0.863	166,000	3,525,316	3,672,201	0.959	300,000
280,654	299,053	0.770	63,000	1,216,788	1,255,914	0.866	170,000	3,672,201	3,826,650	0.962	300,000
299,053	318,410	0.773	65,000	1,255,914	1,295,976	0.869	174,000	3,826,650	3,989,009	0.965	300,000
318,410	338,707	0.776	67,000	1,295,976	1,337,061	0.872	178,000	3,989,009	4,159,630	0.968	300,000
338,707	359,924	0.779	69,000	1,337,061	1,379,268	0.875	182,000	4,159,630	4,338,871	0.971	300,000
359,924	382,034	0.782	71,000	1,379,268	1,422,700	0.878	186,000	4,338,871	Above	0.974	300,000

* Preliminary values

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