August 25, 2023

Financial Services Regulatory Authority
5160 Yonge Street, 17th Floor
North York, ON M2N 6L9

Attention: Mr. Cong Wang, Director, Products and Approvals, FSRA

RE: OW Preliminary Ontario Private Passenger Vehicle Annual Review (Based on Industry Data Through December 31, 2022) dated July 6, 2023

Dear Mr. Wang,

Please find enclosed Facility Association's (FA) submission to the Financial Services Regulatory Authority of Ontario ("FSRA") Annual Review of Automobile Insurance Loss Experience. Our submission is in two parts. The first section provides FA's perspective on the current state of the insurance market in the province. The second section, addresses the draft Oliver Wyman ("OW") reports entitled "*Draft Ontario Private Passenger Vehicles Annual Review (Based on Industry Data Through December 31, 2022*" dated July 6, 2023 ("OW Report").

Any questions related to this submission may be directed to me by email at pgosselin@facilityassociation.com or by phone at 416-644-4968.

Best regards,

Philippe Gosselin, FCAS, FCIA
VP Actuarial & CRO

INTRODUCTION

FA's purpose is to ensure the availability of Automobile Insurance, and it is our continued position that this is best achieved through the availability of automobile insurance in the voluntary market in Ontario, providing consumers a choice in terms of both insurance provider and type and amount of coverage available[1]. We believe this corresponds with the Financial Services Regulatory Authority ("FSRA") mission of fostering a sustainable, competitive financial services sector and respond to market changes quickly.

Broadly speaking, we have some concern with potential availability issues in Ontario. We note that, except for 2020 and 2021 (impacted by COVID-19), the OW estimates of PPV loss ratios (indemnity, ALAE, and ULAE) have persisted at only a marginal improvement from their peak in 2016, and, since 2015, have remained well above the 68% level we estimate would be consistent with the proposed benchmarks as per the OW Report. The lower loss ratios of 2020 and 2021 cannot be expected to continue as the pandemic restrictions and their economic impact recede, as shown by 2022 loss ratio being relatively similar to pre COVID-19 levels.

It is challenging to promote both fairness and predictability in automobile insurance rates at a time when the underlying costs of benefits provided by the insurance product are very difficult to predict, as stated in several passages of the OW Report. This is especially the case following significant reforms, and challenges in the understanding of changes in frequency of accidents and claims, and their associated severity, both in relation to injured parties and to vehicle damage. Nonetheless, we believe promoting fairness and insurers' ability to set and predict their rates will enhance availability and competition in the marketplace to the ultimate benefit of consumers.

FA's long-standing position has been that that benchmarking exercises should be used to inform regulators of considerations for rate filings, rather than to set specific targets, caps, or floors with respect to any one particular assumption. This approach opens the opportunity for insurers to reflect their own assessment of future costs in providing their product / service to the consumer, and allows them to set their rates based on their assessment of the competitive market in which they operate. This, we believe results in the greatest consumer choice in both providers and product, while maintaining fairness to all parties.

In contrast, setting specific values, floors or caps would adversely impact availability of voluntary automobile insurance in the province, to the extent that capital providers in the voluntary market take an adverse view of their ability to charge rates that they have assessed relative to the future costs and risk of providing insurance.

We believe it is important to lay the foundation for a flexible system, where insurers would be able to include their best estimates of future costs based on their own assumptions, judged by the regulators on their own merit and the basis of reasonableness, considering prediction uncertainty.

Our concern from a voluntary market availability standpoint, is that benchmarks based on the OW Draft Report may act to discourage insurers from filing for rate changes and pull back from the market, reducing competition and availability.

[1] Consumers in Ontario are required to purchase $200,000 of third party liability protection. However, it is clear that consumers see value in broader insurance coverage to protect them and their financial wellbeing, as less than 0.04% of private passenger vehicles were insured for the required minimum third party liability limit, according to 2022 data found in GISA industry data (the AUTO7501). Further, 89% purchased protection for their vehicle against collision/upset, and 72% purchased protection for their vehicle against theft and non-collision damage. We believe these statistics show a clear consumer appetite in the province for automobile insurance across many of the perils to which owning or operating an automobile exposes consumers.

This being said, we commend FSRA's position that benchmarks are used to '***assist*** *FSRA in reviewing Private Passenger Automobile ("PPA") insurance rate filing applications based on statutory requirements*' as well as that '*As Benchmarks are developed based on the review of the industry data, they may not represent an individual insurer's business. FSRA indicated in the 2020-H2 Guidance that insurers are no longer permitted to directly adopt the Benchmarks without justification. FSRA requires that all actuarial assumptions be fully supported with an analysis of the insurers' own data, to the extent credible, regardless of whether FSRA Benchmarks are assumed*.'

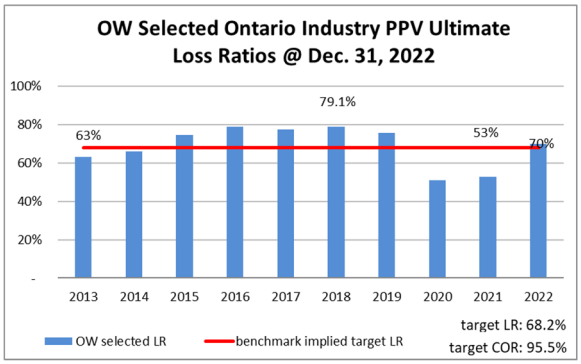
We would respectfully request the FSRA consider expanding the areas where it permits more flexibility for companies when selecting assumptions supporting their rate applications, including:

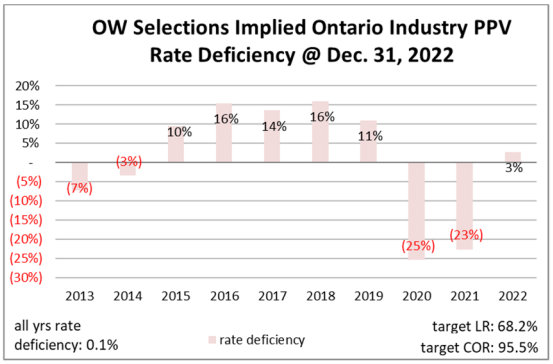
- Impact of Reform and COVID-19;
- Selection of industry ultimate claim counts and amounts supporting their analyses (including trend analyses);
- Selection of trend models (including the underlying methodology and approach) and associated estimates of trends or other changes to claims metrics;
- Operational expenses; and
- Profit provisions (in terms of both the metric to use, and the level to target).

In considering these areas of potential flexibility, it is important to recognize the extent of the current estimated rate deficiency in the province. Based on our interpretation, the draft benchmark assumptions would indicate a target indemnity and claims expense ratios of approximately 68% for PPV. The charts below summarize the estimated rate deficiencies for PPV, by accident year, relative to this target level.

It is important to note that these are not estimates of actual hindsight rate deficiencies, nor do they represent FA models of required profitability. This is rather the estimated rate deficiency when applying the OW benchmark assumptions per the current draft benchmark report. We have not attempted to put claims or premium amounts "on-level" (i.e. adjusted claims for trends/reforms over time; adjusted premium levels for premium trend and rate changes).

*Industry Ontario **PPV** @ December 31, 2022 - OW selected indemnity, ALAE, ULAE LRs and implied rate deficiencies on basis of OW selected current benchmarks*





For PPV, if we exclude 2020 and 2021, the estimated weighted average rate deficiency would be about 7.2% or **greater than $6.4 billion in PPV premium shortfall over that 8-year period**. If we were to include 2020 and 2021, the weighted average rate deficiency would decrease to 0.1% or **greater than $0.1 billion in PPV premium shortfall over that 10-year period.**

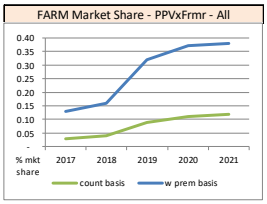
The Ontario industry PPV average premium deficiency over the decade is not significant (0.1%). However, the industry PPV loss ratios have been consistently higher than the target loss ratio of 68% since 2015, except 2020 and 2021 mainly due to impact of COVID-19.

In addition, FARM PPV written exposure and FARM PPV market share have been increasing steadily since 2017. Indeed, FARM market share has more than doubled in this time frame, increasing from 0.03% in 2017 to 0.12% in 2021 (2022 industry AIX data is not available at this time). With the continued increase of the FARM PPV written exposure and FARM PPV market share since 2017, we were concerned for the FARM rates' competitiveness and that it could be an early indicator of some availability issue in Ontario for private passenger vehicles. In consideration of this increasing market share as well as profitability issues, FARM filed for a +12.1% rate increase effective June 1, 2022 and a +13.1% rate increase effective May 1, 2023, which have led to a decrease in exposures in 2022 and 2023 based on the early data we are seeing. We commend FSRA's cooperation and understanding during FARM's filing review and approval process, supporting FARM towards achieving desired goals of reasonable profitability and minimizing our market share.

The chart below shows the Ontario PPV FARM market share since 2017. Please note that the 2022 industry data is not available at the time of this submission.

Written Premium is in $000s

Private Passenger Vehicles excluding Farmers	Year	FARM ON - PPVxFrmr - All			Industry ON - PPVxFrmr - All			FARM Market Share / AWP Comparison		
		Written Exposure (excl trailers) - policy	Written Premium	Average Written Premium	Written Exposure (excl trailers) - policy	Written Premium	Average Written Premium	FARM Market Share (veh counts)	FARM Market Share (w prem)	FARM / Industry AWP
PPVxFrmr	2017	2,354	14,457	6,142	7,586,132	10,972,617	1,446	0.03	0.13	425
PPVxFrmr	2018	3,127	18,349	5,869	7,766,276	11,694,321	1,506	0.04	0.16	390
PPVxFrmr	2019	6,958	41,111	5,909	7,905,439	12,970,552	1,641	0.09	0.32	360
PPVxFrmr	2020	8,909	48,864	5,485	7,899,796	13,173,549	1,668	0.11	0.37	329
PPVxFrmr	2021	9,594	50,603	5,274	8,019,656	13,255,173	1,653	0.12	0.38	319
	Total	30,941	173,384	5,604	39,177,300	62,066,211	1,584	0.08	0.28	354



SPECIFIC COMMENTS REGARDING THE ANNUAL REVIEW OF INDUSTRY EXPERIENCE

This document represents the Facility Association ("FA") written submission to the Financial Services Regulatory Authority ("FSRA") with respect to the Oliver Wyman reports entitled "*Draft Ontario Private Passenger Vehicles Annual Review (Based on Industry Data Through December 31, 2022)*" dated July 6, 2023 ("OW Report").

In the next few pages, specific to the trends outlined in the OW Report, we discuss the following issues and our views more broadly over the following pages:

- Selection of ultimates and valuation methodologies;
- Use of indemnity + ALAE + ULAE vs use of indemnity alone;
- Model complexity for reform parameters and reform impacts;
- Mobility parameter and Mobility Composite; and
- Selection of loss trend rates and uncertainty.

Summary of Selection

Our position has not changed that:

> For each coverage, there are many possible models for frequency, severity, and loss costs that are valid and reasonable. The ultimate selection of models by insurers in developing their rates is a matter of judgment and interpretation that can differ among actuaries even when modeling the same data. Differences should be expected and be seen as healthy in a competitive environment. It is the nature of the actuarial science.
>
> Specifically, we feel it is important for regulators to consider that valid differences in actuarial judgment and opinion can lead to differing selections of ultimates, and differing trend results. Indeed, differing models can fit actual results equally well, and yet, due to their structure (i.e. the selected parameters included in each), result in divergent forecasts.
>
> We also believe regulators should allow the filing insurer to set their prices and market share on their views of ultimates and their selections of models describing frequency/severity/loss costs over time and as projected into the future. The rate review process should focus on whether the filing insurer's process to arrive at their forecast was reasonable (and consistent with the insurer's previous views / process / approach unless an explanation is provided as to what has changed and why). If so satisfied, we believe regulators should accept the filing insurer's view, even if it differs from the view of the regulator's actuary.
>
> Forcing all participants in the insurance market place to adopt a single view introduces systemic risk and potentially detracts from the competitive marketplace should certain participants reduce their risk appetite where they do not agree with the imposed view. This can lead to an overly prescriptive regulatory environment, which we believe is not the intention of regulators.

With that in mind and as stated previously, we commend FSRA's position on the use of benchmarks as laid out in their latest Annual Review Guidance (No. AU0132APP) issued on December 20, 2022.

1. Selection of ultimates and valuation methodologies

As a starting point, we appreciate that GISA selected estimate of the ultimate loss amounts and claims counts are now based on multiple valuation methodologies as indicated in the GISA exhibits[2]. Indeed, it has been and is still our position that it is uncommon practice in Canada for a valuation actuary to rely on a single valuation **methodology in completing a valuation** as this introduces significant model risk (the risk that the model employed is not appropriate or has significant shortcomings for the experience being projected). To minimize model risk it is common to employ different models. Considering that the selection of ultimates is a critical and foundational input of the loss trend analysis, we believe that it is a significant enhancement to the process.

We also commend OW for their use of these ultimates as stated on Page 27 of the OW Report: "*At the request of FSRA, we reviewed the analysis prepared by EY on behalf of GISA to estimate the ultimate loss amounts (including ALAE) and claim counts for each accident half-year….Although we have different preferences in methodology, and would make different selections for the same methodologies, we find GISA's ultimate loss amount and claim count selections are reasonable for our purpose of determining loss trend rates.*"

2. Use of indemnity + ALAE + ULAE vs use of indemnity alone

OW uses indemnity plus allocated loss adjustment expense (ALAE) plus unallocated loss adjustment expense (ULAE) as the basis for loss amounts in their trend analysis.

Even though we understand that the combined indemnity and expense data is the norm in the industry, we would like to emphasize that the indemnity and expense data, as well as the underlying development and trend may be significantly different. Consequently, we should consider this if the analysis is based on the combination of both.

If the objective is to minimize any impacts or distortions in the data that may arise from insurers changing their mix of ULAE and ALAE over time, this can be achieved by modeling indemnity only data and recognizing that individual insurers are in a much better position to make direct adjustments for any shifts in their usage of ULAE vs ALAE over time, as they deem appropriate.

FA is analyzing the Ontario Industry PPV trends on an indemnity basis only and as explained above, this could result in different selections than those made by OW.

3. Model complexity for reform parameters and reform impacts

We appreciate that the OW Report includes the model design matrix in Appendix F with estimated coefficients for the parameters of the loss trend models. OW indicates that model complexity (or lack thereof, aka model parsimony) is considered in their model selection process[3].

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[2] *Please refer to AUTO1005-ON_2022, as it provides the implied loss development factors by coverage, where the implied loss development factors were based on the "Valuation of Ultimates Report on Implied Incurred Count and Loss Factors for Application in December 31, 2022 Exhibits to All-Industry Ontario Automobile Insurance Private Passenger (excluding Farmers) Class of Business as of the Valuation Data December 31, 2022" prepared by GISA's consultation actuary (Ernst & Young LLP).*

[3] *OW Report page 33 states "For this reason, we employ a holistic approach to modeling and consider several with varying parameters and accident periods to identify the underlying trends that occurred."*

We agree with this approach. FA similarly considers model complexity in its selection process, with a general preference of simple models over more complex models. We would also suggest that complexity reflects stakeholders' ability (ease or difficulty) to explain the model design and use the model output.

However, as mentioned in previous submissions, we still believe that, unfortunately with respect to the Accident Benefits reform factor approach, we would assess the OW models as complex. We believe the OW reform approach is overly complex in approach, and may lead to low variance / higher bias, resulting in future coefficient estimates that are at risk of significant change. The model design and output is, in our view, difficult to explain as both reform scalars and trends are modeled as changing over a period of time related to the most recent changes.

OW Report Appendix F Page 4

Financial Services Regulatory Authority of Ontario
Private Passengers Vehicles (Excluding Farmers)

Selected Trend Model: Accident Benefits - Total
Data as of 12/31/22

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Observed			Covariates					Predicted		
Time	Frequency (000)	Severity	Loss Cost	Phase-in Reform Scalar Parameter	Phase-in Trend Parameter	Seasonality	Mobility	New Normal	Frequency (000)	Severity	Loss Cost
2011.75	10.080	31,181	314.31	0.00	0.000	1	0.00	0			323.6
2012.25	8.847	31,920	282.41	0.00	0.000	0	0.00	0			294.2
2012.75	9.565	34,704	331.96	0.00	0.000	1	0.00	0			345.5
2013.25	9.356	32,984	308.58	0.00	0.000	0	0.00	0			314.1
2013.75	10.908	33,290	363.15	0.00	0.000	1	0.00	0			369.0
2014.25	9.646	33,352	321.72	0.00	0.000	0	0.00	0			335.4
2014.75	10.002	36,629	366.37	0.00	0.000	1	0.00	0			394.0
2015.25	10.156	34,839	353.82	0.00	0.000	0	0.00	0			358.2
2015.75	10.718	38,718	414.99	0.00	0.000	1	0.00	0			420.7
2016.25	10.107	37,744	381.48	0.01	0.003	0	0.00	0			381.8
2016.75	11.171	33,829	377.90	0.33	0.170	1	0.00	0			411.1
2017.25	9.978	30,781	307.15	0.83	0.583	0	0.00	0			324.1
2017.75	11.055	31,597	349.31	1.00	1.083	1	0.00	0			353.6
2018.25	9.818	30,725	301.67	1.00	1.583	0	0.00	0			310.9
2018.75	10.679	31,880	340.43	1.00	2.083	1	0.00	0			353.1
2019.25	9.624	32,248	310.36	1.00	2.583	0	0.00	0			310.4
2019.75	10.694	31,223	333.89	1.00	3.083	1	0.00	0			352.6
2020.25	5.631	37,145	209.16	1.00	3.583	0	(35.99)	0			215.4
2020.75	6.884	36,794	253.28	1.00	4.083	1	(33.22)	0			251.7
2021.25	5.221	35,926	187.57	1.00	4.583	0	(41.07)	0			204.4
2021.75	7.910	36,854	291.53	1.00	5.083	1	(20.38)	0			286.2
2022.25	7.178	33,539	240.74	1.00	5.583	0	(20.43)	0			251.5
2022.75	8.289	40,150	332.82	1.00	6.083	1	0.00	1			351.2

		Frequency Model	Severity Model	Direct Loss Cost Model
A.	Intercept			(126.400)
B.	Time			0.066
C.	Phase-in Reform Scalar Parameter			(0.233)
D.	Phase-in Trend Parameter			(0.067)
E.	Seasonality			0.128
F.	Mobility			0.010
G.	New Normal			

We question whether the additional complexity is necessary. In particular, the OW Accident Benefit - Total model introduced two complexities:

- **non-binary explanatory variables for the reform periods** – that is, fractional factors applied to accident half data to give weight over time to differentiate between claims arising that were subject to reforms and those that were not:
    - 0.00 for accident halfs 2015-H2 and prior
    - 0.01 for accident half 2016-H1
    - 0.33 for accident half 2016-H2

- 0.83 for accident half 2017-H1
- 1.00 for accident halfs 2017-H2 and subsequent

The factors were determined to give weight over time to differentiate between claims arising that were subject to reforms / changes and those that were not. We have no general issue on the approach, but it does raise the question as to whether it results in "better" estimates than a simpler model that picks a single period as the point at which to determine the scalar change.

- **staggered variable for time related to the reform impacts** – we recognize that this was set to align with the effective date of the reform, but contend this approach has led to a fragile model:
  - 0.000 for accident halves 2015-H2 and prior
  - 0.003 for accident halves 2016-H1
  - 0.170 for accident half 2016-H2 (an increase of 0.167, rather than 0.50)
  - 0.583 for accident half 2017-H1 (an increase of 0.413, rather than 0.50)
  - 1.083 for accident half 2017-H2 and increasing by 0.50 for each subsequent accident half

  For temporal spacing, the first three intervals are unusual, and we would ask whether this is necessary.

We applied the OW design matrix (OW Report Appendix F Page 4) to the FA Accident Benefit - Total data set[4]. The charts below show the model output of the OW Accident Benefit - Total design matrix applies to FA Accident Benefit - Total data set with OW explanatory variables values for the 2016 reform and mobility variables.

Model 1 Output – OW Accident Benefit - Total Design Matrix applied to FA Accident Benefit - Total data set with OW explanatory variables for reform and OW mobility variables (OW Report Appendix F Page 4)

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9913	0.9826	0.9775	0.0293	23	17	6

Runs-Test Result: 0.6998 RESIDUALS RUNS RANDOM ; residuals normal

parameters with p-value >5% 0 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.	
	1	2						
Intercept	(138.227)	12.283	(11.254)	0.0%	(164.142)	(112.313)	(138.227)	6
Season	0.120	0.013	9.477	0.0%	0.093	0.147	0.120	5
All Years	0.071	0.006	11.710	0.0%	0.059	0.084	0.071	4
Scalar 1	(0.252)	0.028	(8.967)	0.0%	(0.311)	(0.193)	(0.252)	3
Trend 1	(0.079)	0.008	(9.626)	0.0%	(0.096)	(0.062)	(0.079)	2
Scalar 2	0.010	0.001	15.071	0.0%	0.008	0.011	0.010	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9913	0.9826	0.9775	0.0293	23	17	6

Runs-Test Result: 0.6998 RESIDUALS RUNS RANDOM ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted
past	7.4%		6.8%	'16H1 => last period in "past"
future	(0.8%)		(0.1%)	

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.
All Yrs or AY	0.071	0.006	11.710	0.0%	0.059	0.084	0.071
AY+1	(0.008)	0.006	(1.287)	21.5%	(0.020)	0.005	(0.008)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Scalar 1 refers to 2016 reform parameter, and Scalar 2 refers to Mobility parameter. Note that New Normal parameter starting at 2022-H2 is not included in the AB model to be consistent as shown on Appendix F page 4 in the chart at the bottom.

[4] We pull all Accident Benefit sub-coverage data together which includes ME, DI, DB and FU based on FA's industry ultimate indemnity.

In FA's general loss trend modeling approach, scalars are introduced in models as dummy variables, taking values of 0 or 1, and the staggered variable for time increase by 0.5. The models results based on FA's approach, with changing of explanatory and staggered variables are summarized below:

Model 2 Output – OW Accident Benefit - Total *Design Matrix applied to FA* Accident Benefit - Total *data set, change the explanatory variables at 2016-H1 from (0.01) to 0, no other changes*

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9914	0.9828	0.9777	0.0292	23	17	6

Runs-Test Result: 0.6998 RESIDUALS RUNS RANDOM ; residuals normal

parameters with p-value >5% 0 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.	
	1	2						
Intercept	(137.849)	12.189	(11.309)	0.0%	(163.566)	(112.132)	(137.849)	6
Season	0.120	0.013	9.543	0.0%	0.094	0.147	0.120	5
All Years	0.071	0.006	11.768	0.0%	0.058	0.084	0.071	4
Scalar 1	(0.251)	0.028	(9.022)	0.0%	(0.310)	(0.192)	(0.251)	3
Trend 1	(0.079)	0.008	(9.653)	0.0%	(0.096)	(0.062)	(0.079)	2
Scalar 2	0.010	0.001	15.144	0.0%	0.008	0.011	0.010	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9914	0.9828	0.9777	0.0292	23	17	6

Runs-Test Result: 0.6998 RESIDUALS RUNS RANDOM ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted		
past	7.4%		6.8%		'16H1	=> last period in "past"
future	(0.8%)		(0.1%)			

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.
All Yrs or AY	0.071	0.006	11.768	0.0%	0.058	0.084	0.071
AY+1	(0.008)	0.006	(1.295)	21.3%	(0.020)	0.005	(0.008)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Model 3 Output – OW Accident Benefit - Total Design Matrix applied to FA Accident Benefit - Total data set, change the explanatory variables at 2016-H1 from (0.01) to 0 and the stagger variables at 2016-H1 from (0.003, 0.17, 0.583, 1.083, +0.5) to FA standard value (0.25, 0.75, 1.25, +0.5), no other changes

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9922	0.9845	0.9799	0.0277	23	17	6

Runs-Test Result: 0.2232 RESIDUALS RUNS RANDOM ; residuals normal

parameters with p-value >5% 0 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.	
	1	2						
Intercept	(146.219)	12.103	(12.081)	0.0%	(171.755)	(120.684)	(146.219)	6
Season	0.121	0.012	10.085	0.0%	0.096	0.146	0.121	5
All Years	0.075	0.006	12.544	0.0%	0.063	0.088	0.075	4
Scalar 1	(0.204)	0.027	(7.634)	0.0%	(0.261)	(0.148)	(0.204)	3
Trend 1	(0.084)	0.008	(10.256)	0.0%	(0.102)	(0.067)	(0.084)	2
Scalar 2	0.010	0.001	15.927	0.0%	0.008	0.011	0.010	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9922	0.9845	0.9799	0.0277	23	17	6

Runs-Test Result: 0.2232 RESIDUALS RUNS RANDOM ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted		
past	7.8%		6.8%		'16H1	=> last period in "past"
future	(0.9%)		(0.1%)			

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.
All Yrs or AY	0.075	0.006	12.544	0.0%	0.063	0.088	0.075
AY+1	(0.009)	0.006	(1.570)	13.5%	(0.021)	0.003	(0.009)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Model 4 Output – OW Accident Benefit - Total Design Matrix applied to FA Accident Benefit - Total data set, change the explanatory variables at 2016-H1 to 2017-H1 from (0.01, 0.33, 0.83) to FA standard value (0, 1, 1) and the stagger variables at 2016-H1 to 2017-H1 from (0.003, 0.173, 0.583) to FA standard value (0.25, 0.75, 1.25), no other changes

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9896	0.9793	0.9733	0.0320	23	17	6

Runs-Test Result: 2.0705 RESIDUALS RUNS NOT RANDOM ; residuals normal

parameters with p-value >5% 0 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.	
	1	2						
Intercept	(152.681)	14.657	(10.417)	0.0%	(183.604)	(121.757)	(152.681)	6
Season	0.130	0.014	9.398	0.0%	0.101	0.159	0.130	5
All Years	0.079	0.007	10.799	0.0%	0.063	0.094	0.079	4
Scalar 1	(0.168)	0.027	(6.287)	0.0%	(0.224)	(0.111)	(0.168)	3
Trend 1	(0.097)	0.009	(10.369)	0.0%	(0.117)	(0.077)	(0.097)	2
Scalar 2	0.009	0.001	13.613	0.0%	0.008	0.011	0.009	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9896	0.9793	0.9733	0.0320	23	17	6

Runs-Test Result: 2.0705 RESIDUALS RUNS NOT RANDOM ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted		
past	8.2%		6.8%		'16H1	=> last period in "past"
future	(1.8%)		(0.1%)			

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.
All Yrs or AY	0.079	0.007	10.799	0.0%	0.063	0.094	0.079
AY+1	(0.019)	0.006	(3.291)	0.4%	(0.031)	(0.007)	(0.019)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

The model 1, model 2, and model 3 are statistically similar as the parameter coefficients are within one standard error of the each model. However, the model 4 is statistically different than the other models.

The comparison of the models outputs above show the explanatory variable at 2016-H1 (0.01) and the stagger variable at 2016-H1 to 2017-H1 (0.003, 0.173, 0.583) do not have significant impact on the model results, but the explanatory variables at 2016-H2 to 2017-H1 (0.33, 0.83) have significant impact on the model results.

In summary, we would view two takeaways:

1. the minor weight (0.01) given to 2016-H1 for scalar 1 do not appear to be necessary from a statistical standpoint (and, as such, we recommend replacing with 0);
2. the additional temporal differences introduced for trend do not appear to be necessary from a statistical standpoint (and, as such, we recommend replacing with standard values).

The OW Report estimates Bill 15 and Bill 91 reforms coefficient is -23.3% (20.8% decrease) based on industry PPV data as December 31, 2022 in Accident Benefit - Total loss cost (Appendix F page 4). However, using FA's approach and FA data set, the estimated Bill 15 and Bill 91 reform coefficient is -16.8% +/-2.7% (15.5% decrease based on model 4) in Accident Benefit - Total loss cost.

FA selected model estimate Bill 15 and Bill 91 reform scalar coefficient is -23.9% (21.3% decrease) in medical & rehabilitation loss cost that is similar to OW Report estimated reform impact (20.8% decrease) in accident benefit total loss cost, however, FA selected model estimates Bill 15 and Bill 91 reform impact in disability income loss cost is not significant.

4. Mobility Parameter and Mobility Composite

OW Report includes estimated mobility composite factors for 2020-H1, 2020-H2, 2021-H1, 2021-H2, and 2022-H1 on Table 20.

Table 20: Average Mobility Composite

	Average Mobility					
Scenario	2020-1	2020-2	2021-1	2021-2	2022-1	2022-2
Projection	-36.0	-33.2	-41.1	-20.4	-20.4	-4.0

OW Report introduces Mobility Parameter in the loss trend models with non-binary explanatory variables for mobility parameter as indicated below (as examples, we are using BI and Accident Benefit - Total, OW Report Appendix F Page 1 and 4):

- 0.00 for accident halves 2019-H2 and prior
- -35.99 for accident half 2020-H1 for BI and Accident Benefit - Total
- -33.22 for accident half 2020-H2 for BI and Accident Benefit - Total
- -41.07 for accident half 2021-H1 for BI and Accident Benefit - Total
- -20.38 for accident half 2021-H2 for BI and Accident Benefit - Total
- -20.43 for accident half 2022-H1 for BI and Accident Benefit – Total
- 0.00 for accident half 2022-H2

Selected Trend Model: Bodily Injury
Data as of 12/31/22

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
								exp(A + (1) * B + Sumproduct((5):(8), (C):(F)))			Exp[Δ(1) * B]
	Observed			Covariates				Predicted			Incremental Semi
Time	Frequency (000)	Severity	Loss Cost	2016 Trend Change	Seasonality	Mobility	New Normal	Frequency (000)	Severity	Loss Cost	Time
2011.75	2.048	134,966	276.44	0.00	1	0.00	0	2.140	127,460	272.8	1.011
2012.25	1.767	135,850	240.04	0.00	0	0.00	0	1.862	128,831	239.8	1.011
2012.75	1.981	139,361	276.13	0.00	1	0.00	0	2.140	130,217	278.6	1.011
2013.25	1.871	128,774	240.99	0.00	0	0.00	0	1.862	131,617	245.0	1.011
2013.75	2.259	126,420	285.58	0.00	1	0.00	0	2.140	133,033	284.7	1.011
2014.25	1.944	125,918	244.80	0.00	0	0.00	0	1.862	134,464	250.3	1.011
2014.75	2.132	128,679	274.41	0.00	1	0.00	0	2.140	135,910	290.8	1.011
2015.25	1.980	130,277	257.97	0.00	0	0.00	0	1.862	137,372	255.7	1.011
2015.75	2.173	142,470	309.65	0.00	1	0.00	0	2.140	138,850	297.1	1.011
2016.25	1.886	133,350	251.53	0.00	0	0.00	0	1.862	140,343	261.3	1.011
2016.75	2.120	146,688	311.05	0.50	1	0.00	0	2.081	141,853	295.2	1.011
2017.25	1.717	135,982	233.51	1.00	0	0.00	0	1.761	143,379	252.4	1.011
2017.75	1.912	153,778	293.97	1.50	1	0.00	0	1.968	144,921	285.2	1.011
2018.25	1.592	146,996	233.96	2.00	0	0.00	0	1.665	146,480	243.9	1.011
2018.75	1.768	152,778	270.16	2.50	1	0.00	0	1.861	148,056	275.6	1.011
2019.25	1.496	148,497	222.22	3.00	0	0.00	0	1.575	149,648	235.7	1.011
2019.75	1.760	151,336	266.34	3.50	1	0.00	0	1.760	151,258	266.3	1.011
2020.25	0.924	175,965	162.66	4.00	0	(35.99)	0	0.982	152,885	150.1	1.011
2020.75	1.157	160,834	186.13	4.50	1	(33.22)	0	1.133	154,529	175.1	1.011
2021.25	0.847	161,828	137.11	5.00	0	(41.07)	0	0.876	156,191	136.8	1.011
2021.75	1.259	156,890	197.52	5.50	1	(20.38)	0	1.244	157,871	196.3	1.011
2022.25	1.077	137,094	147.62	6.00	0	(20.43)	0	1.052	159,570	167.8	1.011
2022.75	1.300	181,799	236.27	6.50	1	0.00	1	1.318	161,286	212.5	

		Frequency Model	Severity Model	Implied Loss Cost Model
A.	Intercept	0.621	(31.292)	(37.578)
B.	Time		0.021	0.021
C.	2016 Trend Change	(0.056)		(0.056)
D.	Seasonality	0.139		0.139
E.	Mobility	0.012		0.012
F.	New Normal	(0.122)		(0.122)

We applied the OW design matrix above (OW Report Appendix F page 1) to the FA BI data sets.

The charts below show the model output of the OW BI design matrix apply to FA BI data set with OW mobility variables.

Model 1 Output – OW BI Design Matrix applied to FA BI data set with OW mobility variables (OW Report Appendix F Page 1)

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9777	0.9558	0.9429	0.0465	23	17	6

Runs-Test Result: 3.3297 **RESIDUALS RUNS NOT RANDOM** ; residuals normal

 # parameters with p-value >5% 1 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.	
	1	2						
Intercept	(34.596)	17.181	(2.014)	6.0%	(70.846)	1.654	(34.596)	6
Season	0.173	0.020	8.555	0.0%	0.130	0.215	0.173	5
All Years	0.020	0.009	2.318	3.3%	0.002	0.038	0.020	4
Scalar 1	-	-	-	n/a	-	-	-	0
Trend 1	(0.043)	0.015	(2.780)	1.3%	(0.076)	(0.010)	(0.043)	3
Scalar 2	0.010	0.001	8.001	0.0%	0.007	0.012	0.010	2
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	(0.030)	0.066	(0.455)	65.5%	(0.169)	0.109	(0.030)	1
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9777	0.9558	0.9429	0.0465	23	17	6

Runs-Test Result: 3.3297 **RESIDUALS RUNS NOT RANDOM** ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted	
past	2.0%		2.2%	'16H2	=> last period in "past"
future	(2.3%)		(3.4%)		

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.
All Yrs or AY	0.020	0.009	2.318	3.3%	0.002	0.038	0.020
AY+1	(0.023)	0.009	(2.556)	2.0%	(0.042)	(0.004)	(0.023)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Where Scalar 2 refers to Mobility parameter, and Scalar 3 refers to New Normal at 2022-H1. Scalar 3 is not statistical significant at 5% p-value level, and a statistically significant model output is provided in the chart below.

Model 1 Output – OW BI Design Matrix applied to FA BI data set with OW mobility variables (OW Report Appendix F Page 1), Scalar 3 removed as not being statistical significant

FITTED TREND STRUCTURE REGRESSION STATISTICS						
		Adjusted	S.E. of	# of Obs.	# of Obs.	# parameters
Multiple R	R^2	R^2	Estimate	n	Excluded	p
0.9774	**0.9553**	**0.9454**	0.0455	23	17	5

Runs-Test Result: 2.6431 RESIDUALS RUNS NOT RANDOM ; residuals normal

parameters with p-value >5%: 0 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.	
	1	2						
Intercept	(36.425)	16.333	(2.230)	3.9%	(70.739)	(2.111)	(36.425)	5
Season	0.172	0.020	8.739	0.0%	0.131	0.213	0.172	4
All Years	0.021	0.008	2.551	2.0%	0.004	0.038	0.021	3
Scalar 1	-	-	-	n/a	-	-	-	0
Trend 1	(0.047)	0.013	(3.597)	0.2%	(0.074)	(0.019)	(0.047)	2
Scalar 2	0.009	0.001	9.573	0.0%	0.007	0.012	0.009	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS						
		Adjusted	S.E. of	# of Obs.	# of Obs.	# parameters
Multiple R	R^2	R^2	Estimate	n	Excluded	p
0.9774	**0.9553**	**0.9454**	0.0455	23	17	5

Runs-Test Result: 2.6431 RESIDUALS RUNS NOT RANDOM ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted	
past	**2.1%**		**2.2%**	'16H2	=> last period in "past"
future	(2.6%)		(3.4%)		

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.
All Yrs or AY	0.021	0.008	2.551	2.0%	0.004	0.038	0.021
AY+1	(0.026)	0.007	(3.875)	0.1%	(0.040)	(0.012)	(0.026)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Removing Scalar 3 (New Normal) parameter has no significant impact, we would suggest to remove it from the model.

We appreciate the inclusion of mobility composite, but we are still not sure about "*By applying the mobility parameter's coefficient to the mobility, we are able to estimate the effect of the COVID-19 pandemic on claims experience*"[5]. The model design and output is, in our view, difficult to explain and use.

In the FA general approach, scalars are introduced in models as dummy variables, taking values of 0 or 1. The model results based on FA approach, with only replacing Scalar 2 temporal variables of mobility to 1, are summarized below:

Model 2 Output – OW BI Design Matrix applied to FA BI data set, only change the mobility variables at 2020-H1 to 2022-H1 from (-35.99, -33.22, -41.07, -20.38 and -20.43) to FA standard value (1, 1, 1, 1, and 1), no other changes

FITTED TREND STRUCTURE REGRESSION STATISTICS						
		Adjusted	S.E. of	# of Obs.	# of Obs.	# parameters
Multiple R	R^2	R^2	Estimate	n	Excluded	p
0.9366	**0.8772**	**0.8411**	0.0776	23	17	6

Runs-Test Result: 2.5518 RESIDUALS RUNS NOT RANDOM ; residuals normal

parameters with p-value >5%: 3 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.	
	1	2						
Intercept	(31.423)	29.491	(1.065)	30.2%	(93.643)	30.798	(31.423)	6
Season	0.186	0.033	5.573	0.0%	0.116	0.257	0.186	5
All Years	0.018	0.015	1.243	23.1%	(0.013)	0.049	0.018	4
Scalar 1	-	-	-	n/a	-	-	-	0
Trend 1	(0.041)	0.029	(1.411)	17.6%	(0.104)	0.021	(0.041)	3
Scalar 2	(0.276)	0.079	(3.484)	0.3%	(0.443)	(0.109)	(0.276)	2
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	(0.030)	0.124	(0.242)	81.1%	(0.293)	0.232	(0.030)	1
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS						
		Adjusted	S.E. of	# of Obs.	# of Obs.	# parameters
Multiple R	R^2	R^2	Estimate	n	Excluded	p
0.9366	**0.8772**	**0.8411**	0.0776	23	17	6

Runs-Test Result: 2.5518 RESIDUALS RUNS NOT RANDOM ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted	
past	**1.8%**		**2.2%**	'16H2	=> last period in "past"
future	(2.3%)		(3.4%)		

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.
All Yrs or AY	0.018	0.015	1.243	23.1%	(0.013)	0.049	0.018
AY+1	(0.023)	0.019	(1.258)	22.5%	(0.062)	0.016	(0.023)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

As the All Years, Trend 1 and Scalar 3 parameters are not statistically significant at 5% p-value level, we should remove them, and a statistically significant model output is provided in the chart below.

[5] OW Report page 37.

Model 2 Output – OW BI Design Matrix applied to FA BI data set, only change the mobility variables at 2020-H1 to 2022-H1 from (-35.99, -33.22, -41.07, -20.38 and -20.43) to FA standard value (1, 1, 1, 1, and 1), All Years, Trend 1 and Scalar 3 removed as not being statistical significant

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9179	**0.8426**	**0.8269**	0.0810	23	17	3

Runs-Test Result: 3.2558 **RESIDUALS RUNS NOT RANDOM** ; residuals normal

 # parameters with p-value >5% **0** (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.	
	1	2						
Intercept	5.214	0.027	193.947	0.0%	5.158	5.270	5.214	3
Season	0.171	0.034	5.018	0.0%	0.100	0.242	0.171	2
All Years	-	-	-	n/a	-	-	-	0
Scalar 1	-	-	-	n/a	-	-	-	0
Trend 1	-	-	-	n/a	-	-	-	0
Scalar 2	(0.344)	0.041	(8.329)	0.0%	(0.430)	(0.258)	(0.344)	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9179	**0.8426**	**0.8269**	0.0810	23	17	3

Runs-Test Result: 3.2558 **RESIDUALS RUNS NOT RANDOM** ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted		
past	**0.0%**		**2.2%**		**'16H2**	**=> last period in "past"**
future	**0.0%**		**(3.4%)**			

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.
All Yrs or AY	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

The model indicates Scalar 2 (COVID-19 impact) parameter is significant and estimates of the Scalar 2 coefficient is -34.4% +/-4.1%. This is easy to explain that the estimated average annual COVID-19 impact is about 29.1% decreasing comparing to pre-pandemic based on the industry data as at December 31, 2022. However, it is difficult to explain and use the OW model estimated mobility coefficient of 1.2%[6] with the mobility composite.

We conducted the same exercise in relation to Accident Benefit total loss cost. We applied the OW design matrix (OW Report Appendix F page 4) to the FA Accident Benefit - Total data sets[7]. The charts below show the model output of the OW Accident Benefit - Total design matrix apply to FA Accident Benefit - Total data set with OW explanatory variables values for the 2016 reform and mobility variables.

Model 1 Output – OW Accident Benefit - Total Design Matrix applied to FA Accident Benefit - Total data set (Appendix F page 4)

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9913	**0.9826**	**0.9775**	0.0293	23	17	6

Runs-Test Result: 0.6998 **RESIDUALS RUNS RANDOM** ; residuals normal

 # parameters with p-value >5% **0** (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.	
	1	2						
Intercept	(138.227)	12.283	(11.254)	0.0%	(164.142)	(112.313)	(138.227)	6
Season	0.120	0.013	9.477	0.0%	0.093	0.147	0.120	5
All Years	0.071	0.006	11.710	0.0%	0.059	0.084	0.071	4
Scalar 1	(0.252)	0.028	(8.967)	0.0%	(0.311)	(0.193)	(0.252)	3
Trend 1	(0.079)	0.008	(9.626)	0.0%	(0.096)	(0.062)	(0.079)	2
Scalar 2	0.010	0.001	15.071	0.0%	0.008	0.011	0.010	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9913	**0.9826**	**0.9775**	0.0293	23	17	6

Runs-Test Result: 0.6998 **RESIDUALS RUNS RANDOM** ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted		
past	**7.4%**		**6.8%**		**'16H1**	**=> last period in "past"**
future	**(0.8%)**		**(0.1%)**			

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. Lower	95% Upper	Selected Coeff.
All Yrs or AY	0.071	0.006	11.710	0.0%	0.059	0.084	0.071
AY+1	(0.008)	0.006	(1.287)	21.5%	(0.020)	0.005	(0.008)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

In the FA general approach, scalars are introduced in models as dummy variables, taking values of 0 or 1. The model results based on FA's approach, with only replacing Scalar 2 temporal variables of mobility to 1, are summarized below:

[6] OW model estimated mobility coefficient of 1.2% is from OW Report Appendix F Page 1.

[7] We pull all the Accident Benefit sub-coverage data together includes ME, DI, DB, FU claims based on FA's selected ultimate indemnity.

Model 5 Output – OW Accident Benefit - Total Design Matrix applied to FA Accident Benefit - Total data set, only change the mobility variables at 2020-H1 to 2022-H1 from (-35.99, -33.22, -41.07, -20.38 and -20.43) to FA standard value (1, 1, 1, 1, and 1), no other changes

FITTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9592	0.9201	0.8966	0.0629	23	17	6

Runs-Test Result: 2.8867 **RESIDUALS RUNS NOT RANDOM** ; residuals normal

 # parameters with p-value >5% 0 (intercept specifically not included)

	Coefficients	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.	
	1	2						
Intercept	(140.208)	26.340	(5.323)	0.0%	(195.781)	(84.635)	(140.208)	6
Season	0.132	0.027	4.867	0.0%	0.075	0.189	0.132	5
All Years	0.072	0.013	5.535	0.0%	0.045	0.100	0.072	4
Scalar 1	(0.275)	0.061	(4.526)	0.0%	(0.403)	(0.147)	(0.275)	3
Trend 1	(0.075)	0.018	(4.056)	0.1%	(0.114)	(0.036)	(0.075)	2
Scalar 2	(0.288)	0.048	(6.006)	0.0%	(0.388)	(0.187)	(0.288)	1
Trend 2	-	-	-	n/a	-	-	-	0
Scalar 3	-	-	-	n/a	-	-	-	0
Trend 3	-	-	-	n/a	-	-	-	0
Scalar 4	-	-	-	n/a	-	-	-	0
Trend 4	-	-	-	n/a	-	-	-	0

SELECTED TREND STRUCTURE REGRESSION STATISTICS

Multiple R	R^2	Adjusted R^2	S.E. of Estimate	# of Obs. n	# of Obs. Excluded	# parameters p
0.9592	0.9201	0.8966	0.0629	23	17	6

Runs-Test Result: 2.8867 **RESIDUALS RUNS NOT RANDOM** ; residuals normal

	Fitted Annual	Previous Selected	OW Selected Annual	selected = fitted
past	7.5%		6.8%	'16H1 => last period in "past"
future	(0.2%)		(0.1%)	

Cumulative Trends (summed coefficients)	fitted coeff	S.E.	t-Stat	p-value	C.I. 95% Lower	C.I. 95% Upper	Selected Coeff.
All Yrs or AY	0.072	0.013	5.535	0.0%	0.045	0.100	0.072
AY+1	(0.002)	0.014	(0.166)	87.0%	(0.032)	0.027	(0.002)
AY+1+2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AY+1+2+3+4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

The model 5 output indicates Scalar 2 coefficient of -28.8% +/-4.8%, and it is easy to explain that the estimated average annual COVID-19 impact is about 25.0% decreasing comparing to pre-pandemic based on the industry data as at December 31, 2022. However, it is difficult to explain the OW model estimated mobility coefficient of 1.0%[8] with the mobility composite.

Also, OW Report models in Appendix F include a New Normal parameter at 2022-H2 (e.g. BI, DCPD, CL), we tested its significance in BI loss cost and found the new normal parameter is not significant. We have concerns regarding the inclusion of new normal parameter in the model and the accuracy of the estimates of the new normal parameter coefficient based on only one data point, we would suggest to wait until we have more post pandemic experience to estimate the New Normal.

5. Selection of Trends Rates and Uncertainty

As stated on Page 2 of the OW Report:

> *"The COVID-19 pandemic affected the loss costs for 2020, 2021, and 2022-1 mainly driven by a decline in the claim frequency rate. Current projections of mileage and mobility (cell phone data) indicate a return to pre-pandemic mobility levels in the second half of 2022. We believe 2022-2 may be the start of a "new-normal" with remote and hybrid work models commonplace, and the pandemic behind us.*
>
> *Our loss trend selections are based on frequency levels without the influence of the COVID-19 pandemic."*

We agree with the assumption of return to pre-pandemic level, however we note that there are uncertainties as to the cut-off time, whether the new normal starts at 2022-1 or 2022-2 or 2023-1. This should be continued to be monitored as data emerges.

We have completed our own loss trend analysis using Ontario PPV Industry Experience as of December 31, 2022 with the exclusion of 2020-H1, 2020-H2, 2021-H1, 2022-H1, and 2022-H2 data points to remove the COVID-19 impacts, and we would like to provide FSRA with a summary of our selections of the past and future trends and how they compared with the preliminary selections from the OW Reports.

[8] OW model estimated mobility coefficient of 1.2% is from OW Report Appendix F Page 2.

Ontario Industry Trends as at December 31, 2022

Coverage	Ontario PPV FA Loss Cost Trend as at:2022-12		Ontario PPV OW Loss Cost Trend as at:2022-12		Loss Cost Trend Change Between FA and OW	
	past	future	past	future	past	future
BI	1.9%	1.9%	2.2%	(3.4%)	(0.3%)	5.3%
PD	5.4%	5.4%	4.7%	4.7%	0.7%	0.7%
DCPD	9.8%	9.8%	0.5%	8.8%	9.3%	1.0%
ME	2.3%	2.3%	7.3%	0.2%	(5.0%)	2.1%
DI	1.1%	1.1%	5.4%	(1.3%)	(4.3%)	2.4%
DB	(2.0%)	(2.0%)	(1.7%)	(1.7%)	(0.3%)	(0.3%)
FE	(1.6%)	(1.6%)	(1.7%)	(1.7%)	0.1%	0.1%
SU	-	-	-	-	-	-
AccBen (indivis)	2.0%	2.0%	6.8%	(0.1%)	(4.8%)	2.1%
UA	(2.3%)	(2.3%)	(9.3%)	0.1%	7.0%	(2.4%)
UM	-	-	2.2%	2.2%	(2.2%)	(2.2%)
CL	10.1%	10.1%	8.8%	8.8%	1.3%	1.3%
CM	9.0%	9.0%	10.4%	10.4%	(1.4%)	(1.4%)
SP	11.2%	11.2%	10.4%	10.4%	0.8%	0.8%
AP	6.9%	6.9%	9.4%	10.0%	(2.5%)	(3.1%)

Note: the past and future trends cut-off date between FA and FSRA may be different

We estimate that the OW future trend selections at the coverage level will translate to an overall loss cost future trend rate of 4.7% for private passenger vehicles, while the FA estimated overall loss cost future trend rate will be 6.0% using ON PPV industry 2022 ultimate indemnity as weights.

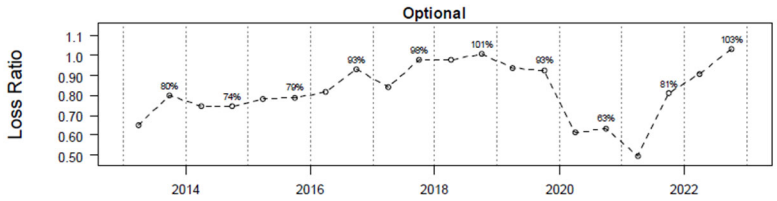
The difference between FA estimated future loss cost trend rates and OW preliminary loss cost trend rates would be due to many reasons such as: indemnity only or indemnity plus expenses, design matrix, using different values of the explanatory variables for the reform and mobility parameters, as well as data exclusion.

We also compare the OW preliminary loss cost trends as of December 31, 2022 to FSRA current benchmark loss cost trends as of June 30, 2022 (see below). The OW increased future trends for Bodily Injury, Accident Benefit, Uninsured Auto and Underinsured Motorist, but decreased future trends for physical damage coverages.

Coverage	Ontario PPV OW Loss Cost Trend as at:2022-12		Ontario PPV FSRA Loss Cost Trend as at:2022-06		Loss Cost Trend Change Between 2022-12 vs 2022-06	
	past	future	past	future	past	future
BI	2.2%	(3.4%)	(4.6%)	(4.6%)	6.8%	1.2%
PD	4.7%	4.7%	4.8%	4.8%	(0.1%)	(0.1%)
DCPD	0.5%	8.8%	8.7%	14.4%	(8.2%)	(5.6%)
ME	7.3%	0.2%	(0.9%)	(0.9%)	8.2%	1.1%
DI	5.4%	(1.3%)	(0.4%)	(0.4%)	5.8%	(0.9%)
DB	(1.7%)	(1.7%)	(1.3%)	(1.3%)	(0.4%)	(0.4%)
FE	(1.7%)	(1.7%)	(1.3%)	(1.3%)	(0.4%)	(0.4%)
SU	-	-	-	-	-	-
AccBen (indivis)	6.8%	(0.1%)	(0.8%)	(0.8%)	7.6%	0.7%
UA	(9.3%)	0.1%	(3.5%)	(3.5%)	(5.8%)	3.6%
UM	2.2%	2.2%	1.4%	1.4%	0.8%	0.8%
CL	8.8%	8.8%	8.5%	14.2%	0.3%	(5.4%)
CM	10.4%	10.4%	10.1%	15.8%	0.3%	(5.4%)
SP	10.4%	10.4%	10.1%	15.8%	0.3%	(5.4%)
AP	9.4%	10.0%	8.9%	14.6%	0.5%	(4.6%)

Note: the past and future trends cut-off date between FA and FSRA may be different

The OW Report Figure 6 provides loss ratio summary for Optional coverage (see chart on top of then next page). Loss ratios as of December 31, 2022 for optional coverages have been increasing since 2021 and continued to increase to 103% at 2022-2.



With uncertain economic condition and the increasing loss ratio for optional coverages, we would suggest FSRA consider increasing the future trends for physical damage coverages.

Finally, we appreciate the OW Reports' recommendation/mention regarding recent higher inflation:

> *"The recent claim experience is exceptional due to the COVID-19 pandemic and the recent rise in inflation. Potential future inflation scenarios add uncertainty to the selected future trend rate." (OW Report Page 2)*
>
> *"… when selecting the future trend rate, we suggest consideration of: …The impact of economic conditions and general high inflation on vehicle usage" (OW Report Page 3)*
>
> *"The recent rise in inflation that began in late 2021 affects the past loss cost levels; and any stabilization, moderation or increase in future inflation will affect future loss cost levels." (OW Report page 43)*
>
> *"Additionally, given the dynamic nature of the recent inflation environment, we recognize insurers may find an inflationary adjustment is required at the time of filing." (OW Report page 48)*

The recent rise in inflation, rise in vehicle thefts, and significant increase in the prices of used cars are just other indicators of pressure points affecting our industry.

The projection of future loss trend rate needs is subject to **considerable uncertainty** and FSRA should consider this when review individual rate filings.