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Ms. Cheryl Blundon
Board Secretary
Board of Commissioners of Public Utilities
P.O. Box 21040
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July 6, 2018

Oliver Wyman Responses to Interrogatories

Dear Ms. Blundon,

Following the recent Newfoundland and Labrador Automobile Insurance Review Hearing during which testimony was provided by Oliver Wyman from June 5 to 8, interrogatories were submitted to Oliver Wyman by three parties:

- Gittens & Associates

- Insurance Bureau of Canada, and

- Campaign to Protect Accident Victims.

Our responses to the interrogatories from each of these three parties are attached.

Distribution and Use

Considerations and Limitations

- For our review, we relied on data and information provided by GISA and OSFI without independent audit. Though we have reviewed the data for reasonableness and consistency, we have not audited or otherwise verified this data. It should also be noted that our review of data may not always reveal imperfections. We have assumed that the data provided is both accurate and complete. The results of our analysis are dependent on this assumption. If this data or information is inaccurate or incomplete, our findings and conclusions may need to be revised.

- Our conclusions are based on an analysis of the GISA and OSFI data and on the estimation of the outcome of many contingent events. Future costs were developed from the historical claim experience and covered exposure, with adjustments for anticipated changes. Our estimates make no provision for extraordinary future emergence of new classes of losses or types of losses not sufficiently represented in historical databases or which are not yet quantifiable.

- While this analysis complies with applicable Actuarial Standards of Practice and Statements of Principles, users of this analysis should recognize that our projections involve estimates of future events, and are subject to economic and statistical variations from expected values. We have not anticipated any extraordinary changes to the legal, social, or economic environment that might affect the frequency or severity of claims. For these reasons, no assurance can be given that the emergence of actual losses will correspond to the projections in this analysis.

Sincerely,

Paula Elliott, FCAS, FCIA

OLIVER WYMAN

Interrogatories

Response to Gittens / Mason

July 6, 2018

The questions/documentation that Mr. Barry Mason had requested from Ms. Elliott are as follows:

1. *He asked Ms. Elliott to re-calculate the return on equity, a calculation she computed at page 24 of her report (-9% Return on Equity) by holding all of the factors set out in her analysis from page 23 to 25 steady except for operating expenses. Specifically, he had requested Ms. Elliott to recalculate the return on equity by reducing the operating expense for Newfoundland by 6.2% (average Newfoundland operating expense ratio of 29.2% for the period of 2007 to 2012 minus the operating expense ratio deemed appropriate for Alberta of 23% = 6.2%). What is the return on equity for Newfoundland when this reduction is applied to the average expense ratio (which is 24.4% [new average for operating expenses]- 6.2% =18.2%)?*

Response: It is unclear if this question is requesting a hypothetical test using an expense ratio of 23% or 18.2%, or both. Given this, we provide our response to this question with sensitivity tests on the estimated after-tax return on equity (ROE) for accident year 2017 using two *hypothetical* assumptions for the expense ratio at 23% and 18.2%, instead of the expense ratio we had selected (26.2%) based on the actual Newfoundland and Labrador 2016 expense ratio of 25.7%, adjusted for the mid-year change in the premium tax rate from 4% to 5%, effective July 1, 2016 (i.e., 26.2%= 25.7% + 0.5%).

The after-tax ROE that we measured for accident year 2017 was -9%, and this would increase to -4.5% and +2.3% based on the 23.0% and 18.2% hypothetical expense ratios, respectively. Our calculations are not intended to imply our agreement with these two hypothetical expense ratios.

In particular, Alberta's expense ratio of 23% was based on a premium tax rate of 3%, whereas our selected expense provision (26.2%) is based on Newfoundland and Labrador's *actual* premium tax rate of 5%. The Alberta provision of 23% would increase to 25% if based on the same 5% premium tax rate as in Newfoundland and Labrador. Furthermore, we disagree with the hypothetical expense ratio of 18.2% suggested in the question given the Newfoundland and Labrador 2016 average commission ratio and premium tax rate are 12.2% and 5%, respectively for a total of 17.2%. The difference (1% = 18.2% - 17.2%) for all remaining operating expenses (e.g., staff salaries, IT services, rent, etc.) is unreasonable in light of actual recent expense ratios.

2. *To perform the same calculation using a 25% operating ratio as set by the*

*Newfoundland Board in its decision in 2005 (reduction of 29.2% -25% = 4.2%
(24.4% [new average for operating expenses] - 4.2% = 20.2%).*

Response: It is unclear if this question is requesting a hypothetical test using an expense
ratio of 25% or 20.2%, or both. Given this, we provide our response to this question with
sensitivity tests on the estimated after-tax return on equity (ROE) for accident year 2017
using two *hypothetical* assumptions for the expense ratio at 25% and 20.2%, instead of
the expense ratio we had selected (26.2%) based on the actual 2016 expense ratio of
25.7%, adjusted for the mid-year change in the premium tax rate from 4% to 5%, effective
July 1, 2016 (i.e., 26.2%= 25.7% + 0.5%).

The after-tax ROE that we measured for accident year 2017 was -9%, and this would
increase to -7.3% and -0.5% based on the 25.0% and 20.2% hypothetical expense ratios,
respectively. Our calculations are not intended to imply our agreement with these two
hypothetical expense ratios. In particular, the 25% expense ratio was based on an out-
of-date premium tax rate of 4%, whereas our selected expense provision (26.2%) is based
on Newfoundland and Labrador's *actual* premium tax rate of 5%. We do not follow the
rationale for the hypothetical expense ratio of 20.2% suggested in the question given the
Newfoundland and Labrador 2016 average commission ratio and premium tax rate are
12.2% and 5%, respectively for a total of 17.2%. The difference (3% = 20.2% - 17.2%)
for all remaining operating expenses is insufficient.

3. *If the UL & ALAE is $354.37 per car (as established in the accident year 2014)
   and we assume that claims costs have not increased and finally, we assume
   that the remaining factors set out at page 23 to 25 of Ms. Elliott's report
   remains the same, what is the return on equity for auto insurers for 2017?*

   Response: The accident year 2017 estimate of the UL& ALAE cost per vehicle for Bodily
   Injury presented in our report is approximately $406. We understand the question to ask
   that a hypothetical estimate of $354.37 be substituted for the $406 provision, and assume
   that there has been no inflation since 2014. This change, and no other changes in
   assumptions, increases the 2017 accident year ROE estimate from -9% to -2.5%. Our
   calculations are not intended to imply our agreement with the hypothesis that claims costs
   from accident year 2014 without an adjustment for inflation (or claims cost trends) is a
   realistic approach to measure 2017 accident year claims costs.

4. *If the UL & ALAE is $354.37 per car and the operating expenses are reduced
   by 6.2% as noted above, what is the return on equity for auto insurers in
   2017?*

   Response: Similar to question #1 above, it is unclear if the request is to apply an expense
   ratio of 23% or 18.2%; we therefore provide our response with both hypothetical expense
   ratios for this sensitivity test.

- The accident year 2017 estimate of the UL & ALAE cost per vehicle presented in our report is approximately $406 and the expense provision is 26.2%. Using a hypothetical estimate of the UL & ALAE for accident year 2017 of $354.37 instead of $406, and an expense ratio of 23% instead of 26.2%, and no other changes in assumptions, increases the 2017 accident year ROE estimate from -9% to +2.0%.

- The accident year 2017 estimate of the UL & ALAE cost per vehicle presented in our report is approximately $406 and the expense provision is 26.2%. Using a hypothetical estimate of the UL & ALAE for accident year 2017 of $354.37 instead of $406, and an expense ratio of 18.2% instead of 26.2%, and no other changes in assumptions, increases the 2017 accident year ROE estimate from -9% to +8.7%.

Our calculations are not intended to imply our agreement with these two hypothetical expense ratios, nor the assumption that claims costs do not change over time.

5. *If the UL & ALAE is $354.37 per car and the operating expenses are reduced by 4.2%, what is the return on equity for auto insurers in 2017?*

Response: Similar to question #1 above, it is unclear if the request is to apply an expense ratio of 25% or 20.2%; and we therefore provide our response with both hypothetical expense ratios for this sensitivity test.

- The accident year 2017 estimate of the UL & ALAE cost per vehicle presented in our report is approximately $406 and the expense provision is 26.2%. Using a hypothetical estimate of the UL & ALAE for accident year 2017 of $354.37 instead of $406, and an expense ratio of 25% instead of 26.2%, no other changes in assumptions, increases the 2017 accident year ROE estimate from -9% to -0.8%.

- The accident year 2017 estimate of the UL & ALAE cost per vehicle presented in our report is approximately $406 and the expense provision is 26.2%. Using a hypothetical estimate of the UL & ALAE for accident year 2017 of $354.37 instead of $406, and an expense ratio of 20.2% instead of 26.2%, no other changes in assumptions, increases the 2017 accident year ROE estimate from -9% to +5.9%.

Our calculations are not intended to imply our agreement with these two hypothetical expense ratios, nor the assumption that claims costs do not change over time.

6. *Ms. Elliott advised that she would provide the raw data for the GISA UL and ALAE costs for Newfoundland and Labrador for the past 10 years. We look forward to the receipt of these records.*

Response: The raw data file produced by GISA is titled AUTO 7501-ATL. This is a "csv" file which includes data (separately) for each of the four Atlantic Provinces for the past

twenty years by accident half year. This datafile can be downloaded from the GISA website. At the time of our report preparation, the most recent AUTO 7501 datafile was

as of June 30, 2017. Any difficulties in accessing or downloading this file should be directed to Ryan Oake (Board Staff) at 709-726-1097.

OLIVER WYMAN

Interrogatories

Response to Insurance Bureau of Canada

July 6, 2018

Minor Injury Reform Cost Estimates Private Passenger Automobiles

1. *Ms. Elliott, could there be additional cost savings associated with establishing a minor injury non-pecuniary damages cap from the cap causing lower prejudgment interest and party and party fee payments? If so, what are the updated percentage reductions in total settlement and allocated loss adjustment expense (ALAE) costs and average reductions in required premium?*

   Response: The prejudgment interest and party & party costs could be affected by the lower settlement amount if a cap was introduced; however, the degree that it would be affected is uncertain. The total payments under these two heads of damages represents 4.1% of the total indemnity and ALAE amount in the closed claim study sample of 1,741 claimants. Thus, any reduction to these costs would have a relatively small impact on the total percentage reduction that would result from the introduction of a cap for minor injury claimants.

   If it is assumed that these two heads of damages would experience a proportionate reduction as estimated for the non-pecuniary amount reduction of each claimant, this would modestly increase the range for Table 1 (on page 2) of our report titled Minor Injury Reform Cost Estimates - Private Passenger Automobiles. For example, as presented in Table 1, for an MIR cap at $7,500 and 0% change in frequency assumption, the estimated percentage reduction in total settlement costs including ALAE ranges from 19% to 24%. This range would increase to a range of 20% to 25% with this assumption. Given this, we consider any possible reduction to these two heads of damage not material to our findings.

2. *Ms. Elliott, your percentage reduction in total settlement and ALAE costs and average reduction in required premium contain a range of savings for cap amounts of $5,000, $7,500 and $10,000 based on minor injury claim frequency reductions of 0% to 15%. Could you please comment on the likelihood of the three minor injury cap amounts achieving the up to 15% minor injury claim frequency rate reduction? Additionally, could you please comment on what you believe is the most likely claim frequency rate reduction for each cap amount, and explain how you arrived at each of these estimates?*

   Response: We suggest that as the cap amount increases, the effect on the claims frequency rate will decrease. We are unable to quantify how the frequency rate might change at different cap levels, as this frequency change would be driven a

change in consumer behaviour, and we are unaware of any data that would support a calculation of the estimated impact by cap level.

Profit and Rate Adequacy Review Private Passenger Automobiles

3. *Ms. Elliott, an intervenor has requested that you estimate industry return-on-equity (ROE) rating expense percentages in Newfoundland and Labrador. These percentages include 18.2%, 20.2% and 24.4%. Could you please comment on why you used the General Insurance Statistical Agency's published expense ratios and the reasonableness of your selection relative to the three requested percentages above?*

    Response: The suggested expense provisions (18.2%, 20.2% and 24.4%) are not based on the most recent actual expense information reported by each individual insurer in Newfoundland and Labrador, which was the expense information we relied upon. The purpose of our report was to measure, in hindsight, the adequacy of premiums charged and the profit level achieved for private passenger automobile in Newfoundland and Labrador. It was not to estimate a hypothetical or what-if scenario based on alternate expense provisions that do not reflect the actual expense costs incurred.

    The expense provisions used in our report are appropriate for the purpose intended

    - a hindsight measurement using actual costs.

    Testing and estimating what the profit level might have been if the expense provision were different would be appropriate if changes to the expense provision were under consideration. The Terms of Reference did not outline this consideration.

4. *Ms. Elliott, an intervenor asked you to calculate the ROE assuming that the bodily injury loss cost for 2017 remains at its 2014 level of $354.37, instead of the 2017 forecast of $387.69 in your report. Do you believe using the 2014 loss cost is a reasonable approach for calculating the 2017 ROE?*

    Response: No, we do not believe this to be a reasonable approach, as this approach would not reflect or consider actual inflation of claims costs over time. We view it as a hypothetical question for information purposes only.

5. *Ms. Elliott, an intervenor asked you to calculate the 2017 premium deficiency based on a higher investment return, such as 6%. Could you please comment on why you used 2.9% and the reasonableness of using a return as high as 6%?*

    Response: We used 2.9% as this is the average investment rate (ROI) earned by insurers in 2014 to 2016, based on the financial data reported to the Office of the Superintendent of Insurance (OSFI) by each insurer. It is our view that an average of the recent past (2014 to 2016) is a reasonable estimate for the upcoming year (2017). Each insurer calculates the

ROI and presents this information in its (audited) financial statements. We calculate an annual average ROI amongst the companies who operate in Newfoundland and Labrador.

We view the 6% rate as a hypothetical rate proposed for testing purposes, but it does not reflect the actual ROI of insurers in the recent past. On that basis, we find the 6% assumption to be high.

The 2017 financial data was released after our profit study report was prepared. Based on the reported 2017 actual ROI for each insurer in Newfoundland and Labrador, the average ROI is 3.0%.

OLIVER WYMAN

Interrogatories

Response to Campaign

July 6, 2018

The following questions are submitted on behalf of the Campaign to Protect Accident Victims ("CTPAV") for reply by Paula Elliott of Oliver Wyman ("OW") arising out of or in relation to her report and presentation of Newfoundland and Labrador Private Passenger Vehicles Profit and Rate Adequacy Review:

1. *How were the pre-tax investment returns calculated?*
   a. *How do these compare to the actual pre-tax investment returns in the GISA report?*
   b. *Why the differences?*

   Response: The pre-tax investment returns (ROI) used by Oliver Wyman are based are ROI values calculated by each insurer and reported to the Office of the Superintendent of Financial Institutions (OSFI) annually. We use the reported ROI of each insurer to calculate an average for each year. These ROI amounts are company-wide values, and are not line of business or province specific (because investments held by insurers are not line of business or province specific).

   Each insurer is required to report, amongst other financial data, its investment income that it allocates to each province for the automobile line of business to GISA. This is a notional allocation process completed by each insurer. ROI rates are not provided in the GISA report, only the dollar amount of investment income allocated.

2. *What pre-tax investment returns are used by regulators in other provinces?*
   a. *Why the differences between your estimates and those used in other provinces?*

   Response: It is our understanding that the current per-tax ROI rate filing guidelines for private passenger automobile are 2.25% and 2.50% in Ontario and Alberta, respectively. We are not aware of any other published ROI rate filing guidelines in any other provinces.

   The historical profit (after-tax return on equity) estimates provided in Part I of our report (Profit and Rate Adequacy Review- Private Passenger Automobiles, March 29, 2018) were derived using the actual ROI levels for insurers as reported to OSFI.

   The private passenger vehicle rate level adequacy measures presented in Part II of our report for the last five years (2012 to 2016) were based on the Board's minimum

ROI guideline of 2.8%. We used the Board's guideline, as it is relevant to this province. If we used the ROI rate filing guidelines from Alberta or Ontario, as these ROI rates are lower, this would have increased the rate inadequacy presented in our report.

3. *How would your estimates of premium deficiencies change if you had used higher investment returns, e.g., 6%?*

Response: The higher the investment rate (ROI) assumed, the lower the required premium level. For example, the accident year 2016 required premium would reduce from $1,281 to $1,195; and the deficiency (i.e., rate inadequacy) estimate would reduce from $179 to $93 if a ROI rate of 6% was assumed. Our calculations are not intended to imply our agreement with this hypothetical 6% ROI rate.

4. *In light of your very low estimates for pre-tax investment returns, and the declining trend during the past 10 years, do you believe that a 10% after-tax ROE for automobile insurance companies is appropriate?*

Response: First, we wish to clarify that pre-tax investment returns we used in our calculations are not "very low." They are an average of the actual ROI levels reported by insurers to OSFI (not estimates), and this financial data is fully audited by independent auditors.

The issue of an *appropriate* ROE for insurers is a question for economists. We do not provide advice to the Newfoundland and Labrador Board, or any other regulator, regarding what an appropriate target ROE for insurers should be for the rate applications filed by insurers.

5. *How did you estimate your general expense ratios for the industry?*
   a. *What has happened to commissions over time?*
   b. *Have auto insurance companies changed their model to rely more on online marketing than on independent brokers and agents?*
   c. *Have you considered that many insurance brokerages in Newfoundland and Labrador are now owned subsidiaries of insurance companies underwriting in the province and that there has been a vertical integration of the commission fees?*
   d. *What is the source of your estimates of commissions?*
   e. *If you deduct your estimates for commissions and taxes from GISA's aggregate expense ratios, what are the resulting general expense ratios?*
   f. *Why the differences between your estimates and the revised estimates you just derived?*
   g. *How would your estimate of premium deficiencies change if you used these new general expense ratio estimates?*

Response:

a. The expense information we relied upon was based on the expense report compiled and published by GISA (e.g., AUTO 9502 as of December 31, 2016). GISA compiles this report using the expense data for private passenger automobile in Newfoundland and Labrador reported by each insurer. As reported by GISA, the commissions (excluding contingent commissions) as a percentage of premiums in Newfoundland and Labrador for 2013 to 2016 (most recent report from GISA) were 11.3%, 11.8%, 12.2% and 12.1%, respectively. The contingent commission for 2013 to 2016 were 1.6%, 1.0%, 0.7% and 0.1%, respectively. Hence, most recently, the commission rate (excluding contingent commissions) has increased from 2013 to 2016 and the contingent commissions have decreased from 2013 to 2016. These shifts in commissions imply that there may be a shift towards the use of broker based companies, and that the profitability of the business is reducing as less is paid in contingent commissions.

b. Generally, individual insurance companies do not change their distribution model from broker based to direct marketing. However, in the P&C industry there has been an expansion of new insurers adopting on-line platforms for their distribution systems over the last twenty years. We have seen an expansion within an organization (or group), whereby there are several (individual) companies each with different distribution models. Therefore, within one province, an organization could have more than one insurance company each with different distribution approaches and different rates.

c. The acquisition of brokers by insurers does not dictate or require a change in the commission compensation structure. Regardless of the ownership of a brokerage (whether an insurer invests capital in a brokerage, or a brokerage is independently owned), the expense data (e.g., commissions) are reported to GISA.

d. The commission information we used is based on the data reported by insurers to GISA, which is then compiled and published by GISA. We do not make any adjustment to the published expense information provided by GISA. Hence, the commissions data used for the historical profit measurement (Part I) and hindsight rate adequacy measurement (Part II) is not "estimated" by Oliver Wyman.

e. The general expenses, as reported by GISA in its most recent report are 7.2%, 8.6%, 7.7% and 9.1% for 2013 to 2016, respectively. These are the general expenses (e.g.; everything except all commissions and premium taxes). As we use GISA's data without adjustment, this is equivalent to the result that would be obtained by deducting the provisions for commissions and taxes from GISA's aggregate expense ratios.

f. We do not follow the question, as we used the GISA expense information.

g. Again, we used the GISA expense information without adjustment.

OLIVER WYMAN

6. *How would your estimates of premium deficiencies change if you used more realistic estimates for pre-tax returns on investment income and general expense ratios?*

Response: We do not follow what is being asked in this question by "more realistic" estimates. Our expense ratios are based on the reported information published by GISA, and the ROI rates are based on the values reported to OSFI. As these are <u>actual</u> values, and not estimates, we consider them to be "realistic."

7. *How would your estimates of premium deficiencies change if you used more realistic estimates for after-tax ROEs?*

Response: We do not follow what is meant by "realistic" ROEs. The premium deficiencies were measured using the Board's guideline maximum of 10%.

8. *Why do your claims ratios differ so markedly from those in the GISA report for the years 2014-2016?*
   a. *Do you expect the claims ratios (yours and GISA's) to converge in the future? Why/Why not?*
   b. *If they converge, what are the implications for your estimates for premium deficiencies going forward?*

Response: The claims ratios for 2014-2016 differ mainly because the data presented by Oliver Wyman is based on the more recent reported claims experience through to June 30, 2017, whereas the GISA loss ratios are based on reported claims experience through to December 31, 2016.

Yes, we expect the GISA and Oliver Wyman loss ratio estimates to converge over time. This is because with the passage of time, all claims are closed and settle, and no estimates of the ultimate loss amounts to be paid are required.

If our loss ratio estimates for 2014 - 2016 increase over time, our estimated premium deficiencies will increase. Similarly, if our loss ratio estimates for 2014-2016 decrease over time, our premium deficiencies will reduce.

The following additional questions are submitted on behalf of CPTAV for reply by Paula Elliott of OW arising out of or in relation to her report and presentation of Amended Minor Injury Reform Cost Estimates Private Passenger Automobiles.

To assist with context, we reference the following sections of Ms. Elliott's evidence given at the review hearing:

In the transcript for June 7, 2018 at p. 34, Ms. Elliott states that "in Nova Scotia

and New Brunswick, we do analyze their data and we do use what's called a parameter in our regression models to test the impact, the cost level change and the frequency level change with respect to the minor injury reforms. We test that parameter for reasonableness using T tests and P values. We do a very rigorous review. So, we are able to identify that there was an impact on the reforms at that time - sorry, an impact on the frequency rate at the time of the reform introduction."

On June 7, 2018 at p. 167 of the transcript, Ms. Elliott elaborated on the models that she says OW used to attribute the post-2003 drop in frequency to the Minor Injury Regulation. She stated that, "We put in a value, a parameter, and then we associate and we say well, *at that point in time*, there was a minor injury reform and therefore we attribute that change to the minor injury reform." [emphasis added]

9. *Can you provide details of the regression model by which you tested the impact of the reforms on frequency?*

Response: Reported incurred claim amount and claim count data, by accident half-year, is provided by GISA. We refer to this as the raw data. The data we use in our regression model is based this raw data provided by GISA, but adjusted based on our estimate of the ultimate claim amount including loss adjustment expenses and ultimate claim counts by accident half-year. Our regression analysis is based on a standard log-linear model with the option of including level change parameters and changes in the trend rate at different points in time. We include a parameter for seasonality in our selected model when it is shown to be statistically significant. We consider parameters to be statistically significant with a p-value of 5% or less (i.e., less than 1 in 20 chance that the parameter is not true).

10. *Has the same test been performed for points in time other than 2003? (i.e. using 2002, 2004, 2005, 2006, etc. as the dividing line between 'before' and 'after'). Do these tests show a comparable magnitude of change as the test that uses 2003 as the dividing line? If yes, does that cast doubt on the reforms being the cause of the change in frequency?*

Response: The purpose of the question raised, as we understand it, is given the decline in the frequency level both before and after the introduction of the minor injury reforms, how can we be confident that the reforms were a key contributor to the decline in the frequency level? We discuss our findings for each of Nova Scotia and New Brunswick below.

Based on our review of the historical Nova Scotia data, we observe an increasing frequency trend rate up until 2001. After 2001, we observe a period where the frequency trend rate was declining (i.e., negative) through to 2010, except for the constitutional challenge (2008-1) where there was a steep decline of 23% in the

frequency rate that reversed in 2009. Then, following the introduction of the amendment to the Minor Injury Reforms (MIR) in April 2010, we observe a change in the frequency level and trend rate pattern.

To provide a measure of our confidence that the 2003 reforms impacted the Nova Scotia frequency rate, we model a frequency trend analysis over the 15 year period beginning 2001 through 2015, with parameters for seasonality, the April 2010 MIR, and the November 2003 MIR. We also exclude the 2008-1 data point due to its unusually low value. (Our findings are the same with or without the exclusion of the 2008-1 data point.)

We find that the p-value for the Nova Scotia November 2003 reforms is very significant (at 0.7%), meaning the statistics support the view that the November 2003 reforms affected the frequency level.

Similarly, for New Brunswick, to provide a measure of our confidence in the impact of the reforms on the frequency rate, we model a frequency trend analysis over the 15 year period beginning 2001 through 2015, with parameters for seasonality, the July 2003 MIR, and the July 2013 MIR. We find that the p-value for the July 2003 reforms is very significant at (0.01%), meaning the statistics support the view that the July 2003 reforms affected the frequency level.

To respond to this question, we prepared four additional regression tests (for each of Nova Scotia and New Brunswick) by adding in an additional parameter to measure the level change at four different points in time: July 1, 2002, July 1, 2004, July 1, 2005 and July 1, 2006. If the p-values for these additional test parameters are lower than for the actual reform parameter (i.e., indicating a greater level of statistical significance), or if the 2003 reform parameter was no longer statistically significant, this would "cast doubt" that the introduction of the reforms affected the frequency level.

The following table presents these statistical results (p-values) which support the view that the MIR reforms in Nova Scotia and New Brunswick contributed to the declined in the frequency level. In all cases the July 2003 (New Brunswick) and November 2003 (Nova Scotia) reforms parameter is statistically significant and none of the random test date parameters (July 1, 2002, July 1, 2004, July 1, 2005 and July 1, 2006) were statistically significant.

To further explain the tables, we refer to the first two rows of the Nova Scotia table. November 2003, when tested alone, is deemed to be statistically significant based on its p-value of 0.7%. In the subsequent row, we simultaneously test the impact of November 2003 and July 2002. November 2003 is still deemed statistically significant (based on its p-value of 5%), and July 2002 is not deemed significant (based on its p-value of 20.6%).

P- Values for Parameters (<5% is Statistically Significant)		
Nova Scotia	**November 2003**	**Test-July**
Baseline	0.7%	NA
With July 1, 2002	5.0%	20.6%
With July 1, 2004	0.9%	28.1%
With July 1, 2005	1.9%	25.3%
With July 1, 2006	0.7%	32.4%

P- Values for Parameters (<5% is Statistically Significant)		
New Brunswick	**July 2003**	**Test-July**
Baseline	0.0%	NA
With July 1, 2002	0.6%	17.4%
With July 1, 2004	0.0%	12.1%
With July 1, 2005	0.0%	73.1%
With July 1, 2006	0.0%	89.9%

11. *The graph on p.21 of the report shows the frequency briefly rebounding in 2005, for both NB and NS. Does the parameter have the property of placing full effect on the 2003-2004 decline, while discounting the effect of the 2005 rebound?*

Response: We tested removing the 2005 data in our regression model to remove the effects, if any, of 2005 on the MIR parameter measurement.

Similar to our regression analysis described in the questions above, for Nova Scotia, we model a frequency trend analysis over the 15-year period from 2001 through 2015, with parameters for seasonality, the April 2010 MIR, and the November 2003 MIR. We excluded the 2005-1 and 2005-2 data points, as well as the 2008-1 data point due to its unusually low value. Similarly, for New Brunswick, we model a frequency trend analysis over the 15-year period from 2001 through 2015, with parameters for seasonality, the July 2003 MIR, and the July 2013 MIR; and exclude the 2005-1 and 2005-2 data points.

The following table presents these statistical results. We find the inclusion or exclusion of the 2005 data does not change the finding that the introduction of the MIR in 2003 affected the frequency level.

P- Values for Parameters (<5% is Statistically Significant)	
	2003 MIR
New Brunswick Baseline	0.0%
New Brunswick- Exclude 2005	0.0%
Nova Scotia Baseline	0.7%
Nova Scotia Exclude 2005	0.3%

12. *There is oscillation in the frequency presented on the graph on p. 21of the report. Would compiling annual frequency statistics(rather than semi-annual) provide a clearer view of the longer-term trend?*

    Response: We find there are advantages to using semi-annual data, particularly with the introduction of reforms at dates other than January 1 or July 1. As well, accident half-year data allows the removal of individual accident half-year data points that may be outliers, rather than a full year. The regression models that we use can identify the seasonality of the data (i.e., oscillation) between the first half and second half of the year.

    Perhaps *visually* annual data provides a "clearer view" of the longer-term trend pattern, but for regression modelling, it is our view that there are benefits to the use of the accident half-year data.

13. *If these tests, at 2002, 2004, etc. show a comparable magnitude of change, does that cast doubt on the reforms being the cause of the change in frequency?*

    Response: As discussed above in response to question #10, the statistical results of the tests do not show that parameters for 2002, 2004, 2005 or 2006 to be statistically significant based on the p-values. Therefore, the requested tests provide additional support that the 2003 MIR affected the frequency level in both Nova Scotia and New Brunswick and do not "cast doubt" on this finding.

14. *On June 7, 2018 at p.158 of the transcript, you state that "other external factors [besides the reform] also affect the frequency, the roads the winter, the ice, different things." On p. 160, you add "car safety" as an additional explanation of frequency changes. Has there been an attempt to use statistical rigor to allocate the magnitude of frequency change between these factors?*

    Response: To the best of my knowledge, there is no data (or index) that captures road improvements and car safety. Hence, it would be difficult to quantify how such improvements contribute to the frequency and severity level of claims. Furthermore, while weather data is captured, it too is difficult to accurately apply for regression purposes. For example, the weather data is local data (e.g., airports) and not provincial data. Some extreme weather periods (e.g., large snow falls) have been assumed to be attributed to

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spikes in frequency; and where appropriate these data points (spikes) can be excluded from the regression analysis.

15. *Has there been an attempt to parameterize the changes over time in the causal elements cited in Question CTPAV - OW 14? If yes, have they been incorporated into the regression model?*

Response: As noted, we are not aware of any data for road safety or car improvements that could be included in the regression models. Similarly, while weather data is collected, it generally serves to explain one-time spikes in the frequency data. Further, road and vehicle safety improvements are generally gradual changes, and as a result their impact on claims experience, if any, would likely be more gradual over time. For example, a new safety feature may be introduced on all cars of a certain model year, but it will take a number of years for all drivers to eventually purchase cars of that model year or later. Thus, these items contribute to the negative claim frequency trend over time, but in a very gradual manner. This gradual effect is different than a reform change which typically results in a one-time level change of the severity and/or frequency, and possibly a change in the trend rate.

16. *On June 7, 2018 at pp.224 to 228 of the transcript, you discuss the OW assumption, from p.17 of the report that "based on our judgment, we estimate there to be a 25% reduction in ALAE costs for minor claimants who would be subject to the cap." Was there an attempt to evaluate empirically, from GISA data for ALAE, the change in ALAE per claim seen in NS and NB at the time of their reforms?*

Response: The adjustment to the ALAE to account for the potential reduction of ALAE costs for claimants with a minor injury with the introduction of a cap was based on our judgement. The 25% assumption could be considered low, as it is not proportional to the expected reduction in the indemnity amount for minor injury claimants.

While we did not use GISA data to review the reduction to ALAE for Nova Scotia and New Brunswick, we can share the results of the New Brunswick closed claim study (CCS) conducted in 2011. The New Brunswick CCS included sample claimant data both before (2002) and after (2004) the New Brunswick $2,500 cap for minor injury introduced in July 2003. The average ALAE prior to the reforms was $3,186 (2002), and this reduced by 38% to $1,972 after the reforms (2004). Given that the cap amounts under consideration in Newfoundland and Labrador ($5,000, $7,500, and $10,000) are higher than the $2,500 cap implemented in New Brunswick, it is expected that Newfoundland and Labrador would experience a percentage savings lower than the 38% observed in New Brunswick, all else being equal.