

Public Utilities Board (PUB)

2022 GRA TC Evidence Information Requests

September 28, 2021

PUB (TC) 1-1

Part and Chapter:	TC evidence	Page No.:	4
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	Passenger VFH Pricing		
Sub Topic:	Serious Loss Loading		

Preamble to IR (If Any):

Dion Strategic indicates in Option 1 of Recommendations that a Serious Loss loading of \$428 per Passenger VFH unit could be appropriate.

Dion Strategic indicates in Option 2 of Recommendations that a Serious Loss loading of \$258 per Passenger VFH unit is fair, appropriate, and the minimum that should be considered.

TC (MPI) 1-18 provided loss experience for all VFH classes.

Question:

- a) Using collision claim counts provided in TC (MPI) 1-18(a)(b) Appendix 1, and earned vehicles as provided in RM-Appendix 9 Table 11, please calculate and show collision claim frequency for each of Passenger VFH and Taxi VFH for each year available for each territory.
- b) Please determine the relative claim frequency of the Passenger VFH versus the Taxi VFH for Territory 1, where most of the Passenger VFH are located, showing the calculations, and comment on whether TC believes that the observed claims frequencies for collision are indicative of similar expectations of accidents for Passenger VFH and Taxi VFH.
- c) Please calculate the average severity of collision claims for Passenger VFH and Taxi VFH in Territory 1 by year, using information provided in TC (MPI) 1-18.

- d) Please indicate if the observed average claim severities for collision claims are indicative of similar claim severity or not?
- e) If the observed claims frequencies for Passenger VFH are significantly less than that of Taxi VFH, as shown in TC answer to b), and if the observed average claim severities for collision are similar for the two classes, why would TC expect the same number of serious claims for both classes, as proposed in Option 1?
- f) Please divide the minimum serious loss loading to be considered in Option 2 of \$258 by the \$428 serious large loss loading for Taxi VFH to estimate a relative frequency assumption.
- g) Please compare the relative frequency assumption inherent to Option 2, as shown in TC answer to f) to the observed collision frequency relativities for Territory 1, as shown in TC answer to b).
- h) Please summarize the results of the above calculations (a-g) in a table.
- i) Given the inconsistency between the relative frequency of collisions and the proposed relative frequency of serious losses, as shown in g) please comment on the appropriateness of Option 2.
- j) Could Ms. Seto please explain why, given the observed significant difference in collision frequencies between Passenger VFH and Taxi VFH, she considers the two options recommended by Dion Strategic to be a reasonable starting point?
- k) Please calculate the serious loss loading for Private Passenger Major Classification.
- l) As an alternative, would TC consider a serious loss loading based on the relative frequency of collision claims for Passenger VFH in territory 1 versus Taxi VFH, multiplied by the Taxi serious loss loading, to be a more appropriate actuarial estimate of a serious loss loading applicable to Passenger VFH that

reflects the relative frequency of accidents of the two classes? Would this serious loss loading fall between the level of the Private Passenger Major Classification loss loading and that of Taxi VFH?

Rationale for Question:

To understand the implications of Options 1 and 2.

RESPONSE:

a) See the table below for the calculations

	Taxi VFH - COLLISION Claim Counts					Passenger VFH - COLLISION Claim Counts				
Territory	1	2	3	4	5	1	2	3	4	5
2016	582	49	26	5		0	0	0	0	0
2017	533	51	26	7		0	0	0	0	0
2018	582	54	21	1		177	18	0	0	9
2019	575	57	24	4		230	23	2	1	21
2020	317	42	17	2		201	25	6	0	14
Syr total	2,589	253	114	19	0	608	66	8	1	44
	Taxi VFH - Earned Units					Passenger VFH - Earned Units				
Territory	1	2	3	4	5	1	2	3	4	5
2016	491	158	52	26						
2017	489	153	51	26						
2018	465	112	49	12		365	60	5	13	10
2019	470	102	45	8		602	85	9	20	30
2020	477	106	47	6		812	88	11	24	40
Syr total	2,392	631	244	78	0	1,779	233	25	56	79
	Taxi VFH - COLLISION Claims Frequency					Passenger VFH - COLLISION Claims Frequency				
Territory	1	2	3	4	5	1	2	3	4	5
2016	118.4%	30.9%	49.7%	19.2%						
2017	109.0%	33.4%	50.9%	26.5%						
2018	125.2%	48.2%	42.9%	8.5%		48.4%	30.1%	0.0%	0.0%	88.6%
2019	122.2%	56.0%	53.8%	51.3%		38.2%	27.0%	21.1%	5.1%	71.1%
2020	66.5%	39.6%	36.5%	34.1%		24.8%	28.3%	55.3%	0.0%	35.4%
Syr total	108.2%	40.1%	46.8%	24.4%		34.2%	28.3%	32.1%	1.8%	55.5%

b)

Per part a, the Collision claim frequency in Territory 1 is 108.2% over the last 5 years for Taxi VFH and the Collision claim frequency in Territory 1 is 34.2% over the last 3 years for Passenger VFH. $34.2\% / 108.2\% = 31.6\%$.

The observed claims frequency for Collision for Taxi VFH in Territory 1 is likely indicative of future experience due to the consistency and stability of the Taxi VFH book of business – assuming no changes to the VFH framework.

The observed claims frequency for Collision for Passenger VFH in Territory 1 may be indicative of future experience. Dion Strategic believes caution needs to be exercised due to the immaturity of the Passenger VFH book of business – the data is two and a half years, with the most recent half in a pandemic environment.

c) See the table below for the calculations

Territory	Taxi VFH - COLLISION Incurred Losses					Passenger VFH - COLLISION Incurred Losses				
	1	2	3	4	5	1	2	3	4	5
2016	2,411,412					0				
2017	2,303,174					0				
2018	2,295,787					728,173				
2019	2,297,704					1,088,451				
2020	1,243,671					807,457				
Syr total	10,551,748	0	0	0	0	2,624,081	0	0	0	0
Territory	Taxi VFH - COLLISION Loss Severity					Passenger VFH - COLLISION Loss Severity				
	1	2	3	4	5	1	2	3	4	5
2016	4,143									
2017	4,321									
2018	3,945					4,114				
2019	3,996					4,732				
2020	3,923					4,017				
Syr total	4,076	0	0	0	0	4,316	0	0	0	0

d)

Per part c, the observed average claim severity for collision claims is similar (if defined to be within 10%) for Passenger VFH and Taxi VFH in Territory 1. Between 2018 to 2020, the Taxi VFH claims severity in Territory 1 is about 8% smaller than that of Passenger VFH in Territory 1.

e)

Firstly, Dion Strategic notes that the relationship between frequency and severity relative to Taxi VFH is not perfectly correlated. From (TC) 1-18 data between 2011 to 2020:

- Public Major Class – Collision frequency of 20.6%, collision severity of \$4,054.8, collision loss cost of \$837.0, average serious loss per unit of \$157.3

- Taxi VFH – Collision frequency of 92.7%, collision severity of \$4,081.1, collision loss cost of \$3,783.3, average serious loss per unit of \$427.9
- The collision loss cost of Public Major Class versus Taxi VFH is $837.0/3783.3 = 22.1\%$, but the serious loss per unit of Public Major Class versus Taxi VFH is $157.3/427.9 = 36.8\%$

Secondly, the frequency, severity, and loss cost on regular claims may not be indicative of similar experience of Serious claims.

Dion Strategic would like to emphasize that it understands Taxi VFH have higher claims frequency and similar loss severity (within 10%) to Passenger VFH. This is reflected in the pricing as Taxi VFH pay almost four times the average premium of a Passenger VFH from (TC) 1-18 data.

The current VFH framework for Passenger VFH allows a driver to operate exactly like a Taxi. As noted in the 2021 GRA TC (MPI) 1-4, 558 of the 701 Passenger VFH choose all four VFH time bands. As a majority of the Passenger VFH are insured for the ability to drive like a Taxi, it is fair to assume the same Serious Loss Loading for Passenger VFH as that of a Taxi VFH and recognize that, based on loss costs of Passenger VFH versus Taxi VFH, that the applicable loading could be lower than that of historical Taxi VFH data.

Passenger VFH experience is very immature. Frankly, it is an educated guess for all parties involved as to what the Serious Loss Loading should be for Passenger VFH.

- It could be \$0 if MPI truly believes it won't have Serious Losses in the future – Dion Strategic would disagree with \$0 as Private Passenger Major Class have serious losses and MPI recognizes that Passenger VFH is a higher risk than Private Passenger Major Class.
- It could be as high as Taxi VFH if large losses start materializing in coming years.
- Dion Strategic believes that a proper Serious Loss loading falls between Option 2 and Option 1 – choosing too low a loading or none at all will simply extend the underpricing of Passenger VFH premiums.

f) $\$258 / \$428 = 60.3\%$.

g)

Per part f, Option 2 implies a relative frequency assumption of 60.3%.

Per part b, $34.2\%/108.2\% = 31.6\%$ is the observed relative collision frequency for Territory 1.

h) See the table below for the summary

Territory	Taxi VFH - COLLISION Claims Frequency					Passenger VFH - COLLISION Claims Frequency				
	1	2	3	4	5	1	2	3	4	5
2016	118.4%	30.9%	49.7%	19.2%						
2017	109.0%	33.4%	50.9%	26.5%						
2018	125.2%	48.2%	42.9%	8.5%		48.4%	30.1%	0.0%	0.0%	88.6%
2019	122.2%	56.0%	53.8%	51.3%		38.2%	27.0%	21.1%	5.1%	71.1%
2020	66.5%	39.6%	36.5%	34.1%		24.8%	28.3%	55.3%	0.0%	35.4%
5yr total	108.2%	40.1%	46.8%	24.4%		34.2%	28.3%	32.1%	1.8%	55.5%
Territory	Taxi VFH - COLLISION Loss Severity					Passenger VFH - COLLISION Loss Severity				
	1	2	3	4	5	1	2	3	4	5
2016	4,143									
2017	4,321									
2018	3,945					4,114				
2019	3,996					4,732				
2020	3,923					4,017				
5yr total	4,076	0	0	0	0	4,316	0	0	0	0
Relative COLLISION frequencies										
Serious Loss Loading - Option 2 / Option 1 = $\$258 / \$428 = 60.3\%$										
Observed Passenger VFH / Observed Taxi VFH = $34.2\% / 108.2\% = 31.6\%$ for Territory 1										

i)

As discussed in part e, the underlying relative frequency of regular collisions is not perfectly correlated with the relative frequency of serious losses. The example using Public Major Class versus Taxi VFH demonstrates this. In part e, the Public Major Class collision frequency and collision loss cost are 22% of that for Taxi VFH, yet the Public Major Class Serious Loss per Earned Unit is 37% that of Taxi VFH.

Here is another example using relative frequencies. From (TC) 1-18 data between 2011 to 2020:

- Private Passenger Major Class – Collision frequency of 12.5%, collision severity of \$3,271.2, collision loss cost of \$409.5, average serious loss per unit of \$62.0

- Passenger VFH (2018 to 2020) – Collision frequency of 33.5%, collision severity of \$4,290.4, collision loss cost of \$1,435.3, serious losses = \$0
- Relative loss cost of Passenger VFH versus Private Passenger Major Class = $\$1,435.3 / \$409.5 = 350.5\%$
- Using similar reasoning proposed in part L, this would imply a Serious Loss Loading $\$62.0 * 3.505 = \217.3

Given these examples and the inconsistent relationships with relative frequencies of regular claims versus Serious claims, Dion Strategic maintains that Option 2 is fair, appropriate, and the minimum Serious Loss loading that should be considered. Option 2 is simple and assumes similarity between Passenger VFH and other VFH. In our opinion, from an underwriting perspective, VFH risks are all very similar – each VFH carries an (unknown) passenger to a destination for a fee.

j)

Ms. Seto wrote:

“The calculations from Dion Strategic for PUB (TC) 1-1 a, b, and c indicate a Collision Frequency of 108% for Taxis in Territory 1 and 34% for Passenger VFH in Territory 1 with similar Claims Severity. However, frequency and severity are not correlated, and frequency of collisions and frequency of serious losses are not perfectly correlated. Given the two values in TC (MPI) 2-9 part (a) and TC (MPI) 2-9 part (c), in my opinion and using my best underwriting judgment, I inferred that the minimum and maximum Serious Loss loading (in the context of VFH) is \$258 and \$428, respectively. The maximum loading is that Passenger VFH vehicles operate exactly like a taxi – my understanding is nothing stops one from operating like a taxi. The less conservative loading would be to apply the historical average for all VFH combined. Therefore, I deduced that the range of possible Serious Loss loadings for Passenger VFH could likely be somewhere between these two extreme values.”

k)

From 2011 to 2020, data coming from TC1_018_c_Appendix_02_VFH_Taxi_Major_Class_Loss_Experience_Aug20, the Private Passenger Major Class Serious Losses per Earned Unit is \$62.0.

L)

Dion Strategic believes that a a Serious Loss Loading for Passenger VFH is better than no Serious Loss Loading. However, Dion Strategic maintains that an appropriate loading should fall between Option 2 and Option 1, although we understand other parties may come up with a different range of loadings.

Dion Strategic does not believe that a lower relative frequency of collision claims for Passenger VFH is perfectly correlated to a lower amount of Serious Losses.

1) A collision loss frequency is not the same as a Serious Loss frequency.

a. Data compiled from

TC1_018_c_Appendix_02_VFH_Taxi_Major_Class_Loss_Experience_Aug 20

COLLISION	2011 to 2020			Serious Loss Per Earned Unit
	Frequency	Severity	Loss Cost	
Taxi VFH	92.7%	4,081	3,783	427.9
Public Major Class	20.6%	4,055	837	157.3
Private Passenger Major Class	12.5%	3,271	409	62.0
Passenger VFH	33.5%	4,290	1,435	0.0

b. The Public Major Class loss cost is 22% of Taxi VFH loss cost but the Serious Loss per Earned Unit is 37% of Taxi VFH.

c. Similarly for Private Passenger Major Class, the loss cost is roughly 11% of Taxi VFH, but its Serious Loss per Earned Unit is 14.5% of Taxi VFH.

2) Passenger VFH data is limited to two and a half years.

- 3) Dion Strategic believes Passenger VFH should at minimum be treated like all other VFH – in our opinion Passenger VFH have more in common with VFH than Private Passenger vehicles.
- 4) Passenger VFH has been underpriced, as acknowledged by the PUB and MPI. Had conservatism been initially applied, Passenger VFH would currently be at/closer to indicated rates. Dion Strategic believes that conservatism should be applied in setting an appropriate Serious Loss Loading for Passenger VFH – in our opinion, this range should be between Option 2 and Option 1. Like other Actuarial work, there is a range of reasonable outcomes for the PUB to consider.

Dion Strategic concludes PUB (TC) 1-1 and part L with this opinion. In our experience, the marketplace treats Passenger VFH carefully. Companies understand the extra risk compared to private passenger vehicles, rates have been increasing, and some companies such as Intact were willing to forego a 5-year Uber partnership due to price <https://www.canadianunderwriter.ca/insurance/why-uber-canada-dropped-intact-as-its-insurance-provider-1004196996/> .

Dion Strategic's stance is that the loading should not be \$0 and that the range of reasonable outcomes, in our opinion, is between Option 2 and Option 1. We understand that other parties may come up with a different range of reasonable outcomes. If we were tasked with implementing a Serious Loss Loading for Passenger VFH, we would not choose lower than Option 2.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-2

Part and Chapter:	TC evidence	Page No.:	6
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	Passenger VFH Pricing		
Sub Topic:			

Preamble to IR (If Any):

Observation 3 indicates that a loss ratio of 70 to 80% is needed to break even.

Observation 4 provides the Taxi VFH loss ratio from 2011-2019 to be 83.6%, and 2015-2019 to be 71.9%, and comparable values for Private Passenger Major Class to be 69.5% and 67.7% respectively. Passenger VFH has a 2018-2019 loss ratio of 128.9%.

Opinion 3 states that Other Classes like Taxi VFH are currently subsidizing the Passenger VFH market.

Ms. Seto states:

In "TC1_018_c_Appendix_02_VFH_Taxi_Major_Class_Loss_Experience_Aug20.xlsx", provided by MPI, it shows that the two-year average loss ratio for Passenger VFH is greater than 120% (pre-pandemic) compared to the ten-year average loss ratio for Taxi VFH of approximately 80% (pre-pandemic). These loss ratios indicate that the Taxi VFH is subsidizing the Passenger VFH, and that adverse selection is likely to occur if it hasn't already. Therefore we find the recommendation made by Dion Strategic on Passenger VFH rate increases and capping to be appropriate.

Question:

- a) Given the 9 year (2011-2019) loss ratio for Taxis of 83.6%, and the 5 year (2015-2019) loss ratio for taxis of 71.9%, and the observation that a loss ratio of 70-80% is needed to break even, please indicate how Taxis are able to subsidize the Passenger VFH market?
- b) Could Ms. Seto please comment on how she is able to draw a conclusion that the Taxi VFH, with a 10-year average loss ratio of about 80%, given a break even loss ratio of between 70-80%, is able to subsidize another class of business?

Rationale for Question:

To understand the rationale behind opinions stated.

RESPONSE:

a)

All things being equal, for a static amount of money, each class or subset of risk should have similar loss ratios – that is, between 70 to 80%. If one class has higher loss ratios than others – in this case, Passenger VFH has loss ratios of 128.9% (2018-2019) and 99.5% (2018-2020) – then Passenger VFH are paying less than their proper share of losses and other classes/subsets with better loss ratios, such as Taxi VFH with loss ratios of 71.9% (2015-2019) and 67.5% (2015-2020) which is at or slightly better than break-even, may be doing some subsidization.

b)

Ms. Seto wrote:

“To explain how Taxi VFH could be subsidizing Passenger VFH perhaps it would be simpler to look at a 5-year weighted average loss ratio for both Passenger and Taxi VFH as follows:

	Incurred Loss Ratio	
	Passenger VFH	Taxi VFH
2016		71.2%
2017		66.3%
2018	122.5%	84.2%
2019	132.6%	78.7%
2020	67.4%	44.6%
5-yr Wtd	99.5%	68.6%

If the break-even loss ratio is 70%-80%, the 5-year weighted average loss ratio for Taxi VFH at 68.6% appears profitable compared to the Passenger VFH at 99.5%. In the Statement of Principles Regarding Property and Casualty Insurance Ratemaking, Principle 4 states: "A rate is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs associated with an individual risk transfer." Considering the resulting loss ratios of these two VFH categories, it stands to reason that Taxis which are below break-even in recent years is doing some subsidization."

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-3

Part and Chapter:	TC evidence	Page No.:	7
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	Passenger VFH Pricing		
Sub Topic:			

Preamble to IR (If Any):

Opinion 4 states The Passenger VFH market is growing rapidly.

Question:

Please advise as to the evidence upon which this statement is based.

Rationale for Question:

To understand the basis of the opinion.

RESPONSE:

Per TC1_018_c_Appendix_02_VFH_Taxi_Major_Class_Loss_Experience_Aug20,

Year	Earned Units		Earned Units	
	Taxi VFH	Passenger VFH	Taxi VFH Growth	Passenger VFH Growth
2011	719.50	0.00		
2012	722.41	0.00	0.4%	
2013	723.75	0.00	0.2%	
2014	735.78	0.00	1.7%	
2015	732.18	0.00	-0.5%	
2016	728.14	0.00	-0.6%	
2017	719.25	0.00	-1.2%	
2018	637.52	452.86	-11.4%	
2019	624.51	746.16	-2.0%	64.8%
2020	635.10	974.09	1.7%	30.5%

Passenger VFH earned vehicles have more than doubled since its introduction in 2018 and surpassed the Taxi VFH earned vehicles in 2019.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-4

Part and Chapter:	TC evidence	Page No.:	5
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	Passenger VFH Pricing		
Sub Topic:			

Preamble to IR (If Any):

Opinion 5 indicates that in a competitive private market insurers would not cap Passenger VFH increases at 20%.

Opinion 5 provides the example of Cyber insurance.

Question:

- a) Please compare and contrast the differences between government monopolies and the competitive private markets. Please include ways in which they are similar and similar decisions could be made, as well as ways in which they are different, and different decisions could be made. Please draw on experience with public and private insurers.
- b) Please explain the relevance of Cyber insurance pricing of a new coverage with unknown types of claims, to Passenger VFH automobile insurance pricing?

Rationale for Question:

To understand the relevance of the opinion.

RESPONSE:

- a)

To begin, Dion Strategic does not take a stance on whether Public or Private Insurance is better.

The IBC in <http://www.ibc.ca/ns/insurance-101/public-versus-private-auto-insurance> provides a comparison of Public versus Private Insurance. Some of the statements include:

- Taxpayer subsidies <for public auto insurers>
- Private insurers compete to offer the lowest possible rates
- Competition delivers more choice and value. <Private> insurance rates reflect true cost. Premiums in a competitive environment reflect the real cost of insuring a driver.

In our opinion – A government monopoly is slower to react and can afford more cross subsidization between risks due to subsidies; there are also no shareholders to please. A private insurer cannot be slow to react, otherwise, a private insurer would be stuck with adverse selection and have to exit a line of business or raise rates significantly. Both insurance models use data to draw conclusions.

b)

This is the most recent example Dion Strategic could think of regarding a relatively new line of business that was underpriced and the insurance market had to react accordingly. As Cyber Insurance is Commercial Lines, insurers are not obligated to continue to write the business – insurers would either exit the business, increase rates significantly, reduce coverage terms, and/or all of the above. MPI, as a government insurer, does have the luxury to limit the required rate increases – however, in a private market, it is our opinion private insurers would be highly unlikely to do so as VFH is not an ideal risk. As discussed in 1-1 part (L), Intact and Uber Canada were unable to agree on terms due to price despite a 5-year partnership. Note that insurers treat the VFH portion as Commercial Auto insurance.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-5

Part and Chapter:	TC evidence	Page No.:	7
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	Passenger VFH Pricing		
Sub Topic:			

Preamble to IR (If Any):

Opinion 6 states “The low current rates for Passenger VFH could result in adverse selection and market distortion. Taxi drivers who face high insurance rates with poor loss experience, could make the shift towards driving Passenger VFH”

Question:

- a) Is the number of Taxi VFH earned vehicles stable since Passenger VFH came into existence in 2018?
- b) Is there any evidence available that there has been a shift of Taxi drivers towards driving Passenger VFH?

Rationale for Question:

To understand the evidence underlying Opinion 6.

RESPONSE:

a)

As presented in PUB (TC) 1-3 and consistent with RM-Appendix 9 Table 11,

Year	Earned Units		Earned Units	
	Taxi VFH	Passenger VFH	Taxi VFH Growth	Passenger VFH Growth
2011	719.50	0.00		
2012	722.41	0.00	0.4%	
2013	723.75	0.00	0.2%	
2014	735.78	0.00	1.7%	
2015	732.18	0.00	-0.5%	
2016	728.14	0.00	-0.6%	
2017	719.25	0.00	-1.2%	
2018	637.52	452.86	-11.4%	
2019	624.51	746.16	-2.0%	64.8%
2020	635.10	974.09	1.7%	30.5%

Taxi VFH earned units have been stable until 2018, where it dropped and has remained at that level since.

b)

Per the data presented in part a, Dion Strategic infers from an observation standpoint, Taxi VFH earned units dropped 11.4% in 2018, which is the first year Passenger VFH were introduced. We would reason that some Taxi VFH have switched to Passenger VFH per the data.

Dion Strategic has been advised by Duffy's Taxi Ltd that it estimates between 300 to 400 drivers have been lost since early 2020, due to a combination of the pandemic, and competition from rideshare/passenger VFH and delivery services (e.g., Skip the Dishes).

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-6

Part and Chapter:	TC evidence	Page No.:	8
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	Passenger VFH Pricing		
Sub Topic:	Credibility		

Preamble to IR (If Any):

TC states:

The classical approach assumes a Normal distribution with a Poisson claims frequency. A commonly used number of claims needed for full credibility is 1,082. In simpler terms, this means that for a particular class of business, the theory states that a line is fully credible when there are 1,082 or more historical claims.

Question:

- a) Please confirm that the 1082 claims cited above assumes that there is no volatility in the associated severity distribution when applying to a pure premium calculation?
- b) Please confirm that the adjustment cited in literature to account for the volatility of the associated severity distribution is $1082 \times (1 + CV^2)$ where CV is the Coefficient of Variation of the severity distribution.
- c) Please provide an estimate of the Coefficient of Variation of the severity distribution of the Basic line of business.
- d) If there is an appropriate Coefficient of Variation in c), please calculate the indicated full credibility standard.

Rationale for Question:

To determine the appropriateness of the proposed credibility standard.

RESPONSE:

a)

Confirmed. In easier to understand terms, this means a 1,082 claims standard is commonly used for short-tailed claims like collision coverage.

b)

Confirmed.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

c)

Dion Strategic is unable to answer the question, because the data to perform this calculation is not known to be on the record of this proceeding and cannot be reasonably acquired. The calculation requires population mean and variance statistics, which would require all relevant records in MPI's database(s) to calculate.

In general, for a variance calculation the more data is always better. An aggregated set could provide an estimate, but the result would be highly caveated.

d)

Dion Strategic is unable to answer the question, because the data to perform this calculation is not known to be on the record of this proceeding and cannot be reasonably acquired. The calculation requires population mean and variance statistics, which would require all relevant records in MPI's database(s) to calculate.

In general, for a variance calculation the more data is always better. An aggregated set could provide an estimate, but the result would be highly caveated.

PUB (TC) 1-7

Part and Chapter:	TC evidence	Page No.:	10
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	VFH Pricing		
Sub Topic:	Credibility		

Preamble to IR (If Any):

Option 2 states Changing K=60,000 to a lower number.

Werner and Modlin provides a formula for K as the expected value of the process variance (EVPV) divided by the variance of the hypothetical means (VHM).

Dean acknowledges “the selection of P and K is probably more art than science”

Whitney noted “in practice k must be determined by judgement”

Question:

- a) Please explain why TC believes that a lower K value is justified.
- b) Given the comment with regards to Werner and Modlin, please provide any evidence as to the expected value of the process variance and the variance of the hypothetical means which would lead to a potential K value?

Rationale for Question:

To understand the basis of Option 2.

RESPONSE:

a)

Dion Strategic finds that the Classical Credibility Approach, as presented in Section 3.1, would provide Taxis with 100% credibility based on Collision claim counts, which represents 70% of their incurred losses. Similarly, choosing a high K value, as presented in Section 3.1 Opinion 1, gives little credibility to smaller classes of business. Classes that will never reach the same volume levels as Private Passenger will be relegated to always being below full credibility and be affected by a slow reacting methodology as illustrated in Appendix 5.2. As such, lowering the K value is a justified approach.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

b)

Dion Strategic is unable to answer the question, because the data to perform this calculation is not known to be on the record of this proceeding and cannot be reasonably acquired. The calculation requires population mean and variance statistics, which would require all relevant records in MPI's database(s) to calculate.

In general, for a variance calculation the more data is always better. An aggregated set could provide an estimate, but the result would be highly caveated.

PUB (TC) 1-8

Part and Chapter:	TC evidence	Page No.:	10
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	VFH Pricing		
Sub Topic:	Credibility		

Preamble to IR (If Any):

Three options are given by TC for credibility:

1. Switch to a Classical Credibility Approach
2. Changing K to a lower number
3. Changing the minimum credibility of 10% to 20%, 30% or 40%.

Question:

Please comment on the potential volatility in proposed rates given a switch to a classical credibility approach, changing K to a lower number, or higher minimum credibility being applied to the many small classifications, and the potential issues thereof?

Rationale for Question:

To understand the implications of increasing the minimum credibility level.

RESPONSE:

Dion Strategic is aware that any of these options could result in volatility in rates. Dion Strategic is presenting options for the PUB and MPI to consider – Credibility is a

simple concept yet it is difficult to implement due to the amount of judgment involved. The PUB, MPI, and interveners should work together to improve the current methodology which gives little credibility to smaller classes of risk and managing any dislocation that may result. Judgmentally selecting K to have 95% credibility to the largest class automatically assumes that the smaller classes will not be credible.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-9

Part and Chapter:	TC evidence	Page No.:	14
PUB Approved Issue No:	2b. Ratemaking methodology		
Topic:	Ratemaking methodology		
Sub Topic:	Minimum Bias versus GLM		

Preamble to IR (If Any):

Opinion 1 states that there is no reason in 2021 not to be using Generalized Linear Models (GLM) for ratemaking.

Ms. Seto indicates “Therefore, we agree with the recommendation by Dion Strategic that MPI should consider switching to GLMs, but it may not be as ‘immediate’ as they would want. We suggest a plan to introduce a few new rating variables at a time, so that their impact can be monitored over time, evaluated periodically and revised as needed.”

Question:

- a) Please provide an estimate of the number of automobile rate indications completed by Dion Strategic that have used GLMs, and the number that have used minimum bias, in the last five years.
- b) Please provide an estimate of the number of automobile rate indications completed by Ms. Seto that have used GLMs, and the number that have used minimum bias, in the last five years.
- c) Please indicate whether what type of model Ms. Seto suggests should be used to introduce a few new rating variables at a time.

Rationale for Question:

To understand the current use of minimum bias and GLMs, and whether minimum bias is still a standard actuarial technique in widespread use in the industry. And to understand the recommendation by the peer reviewer.

RESPONSE:

a)

The Dion Strategic Property and Casualty (P&C) team have worked on at least five automobile rate indications using GLMs in the last five years (Alberta auto, Ontario auto >1, Atlantic auto). The P&C team has not used the minimum bias procedure in the last five years – we note that outside of the MPI’s GRA, the P&C team do not recall encountering the minimum bias procedure in our professional careers as consultants and in prior work experiences. Our actuarial contacts confirm that the largest insurers such as Intact, Aviva, Desjardins, TD, RSA, Economical, Northbridge, and Travelers all use GLMs for pricing.

b)

Ms. Seto wrote:

“Indications using GLMs – four
Indications using Minimum Bias – zero”

c)

Ms. Seto wrote:

“Palm suggests a simple approach to a GLM model, to start, rather than a comprehensive GLM model. For example, one could begin a GLM model using the existing rating factors and not considering any interactions yet. Then the next phase could be a transition phase including the testing for a couple new rating variables but keeping the rating factors within 1 or 2 degree polynomials. Over time, perhaps other

variables and interactions could be tested and included in the model. Results would be monitored periodically. Adjustments to the GLM could be made based on the results”

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.

PUB (TC) 1-10

Part and Chapter:	TC evidence – peer review	Page No.:	8
PUB Approved Issue No:	12. Vehicles for Hire (VFH) class, including rates		
Topic:	VFH Pricing		
Sub Topic:			

Preamble to IR (If Any):

Ms. Seto has commented with regards to territorial experience for Taxis VFH as follows:

"It is our understanding that Territory 1 represents Winnipeg and Territories 2-4 are smaller cities and/or rural areas of Manitoba. We have verified the 5-year loss ratio table derived by Dion Strategic based on

TC1_018_a_b_Appendix_01_VFH_Taxi_Loss_Experience_Aug20.xlsx Territory 1 is significantly higher than the 5-year loss ratios in Territories 2-4. The relativity table that Dion Strategic references from the VFH Technical Conference (April 20, 2021) may also imply the possibility of an issue with segmentation.

However, Territories 2-4 do not have as much volume (earned units) as Territory 1. The mismatch between differentials and loss ratios could simply be due to the randomness of claims. If possible, MPI may want to subdivide Territory 1 to determine what is causing the high loss ratio and high relativity. Perhaps a few areas in Winnipeg may be causing this result, but we cannot verify this without a deeper dive into the claims details of Territory 1. Exploring this issue may also help us determine what areas of the rating algorithm need improvement. Through this line of thinking, we have arrived at a similar conclusion as Dion Strategic, which is to investigate ways to improve the rating algorithm. While the data suggests that Territory 1 may be underpriced and Territories 2-4 may be overpriced, in my opinion, this could simply be random noise due to the lower volume of data."

Question:

- a) Please provide a table showing the collision claim frequency for each of Territory 1 and Territories 2-4 for Taxis, using claim count data from TC (MPI) 1-18 and earned vehicle data from the 2022 GRA.
- b) Please calculate the relative frequency for Territories 2-4 versus Table 1.
- c) Please indicate what the statistical probability is that an observed collision claim frequency for Territories 2-4 that has been consistently less than 50% that of Territory 1, for each of 2016 to 2019, and 50-60% for 2020 given an underlying hypothesis that there is no inherent difference in the territories.
- d) Please comment on the results of a-c) and whether it supports Ms. Seto opinion that it could simply be random noise due to the lower volume of data.

Rationale for Question:

To understand the opinion given.

RESPONSE:

a)

The tables provided in 1-1 were expanded to combine Territories 2 to 4 as follows.

Taxi VFH - COLLISION Claim Counts					
Territory	1	2	3	4	2, 3, and 4
2016	582	49	26	5	80
2017	533	51	26	7	84
2018	582	54	21	1	76
2019	575	57	24	4	85
2020	317	42	17	2	61
5yr total	2,589	253	114	19	386
Taxi VFH - Earned Units					
Territory	1	2	3	4	2, 3, and 4
2016	491	158	52	26	236
2017	489	153	51	26	230
2018	465	112	49	12	173
2019	470	102	45	8	155
2020	477	106	47	6	159
5yr total	2,392	631	244	78	953
Taxi VFH - COLLISION Claims Frequency					
Territory	1	2	3	4	2, 3, and 4
2016	118.5%	31.0%	50.0%	19.2%	33.9%
2017	109.0%	33.3%	51.0%	26.9%	36.5%
2018	125.2%	48.2%	42.9%	8.3%	43.9%
2019	122.3%	55.9%	53.3%	50.0%	54.8%
2020	66.5%	39.6%	36.2%	33.3%	38.4%
5yr total	108.2%	40.1%	46.7%	24.4%	40.5%

b)

Territory	1	2, 3, and 4	(2, 3, 4) / 1
2016	118.5%	33.9%	28.6%
2017	109.0%	36.5%	33.5%
2018	125.2%	43.9%	35.1%
2019	122.3%	54.8%	44.8%
2020	66.5%	38.4%	57.7%
5yr total	108.2%	40.5%	37.4%

c)

To begin, when comparing the inherent loss expectation, both frequency and severity must be taken into account. Frequency and loss ratio are not fully correlated. For example, small fender benders may occur more often in dense areas where you are more likely to collide with another vehicle. However, rural areas could experience higher severity due to travelling at higher speeds from roads with less traffic. With that said, below is the commentary on the differences in the territories being asked.

From the observed historical data in part b:

- The observed collision claims frequency for territories 2 to 4 is less than 50% of territory 1 for each of 2016 to 2019 and at 58% of territory 1 for 2020.
- This implies an observed probability of 80% that the observed claims frequency in territories 2 to 4 is under 50% of the observed claims frequency in territory 1.
- Dion Strategic notes that there is an upward trend over time between 2016 to 2020 in the relative collision frequency for Taxi VFH in territories 2 to 4 versus territory 1.
- Dion Strategic notes that the Taxi VFH Loss Ratio for Territory 2 is better than Territory 1 between 2016 to 2018, but the trend has reversed in 2019 and 2020.

Territory	1	2	3	4	(2, 3, 4)
2016	77.2%	53.4%	51.3%	18.7%	48.7%
2017	74.0%	35.5%	45.4%	26.9%	36.8%
2018	93.6%	47.0%	43.0%	5.8%	42.8%
2019	79.5%	84.6%	61.0%	40.3%	74.8%
2020	41.9%	64.2%	53.2%	18.4%	58.8%
5-year	72.8%	54.1%	50.5%	21.7%	50.2%

For a more statistical based approach, we created a simulation model with the following assumptions.

- Exposures use 2020 Taxi VFH exposures from TC 1-18 = 476.59 Territory 1, 106.04 Territory 2, 46.61 Territory 3, 5.87 Territory 4

- Expected number of claims follow a Poisson distribution
- The expected frequency % per territory is as follows:
 - Model 1 = 5-year averages as shown in part (a) = 108.2% Territory 1, 40.1% Territory 2, 46.7% Territory 3, 24.4% Territory 4
 - Model 2 = 2019 and 2020 claims frequency average = 94.2% Territory 1, 47.6% Territory 2, 45.0% Territory 3, 43.9% Territory 4
- 10,000 iterations.

Results are as follows:

Collision Claims Frequency	<u>Model 1</u>	<u>Model 2</u>
TERR 2 to 4 < 50% TERR 1	Over 95%	55%
TERR 4 < 50% TERR 1	95%	55%
TERR 3 < 50% TERR 1	80%	60%
TERR 2 < 50% TERR 1	Over 95%	50%

*Meaning of table – Model 1 predicts a probability of over 95% that Territories 2 to 4 Collision Claims Frequency will be less than 50% of Territory 1. However, Model 2 predicts a probability of 55% that Territories 2 to 4 Collision Claims Frequency will be less than 50% of Territory 1

d)

Dion Strategic summarizes parts a to c as follows:

- 5-year observed historical data shows Territory 1 Collision claims frequency is much higher than Territories 2 to 4. The relative Collision frequency of Territories 2 to 4 divided by Territory 1 is less than 50% for years 2016 to 2019.
- The relative Collision frequency of Territories 2 to 4 versus Territory 1 is on an upward trend from 2016 to 2020.
- The loss ratio for Territory 2 was much better than Territory 1 between 2016 and 2018. The loss ratio for Territory 2 is now worse than Territory 1 for 2019 and 2020.

- The model results show:
 - Model 1, using 5-year Collision claims frequency assumption, suggests over 95% probability that Territories 2 to 4 claims frequency will be less than 50% of Territory 1
 - Model 2, using 2-year Collision claims frequency assumption, suggests that the probability is now 55% that Territories 2 to 4 claims frequency will be less than 50% of Territory 1

Based on these results, yes, Ms. Seto's point that this could be due to random noise is valid. Models 1 and 2 illustrate the volatility of results based on a simple change in assumptions. If the severity component is added, the volatility of results will further increase.

To conclude:

- There is a noise and volatility component. There are less than 160 earned units for Taxi VFH in territories 2 to 4 combined – results can and will fluctuate.
- The longer-term historical data does suggest that Territories 2 to 4 have outperformed Territory 1
 - Yet small volume means fluctuations can occur. Taxi VFH Territory 1 loss ratios are better than Territory 2 for 2019 and 2020.
- As noted in the report, observed historical data suggests that urban taxis are undercharged and rural taxis overcharged. Yet there is a credibility/low-volume/noise argument which is valid, given the low exposures in territories 2 to 4.
- What Dion Strategic finds most important is that all stakeholders work together to investigate improvements to Territories in relation to different subsets of risks. Small subsets of risks are subject to noise/low-volume/credibility issues. As noted in the report, there is a trade-off between simplicity and complexity in a rating algorithm.

RATIONALE FOR REFUSAL TO FULLY ANSWER THE QUESTION:

TC to insert rationale for refusal here.