REVIEW OF RATE APPLICATION SUBMITTED BY: MANITOBA PUBLIC INSURANCE ACTUARIAL EVIDENCE

Province of Manitoba

Public Utilities Board

October 7, 2022

A business of Marsh McLennan

Contents

1. Executive Summary

1.1. Purpose and Scope

Oliver, Wyman Limited (Oliver Wyman) reviewed the compulsory driver and vehicle insurance rate application submitted by Manitoba Public Insurance (MPI). The application proposes rate levels for policies effective between April 1, 2023, and March 31, 2024.[1]

The Public Interest Law Centre (PILC), on behalf of the Consumers Association of Canada (Manitoba) Inc. (CAC Manitoba), an intervener in the rate application review proceeding, retained Oliver Wyman to provide this report.

Our duty in providing assistance and giving evidence is to help the Public Utilities Board. This duty overrides any obligation to CAC Manitoba.

We intend the evidence that we provide in this report:

- to be fair, objective and non-partisan;
- to be related only to matters that are within our area of expertise; and
- to provide such additional assistance as the Public Utilities Board may reasonably require to determine an issue.

The scope of our retainer was to assist in the review of the MPI General Rate Application (GRA) on issues related to:

- The actuarial models supporting the claims provisions in MPI’s proposed rates.

Manitoba Public Utilities Board

The Public Utilities Board of Manitoba (PUB) is an independent, quasi-judicial administrative tribunal with broad oversight and supervisory powers over public utilities and designated monopolies, as set out in statute. The PUB considers both the impact on customers and the financial requirements of the utility in approving rates.[2]

In executing that mandate, the Board established a hearing schedule for the MPI GRA that is the subject of this report.

Rate Indication Summary

MPI estimates its 2023/24 breakeven premium level to be 0.9% below, on average, premiums that MPI would collect under the 2022/23 program. MPI achieves this reduction through the combination of (i) an overall base rate change of −0.3% and (ii) a 0.6% reduction due to the anticipated movement of registered owners on the MPI Driver Safety Rating (DSR) scale. We present MPI’s proposed changes by class in Table 1.

[1] Unless otherwise indicated, the “20XX/(XX+1)” convention refers to periods incepting April 1, 20XX and expiring March 31, 20XX+1

[2] http://www.pubmanitoba.ca/v1/about-pub/index.html

Table 1: Proposed Rate Changes

Class	Before DSR Change	After DSR Change
Private Passenger	−0.1%	−2.8%
Commercial	+3.7%	+3.7%
Public	+1.8%	+1.7%
Motorcycles	+2.0%	+1.6%
Trailers	−8.6%	−8.6%
Off-Road Vehicles	0.0%	0.0%
Overall	0.0%	−0.3%
DSR Scale Movement and Expansion	-0.9%	−0.6%
Overall, including DSR Scale Movement	−0.9%	−0.9%

1.2. Relevant Comments

- **Distribution of claim costs –** In Table 2 we present the distribution of claim costs by coverage so as to provide context in this report of the proportionate weight to the total for each coverage.

Table 2: Claim Cost Distribution

Coverage	Discounted Claim Cost	Distribution
Bodily Injury	5,254	0.6%
Property Damage	48,507	5.8%
Income Replacement Indemnity	88,927	10.6%
Accident Benefits – Other (Indexed)	59,488	7.1%
Accident Benefits – Other (Non-Indexed)	31,960	3.8%
Collision	506,119	60.2%
Comprehensive	100,387	11.9%
Incurred Claims (Excl Impact of PIPP Enh. & ULAE1)	840,642	100.0%
PIPP Enhancement	5,481	
ULAE	34,741	
Total	880,864	

- **Product Change – Compulsory and Extension Revision Project (CERP)** - Starting with policies renewed in 2021/22, MPI updated the insurance product with the following changes:
  - Increases in deductibles for basic coverages
  - Increases in the minimum coverage for third-party liability.
- **Work from home** – MPI applies a 5% reduction to claim frequency for collision, property damage, weekly indemnity, and ABO-Indexed in consideration of a change in post-pandemic driving behavior as additional

insureds work from home. We have reviewed the effects of the pandemic in other contexts and consider a 5% adjustment to be reasonable.

1.3. Findings and Conclusions

- In this report, we offer our observations on MPI’s development of discounted claims costs for several coverages/perils. Claim costs represent approximately 74% of the overall required rate.
- Our concerns generally relate to MPI’s limited statistical modeling of claims costs. Given the materiality of claim costs to the overall rate, we recommend that, at a minimum, MPI consider estimates based on statistical models fit to data. We appreciate that, at times, it may be appropriate to employ actuarial judgement and deviate from the model indications. However, in those situations, the rationale for the deviations should be included in the rate application.

* * * * *

We continue to review the MPI rate applications and may identify additional concerns or may reconsider our positions.

Please direct all questions related to this report to the undersigned.

<u>Oliver, Wyman Limited</u>

Rajesh Sahasrabuddhe, FCAS, ACIA
rajesh.sahasrabuddhe@oliverwyman.com

Chris Schneider, FCAS, ACIA
chris.schneider@oliverwyman.com

Paula Elliott, FCAS, FCIA
paula.elliott@oliverwyman.com

2. MPI Rate Application

MPI submitted its automobile rate application to the Board on July 12, 2022. The Board issued a Notice of Hearing on July 16, 2022.

The following information was available for our initial review:

- MPI's 2023 General Rate Application

In addition, as scheduled, we submitted information requests (IRs) to MPI on August 5, 2022, and September 14, 2022, and received its responses on August 30, 2022, and September 27, 2022, respectively.

The Board scheduled a hearing of MPI's rate application to begin on October 19, 2022.

3. Actuarial Commentary: Weekly Indemnity

3.1. MPI Projection

MPI develops its estimate for weekly indemnity claims incurred using frequency and severity models. We present MPI's frequency and severity data, projections and models in Table 3. We focus our review on the reasonableness of the 2023 and 2024 accident year projections as these years are used directly in the rate calculation.

Table 3: MPI Weekly Indemnity Claims Incurred[3]

Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity[4]	Claims Incurred (000)
2012/13	812,141	2.47	41,632	83,556
2013/14	823,518	2.28	39,107	73,326
2014/15	835,178	2.02	44,658	75,204
2015/16	848,635	2.10	48,599	86,749
2016/17	861,942	2.10	52,497	94,915
2017/18	874,357	2.21	48,233	93,137
2018/19	882,537	2.15	43,857	83,227
2019/20	887,453	1.97	49,761	87,090
2020/21	891,738	1.43	59,527	75,755
2021/22	918,683	1.92	48,721	86,038
2022/23	932,897	1.90	52,247	92,675
2023/24	**942,908**	**1.88**	**55,470**	**98,391**
2024/25	**953,029**	**1.86**	**57,892**	**102,689**
2025/26	963,262	1.84	60,363	107,072
2026/27	973,606	1.82	62,758	111,320

3.2. Oliver Wyman Review

MPI Severity Model

We have no issues with MPI's weekly indemnity severity model and do not discuss that model further.

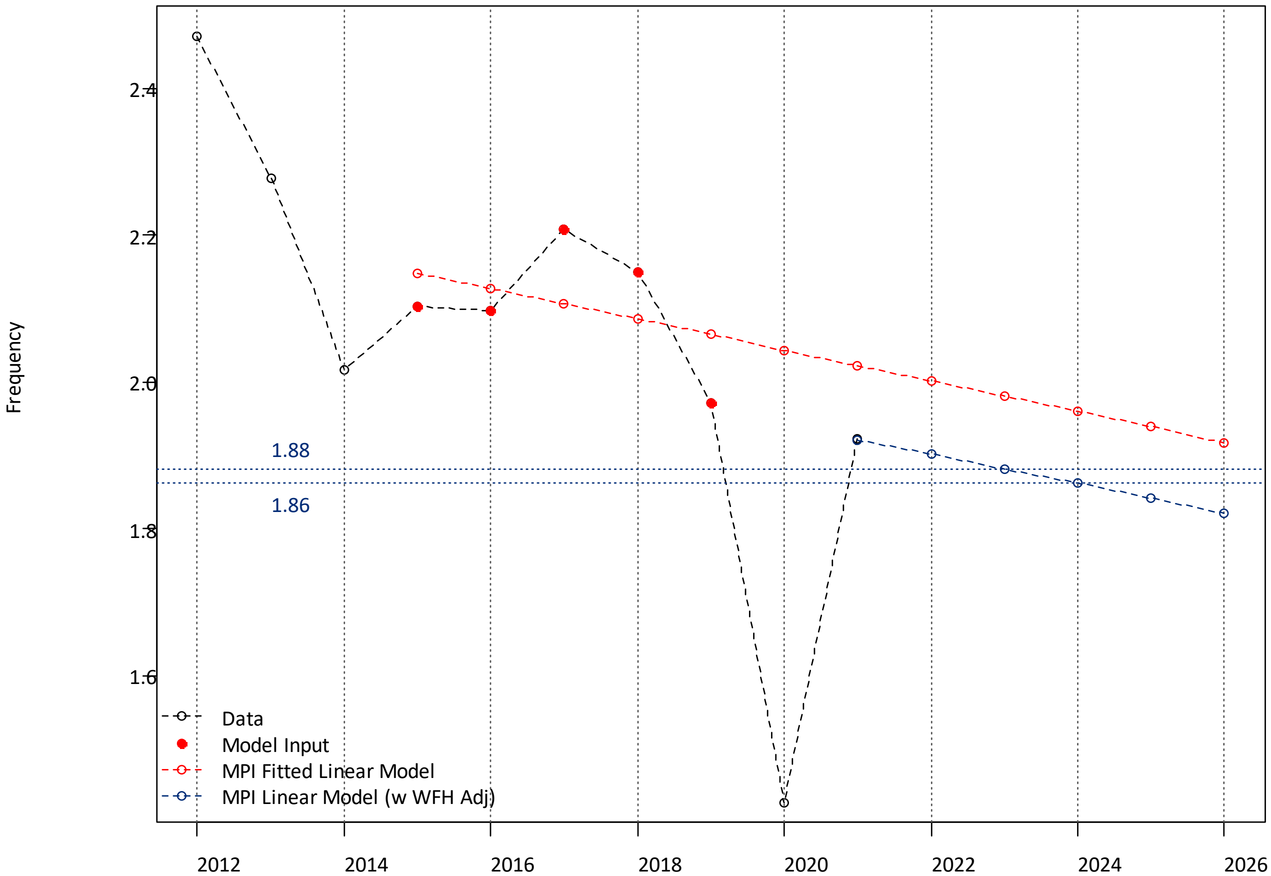
[3] Agrees to Figure CI-14 within rounding tolerances.

[4] We have not included our analysis replicating MPI's model as we have no issues with MPI's projections for this coverage. We will retain our replication of the MPI model in our workpapers and provide projections and regression statistics upon request.

MPI Frequency Model

We present MPI's selected frequency model in Figure 1. MPI first fits a *linear* model to the observed frequencies for 2015 through 2019. MPI then applies a 5% work from home adjustment to the predictions to develop its frequency estimates.

Figure 1: MPI Weekly Indemnity Frequency Model



We present the MPI model regression statistics (**emphasis** added) below:

```
lm(frequency ~ accident_year, data = ab_wi_df,
  subset = ab_wi_df$accident_year %in% 2015:2019 ) |> summary()

##
## Call:
## lm(formula = frequency ~ accident_year, data = ab_wi_df, subset = ab_wi_df$acci
dent_year %in% 2015:2019)
##
## Residuals:
##          4          5          6          7          8
## -4.495e-05 -2.976e-05  1.021e-04  6.486e-05 -9.226e-05
##
```

```
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.443e-02  5.944e-02   0.747    0.509
## accident_year -2.098e-05  2.947e-05  -0.712    0.528
##
## Residual standard error: 9.319e-05 on 3 degrees of freedom
## Multiple R-squared:  0.1446, Adjusted R-squared:  -0.1406
## F-statistic: 0.5069 on 1 and 3 DF,  p-value: 0.5278
```

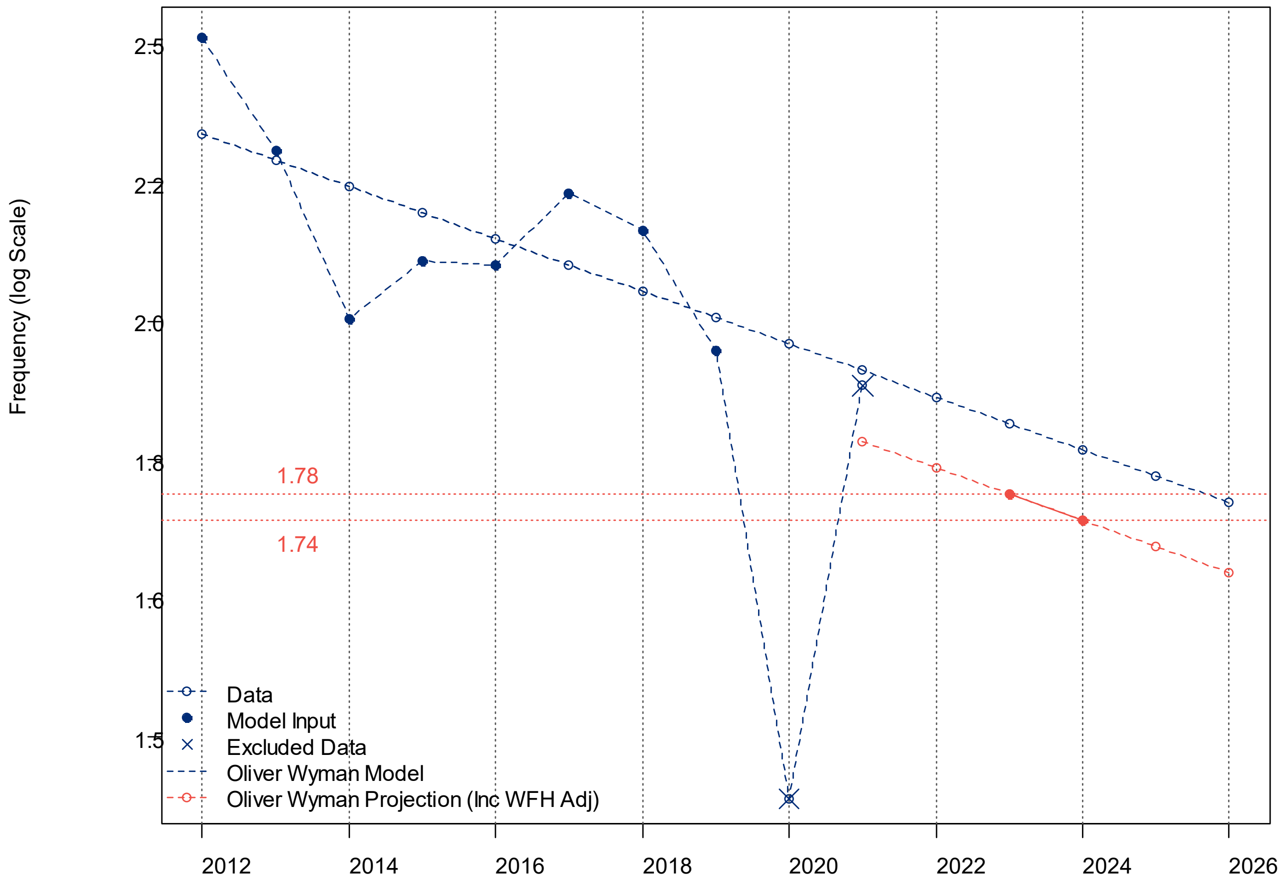
Our concerns with the MPI frequency model are as follows:

- **Model form** – It is more common to fit log-linear models as frequency changes tend to occur on a *percentage* basis rather than an amount basis. A linear model could potentially produce a negative frequency in a limiting case.
- **Poor Fit** – The model has extremely weak R-squared statistics, and the *p*-value for accident year is well above the common 5% upper-bound threshold for statistical significance.

Oliver Wyman Alternative Frequency Model

We present our recommended alternative frequency model in Figure 2.

Figure 2: Oliver Wyman Weekly Indemnity Frequency Model



We present the Oliver Wyman model regression statistics (**emphasis** added) below:

```
summary(ow_model$model)

##
## Call:
## lm(formula = as.formula(model_string), data = data)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.095963 -0.026073 -0.005968  0.046218  0.069503
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     39.036941  18.326213   2.130   0.0772 .
## accident_year -0.018987   0.009093  -2.088   0.0818 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1” 1
##
## Residual standard error: 0.05893 on 6 degrees of freedom
```

```
## Multiple R-squared:  0.4209, Adjusted R-squared:  0.3244
## F-statistic:  4.36 on 1 and 6 DF,  p-value: 0.08181
```

Although we acknowledge that the *p*-value of our model is slightly greater than the 5% upper bound threshold, we note that our model explains a significantly higher percentage of the variation in the data. In addition, unlike the linear form used by MPI, the log-linear form is consistent with the common assumption that year over year changes will impact weekly indemnity frequency on a percentage basis.

4. Actuarial Commentary: Collision

4.1. MPI Projection

We present MPI's estimates for collision claims incurred in Table 4. MPI develops its estimates for collision claims incurred using frequency and severity models separately for claims for vehicle repair ("repairs") and claims for vehicles that are beyond repair[5] ("total loss"). We discuss these models in Section 4.2 and 4.3, below. We focus our review on the reasonableness of the 2023 and 2024 accident year projections as these years are used directly in the rate calculation.

Table 4: MPI Collision Claims Incurred[6]

Accident Year	Repair[7]	Total Loss (Table 5)	Total (000)
2012/13	201,444	114,402	315,846
2013/14	220,503	129,914	350,417
2014/15	195,086	118,756	313,842
2015/16	212,888	142,444	355,332
2016/17	235,773	151,784	387,557
2017/18	246,325	162,653	408,978
2018/19	253,794	155,594	409,388
2019/20	253,748	153,665	407,413
2020/21	204,439	112,897	317,336
2021/22	259,753	159,789	419,542
2022/23	278,705	191,896	470,601
2023/24	**292,127**	**205,223**	**497,350**
2024/25	**306,196**	**219,476**	**525,672**
2025/26	320,943	234,719	555,662
2026/27	336,401	251,021	587,422

4.2. Repair

We have no issues with MPI's collision repair frequency or severity model and do not discuss MPI's collision repair models or projections further.

4.3. Total Loss

We present MPI's frequency and severity data and projections for collision - total loss in Table 5.

[5] Including situations where the cost of the repair exceeds the value of the vehicle.

[6] Agree with Figure CI-39 within rounding tolerances.

[7] We have not included our analysis replicating MPI's model as we have no issues with MPI's projections for this coverage. We will retain our replication of the MPI models and provide projections and regression statistics upon request.

Table 5: MPI Collision Total Loss Claims Incurred[8]

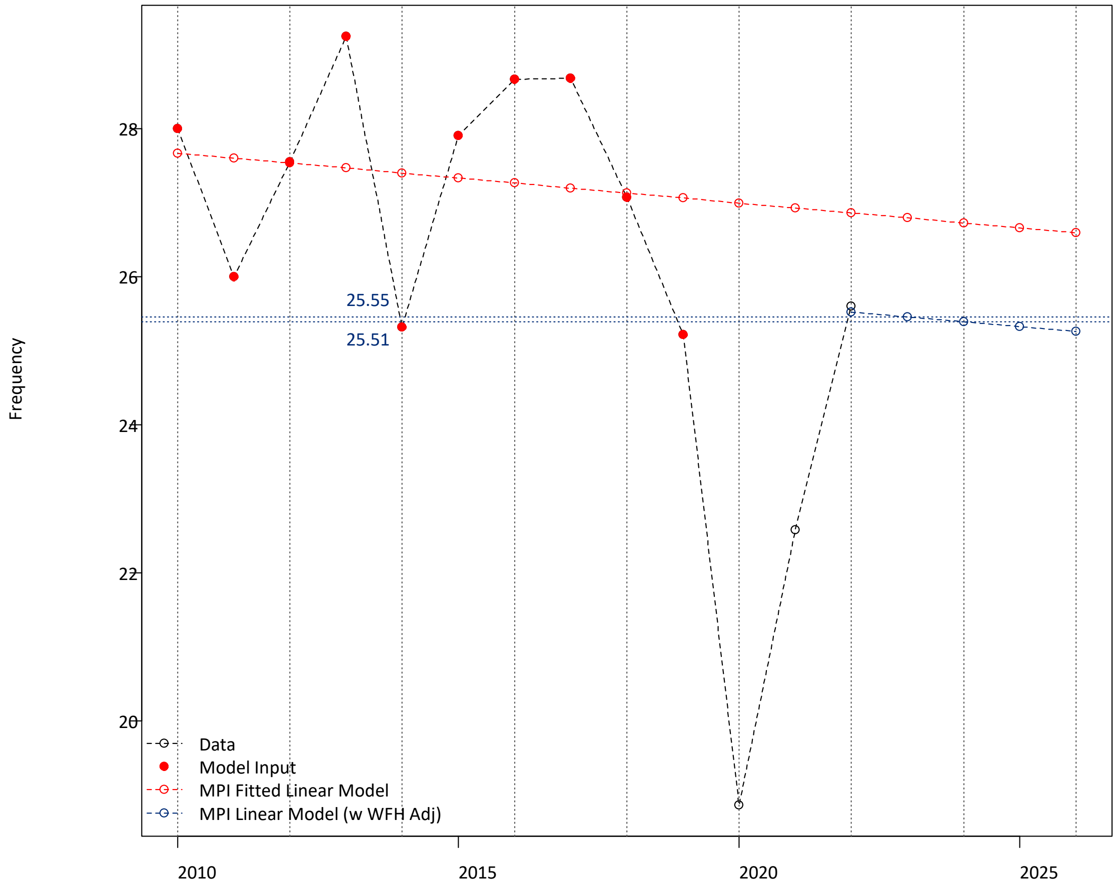
Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	27.55	5,113	114,402
2013/14	823,518	29.25	5,394	129,914
2014/15	835,178	25.32	5,617	118,756
2015/16	848,635	27.90	6,016	142,444
2016/17	861,942	28.67	6,143	151,784
2017/18	874,357	28.68	6,487	162,653
2018/19	882,537	27.07	6,513	155,594
2019/20	887,453	25.21	6,867	153,665
2020/21	891,738	18.86	6,714	112,897
2021/22	918,683	22.57	7,705	159,789
2022/23	932,897	25.60	8,035	191,896
2023/24	**942,908**	**25.55**	**8,517**	**205,223**
2024/25	**953,029**	**25.51**	**9,028**	**219,476**
2025/26	963,262	25.46	9,570	234,719
2026/27	973,606	25.42	10,144	251,021

MPI Frequency Model

MPI first fits a *linear* model to the observed frequencies for 2010 through 2019. MPI then applies a 5% work from home adjustment to the predictions to develop its frequency estimates. We present MPI's model in Figure 3.

[8] Frequency and severity assumptions agree with Figure CI-34 and Figure CI-37, respectively, within rounding tolerances.

Figure 3: MPI Collision Total Loss Frequency Model



We present MPI's model regression statistics (**emphasis** added) below:

```
lm(frequency ~ accident_year, data = cl_repair_df,
   subset = cl_repair_df$accident_year %in% 2010:2019 ) |> summary()

##
## Call:
## lm(formula = frequency ~ accident_year, data = cl_repair_df,
##     subset = cl_repair_df$accident_year %in% 2010:2019)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.0826 -1.2151  0.1756  1.1948  1.7822
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   163.13034  333.52243   0.489    0.638
## accident_year  -0.06739    0.16556  -0.407    0.695
##
## Residual standard error: 1.504 on 8 degrees of freedom
```

```
## Multiple R-squared:  0.02029,    Adjusted R-squared:  -0.1022
## F-statistic: 0.1657 on 1 and 8 DF,  p-value: 0.6946
```

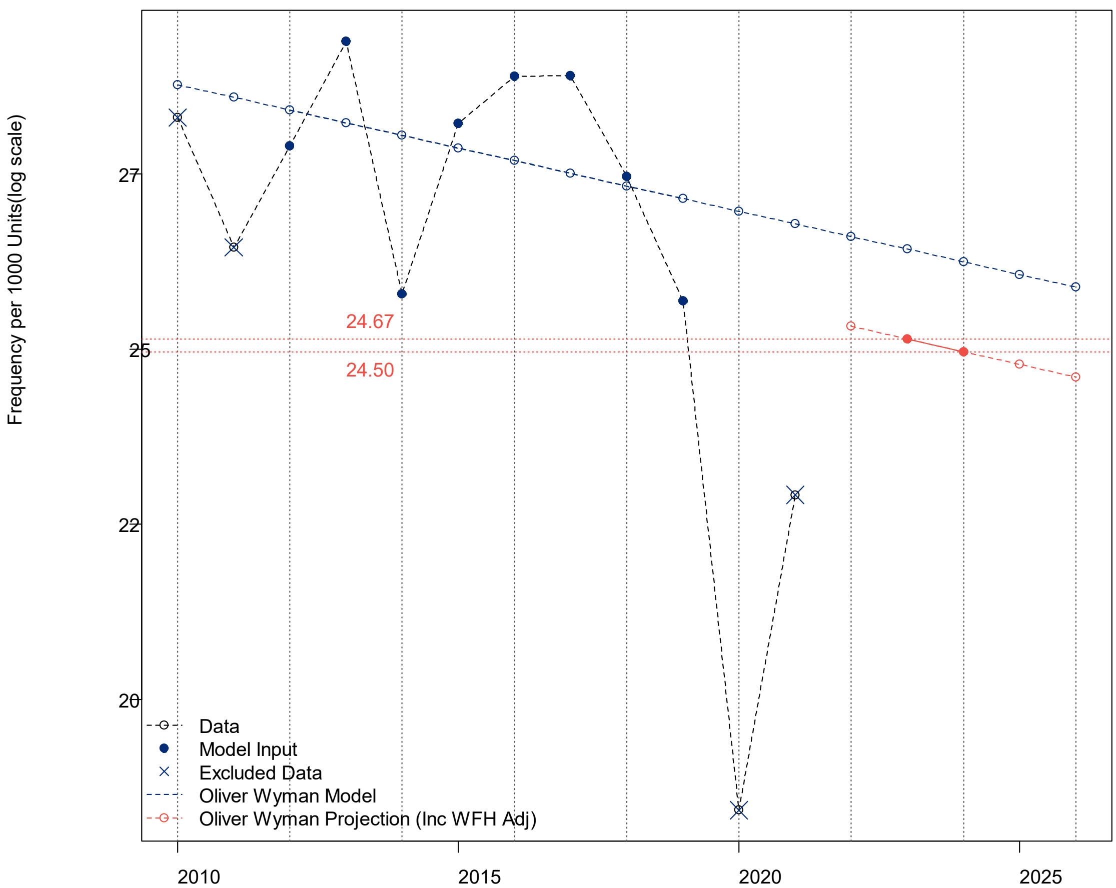
We offer the following concerns with the MPI model:

- **Model form** – It is more common to fit log-linear models as frequency changes tend to occur on a *percentage* basis rather than an amount basis. A linear model could potentially produce a negative frequency in a limiting case.
- **Potential Larger Impact of WFH Adjustment on Collision**– Although we do not take direct issue with MPI's WFH adjustment due to the significant uncertainty associated with this estimate, it has been our experience that the collision frequency has generally been impacted more by the pandemic relative to other coverages. We observe a similar effect in the MPI data. It follows that a larger WFH adjustment may be appropriate in this case. We observe MPI's current projection is slightly greater than the actual level observed in 2019/20 (pre-pandemic).
- **Recent decreasing trend** –We observe frequency decreased significantly since 2017/18.

Oliver Wyman Alternative Model

We present our recommended alternative frequency model in Figure 4. Our recommended model considers a shorter experience period than MPI model to better reflect the decreasing trend observed immediately prior to the pandemic. We note that we view our model as potentially conservative as the use of the longer experience period and our decision not to include 2021/22 (considering the COVID pandemic and maturity) results in a model that doesn't fully capture the recent trend.

Figure 4: Oliver Wyman Collision Total Loss Frequency Model



We present the Oliver Wyman model regression statistics (**emphasis** added) below:

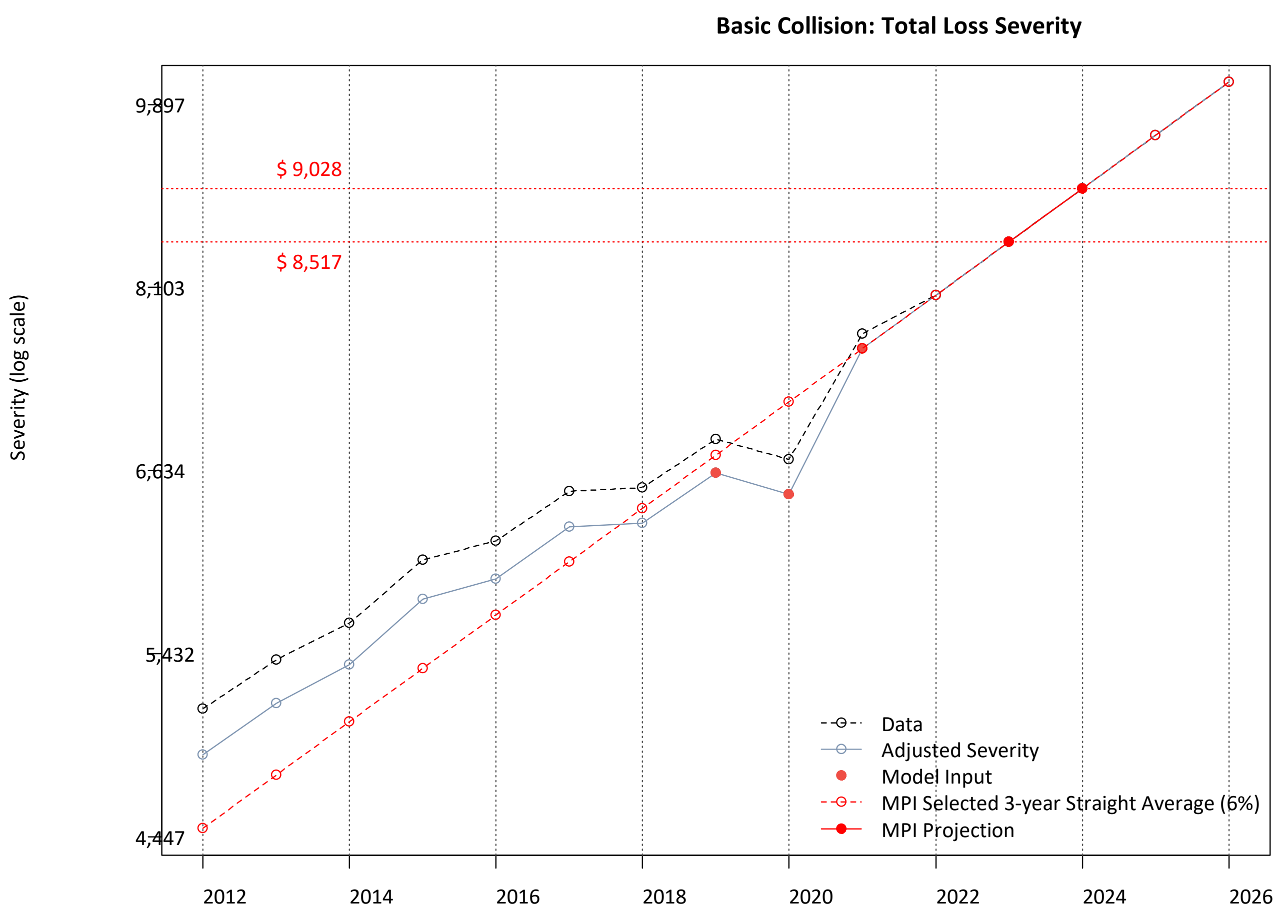
```
summary(ow_model$model)

##
## Call:
## lm(formula = as.formula(model_string), data = data)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.090617 -0.029939  0.009568  0.046936  0.055759
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)     17.867338  17.894484   0.998    0.357
## accident_year  -0.007222   0.008878  -0.813    0.447
##
## Residual standard error: 0.05754 on 6 degrees of freedom
## Multiple R-squared:  0.09933,    Adjusted R-squared:  -0.05078
## F-statistic: 0.6617 on 1 and 6 DF,  p-value: 0.447
```

We note that our model explains a higher percentage (though not a "high percentage") of the variation in the data than MPI's model. In addition, the log-linear form is consistent with the common assumption that year over year changes will impact frequency on a percentage basis.

MPI Severity Model

For 2022, MPI selects the latest severity, reduced by $125 to account for the CERP impact. MPI selects a severity growth trend rate of 6% based on the 3-year trend. We present MPI's selection and model in Figure 5.

Figure 5: MPI Collision Total Loss Severity Model



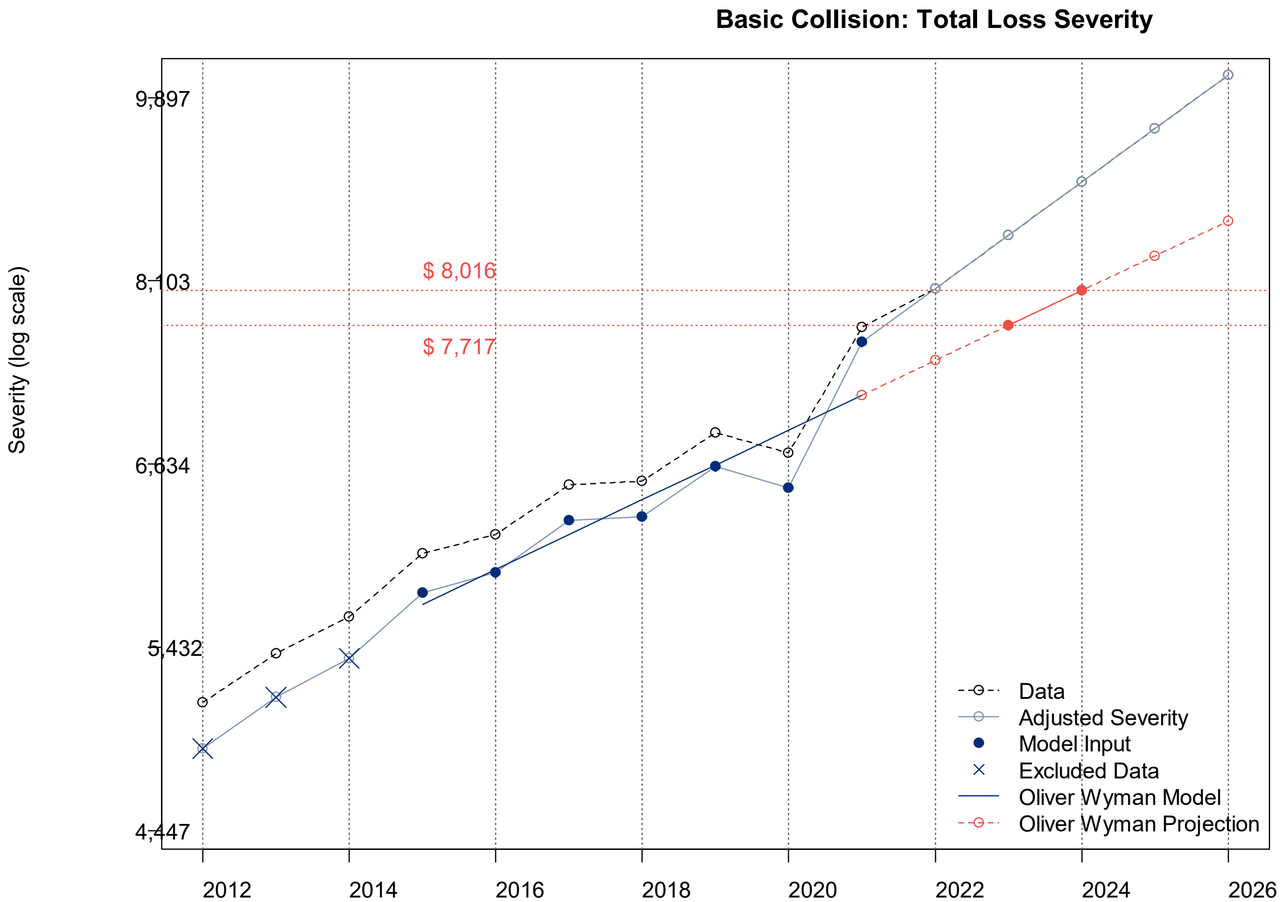
We offer the following concerns with the MPI model:

- **Leverage of current data point in model** - Each data point is comprised of "signal" and "noise." Actuaries use regression models to extract "signal" from data. MPI projects forward the 2021 severity to estimate future severities. Under MPI's approach, both signal and noise are projected forward.
- **Trend Rate Selection** – MPI selects a trend rate as the average of the changes between 2018/2019 and 2019/20 (5.4%); 2019/20 and 2020/21 (−2.2%); and 2020/21 and 2021/22 (14.8%). As with the use of the current data point as a starting point, we consider this period for trend measurement to be too short and too volatile given the effect of the COVID-19 pandemic.

Oliver Wyman Alternative Model

We address both of the shortcomings listed above through the use of a regression model. We present that regression model in Figure 6.

Figure 6: Oliver Wyman Collision Total Loss Severity Model



We present the Oliver Wyman model regression statistics (**emphasis** added) below:

```
summary(ow_model$model)

##
## Call:
## lm(formula = as.formula(model_string), data = data)
##
## Residuals:
##         1         2         3         4         5         6         7
##  0.012850 -0.003336  0.015300 -0.018515 -0.001550 -0.062970  0.058222
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -68.013056  15.359765  -4.428  0.00684 **
```

```
## accident_year   0.038045   0.007611   4.998  0.00411 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1’' 1
##
## Residual standard error: 0.04028 on 5 degrees of freedom
## Multiple R-squared:  0.8332, Adjusted R-squared:  0.7999
## F-statistic: 24.98 on 1 and 5 DF,  p-value: 0.00411
```

The *p*-value of our model is below the 5% upper-bound threshold and is therefore considered statistically significant. In addition, our model explains a high percentage of the variation in the data.

5. Actuarial Commentary: Comprehensive

5.1. MPI Projection

We present MPI's estimates for comprehensive claims incurred in Table 6. MPI develops its estimate for comprehensive claims incurred using frequency and severity models for the following perils: hail, theft, glass, rodents, vandalism and all other. For all perils except glass, MPI develops estimates for vehicle repair claims for ("repairs") and claims for vehicles that are beyond repair ("total loss"). We discuss these models in Section 5.2 through 5.7, below. We focus our review on the reasonableness of the 2023 and 2024 accident year projections as these years are used directly in the rate level change indication calculation.

The claims incurred amounts for each peril that we present in Table 6 are based on our replication of MPI's model using data provided in the GRA and information provided in response to IR#2. We were unable to replicate the severity models based on that information. Therefore, we include balancing differences in Table 6.

Table 6: MPI Comprehensive Claims Incurred[9]

Accident Year	Hail (Table 7)	Theft (Table 8)	Vandalism (Table 9)	Glass (Table 10)	Rodents (Table 11)	All Other (Table 12)	Claims Incurred (000)	Balancing	Balanced Claims Incurred (000)
2012/13	21,300	9,275	10,780	7,878	6,091	16,806	72,130	0	72,130
2013/14	22,041	9,818	9,642	8,516	7,554	17,600	75,172	-	75,172
2014/15	11,675	11,771	9,993	9,947	9,982	18,316	71,685	0	71,685
2015/16	47,430	13,997	12,856	12,930	10,942	23,214	121,369	(2)	121,367
2016/17	39,144	15,315	15,519	14,075	12,234	22,223	118,510	150	118,660
2017/18	6,120	14,942	13,779	15,489	2,975	19,550	72,855	113	72,967
2018/19	40,709	18,870	14,468	16,434	2,532	21,196	114,210	179	114,389
2019/20	7,956	20,581	13,861	16,635	3,694	24,084	86,809	215	87,024
2020/21	7,328	15,570	14,166	19,814	3,800	24,008	84,686	1,710	86,396
2021/22	4,551	23,378	12,354	17,268	3,668	22,826	84,046	195	84,241
2022/23	19,041	21,335	13,638	11,847	3,590	24,698	94,149	203	94,351
2023/24	**19,678**	**22,068**	**14,232**	**13,010**	**3,712**	**25,935**	**98,635**	**302**	**98,937**
2024/25	**20,336**	**22,827**	**14,853**	**14,287**	**3,839**	**27,234**	**103,375**	**406**	**103,781**
2025/26	21,017	23,611	15,500	15,689	3,971	28,600	108,387	515	108,902
2026/27	21,720	24,423	16,176	17,229	4,108	30,035	113,690	628	114,318

[9] As noted, we were not able to replicate the MPI calculations for comprehensive. The "balancing adjustment" is the difference between amounts Figure CI-66 and our replicated values.

5.2. Hail

We present MPI's frequency and severity data, projections and models for comprehensive hail in Table 7.

Table 7: MPI Comprehensive Hail Claims Incurred[10]

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2012/13	6.13	3,181	2.47	2,727	21,300
2013/14	5.19	3,660	2.39	3,252	22,041
2014/15	2.55	3,814	1.27	3,354	11,675
2015/16	7.64	4,422	6.04	3,660	47,430
2016/17	6.58	4,396	4.56	3,611	39,144
2017/18	1.61	3,285	0.50	3,379	6,120
2018/19	5.74	4,332	5.15	4,132	40,709
2019/20	2.42	2,964	0.57	3,147	7,956
2020/21	1.82	3,567	0.41	4,229	7,328
2021/22	1.06	3,829	0.20	4,436	4,551
2022/23	3.73	3,371	2.16	3,639	19,041
2023/24	**3.69**	**3,480**	**2.14**	**3,767**	**19,678**
2024/25	**3.65**	**3,593**	**2.11**	**3,899**	**20,336**
2025/26	3.61	3,710	2.09	4,035	21,017
2026/27	3.57	3,831	2.07	4,176	21,720

MPI Severity Models

We have no issues with MPI's comprehensive hail repair or total loss severity models and do not discuss these models further.

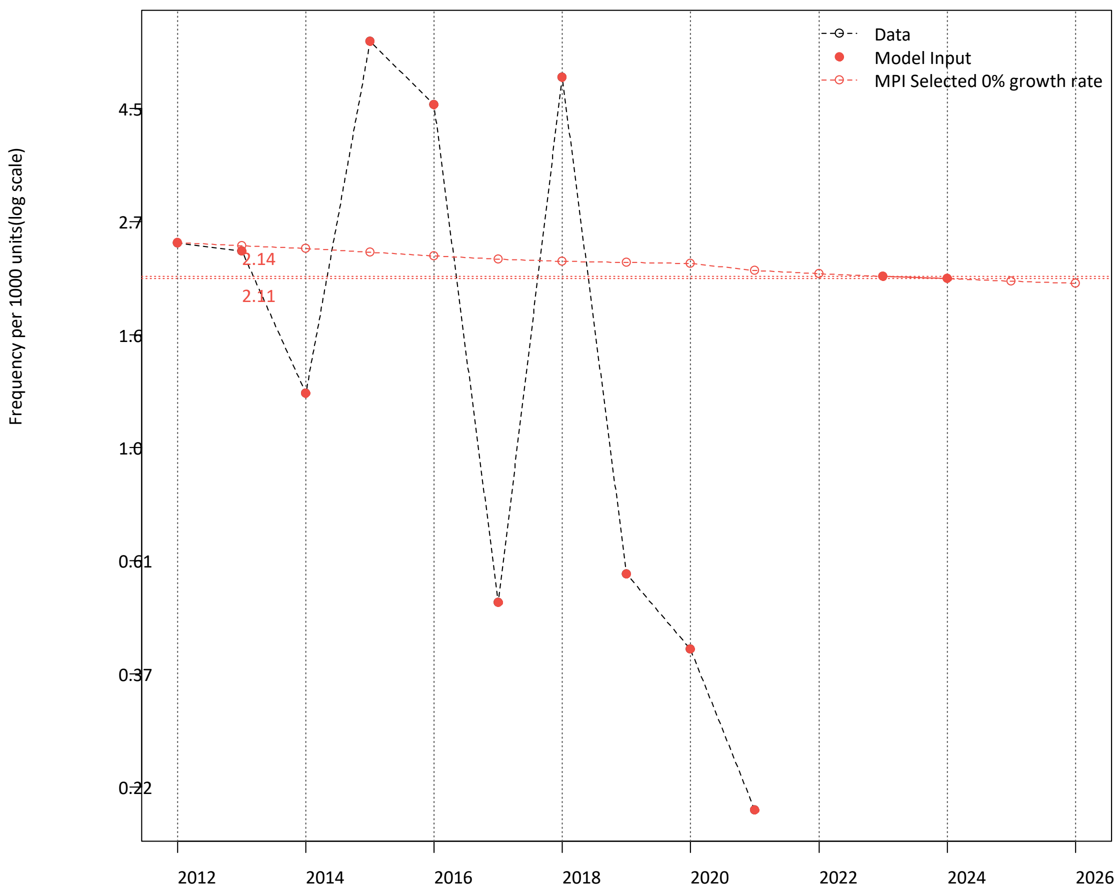
MPI Frequency Models

We have no issues with MPI's comprehensive hail *repair* frequency model and do not discuss this further.

For comprehensive hail *total loss*, MPI selects the 10-year average *claim count* (not frequency) and no trend growth rate in counts (implying a slight negative frequency trend).

[10] Frequency and severity data (2021/22 and prior) agree with Figure CI-42 and Figure CI-54, respectively, within rounding tolerances. Frequency and severity projections (2022/23 to 2026/27) agree with Figure CI-43 and Figure CI-55, respectively, within rounding differences.

Figure 7: MPI Comprehensive Hail Total Loss Frequency Model



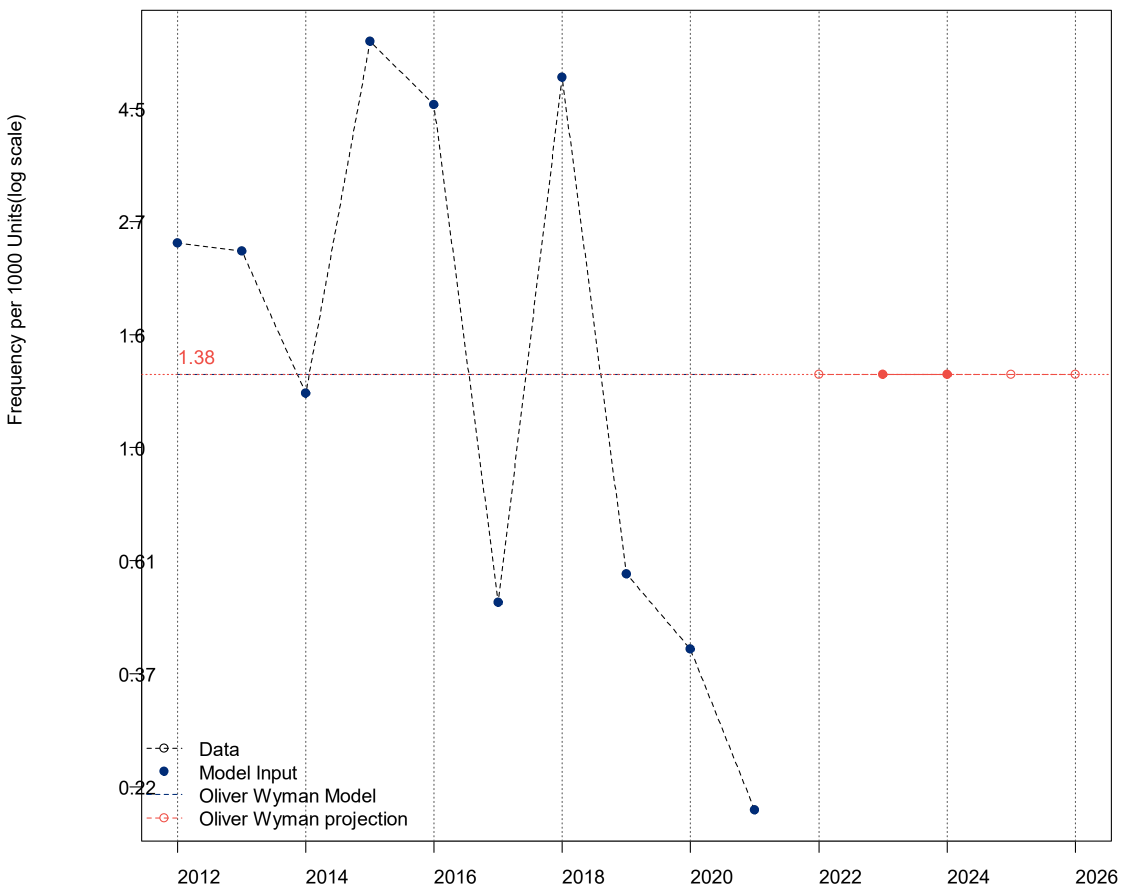
We offer the following concerns with the MPI model:

- **Claim Count vs Frequency** – MPI selects the 10-year average *claim count* and therefore does not normalize the historical experience for exposure volume.
- **High Variability** – We observe a high amount of variability which makes selecting a 2022/23 frequency estimate difficult.
- **Model form** – It is more common to fit log-linear models as frequency changes tend to occur on a *percentage* basis rather than an amount basis.

Oliver Wyman Alternative Model

We present our recommended alternative model in Figure 8. Our selected model is a 10-year log-linear fit to the historical frequency data with only the intercept parameter included in the model (the time/trend parameter was not significant).

Figure 8: Oliver Wyman Comprehensive Hail Total Loss Frequency Model



5.3. Theft

We present MPI's frequency and severity data and projections for comprehensive hail in Table 8.

Table 8: MPI Comprehensive Theft Claims Incurred[11]

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2012/13	1.96	2,040	1.52	4,882	9,275
2013/14	1.66	2,320	1.66	4,869	9,818
2014/15	1.76	2,757	1.75	5,268	11,771
2015/16	1.64	3,242	1.84	6,078	13,997
2016/17	1.85	2,935	1.90	6,484	15,315

[11] Frequency and severity data (2021/22 and prior) agree with Figure CI-44 and Figure CI-56, respectively, within rounding tolerances. Frequency and severity projections (2022/23 to 2026/27) agree with Figure CI-45 and Figure CI-57, respectively, within rounding differences.

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2017/18	1.74	3,045	1.79	6,568	14,942
2018/19	2.08	3,363	2.07	6,944	18,870
2019/20	2.65	3,035	2.19	6,914	20,581
2020/21	2.07	2,714	1.74	6,785	15,570
2021/22	3.47	2,729	2.21	7,234	23,378
2022/23	2.73	2,924	2.05	7,268	21,335
2023/24	**2.73**	**2,997**	**2.05**	**7,432**	**22,068**
2024/25	**2.73**	**3,072**	**2.05**	**7,599**	**22,827**
2025/26	2.73	3,148	2.05	7,770	23,611
2026/27	2.73	3,227	2.05	7,945	24,423

MPI Frequency Models

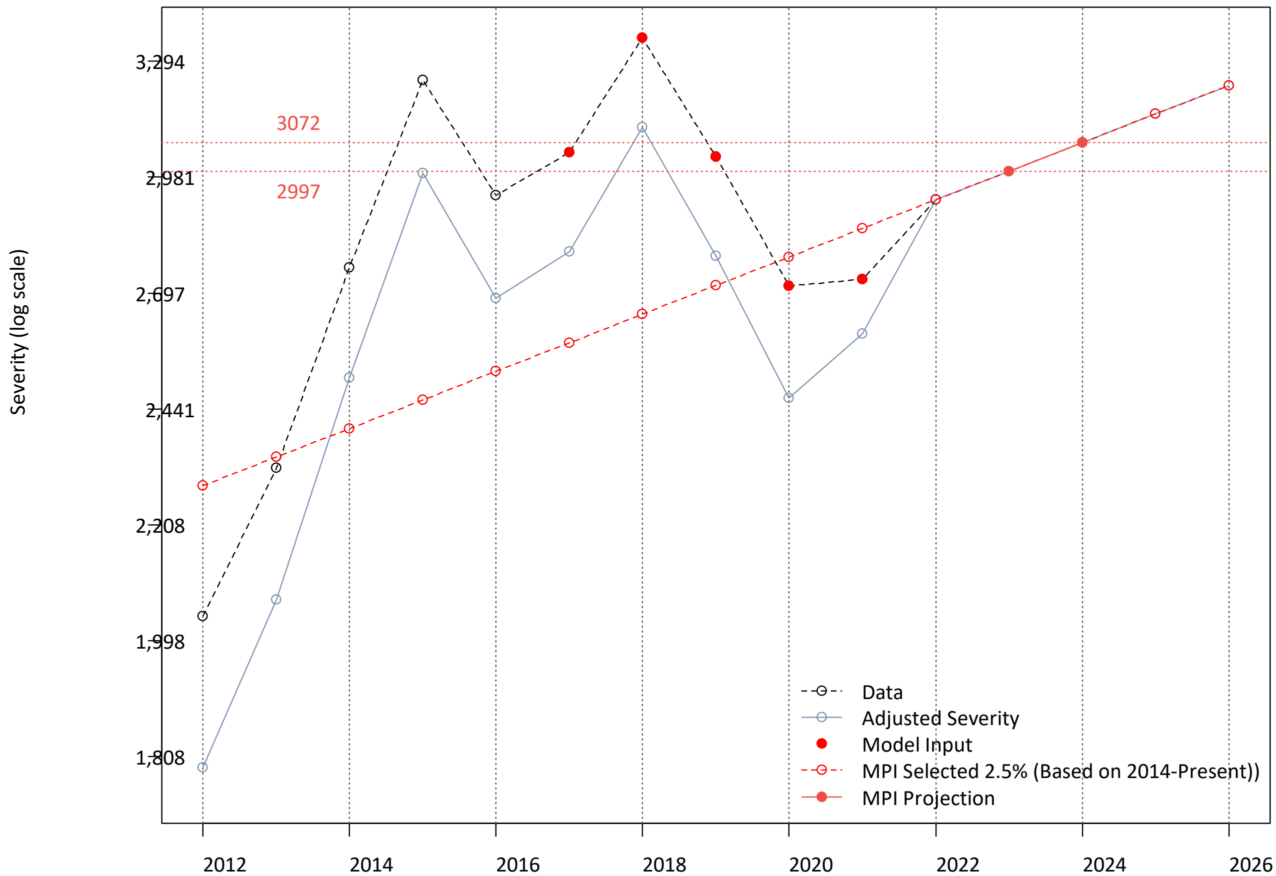
We have no issues with MPI's comprehensive theft repair or total loss frequency models and do not discuss these models further.

MPI Severity Models

We have no issues with MPI's comprehensive theft total loss severity model and do not discuss this model further.

For comprehensive theft repair, MPI selected the 5-year straight average for accident year 2022/23 with an adjustment of $125 to account for the CERP impact and a growth rate of 2.5% based on the trend since 2014/15. We present the selection and model by MPI in Figure 9.

Figure 9: MPI Comprehensive Theft Repair Severity Model



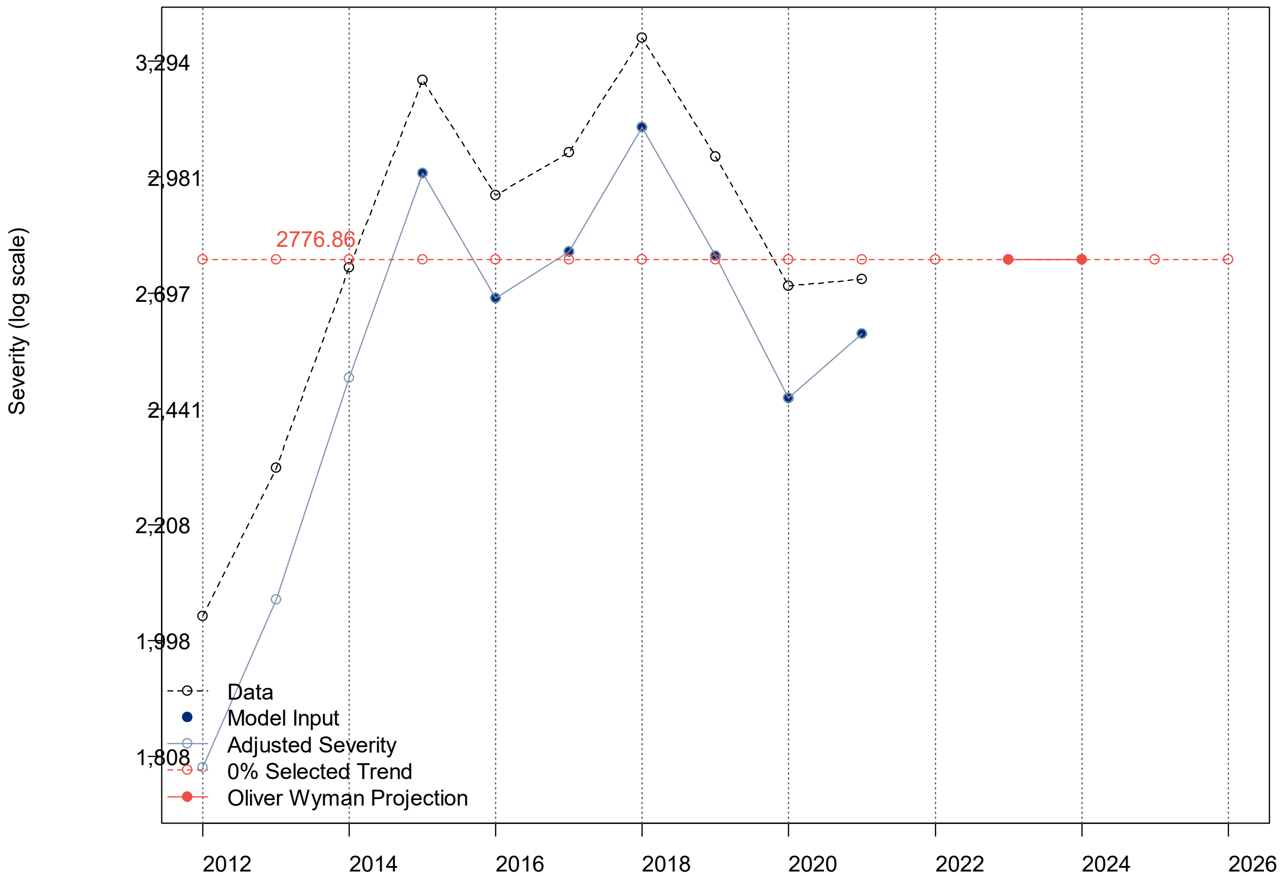
We offer the following concerns with the MPI model:

- **Trend Rate Selection** – MPI judgmentally selects a trend growth rate based on the (highly variable) observed rates of change since 2014, not a statistical model. Between 2014 and 2021, we observe a fairly flat trend rate for adjusted severity.
- **High Variability** –the trend rate does not explain a significant amount of the variance in the model. In cases where a model does not discern a statistically significant trend parameter, we suggest using a 0% trend.

Oliver Wyman Alternative Model

We present our recommended alternative model in Figure 10. Our selected model is a 7-year log-linear fit to the 2015/16 through 2021/22 CERP-adjusted severity data with only the intercept parameter included in the model (the time/trend parameter was not significant).

Figure 10: Oliver Wyman Comprehensive Theft Repair Severity Model



5.4. Vandalism

We present MPI's frequency and severity data and projections for comprehensive vandalism in **Table 9**.

Table 9: MPI Comprehensive Vandalism Claims Incurred[12]

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Oliver Wyman Claims Incurred
2012/13	8.01	1,256	1.08	2,972	10,780
2013/14	6.50	1,332	0.98	3,123	9,642
2014/15	6.26	1,461	0.91	3,080	9,993
2015/16	7.67	1,480	1.13	3,352	12,856
2016/17	9.13	1,477	1.28	3,538	15,519

[12] Frequency and severity data (2021/22 and prior) agree with Figure CI-46 and Figure CI-58 respectively, within rounding tolerances. Frequency and severity projections (2022/23 to 2026/27) agree with Figure CI-47 and Figure CI-59, respectively, within rounding differences.

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Oliver Wyman Claims Incurred
2017/18	8.08	1,466	1.13	3,451	13,779
2018/19	8.84	1,473	0.98	3,439	14,468
2019/20	8.28	1,520	0.81	3,737	13,861
2020/21	8.04	1,653	0.71	3,663	14,166
2021/22	6.37	1,729	0.62	3,940	12,354
2022/23	7.20	1,656	0.71	3,774	13,638
2023/24	**7.20**	**1,710**	**0.71**	**3,896**	**14,232**
2024/25	**7.20**	**1,765**	**0.71**	**4,023**	**14,853**
2025/26	7.20	1,823	0.71	4,154	15,500
2026/27	7.20	1,882	0.71	4,289	16,176

MPI Severity Models

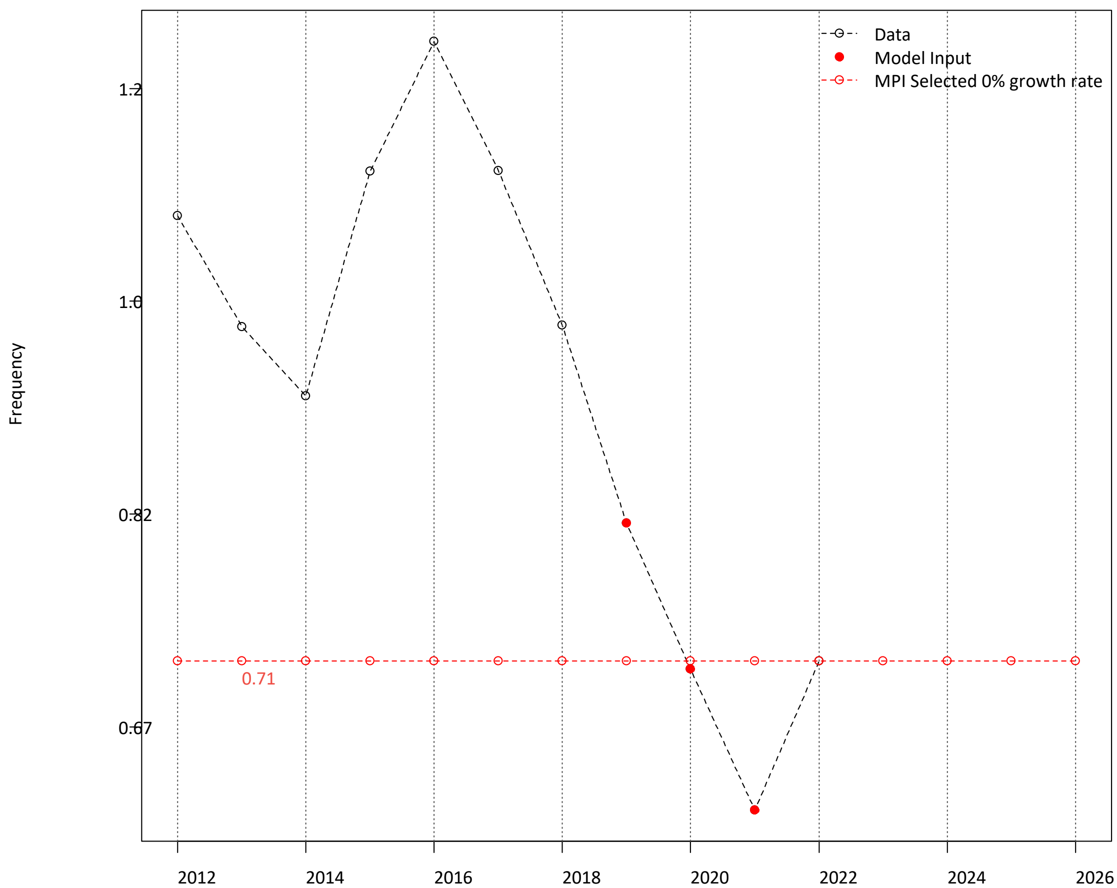
We have no issues with MPI’s comprehensive vandalism repair or total loss severity models and do not discuss these models further.

MPI Frequency Models

We have no issues with MPI’s comprehensive vandalism repair frequency model and do not discuss this model further.

For 2022/23, MPI selects a 2-year straight average repair severity and a 3-year straight average total loss severity. There was no growth trend rate selected. In Figure 11 we present the repair frequency model.

Figure 11: MPI Comprehensive Vandalism Total Loss Frequency Model



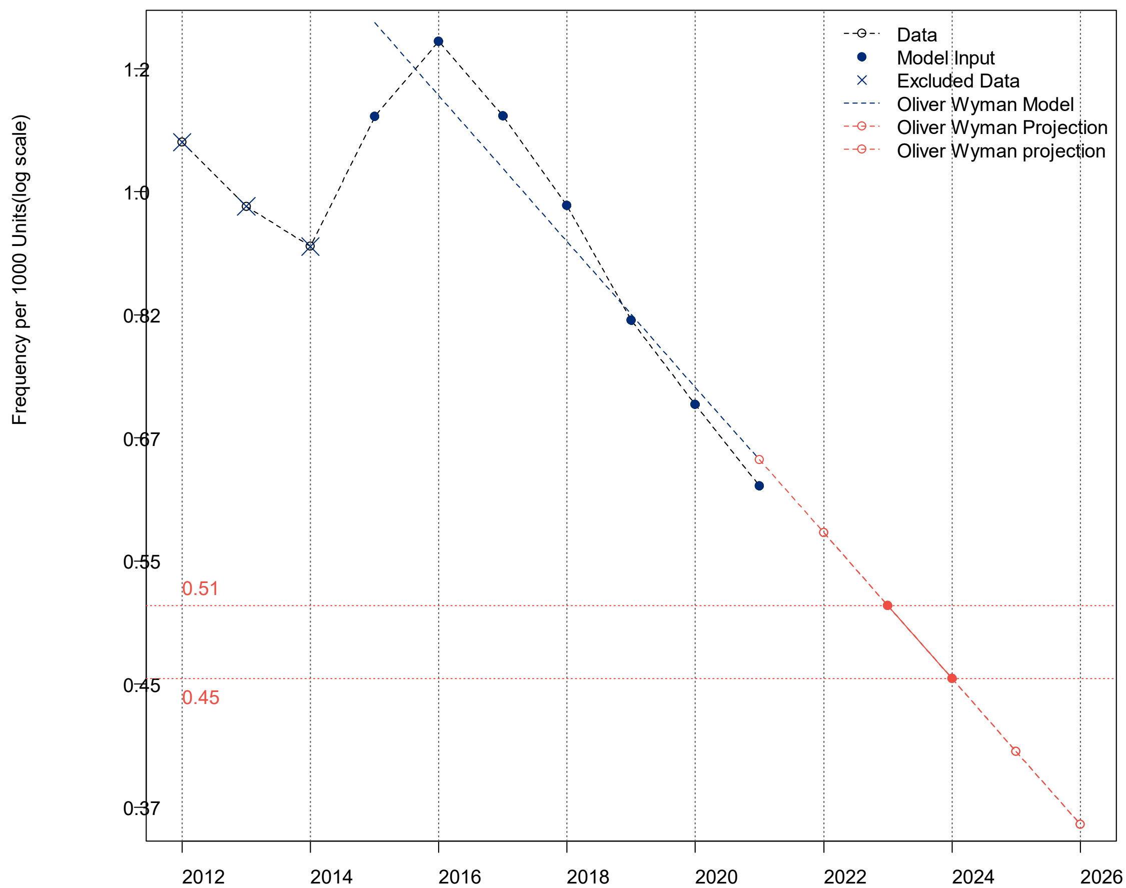
We offer the following concerns with the MPI model:

- **Trend Rate Selection** – MPI selects a 0% trend rate. Between 2015 and 2021, we observe a significant decreasing trend rate.

Oliver Wyman Alternative Model

We address the shortcomings listed above through the use of a regression model. We present that regression model in Figure 12.

Figure 12: Oliver Wyman Vandalism Total Loss Frequency Model



We present the Oliver Wyman model regression statistics (**emphasis** added) below:

```
summary(ow_model$model)

##
## Call:
## lm(formula = as.formula(model_string), data = data)
##
## Residuals:
##         1         2         3         4         5         6         7
## -0.152036  0.088533  0.085424  0.058303 -0.009379 -0.028292 -0.042552
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    238.8286    35.9168   6.649  0.00116 **
## accident_year   -0.1184     0.0178  -6.652  0.00116 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.09418 on 5 degrees of freedom
## Multiple R-squared:  0.8985, Adjusted R-squared:  0.8782
## F-statistic: 44.25 on 1 and 5 DF,  p-value: 0.001158
```

The *p*-value of our model is below the 5% upper bound threshold and is therefore considered statistically significant. We note that our model explains a high percentage of the variation in the data.

5.5. Glass

We present MPI's frequency and severity data and projections for comprehensive glass in Table 5.

Table 10: MPI Comprehensive Glass Claims Incurred[13]

Accident Year	Frequency	Severity	Claims Incurred (000)
2012/13	37.75	257	7,878
2013/14	38.12	271	8,516
2014/15	40.44	295	9,947
2015/16	46.10	331	12,930
2016/17	47.19	346	14,075
2017/18	49.19	360	15,489
2018/19	49.59	375	16,434
2019/20	50.15	374	16,635
2020/21	52.25	425	19,814
2021/22	44.11	426	17,268
2022/23	34.32	370	11,847
2023/24	**35.17**	**392**	**13,010**
2024/25	**36.05**	**416**	**14,287**
2025/26	36.95	441	15,689
2026/27	37.88	467	17,229

MPI Frequency and severity Model

We have no issues with MPI's comprehensive glass frequency and severity models and do not discuss these models further.

5.6. Rodents

We present MPI's frequency and severity data and projections for comprehensive rodents in Table 11.

[13] Frequency and severity data (2021/22 and prior) agree with Figure CI-48 and Figure CI-60 respectively, within rounding tolerances. Frequency and severity projections (2022/23 to 2026/27) agree with Figure CI-49 and Figure CI-61, respectively, within rounding differences.

Table 11: MPI Comprehensive Rodents Claims Incurred[14]

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Oliver Wyman Claims Incurred
2012/13	1.44	3,074	0.68	4,507	6,091
2013/14	1.51	3,528	0.79	4,857	7,554
2014/15	2.09	3,471	1.09	4,294	9,982
2015/16	2.26	3,363	1.15	4,579	10,942
2016/17	2.75	3,154	1.19	4,633	12,234
2017/18	1.62	1,447	0.19	5,519	2,975
2018/19	1.44	1,444	0.18	4,449	2,532
2019/20	2.10	1,533	0.18	5,188	3,694
2020/21	2.04	1,623	0.19	5,085	3,800
2021/22	1.82	1,571	0.16	7,154	3,668
2022/23	1.99	1,490	0.18	5,060	3,590
2023/24	**1.99**	**1,534**	**0.18**	**5,060**	**3,712**
2024/25	**1.99**	**1,580**	**0.18**	**5,060**	**3,839**
2025/26	1.99	1,628	0.18	5,060	3,971
2026/27	1.99	1,676	0.18	5,060	4,108

MPI Frequency and severity Model

We have no issues with MPI's comprehensive rodents repair or total loss frequency and severity models and do not discuss these models further.

5.7. All Other

We present MPI's frequency and severity data and projections for comprehensive other in Table 12.

Table 12: MPI Comprehensive All Other Claims Incurred[15]

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2012/13	6.02	1,730	1.72	5,977	16,806
2013/14	5.43	1,872	1.65	6,788	17,600
2014/15	5.26	1,961	1.78	6,518	18,316
2015/16	6.24	2,235	2.04	6,566	23,214

[14] Frequency and severity data (2021/22 and prior) agree with Figure CI-50 and Figure CI-62 respectively, within rounding tolerances. Frequency and severity projections (2022/23 to 2026/27) agree with Figure CI-51 and Figure CI-63, respectively, within rounding differences.

[15] Frequency and severity data (2021/22 and prior) agree with Figure CI-52 and Figure CI-64 respectively, within rounding tolerances. Frequency and severity projections (2022/23 to 2026/27) agree with Figure CI-53 and Figure CI-65, respectively, within rounding differences.

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2016/17	5.89	2,267	1.74	7,147	22,223
2017/18	5.46	2,096	1.34	8,173	19,550
2018/19	5.44	2,128	1.59	7,796	21,196
2019/20	5.96	2,318	1.76	7,586	24,084
2020/21	5.65	2,279	1.63	8,602	24,008
2021/22	5.21	2,377	1.21	10,304	22,826
2022/23	5.54	2,325	1.51	9,021	24,698
2023/24	**5.54**	**2,401**	**1.51**	**9,427**	**25,935**
2024/25	**5.54**	**2,479**	**1.51**	**9,851**	**27,234**
2025/26	5.54	2,559	1.51	10,294	28,600
2026/27	5.54	2,642	1.51	10,758	30,035

MPI Frequency and severity Model

We have no issues with MPI's comprehensive all other repair and total loss frequency and severity models and do not discuss these models further.

6. Actuarial Commentary: Property Damage

We present MPI's estimates for property damage claims incurred in Table 13. MPI develops its estimate for property damage claims incurred using frequency and severity models separately for the following perils: third party deductible transfer (Section 6.1), third party loss of use (Section 6.2), and other property damage (Section 6.3). We focus our review on the reasonableness of the 2023 and 2024 accident year projections as these years are used directly in the rate level change indication calculation.

The claims incurred amounts for each peril that we present in Table 13 are based on our internal recreation of MPI's model using data provided in the GRA and information provided in response to IR#2. We were unable to replicate the severity models based on the descriptions in the GRA and MPI's responses to IR#2. Therefore, we include balancing differences in Table 13.

Table 13: MPI Property Damage Claims Incurred[16]

Accident Year	TPL Deductible Transfer (Table 14)	Third Party Loss of Use (Table 15)	Other Property Damage (Table 16)	Claims Incurred	Balancing	Balanced Claims Incurred
2012/13	19,915	9,169	13,195	42,278	-	42,278
2013/14	20,349	10,523	14,348	45,220	(23)	45,197
2014/15	17,920	8,604	14,212	40,737	(41)	40,696
2015/16	18,380	9,080	13,692	41,152	(62)	41,090
2016/17	18,806	9,269	15,615	43,691	(59)	43,632
2017/18	19,476	8,987	18,107	46,569	(22)	46,548
2018/19	19,321	7,670	16,003	42,994	49	43,043
2019/20	17,162	6,445	15,003	38,610	150	38,760
2020/21	11,433	3,898	12,310	27,641	575	28,216
2021/22	20,380	5,971	13,503	39,854	1,098	40,952
2022/23	25,447	7,381	16,149	48,978	(0)	48,977
2023/24	25,036	7,375	16,758	49,168	4	49,172
2024/25	24,608	7,361	17,120	49,089	5	49,094
2025/26	24,166	7,342	17,480	48,987	5	48,992
2026/27	23,707	7,315	17,837	48,859	4	48,863

6.1. Third Party Deductible Transfer

We present MPI's frequency and severity data and projections for property damage, third party deductible transfer in Table 14.

[16] As noted, we were not able to replicate the MPI calculations for property damage. The "balancing adjustment" is the difference between amounts Figure CI-71 and our replicated values.

Table 14: MPI Property Damage Third Party Deductible Transfer Claims Incurred[17]

Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	48.46	506	19,915
2013/14	823,518	48.96	505	20,349
2014/15	835,178	41.65	515	17,920
2015/16	848,635	42.03	515	18,380
2016/17	861,942	42.09	518	18,806
2017/18	874,357	42.90	519	19,476
2018/19	882,537	40.99	534	19,321
2019/20	887,453	37.37	517	17,162
2020/21	891,738	24.58	522	11,433
2021/22	918,683	32.84	676	20,380
2022/23	932,897	34.07	801	25,447
2023/24	**942,908**	**33.08**	**803**	**25,036**
2024/25	**953,029**	**32.09**	**805**	**24,608**
2025/26	963,262	31.10	807	24,166
2026/27	973,606	30.11	809	23,707

MPI Frequency Model

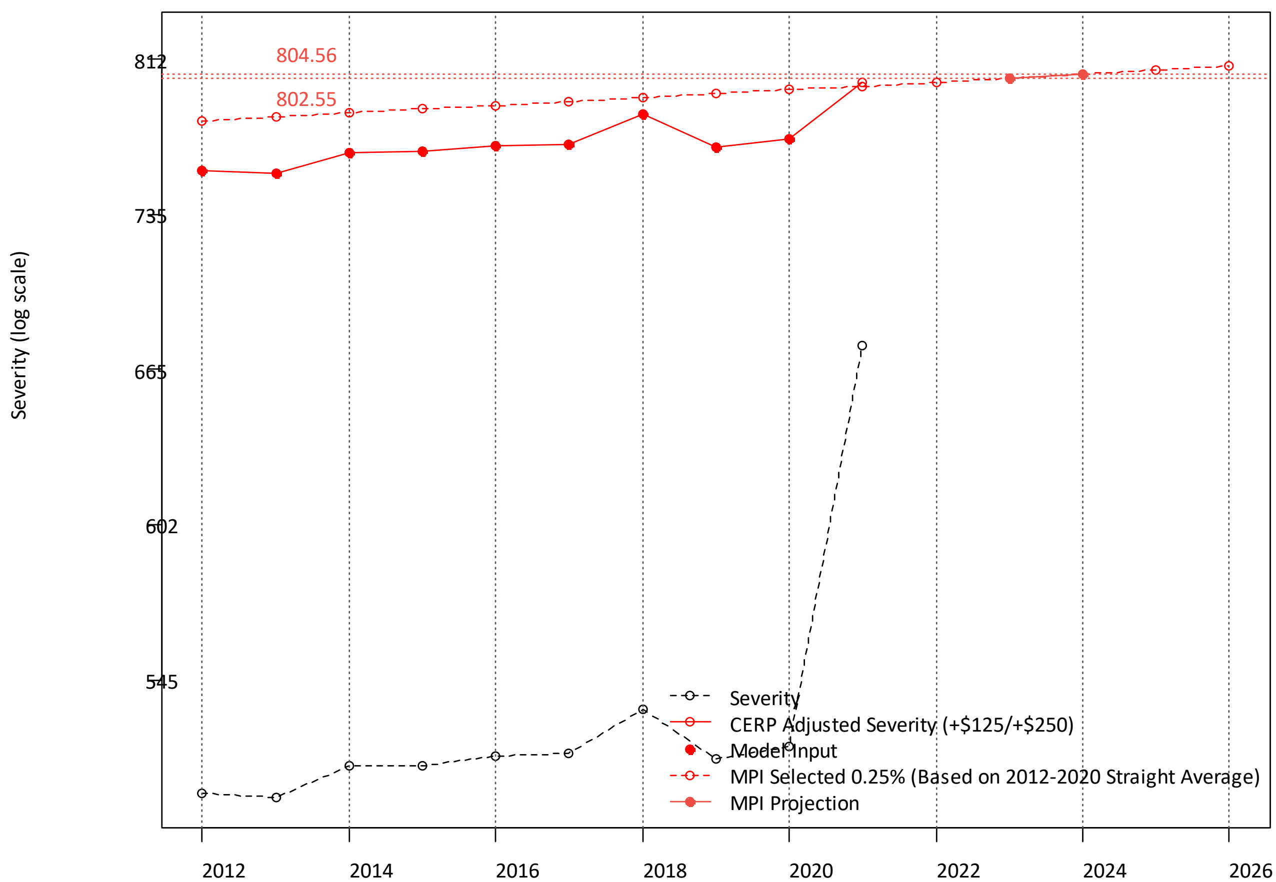
We have no issues with MPI's property damage third party deductible transfer frequency model and do not discuss that model further.

MPI Severity Model

For 2022, MPI selects the latest severity adjusted by $125 to account for the impact of CERP. MPI selects a severity trend rate of 0.25% based on the observed severity growth between 2012 and 2020, thereafter. We present MPI's selection and model in Figure 13. We note that the severity data is adjusted to account for the impact of CERP.

[17] Frequency and severity data agree with Figure CI-69 and Figure CI-70, respectively, within rounding tolerances. Projected claims incurred agrees to IR1 Response CAC 1-50 within rounding differences.

Figure 13: MPI Property Damage Third Party Deductible Transfer Severity Model



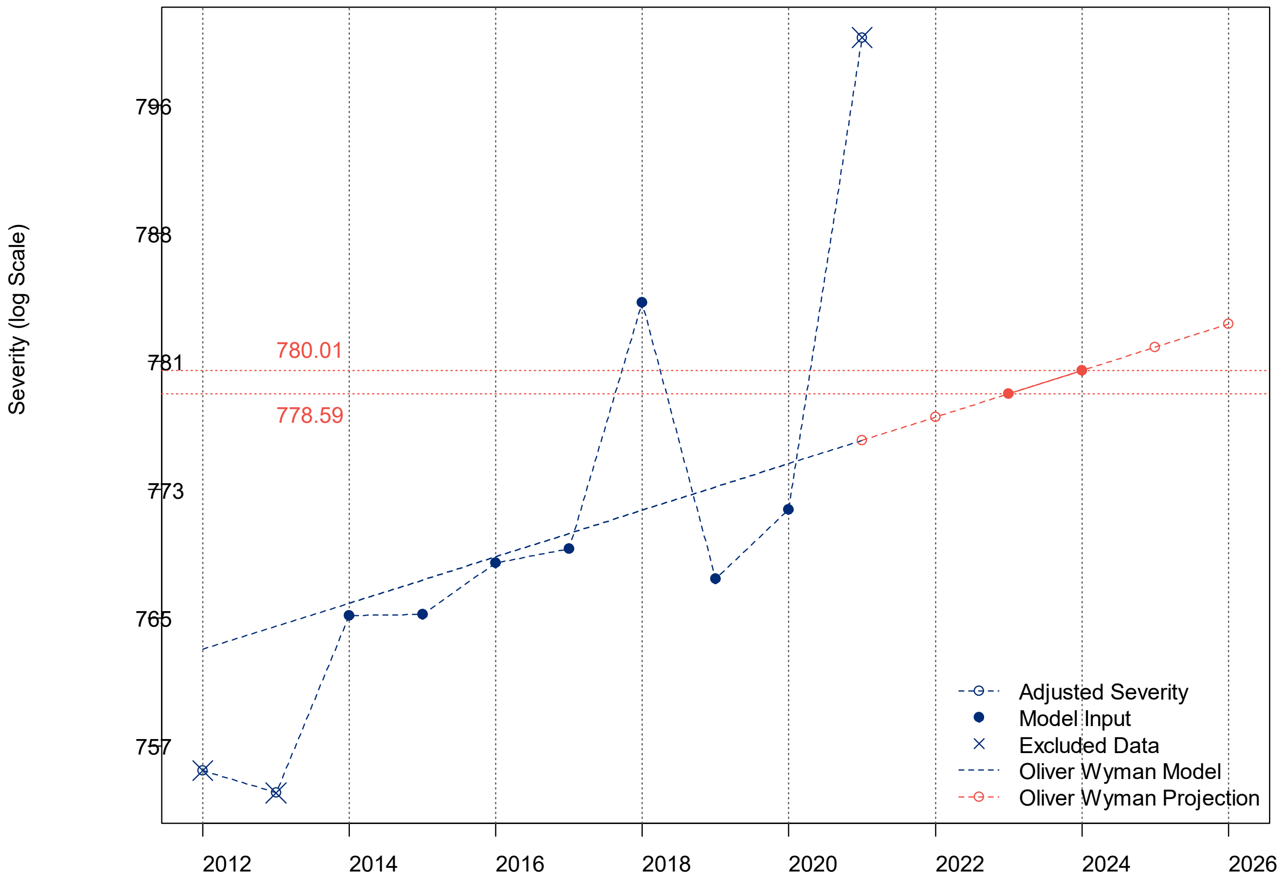
We offer the following concerns with the MPI model:

- **Leverage of current data point in model** - MPI projects forward the 2021 severity to estimate future severities. Each data point is comprised of "signal" and "noise." Actuaries use regression models to extract "signal" from data. Under MPI's approach, both signal and noise are projected forward. In addition, the 2021 data point may be unusually "noisy" for a liability coverage for a pandemic-affected year.
- **Trend Rate Selection** MPI judgmentally selects a trend growth rate based on the (highly variable) observed rates of change between 2012 to the present, not a statistical model.

Oliver Wyman Alternative Model

We present our recommended alternative model in Figure 14. Our selected model is a log-linear fit to the CERP-adjusted severity data for 2014/15 through 2020/21.

Figure 14: Oliver Wyman Property Damage Third Party Deductible Transfer Severity Model



We present the Oliver Wyman model regression statistics (**emphasis** added) below:

```
summary(ow_model$model)

##
## Call:
## lm(formula = as.formula(model_string), data = data)
##
## Residuals:
##          1          2          3          4          5          6          7
## -0.0009926 -0.0027091 -0.0004982 -0.0012322  0.0161817 -0.0071731 -0.0035765
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.984433   3.125582   0.955    0.384
## accident_year 0.001816   0.001550   1.172    0.294
##
## Residual standard error: 0.0082 on 5 degrees of freedom
## Multiple R-squared:  0.2154, Adjusted R-squared:  0.0585
## F-statistic: 1.373 on 1 and 5 DF,  p-value: 0.2941
```

6.2. Third Party Loss of Use

We present MPI's frequency and severity data and projections for property damage, third party loss of used in Table 15.

Table 15: MPI Property Damage Third Party Loss of Use Claims Incurred[18]

Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	25.24	447	9,169
2013/14	823,518	25.27	506	10,523
2014/15	835,178	21.67	475	8,604
2015/16	848,635	21.67	494	9,080
2016/17	861,942	21.69	496	9,269
2017/18	874,357	23.12	445	8,987
2018/19	882,537	21.38	407	7,670
2019/20	887,453	19.15	379	6,445
2020/21	891,738	11.69	374	3,898
2021/22	918,683	13.87	469	5,971
2022/23	932,897	17.79	445	7,381
2023/24	**942,908**	**17.29**	**452**	**7,375**
2024/25	**953,029**	**16.78**	**460**	**7,361**
2025/26	963,262	16.27	468	7,342
2026/27	973,606	15.77	477	7,315

MPI Frequency Model

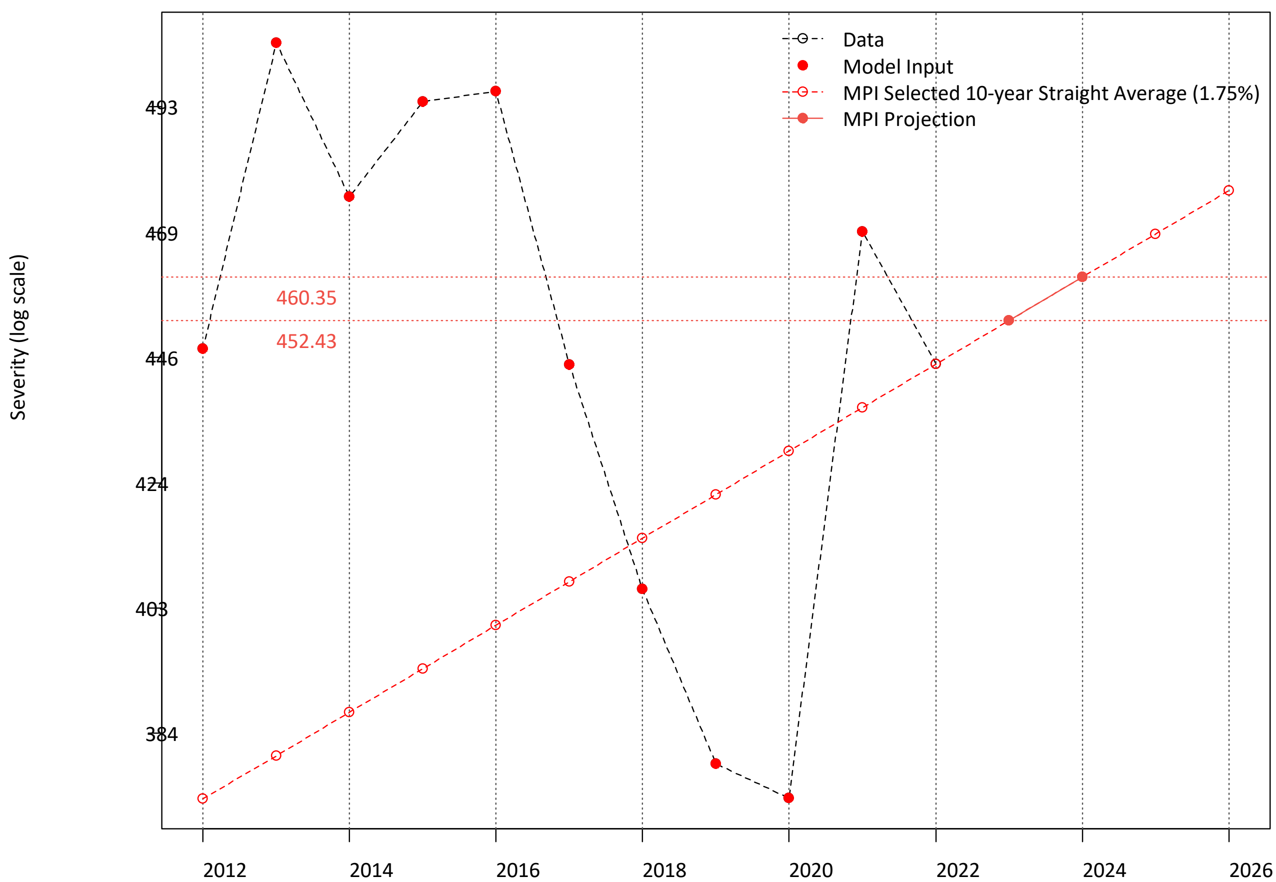
We have no issues with MPI's property damage third party deductible transfer frequency model and do not discuss that model further.

MPI Severity Model

To estimate severity for 2022, MPI selects a 2-year weighted average (33% to 2020/21, 67% to 2021/22) of $437. MPI selects a severity growth trend rate of 1.75% based on the 10-year trend. We present MPI's selection and model in Figure 15.

[18] Frequency and severity data agree with Figure CI-69 and Figure CI-70, respectively, within rounding tolerances. Projected claims incurred agree to IR1 Response CAC 1-50 within rounding differences.

Figure 15: MPI Property Damage Third Party Loss of Use Severity Model



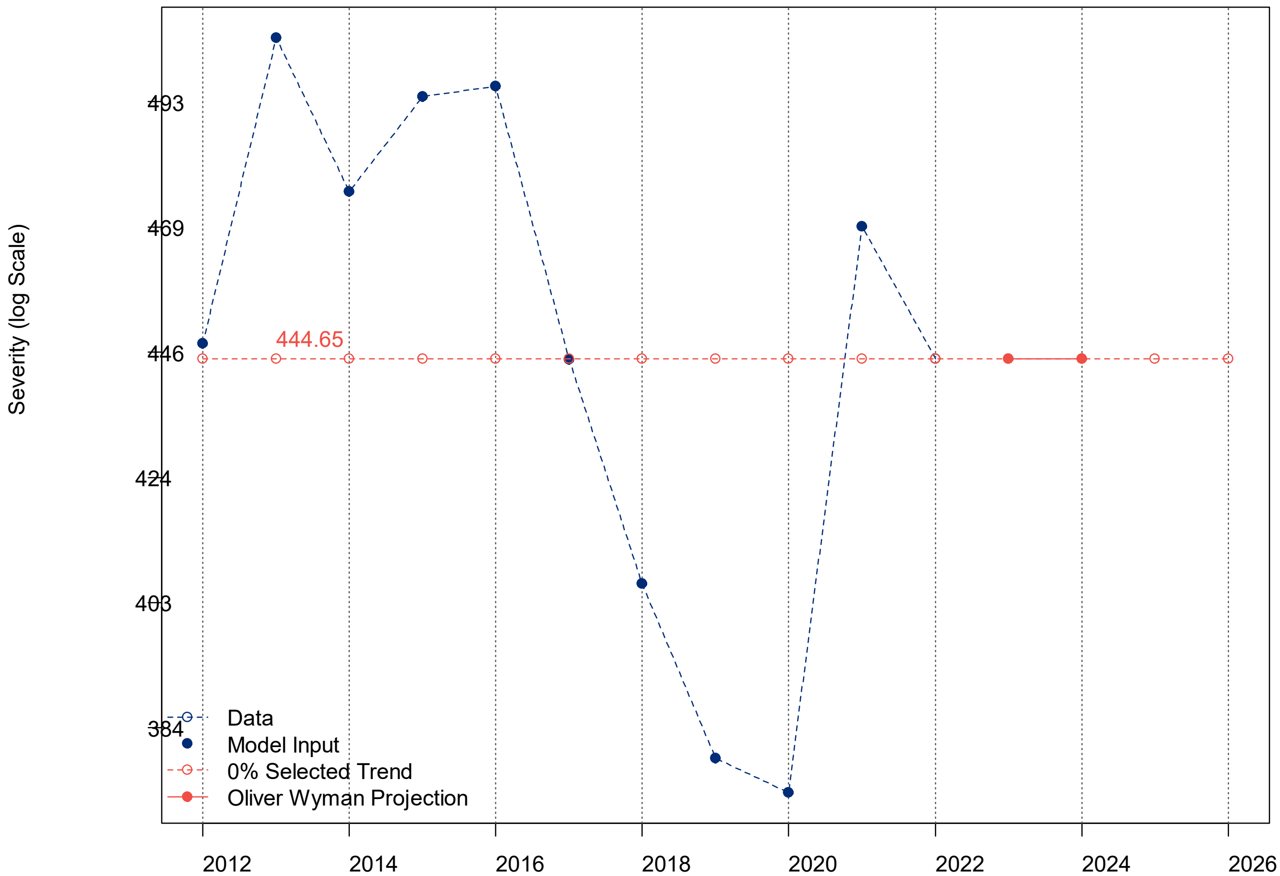
We offer the following concerns with the MPI model:

- **Leverage of two recent data point in model** - MPI projects forward the weighted average of the two most recent severity observations to estimate future severities. Each data point is comprised of “signal” and “noise.” Actuaries use regression models to extract “signal” from data. Under MPI’s approach, both signal and noise are projected forward. In addition, the two most recent observations data point may be unusually “noisy” for a liability coverage for a pandemic-affected year.

Oliver Wyman Alternative Model

We present our recommended alternative model in Figure 16. Visual examination of the data does not indicate a clear increasing or decreasing pattern. This is borne out by the regression statistics presented. In cases where a trend rate other than 0 can not be discerned, it is appropriate to select 0% as a trend rate.

Figure 16: Oliver Wyman Property Damage Third Party Loss of Use Severity Model



6.3. All Other

We present MPI's frequency and severity data and projections for property damage – all other in Table 16.

Table 16: MPI Property Damage – All Other - Claims Incurred[19]

Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	3.71	4,385	13,195
2013/14	823,518	3.75	4,643	14,348
2014/15	835,178	3.53	4,821	14,212
2015/16	848,635	3.40	4,741	13,692
2016/17	861,942	3.55	5,106	15,615
2017/18	874,357	3.78	5,477	18,107

[19] Frequency and severity data agree with Figure CI-69 and Figure CI-70, respectively, within rounding tolerances. Projected claims incurred agrees to IR1 Response CAC 1-50 within rounding differences.

Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2018/19	882,537	3.28	5,523	16,003
2019/20	887,453	3.18	5,312	15,003
2020/21	891,738	2.36	5,840	12,310
2021/22	918,683	2.54	5,792	13,503
2022/23	932,897	2.89	5,995	16,149
2023/24	**942,908**	**2.86**	**6,204**	**16,758**
2024/25	**953,029**	**2.80**	**6,422**	**17,120**
2025/26	963,262	2.73	6,646	17,480
2026/27	973,606	2.66	6,879	17,837

MPI Frequency and Severity Model

We have no issues with MPI’s property damage all other frequency or severity model and do not discuss either model further.

7. Distribution and Use

Usage and Responsibility of Client – Oliver Wyman prepared this report for the sole use of CAC Manitoba and the Public Utilities Board for the stated purpose. This report includes important considerations, assumptions, and limitations and, as a result, is intended to be read and used only as a whole. This report may not be separated into, or distributed, in parts other than by CAC Manitoba and the Public Utilities Board, as needed, in the case of distribution to such client's directors, officers, or employees. All decisions in connection with the implementation or use of advice or recommendations contained in this report are the sole responsibility of CAC Manitoba.

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8. Considerations and Limitations

COVID-19 Pandemic – We have included no explicit adjustments in this report for the effect of the COVID-19 pandemic on loss experience except as specifically noted in this report. The impact of this event on loss experience is highly uncertain and generally unquantifiable at this time.

Data Verification – For our analysis, we relied on data and information provided by MPI without independent audit. Though we have reviewed the data for reasonableness and consistency, we have not audited or otherwise verified this data. 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 might therefore be unreliable.

Prospective Policy / Accident Period Estimates – We estimated the prospective policy/accident period estimates developed in this analysis using estimated loss costs and the projected exposures. Prospective period loss and ALAE estimates are directly related to the projected exposures. Therefore, if actual exposures differ from the projection, we would need to adjust the prospective policy/accident period estimates accordingly.

Supplemental Data – Where historical data of MPI was either (i) not available, (ii) not appropriate or (iii) not sufficiently credible to develop our actuarial assumptions, we supplemented it with external information, as we deemed appropriate. Although we believe these external sources may be more predictive of future experience of MPI than any other data of which we are aware, the use of external data adds to the uncertainty associated with our projections.

Exclusion of Other Program Costs – The scope of the project does not include the estimation of any costs other than those described herein. Such ancillary costs may include unallocated loss adjustment expenses (ULAE); excess insurance premiums; the costs of trustee, legal, administrative, risk management and actuarial services; fees and assessments; and costs for surety bonds or letters of credit pertaining to claim liabilities.

Assumption of Valid Insurance – We assumed that all insurance/reinsurance is valid and fully collectible. We made no assessment, and do not express any opinion, concerning the viability or collectability of any insurance or reinsurance. We have not evaluated the financial strength, claims-paying ability or any other factors with regard to the past, current, and prospective insurers/reinsurers of MPI.

Funding of Claim Payments – We have not examined any assets that may be supporting the liabilities, and we have made no assumptions regarding the maturities and liquidity of these assets, should they exist. This examination is beyond the scope of our review.

Rounding and Accuracy – Our models may retain more digits than those displayed. Also, the results of certain calculations may be presented in the exhibits with more or fewer digits than would be considered significant. As a result, there may be rounding differences between the results of calculations presented in the exhibits and replications of those calculations based on displayed underlying amounts. Also, calculation results may not have been adjusted to reflect the precision of the calculation.

Unanticipated Changes – We developed our conclusions based on an analysis of the data of MPI and on the estimation of the outcome of many contingent events. We developed our estimates from the historical claim experience and covered exposure, with adjustments for anticipated changes. Our estimates make no provision for extraordinary future emergence of new types of losses not sufficiently represented in historical databases or which are not yet quantifiable. Also, we assumed that MPI will remain a going concern, and we have not anticipated any impacts of potential insolvency, bankruptcy, or any similar event.

Internal / External Changes – The sources of uncertainty affecting our estimates are numerous and include factors internal and external to MPI. Internal factors include items such as changes in claim reserving or settlement practices. The most significant external influences include, but are not limited to, changes in the legal, social, or regulatory environment surrounding the claims process. Uncontrollable factors such as general economic conditions also contribute to the variability.

Uncertainty Inherent in Projections – 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, we do not guarantee that the emergence of actual losses will correspond to the projections in this analysis.

Appendix A. Biographies

Paula Elliott, Chris Schneider, and Rajesh Sahasrabuddhe are the actuaries responsible for this report. Ms. Elliott, Mr. Schneider, and Mr. Sahasrabuddhe provide actuarial consulting services related to automobile insurance throughout Canada.[20] Those service include reviewing automobile insurance rate applications, providing expert witness testimony on rate applications, analyzing automobile insurance reform measures, development of model governance frameworks, conducting automobile insurance benchmark rate studies and performing special studies.

Paula Elliott

Paula holds a Bachelor of Mathematics, Actuarial Science (Hons) from the University of Waterloo. Paula is a Principal in the Toronto, Ontario office with the Actuarial Consulting practice of Oliver, Wyman Limited. She specializes in the automobile insurance practice area and in providing actuarial services to insurance regulatory authorities.

Her primary responsibilities include reviewing automobile insurance rate applications, providing expert witness testimony on rate applications, analyzing automobile insurance reform measures, conducting automobile insurance benchmark rate studies and performing special studies.

Prior to joining Oliver Wyman, Paula provided actuarial services to a large insurer as an employee for over 15 years with many areas of responsibility including rate making, loss reserving and financial planning.

Paula is a Fellow of the Canadian Institute of Actuaries and a Fellow of the Casualty Actuarial Society.

Rajesh Sahasrabuddhe

Rajesh (“Raj”) holds a Bachelor of Science, majoring in Mathematics – Actuarial Science (*summa cum laude)* from the University of Connecticut. Raj is a Partner and Philadelphia Office Leader with Oliver Wyman Actuarial Consulting. His primary responsibilities are to provide actuarial consulting services to regulators and a variety of insurance, reinsurance and self-insured organizations.

Raj reviews automobile rate applications in on behalf of regulators and consumer stakeholders in several Canadian provinces. Within the scope of this work, he provides expert witness testimony in rate hearings.

Raj is a Fellow of the Casualty Actuarial Society, an Associate of the Canadian Institute of Actuaries, and a Member of the American Academy of Actuaries. He has been approved to provide captive loss reserve certifications by regulatory authorities in Vermont, South Carolina, Delaware, and Bermuda.

Prior to joining Oliver Wyman, Raj provided actuarial consulting services to self-insured clients at a national brokerage company and financial advisory and litigation support services at an independent consulting firm. With his prior experience at a Big Four audit firm, he is also familiar with insurance accounting issues.

Chris Schneider

Christopher (“Chris”) Schneider is a Senior Manager with Oliver Wyman Actuarial Consulting, Inc., located in the Philadelphia office. He holds a Bachelor of Science degree in Mathematics from Millersville University.

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[20] Including in New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Saskatchewan, Alberta, British Columbia and now Manitoba.

Since joining Oliver Wyman in 2016, Chris has provided actuarial consulting services to several self-insured corporations in the United States involving various types of property/casualty loss exposures. Additionally, Chris provides actuarial consulting services to several Canadian regulators and stakeholders involving automobile liability exposures.

Chris is a Fellow of the Casualty Actuarial Society, an Associate of the Canadian Institute of Actuaries, and a Member of the American Academy of Actuaries.

Appendix B. Exhibits

List of Exhibits

List of Tables

Oliver Wyman

120 Bremner Boulevard
Toronto, Ontario M5J 0A8

Three Logan Square
1717 Arch Street, Suite 1100
Philadelphia, PA 19103