

# **REVIEW OF 2023 RATE APPLICATION SUBMITTED BY: MANITOBA PUBLIC INSURANCE ACTUARIAL EVIDENCE**

Province of Manitoba: Public Utilities Board

3 November 2022

Rajesh Sahasrabuddhe, FCAS, ACIA

A business of Marsh McLennan

**ACTUARIAL CONSULTING**

# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

**7**

**Concluding Remarks**

# INTRODUCTION

- Oliver Wyman’s Actuarial Consulting Practice provides actuarial consulting services to public and private enterprises, self-insured group organizations, insurance companies, government entities, insurance regulatory agencies and other organizations.
- We provide support to **public stakeholders** in automobile rate regulation throughout Canada:
  - British Columbia
  - Alberta
  - Saskatchewan
  - **Manitoba**
  - Ontario
  - New Brunswick
  - Nova Scotia
  - Newfoundland and Labrador
- 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 review of the 2023 General Rate Application submitted by Manitoba Public Insurance.
- 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 provided and the testimony that we will deliver:
  - 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.

# OLIVER WYMAN ACTUARIAL CONSULTING

## CANADIAN AUTOMOBILE RATE REGULATION



Powered by Bing  
© GeoNames, Microsoft, TomTom

# OLIVER WYMAN



**Rajesh Sahasrabuddhe**  
*ACIA, FCAS*

Rajesh (“Raj”) holds a Bachelor of Science, majoring in Mathematics – Actuarial Science (*summa cum laude*) from the University of Connecticut. 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. Raj is a member of the Regulatory subcommittee of the Property & Casualty Insurance Pricing committee of the CIA.



**Paula Elliott**  
*FCIA, FCAS*

Paula holds a Bachelor of Mathematics, Actuarial Science (Hons) from the University of Waterloo. 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.



**Chris Schneider**  
*ACIA, FCAS*

Chris holds a Bachelor of Science degree in Mathematics from Millersville University. 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.

# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

**7**

**Concluding Remarks**

# REVIEW OF CLAIMS INCURRED PROVISION

## 1

### Claims Costs Modeling Approach

---

- 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.

## 2

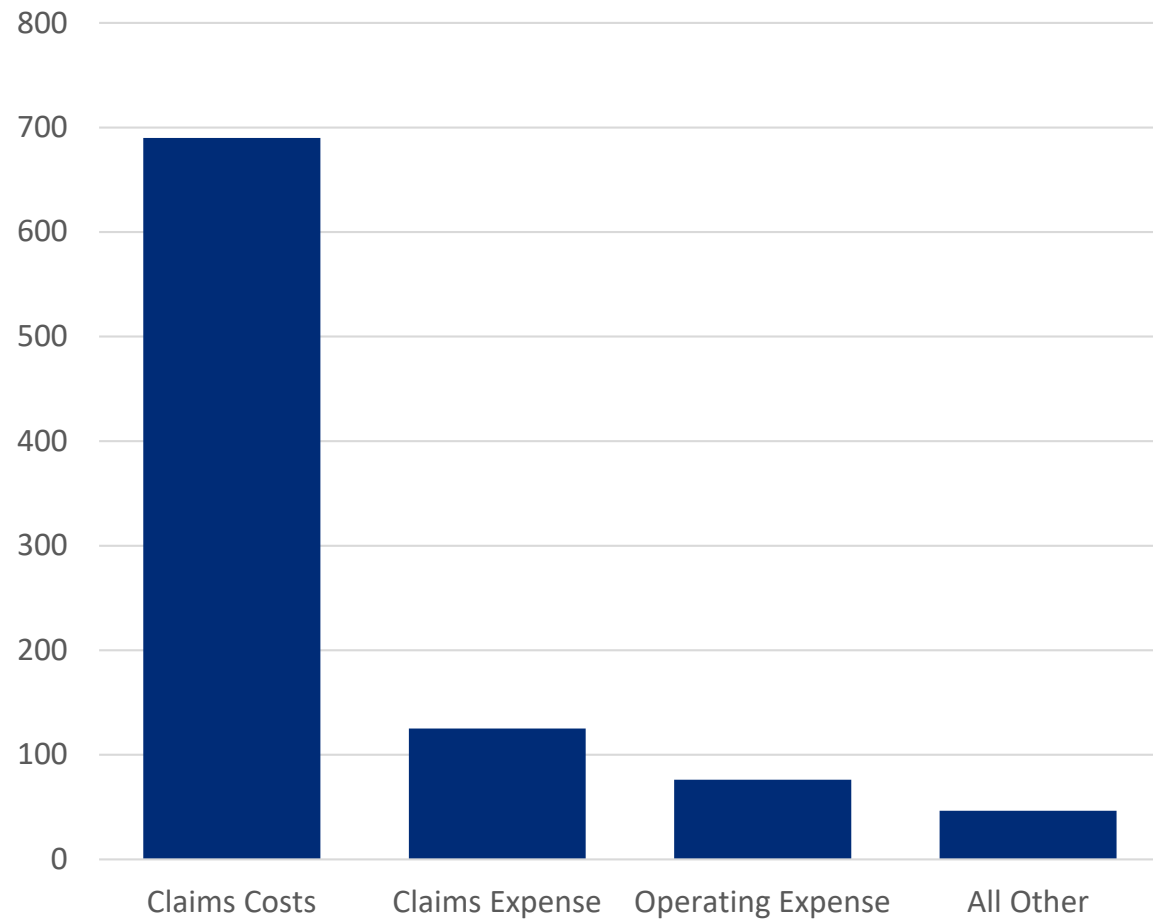
### Implications

---

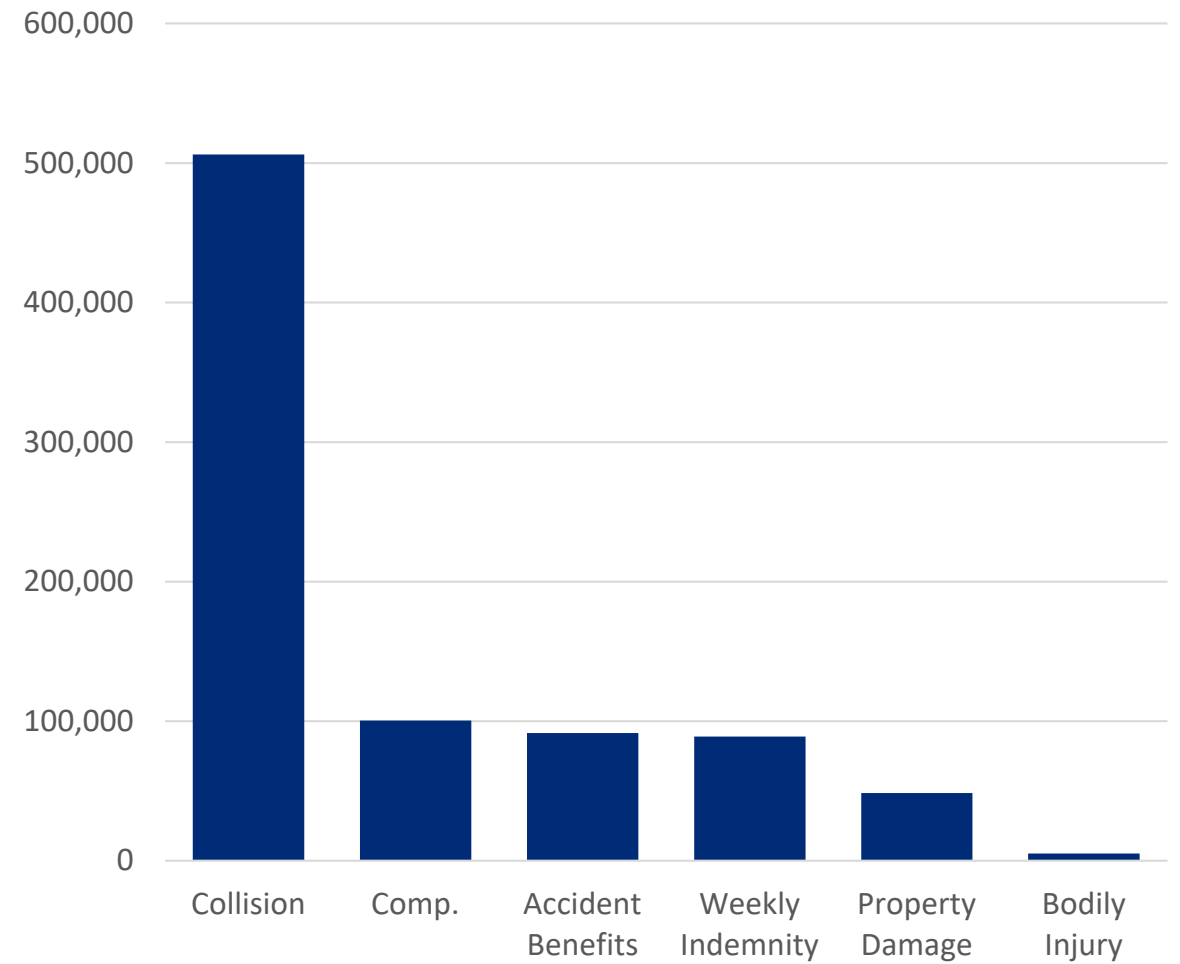
- We will review our observations on MPI's development of discounted claims costs for several coverages/perils.

# 2023 MPI RATE APPLICATION

## Forecast Rating Year Expenditures per Unit



## Rating Year 2023/24 Discounted Claims Costs (000)





# SUMMARY OF FINDINGS

Coverage	Peril	Frequency	Severity
Weekly Indemnity		x	✓
Accident Benefits-Other	Indexed	✓	✓
Accident Benefits-Other	Non-Indexed	✓	✓
Bodily Injury		✓	✓
Collision	Repair	✓	✓
Collision	Total Loss	x	x
Property Damage	Third Party Deductible Transfer	✓	x
Property Damage	Third Party Loss of Use	✓	x
Property Damage	All Other	✓	✓

- We reviewed each coverage and peril to identify coverages with potential undue conservatism or optimism.
- Our assessment of each coverage considers the materiality of the estimate
- Our review process begins with a visualization of the MPI models in comparison to the data.
- We identified **material** issues with a few claims incurred provisions put forward by MPI.

# SUMMARY OF FINDINGS

Coverage	Peril	Frequency	Severity
Comprehensive	Hail - Repair	✓	✓
Comprehensive	Hail – Total Loss	x	✓
Comprehensive	Theft – Repair	✓	x
Comprehensive	Theft – Total Loss	✓	✓
Comprehensive	Vandalism – Repair	✓	✓
Comprehensive	Vandalism – Total Loss	x	✓
Comprehensive	Glass	✓	✓
Comprehensive	Rodents – Repair	✓	✓
Comprehensive	Rodents – Total Loss	✓	✓
Comprehensive	All Other – Repair	✓	✓
Comprehensive	All Other – Total Loss	✓	✓

- The comprehensive coverage includes several perils.

# ENVIRONMENTAL CHANGES

## 1

### 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

#### Oliver Wyman Findings

- Our models include consideration of MPI estimated CERP adjustments

## 2

### Work from home

---

#### MPI Rate Application

- 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.

#### Oliver Wyman Findings

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

# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

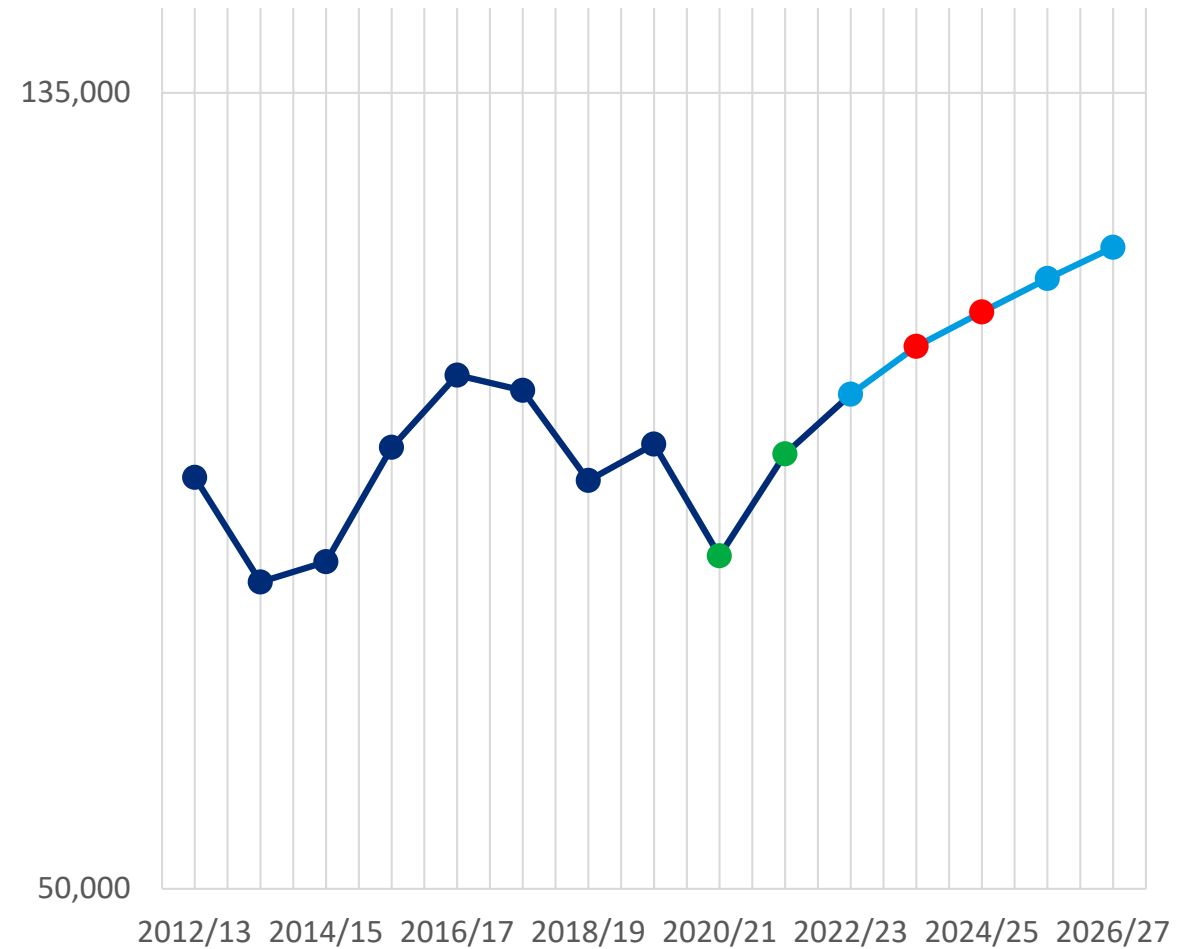
**7**

**Concluding Remarks**

# WEEKLY INDEMNITY

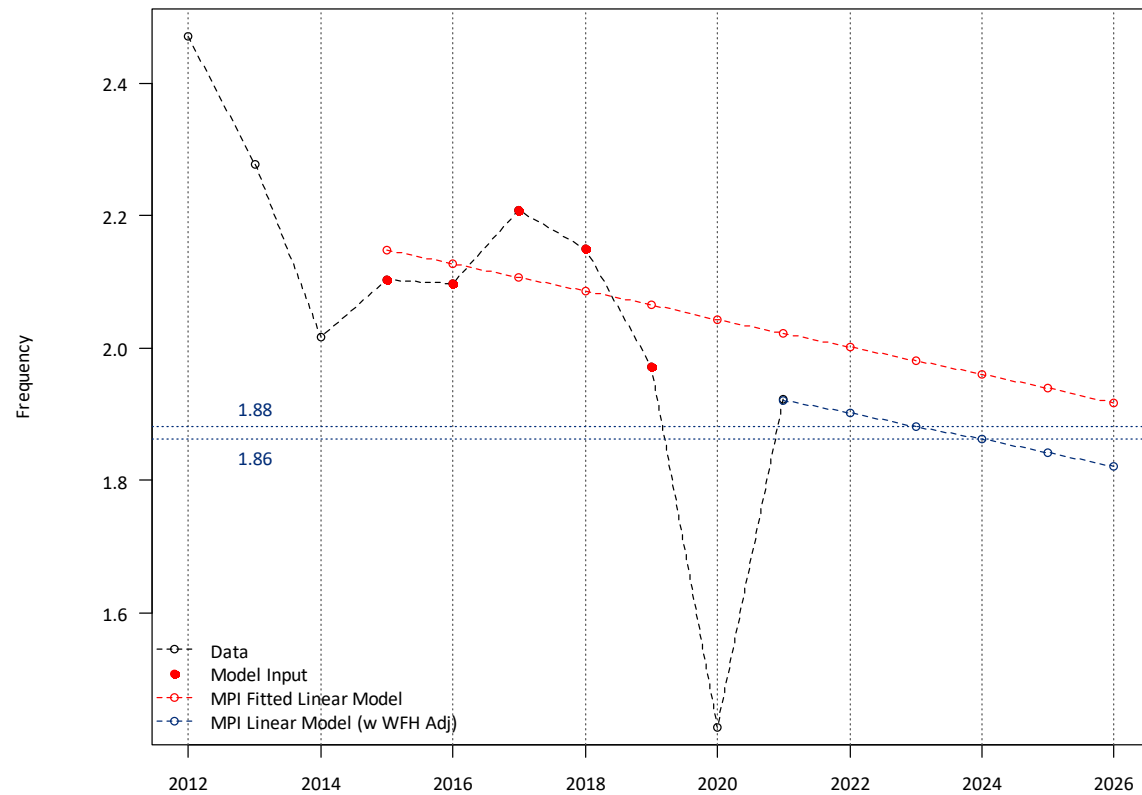
Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	2.47	41,632	83,556
2013/14	823,518	2.28	39,107	73,326
2014/15	835,178	2.02	44,658	75,204
2015/16	848,635	2.10	48,599	86,749
2016/17	861,942	2.10	52,497	94,915
2017/18	874,357	2.21	48,233	93,137
2018/19	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
<b>2023/24</b>	<b>942,908</b>	<b>1.88</b>	<b>55,470</b>	<b>98,391</b>
<b>2024/25</b>	<b>953,029</b>	<b>1.86</b>	<b>57,892</b>	<b>102,689</b>
2025/26	963,262	1.84	60,363	107,072
2026/27	973,606	1.82	62,758	111,320

## Claims Incurred (000)



# WEEKLY INDEMNITY

## MPI Frequency Model

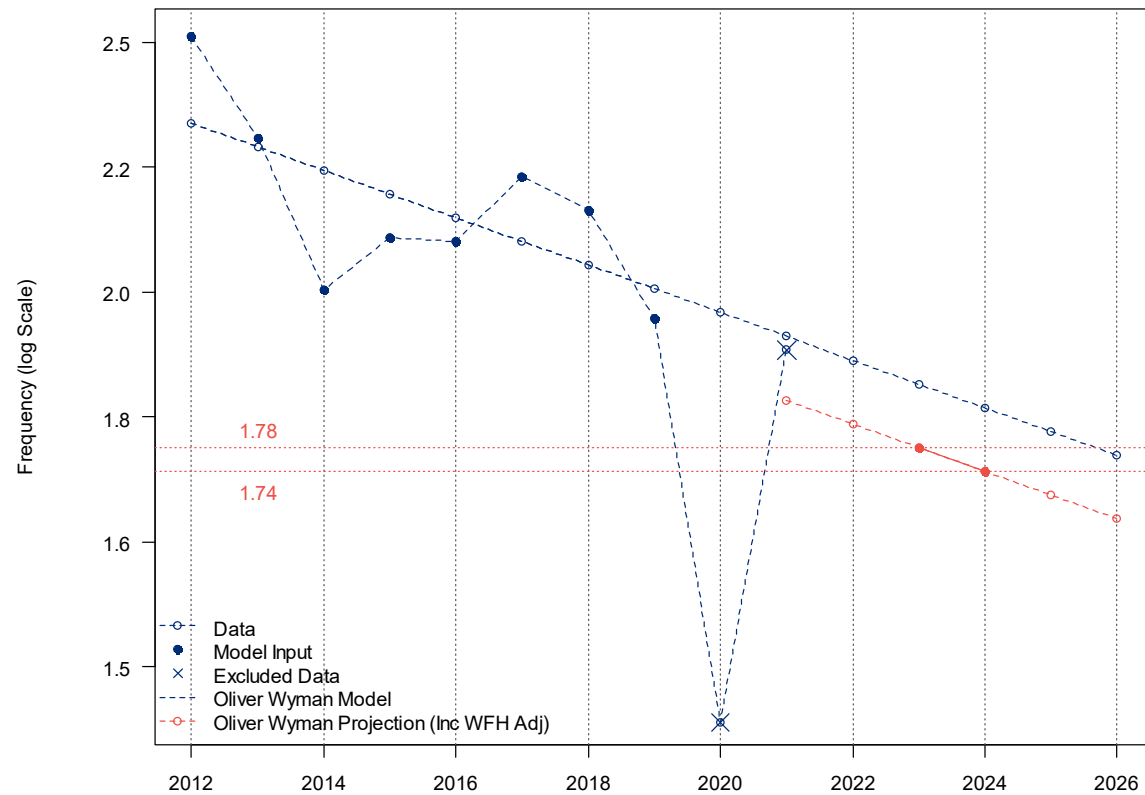


## Concerns

- **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.

# WEEKLY INDEMNITY

## Oliver Wyman Frequency Model

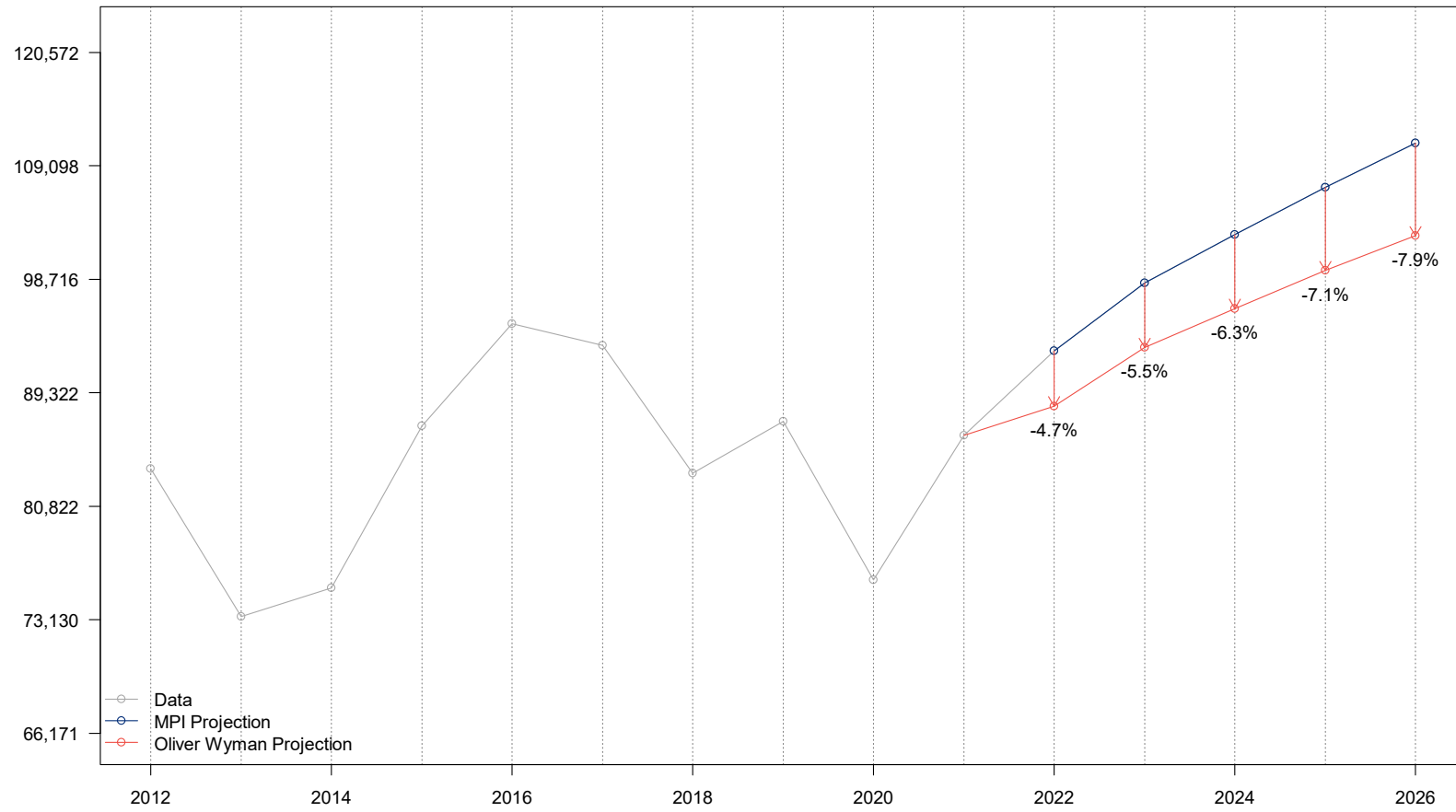


## Benefits

- 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.

# WEEKLY INDEMNITY

## Claims Incurred (000s)





# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

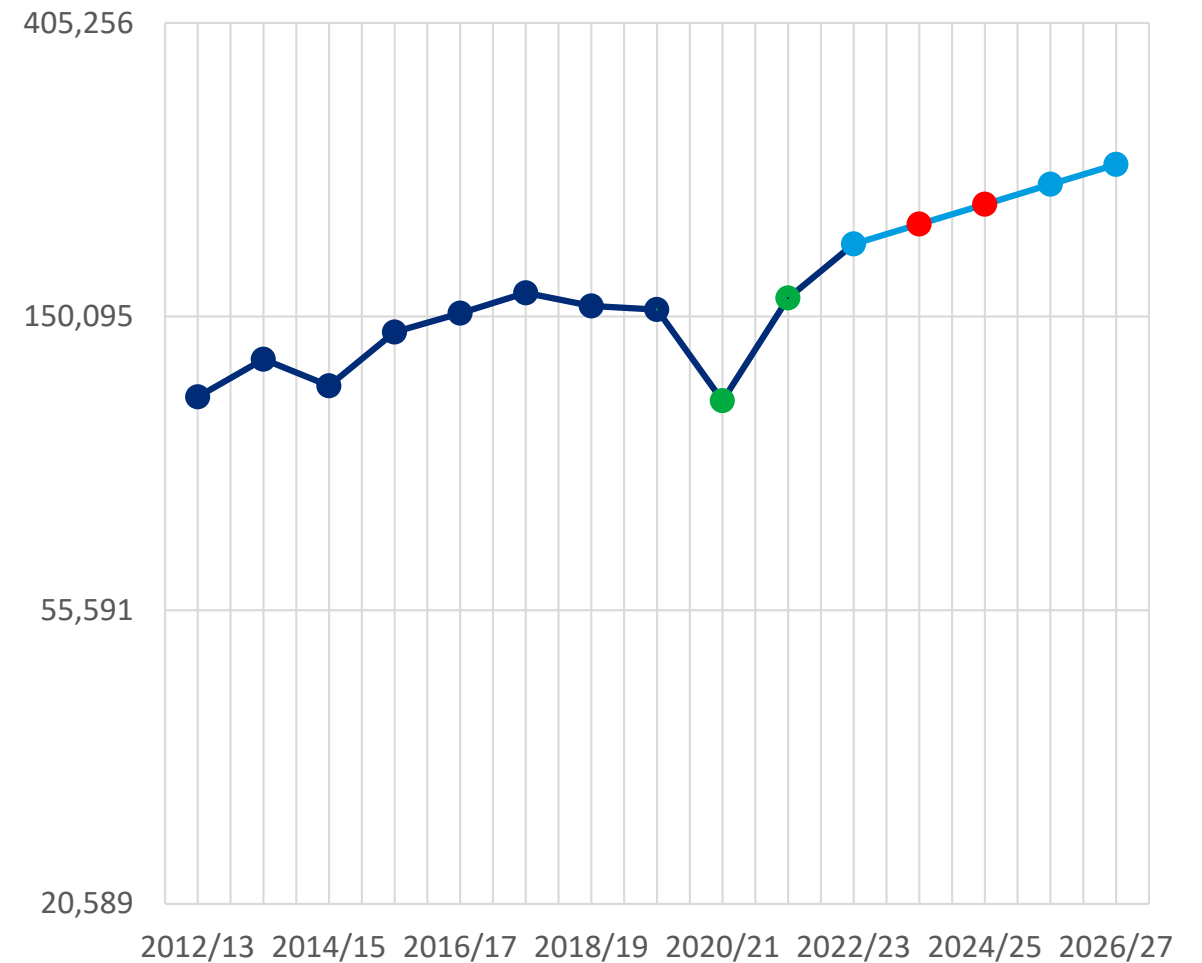
**7**

**Concluding Remarks**

# COLLISION - TOTAL LOSS

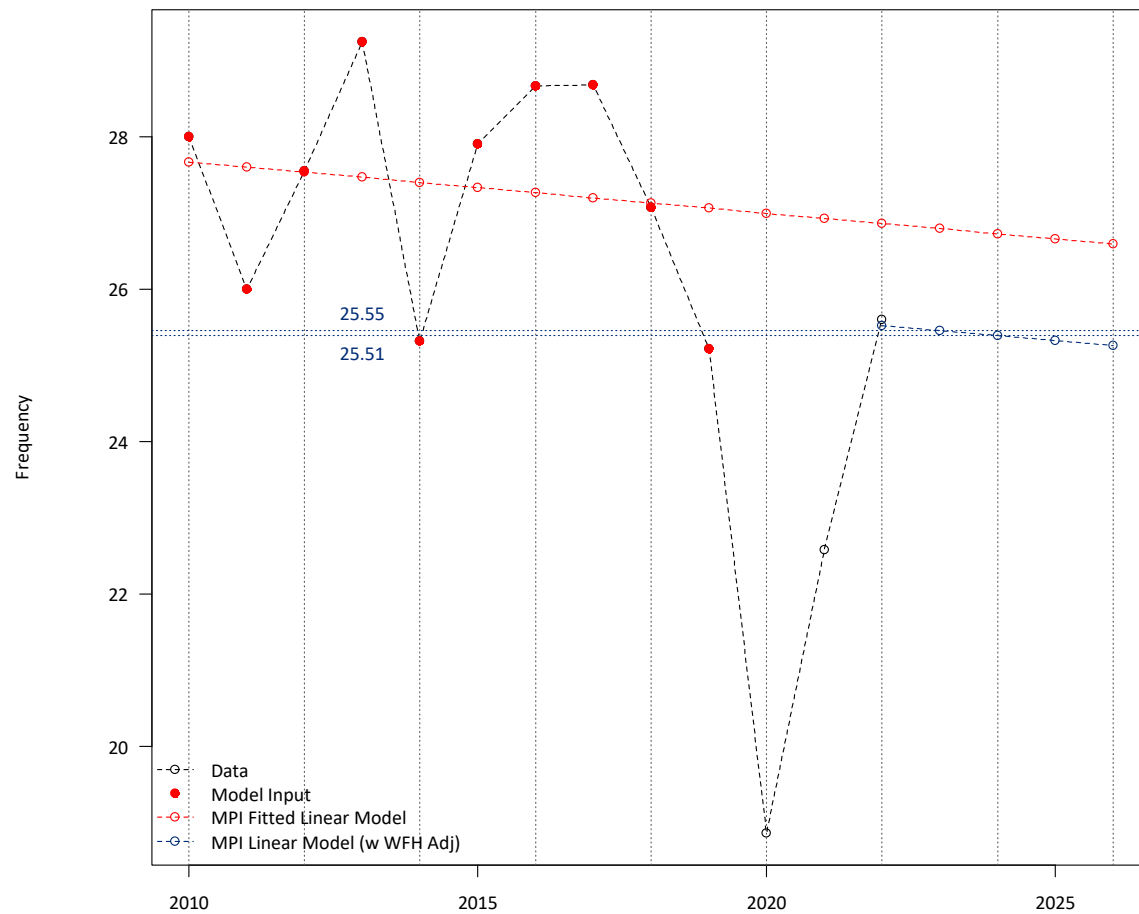
Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	27.55	5,113	114,402
2013/14	823,518	29.25	5,394	129,914
2014/15	835,178	25.32	5,617	118,756
2015/16	848,635	27.90	6,016	142,444
2016/17	861,942	28.67	6,143	151,784
2017/18	874,357	28.68	6,487	162,653
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
<b>2023/24</b>	<b>942,908</b>	<b>25.55</b>	<b>8,517</b>	<b>205,223</b>
<b>2024/25</b>	<b>953,029</b>	<b>25.51</b>	<b>9,028</b>	<b>219,476</b>
2025/26	963,262	25.46	9,570	234,719
2026/27	973,606	25.42	10,144	251,021

## Claims Incurred (000)



# COLLISION – TOTAL LOSS

## MPI Frequency Model

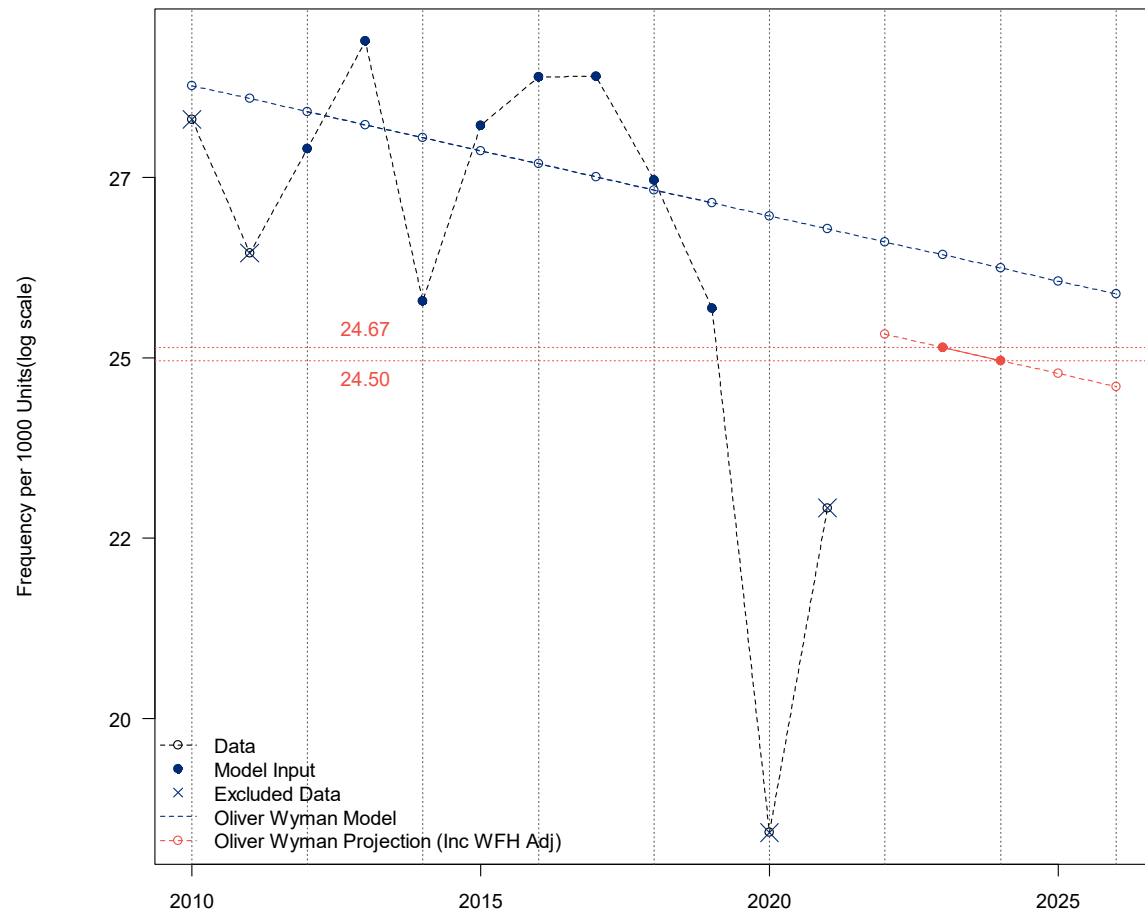


## Concerns

- **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.

# COLLISION - TOTAL LOSS

## Oliver Wyman Frequency Model

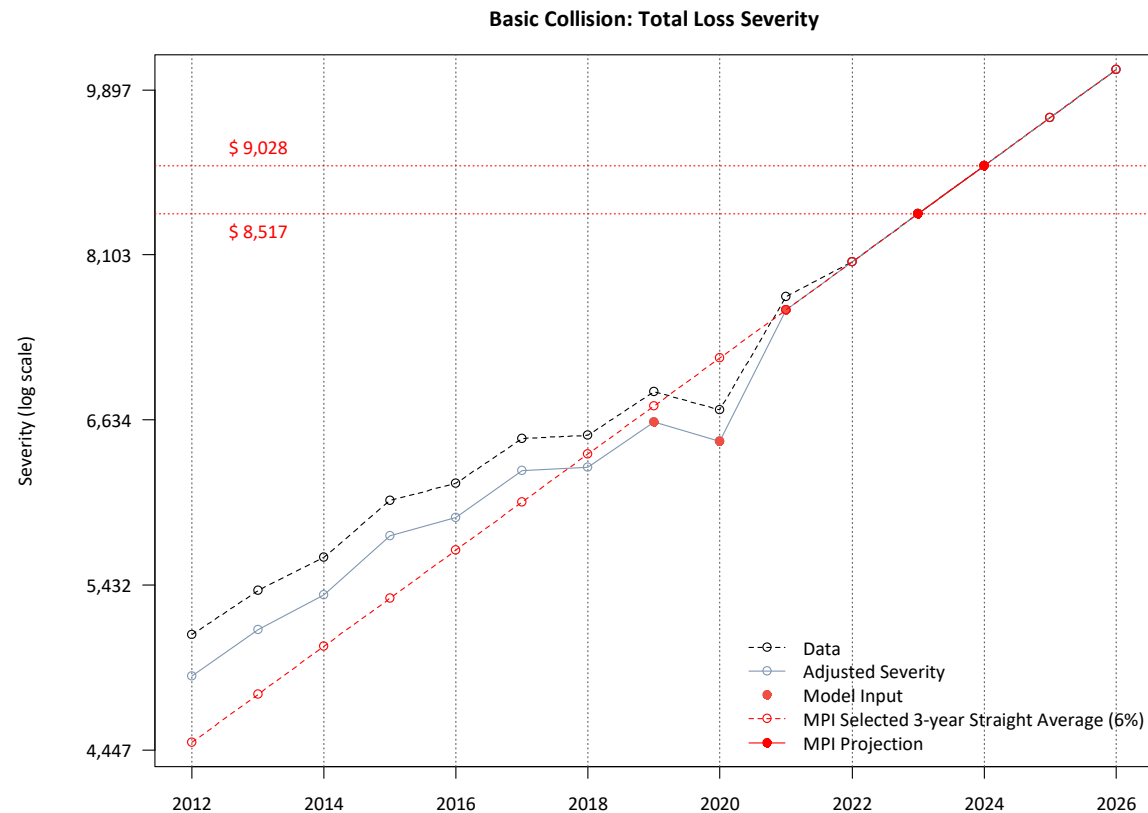


## Comments

- 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.

# COLLISION – TOTAL LOSS

## MPI Severity Model

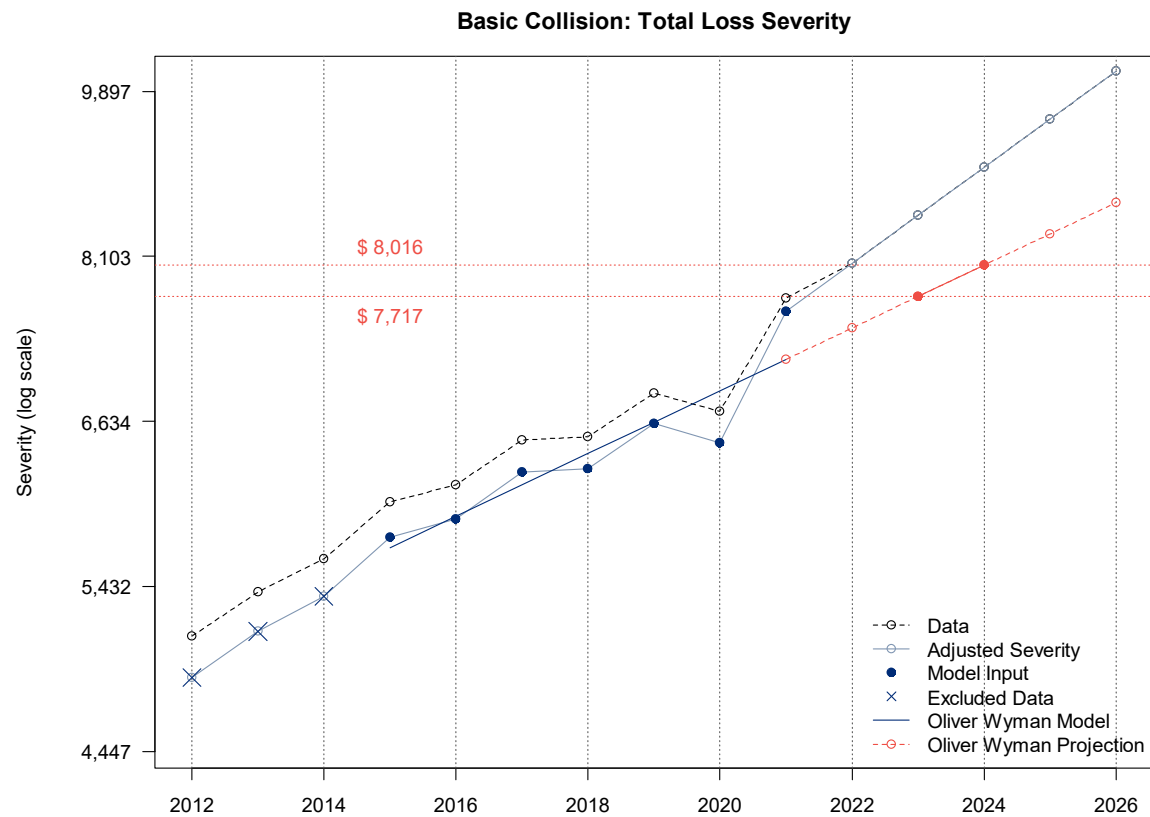


## Concerns

- 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.

# COLLISION - TOTAL LOSS

## Oliver Wyman Severity Model

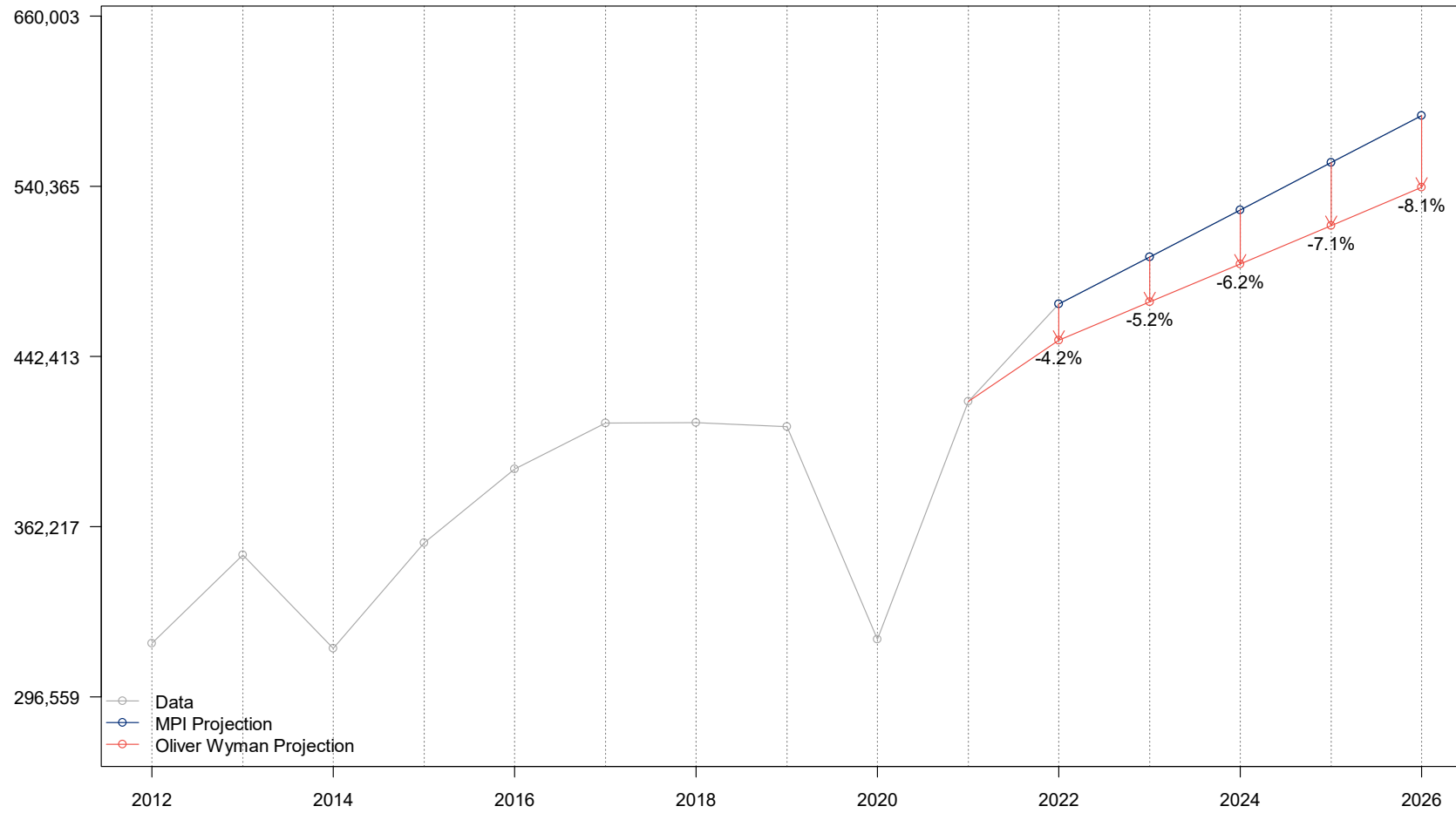


## Comments

- 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.

# COLLISION

## Claims Incurred (000s)



# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

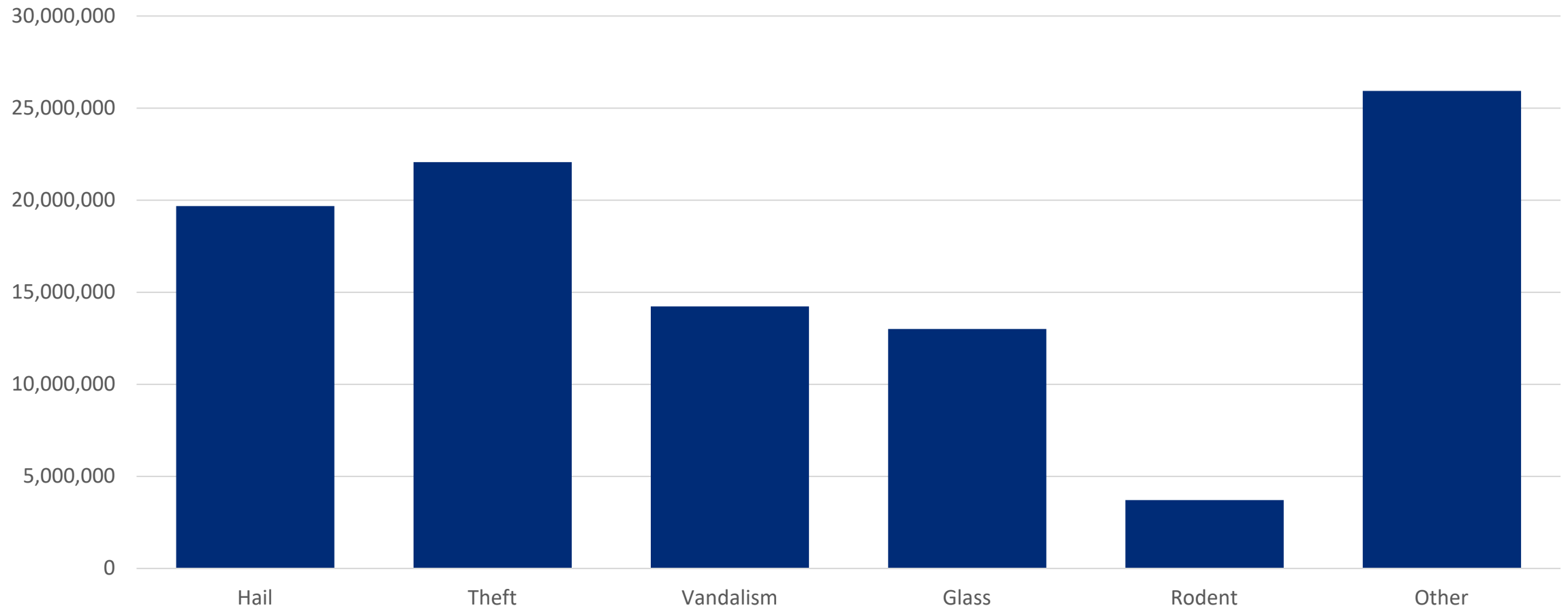
**7**

**Concluding Remarks**



# COMPREHENSIVE SPLIT

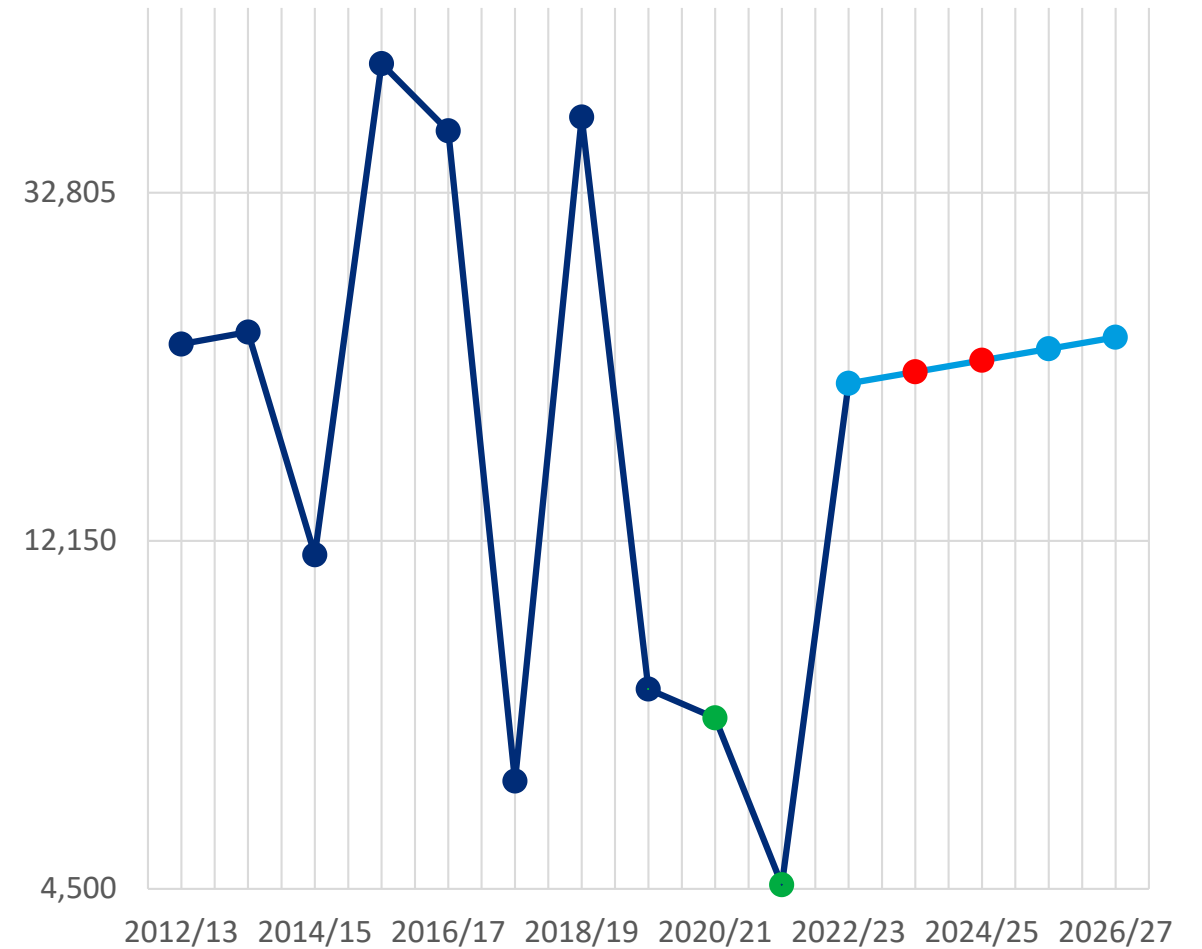
Rating Year 2023/24 Claims Incurred



# COMPREHENSIVE HAIL – TOTAL LOSS

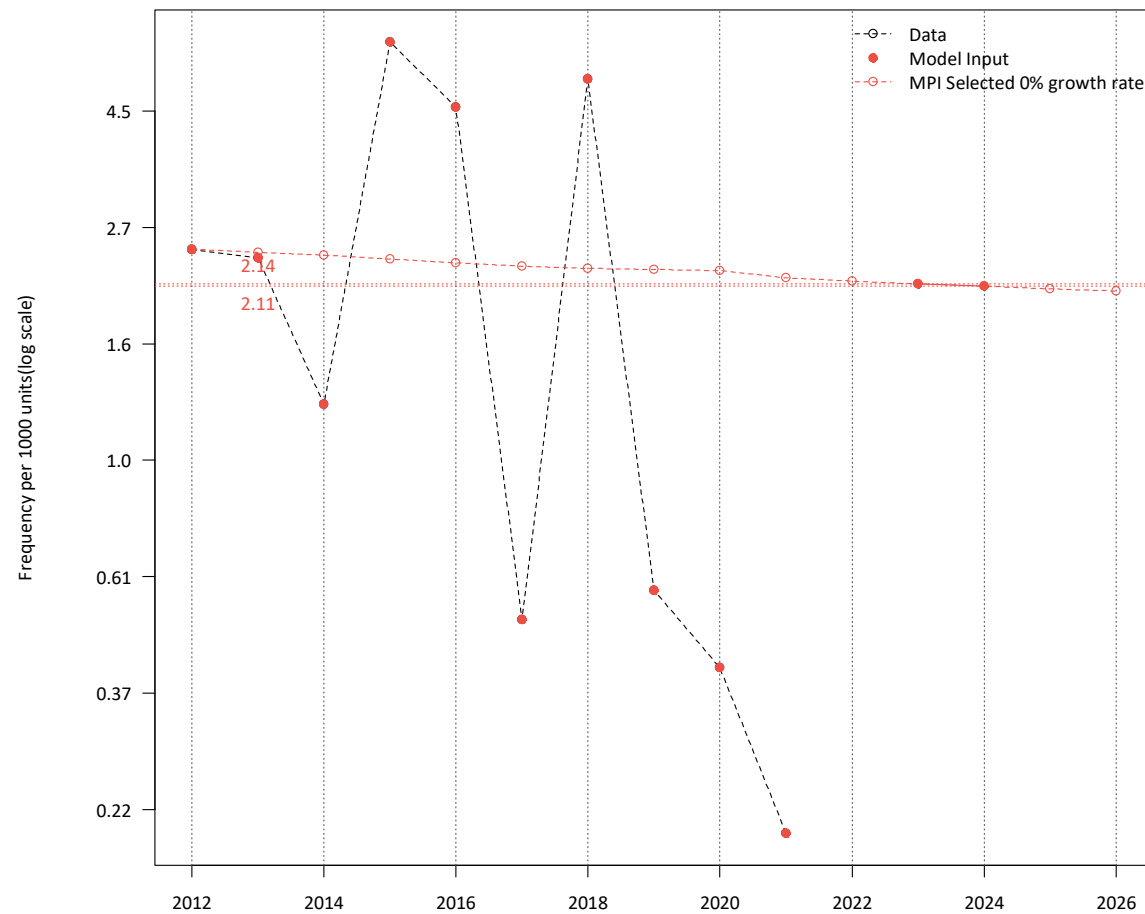
Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2012/13	6.13	3,181	2.47	2,727	21,300
2013/14	5.19	3,660	2.39	3,252	22,041
2014/15	2.55	3,814	1.27	3,354	11,675
2015/16	7.64	4,422	6.04	3,660	47,430
2016/17	6.58	4,396	4.56	3,611	39,144
2017/18	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
<b>2023/24</b>	<b>3.69</b>	<b>3,480</b>	<b>2.14</b>	<b>3,767</b>	<b>19,678</b>
<b>2024/25</b>	<b>3.65</b>	<b>3,593</b>	<b>2.11</b>	<b>3,899</b>	<b>20,336</b>
2025/26	3.61	3,710	2.09	4,035	21,017
2026/27	3.57	3,831	2.07	4,176	21,720

## Claims Incurred (000)



# COMPREHENSIVE HAIL – TOTAL LOSS

## MPI Frequency Model

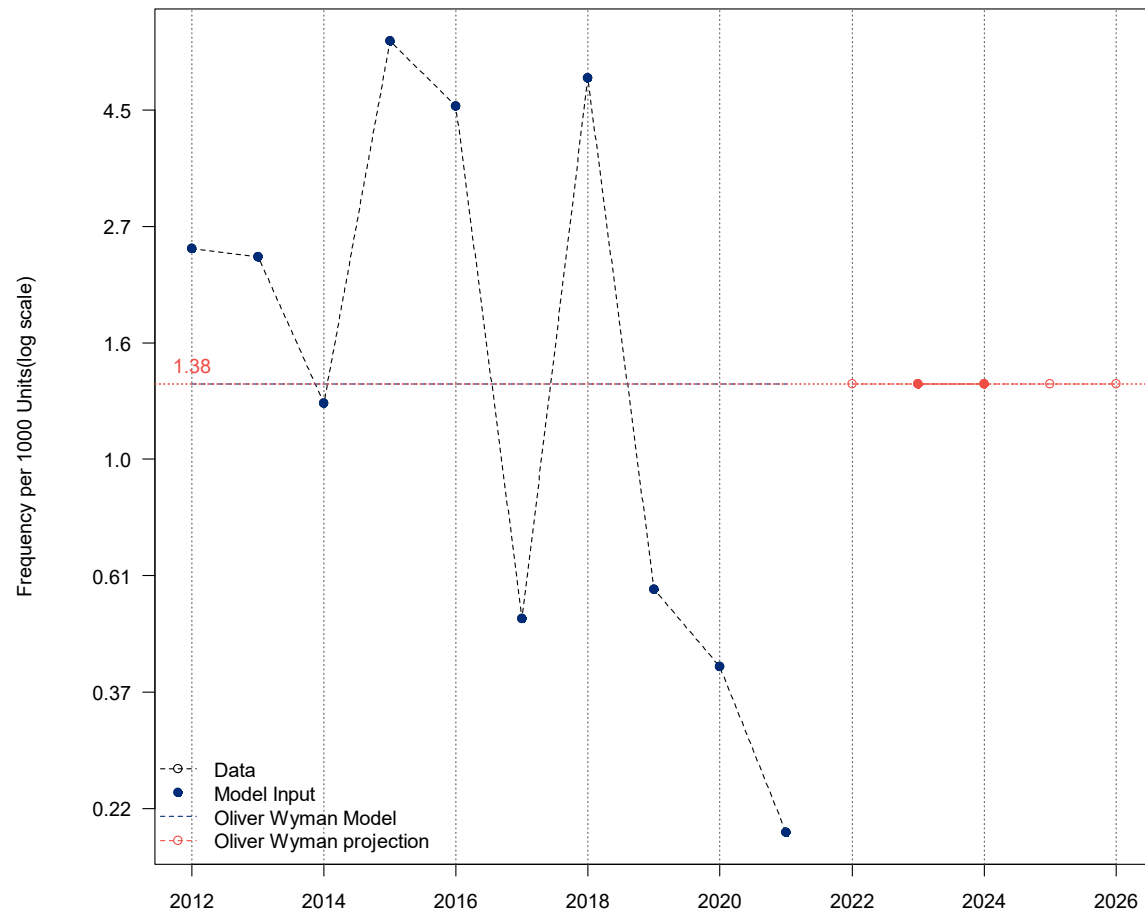


## Concerns

- **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.

# COMPREHENSIVE HAIL – TOTAL LOSS

## Oliver Wyman Frequency Model



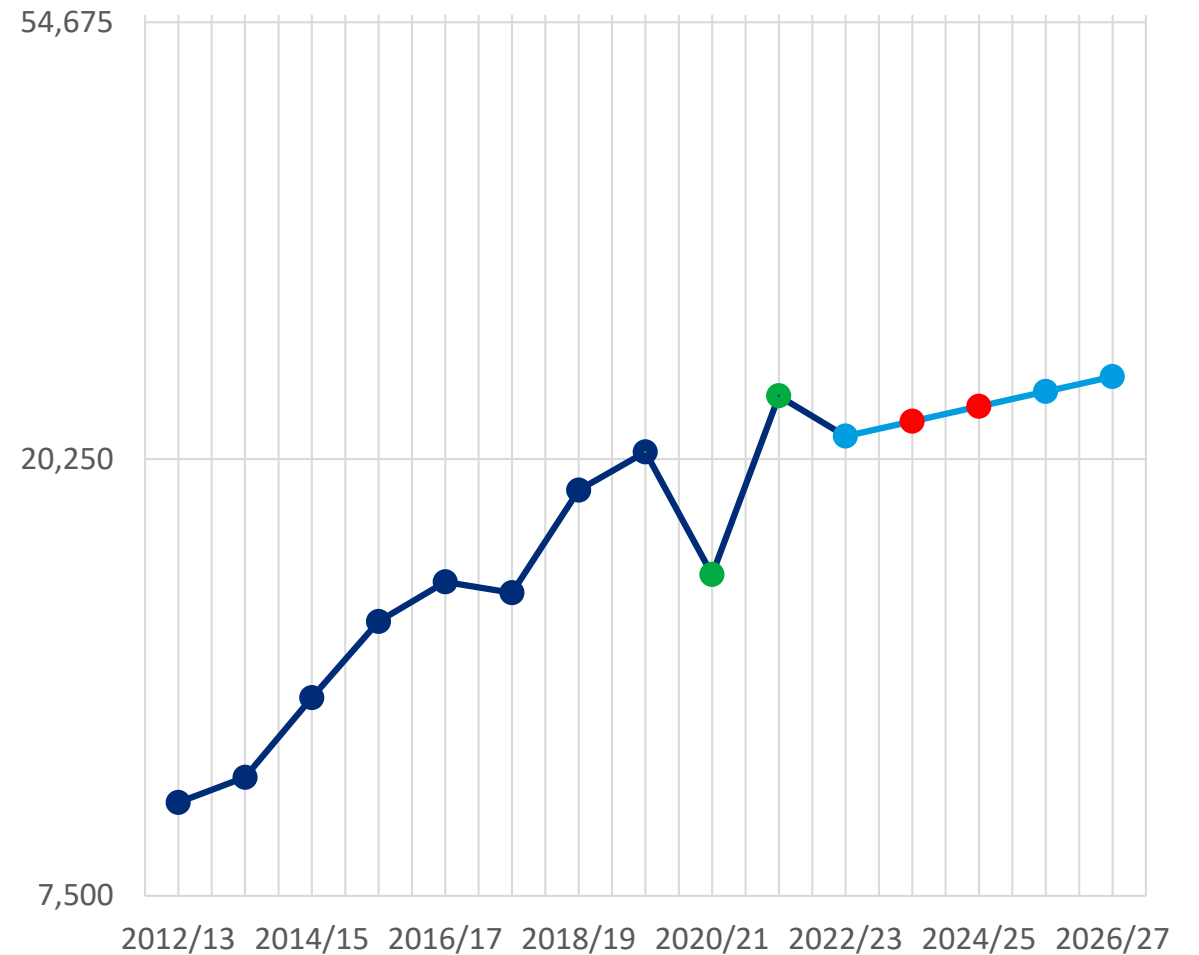
## Concerns

- 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).

# COMPREHENSIVE THEFT - REPAIR

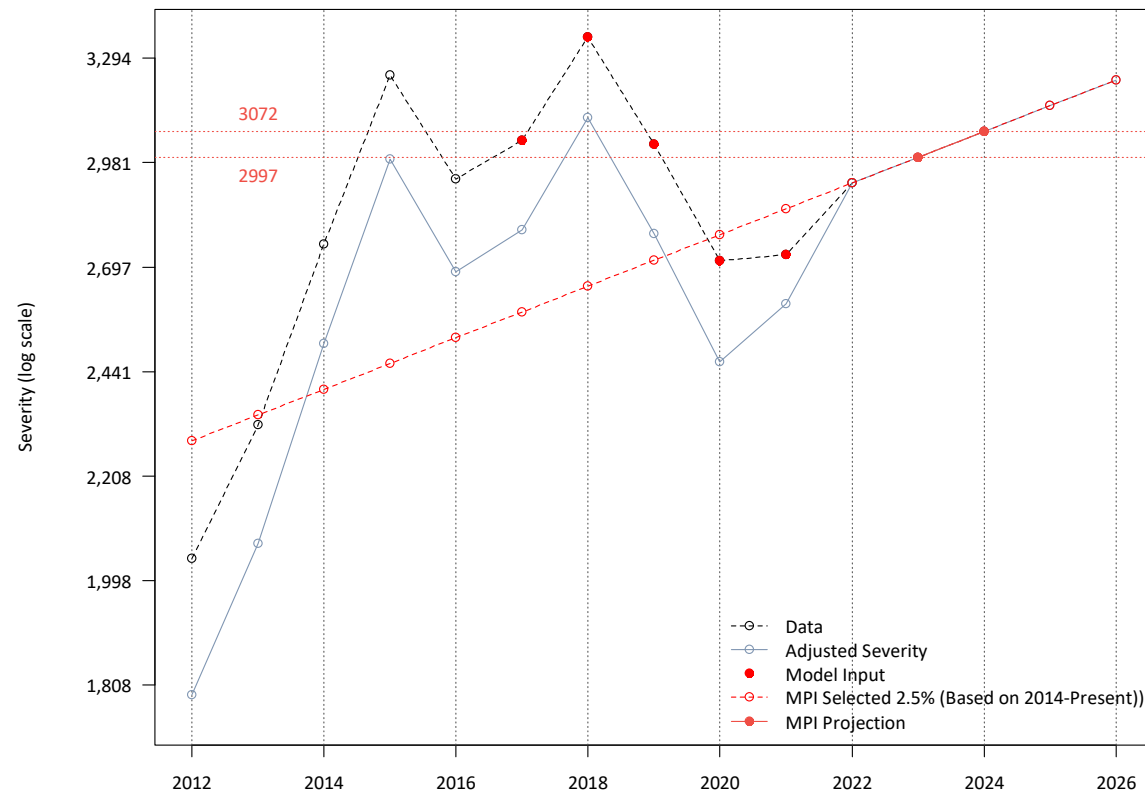
Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
2012/13	1.96	2,040	1.52	4,882	9,275
2013/14	1.66	2,320	1.66	4,869	9,818
2014/15	1.76	2,757	1.75	5,268	11,771
2015/16	1.64	3,242	1.84	6,078	13,997
2016/17	1.85	2,935	1.90	6,484	15,315
2017/18	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
<b>2023/24</b>	<b>2.73</b>	<b>2,997</b>	<b>2.05</b>	<b>7,432</b>	<b>22,068</b>
<b>2024/25</b>	<b>2.73</b>	<b>3,072</b>	<b>2.05</b>	<b>7,599</b>	<b>22,827</b>
2025/26	2.73	3,148	2.05	7,770	23,611
2026/27	2.73	3,227	2.05	7,945	24,423

## Claims Incurred (000)



# COMPREHENSIVE THEFT - REPAIR

## MPI Severity Model

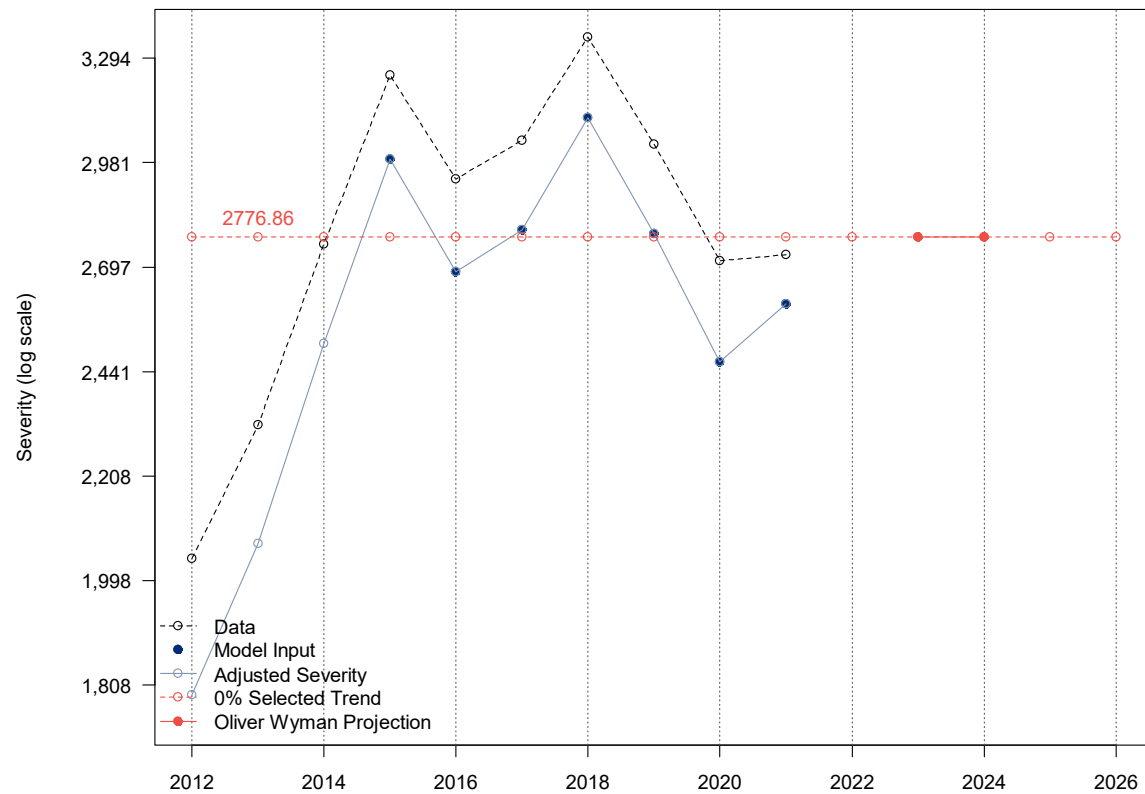


## Concerns

- **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.

# COMPREHENSIVE THEFT - REPAIR

## Oliver Wyman Severity Model



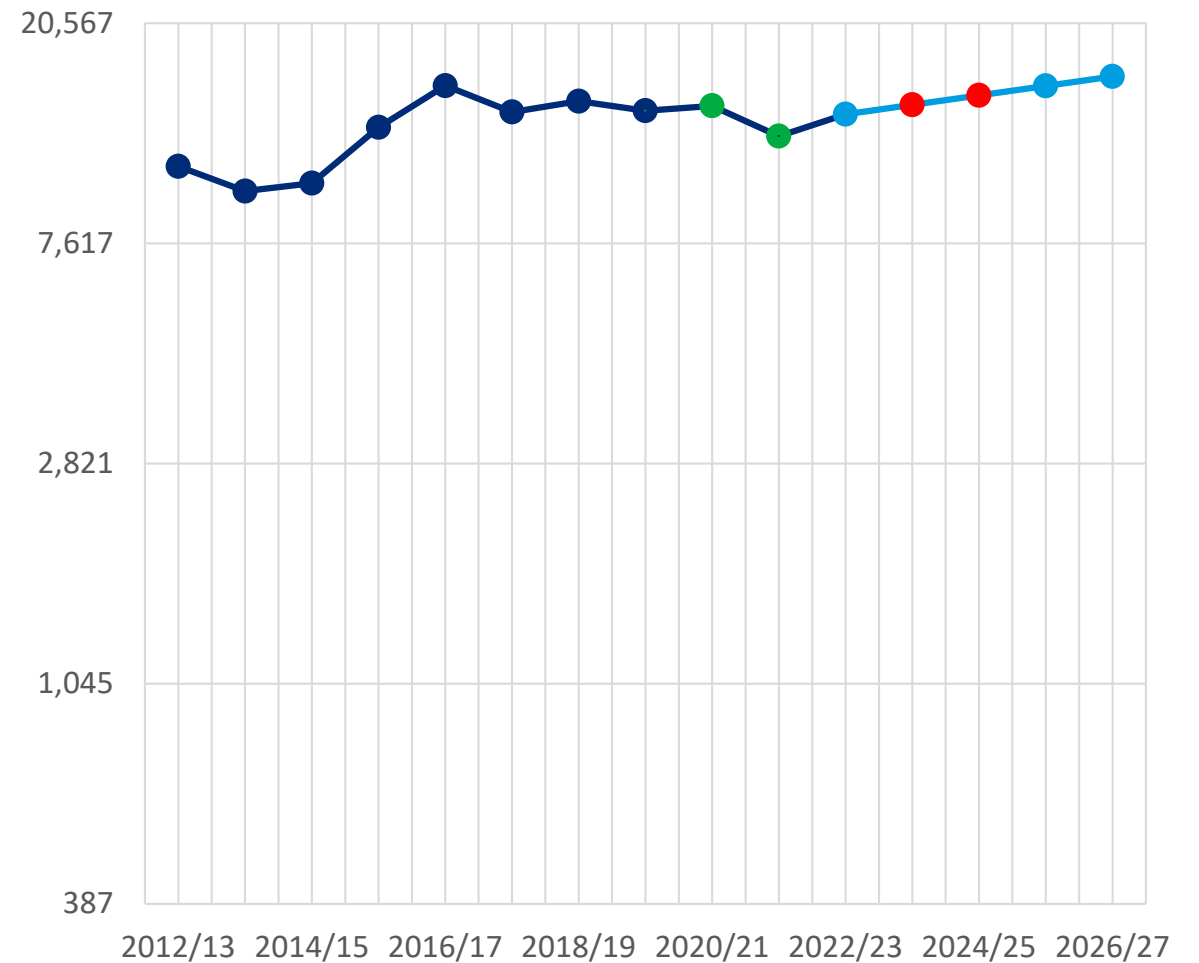
## Comments

- 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).

# COMPREHENSIVE VANDALISM – TOTAL LOSS

Accident Year	Repair Frequency	Repair Severity	Total Loss Frequency	Total Loss Severity	Claims Incurred (000)
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
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
<b>2023/24</b>	<b>7.20</b>	<b>1,710</b>	<b>0.71</b>	<b>3,896</b>	<b>14,232</b>
<b>2024/25</b>	<b>7.20</b>	<b>1,765</b>	<b>0.71</b>	<b>4,023</b>	<b>14,853</b>
2025/26	7.20	1,823	0.71	4,154	15,500
2026/27	7.20	1,882	0.71	4,289	16,176

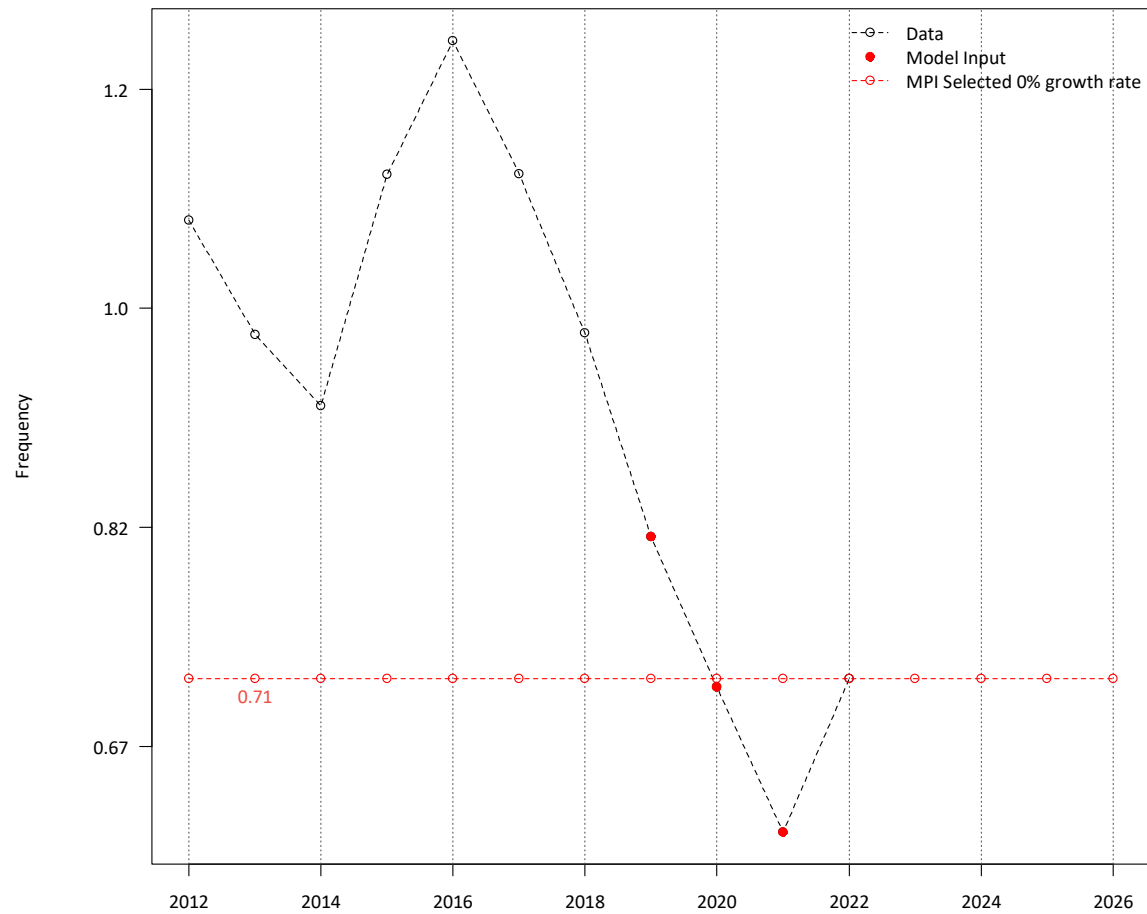
## Claims Incurred (000)





# COMPREHENSIVE VANDALISM – TOTAL LOSS

## Frequency Model

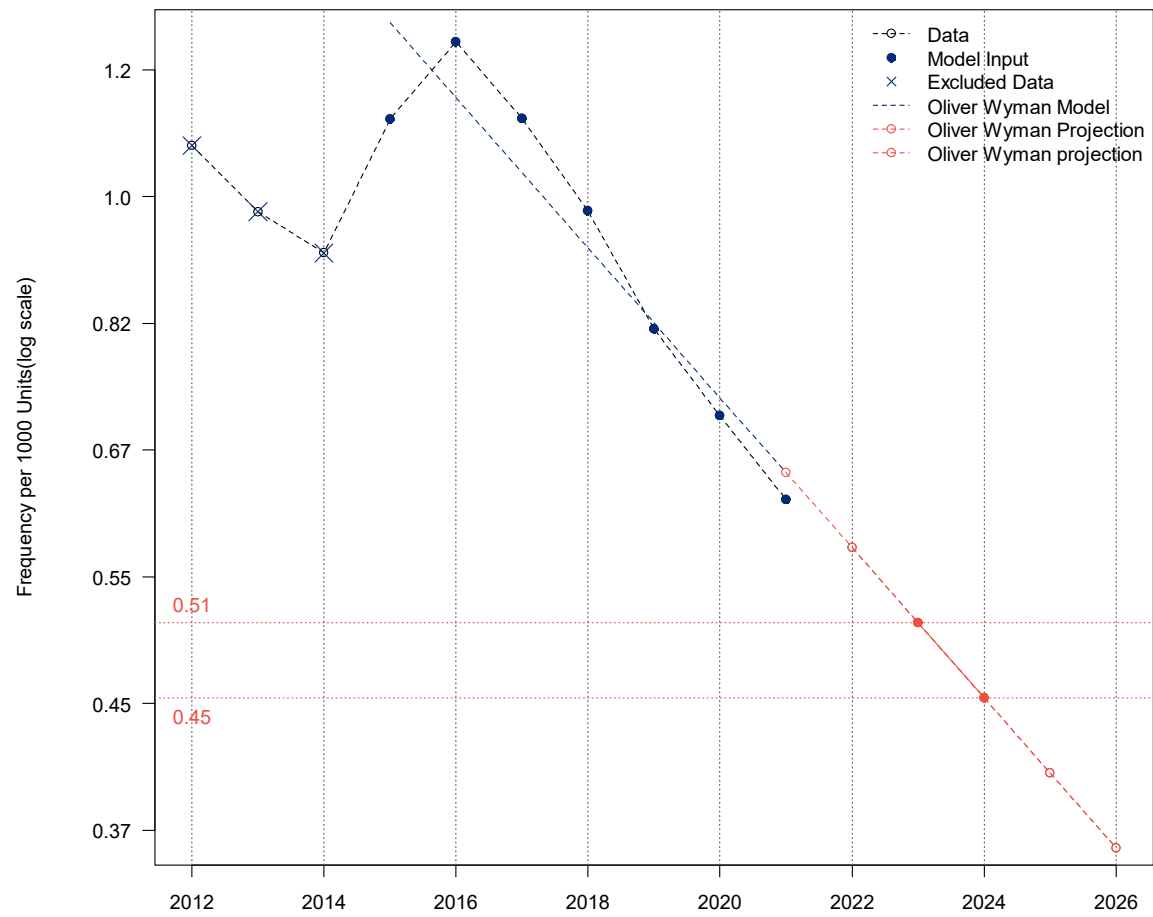


## Concerns

- **Trend Rate Selection** – MPI selects a 0% trend rate.
- **Selected 2022/23 frequency** - For 2022/23, MPI selects a 3-year straight average total loss frequency.

# COMPREHENSIVE VANDALISM – TOTAL LOSS

## Oliver Wyman Frequency Model

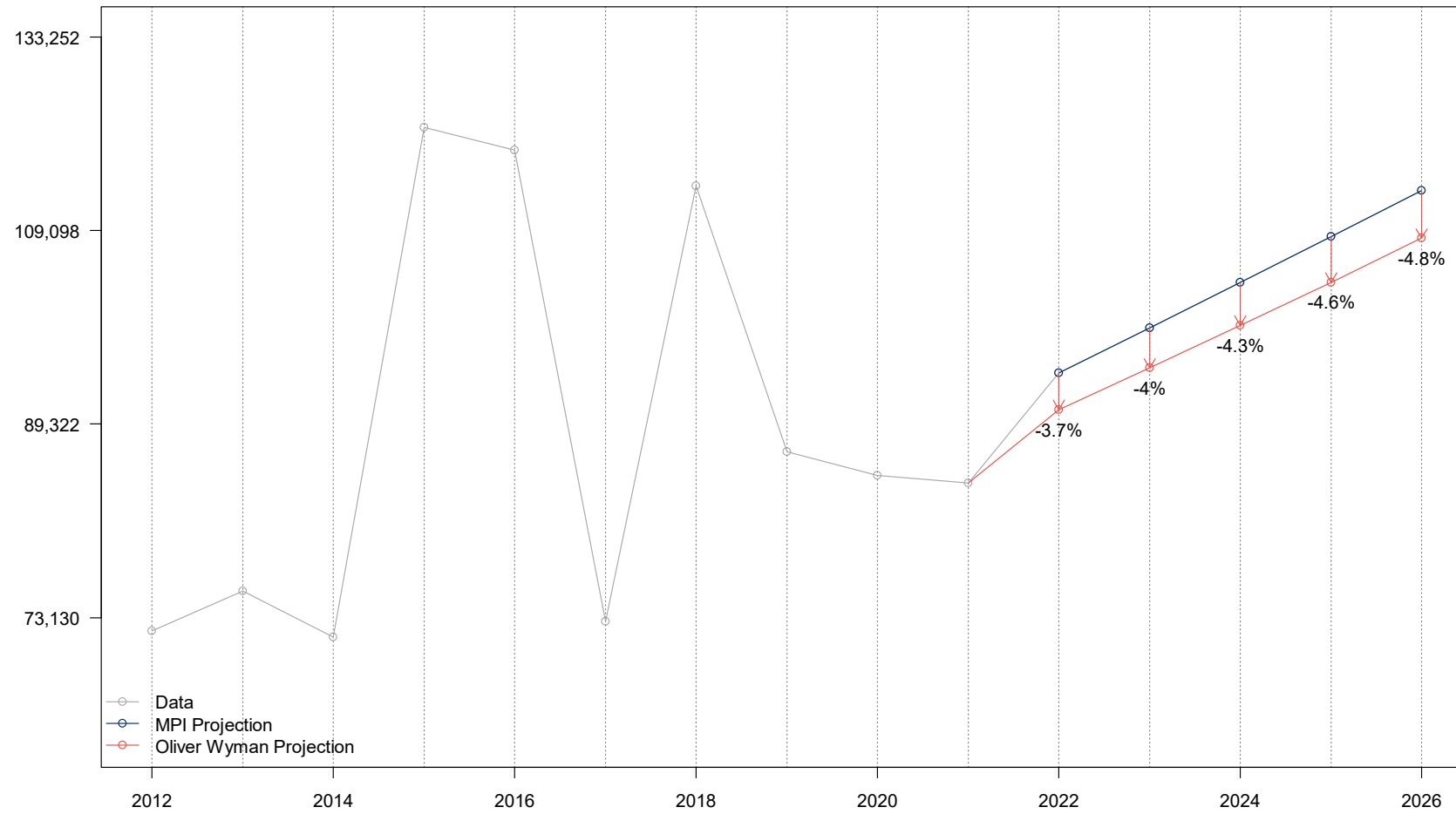


## Comments

- Between 2015 and 2021, we observe a significant decreasing trend rate.

# COMPREHENSIVE

## Claims Incurred (000s)



# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

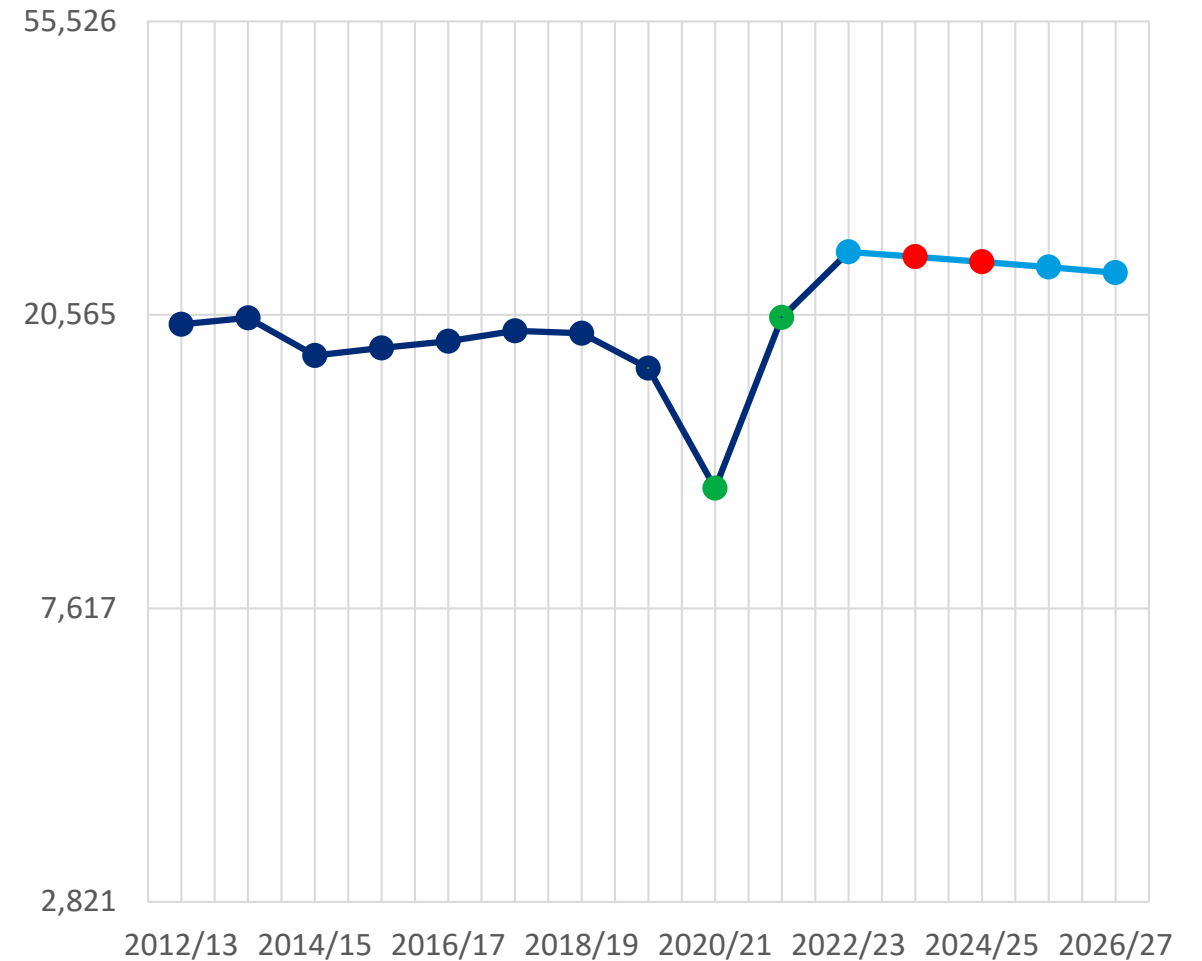
**7**

**Concluding Remarks**

# PROPERTY DAMAGE – THIRD PARTY DEDUCTIBLE TRANSFER

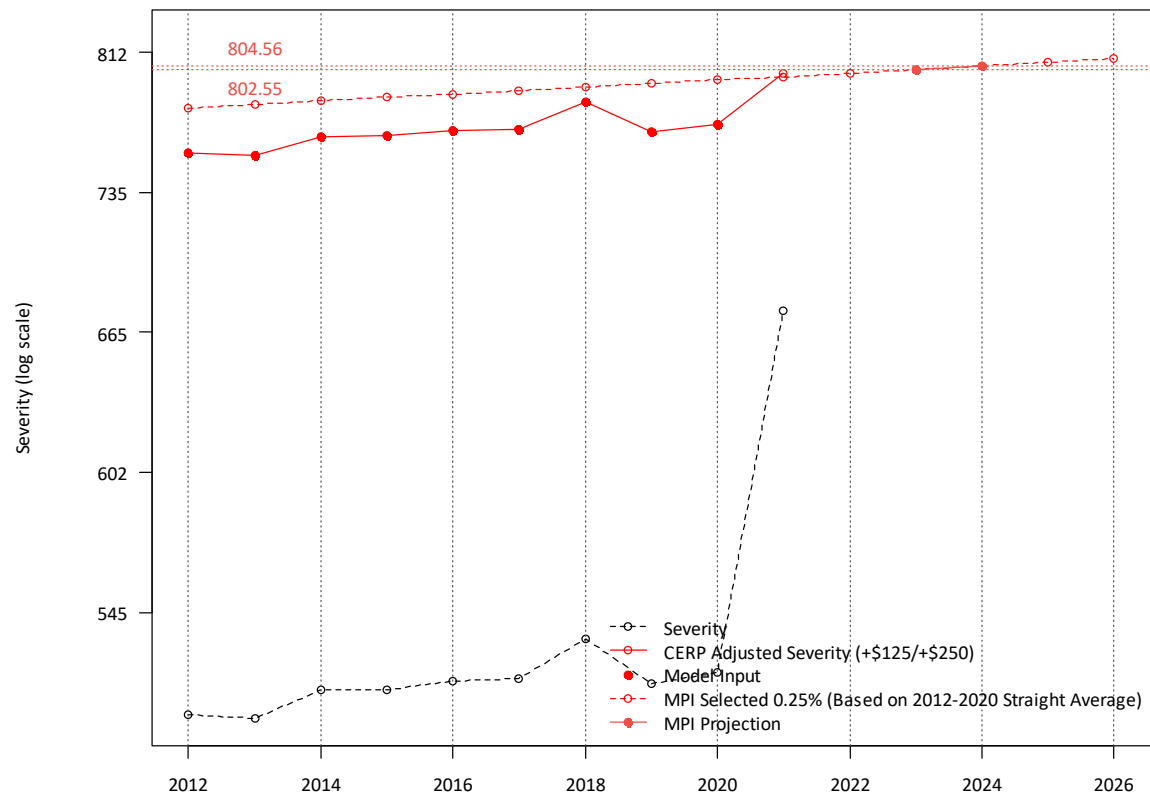
Accident Year	HTA Units	Frequency (per 1000 HTA Units)	Severity	Claims Incurred (000)
2012/13	812,141	48.46	506	19,915
2013/14	823,518	48.96	505	20,349
2014/15	835,178	41.65	515	17,920
2015/16	848,635	42.03	515	18,380
2016/17	861,942	42.09	518	18,806
2017/18	874,357	42.90	519	19,476
2018/19	882,537	40.99	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
<b>2023/24</b>	<b>942,908</b>	<b>33.08</b>	<b>803</b>	<b>25,036</b>
<b>2024/25</b>	<b>953,029</b>	<b>32.09</b>	<b>805</b>	<b>24,608</b>
2025/26	963,262	31.10	807	24,166
2026/27	973,606	30.11	809	23,707

## Claims Incurred (000)



# PROPERTY DAMAGE – THIRD PARTY DEDUCTIBLE TRANSFER

## MPI Severity Model

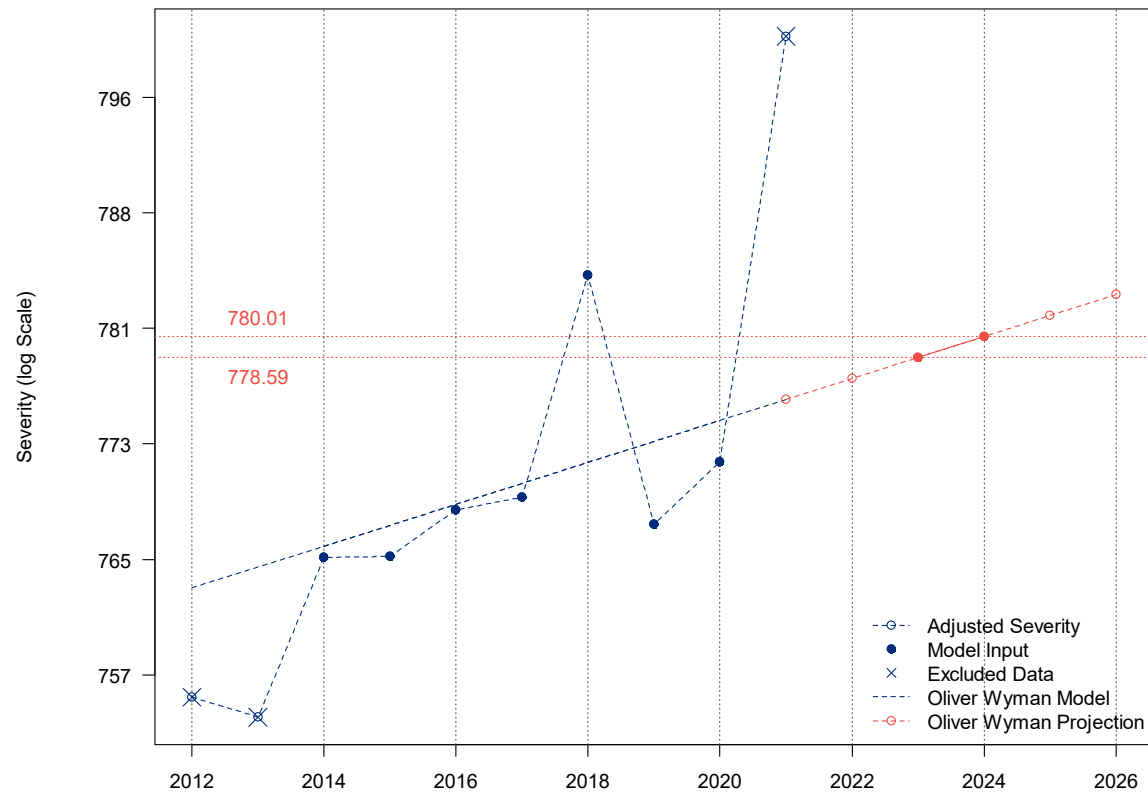


## Concerns

- **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 observed rates of change between 2012 to the present, not a statistical model.

# PROPERTY DAMAGE – THIRD PARTY DEDUCTIBLE TRANSFER

## Oliver Wyman Severity Model



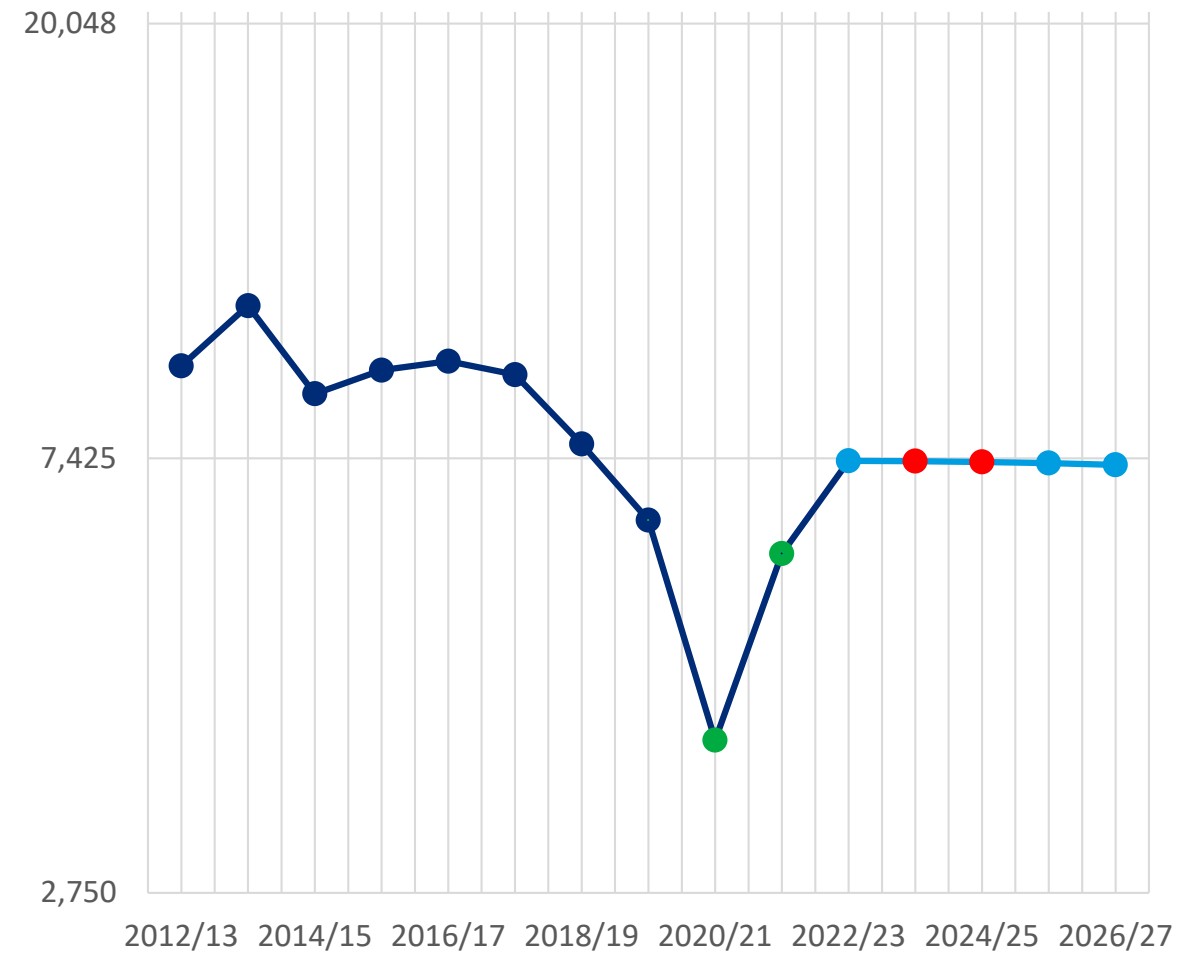
## Comments

- With data visualization tools, we can better understand the trends in the severity. [Add]
- After adjusting the historical data for CERP, 2021/22 appears to outlier.

# PROPERTY DAMAGE – THIRD PARTY LOSS OF USE

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
<b>2023/24</b>	<b>942,908</b>	<b>17.29</b>	<b>452</b>	<b>7,375</b>
<b>2024/25</b>	<b>953,029</b>	<b>16.78</b>	<b>460</b>	<b>7,361</b>
2025/26	963,262	16.27	468	7,342
2026/27	973,606	15.77	477	7,315

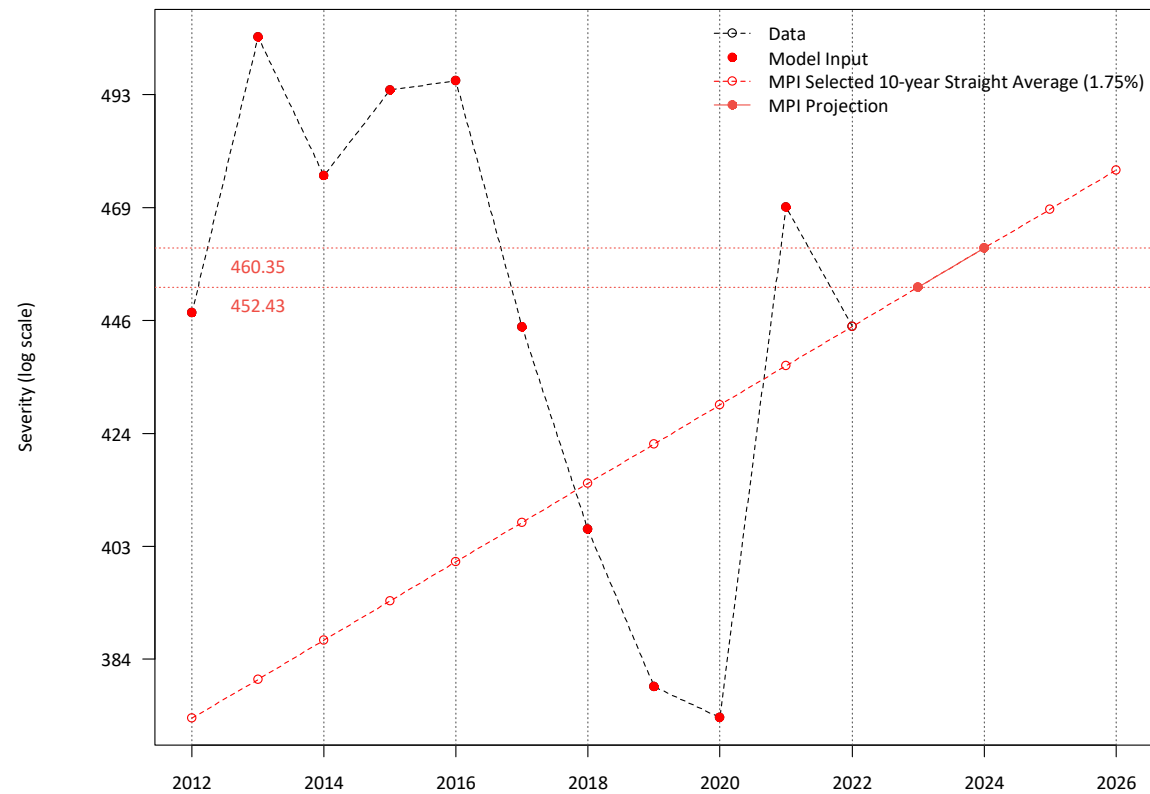
## Claims Incurred (000)





# PROPERTY DAMAGE – THIRD PARTY LOSS OF USE

## MPI Severity Model

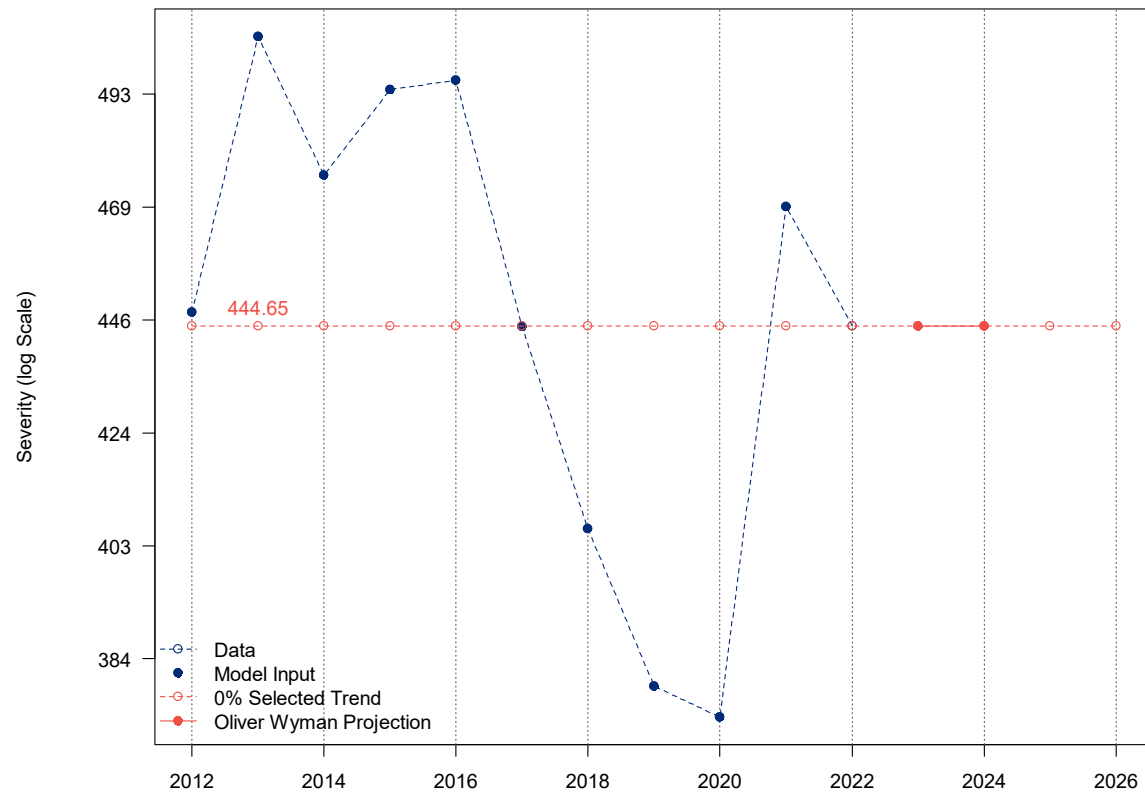


## Concerns

- **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.

# PROPERTY DAMAGE – THIRD PARTY LOSS OF USE

## Oliver Wyman Severity Model

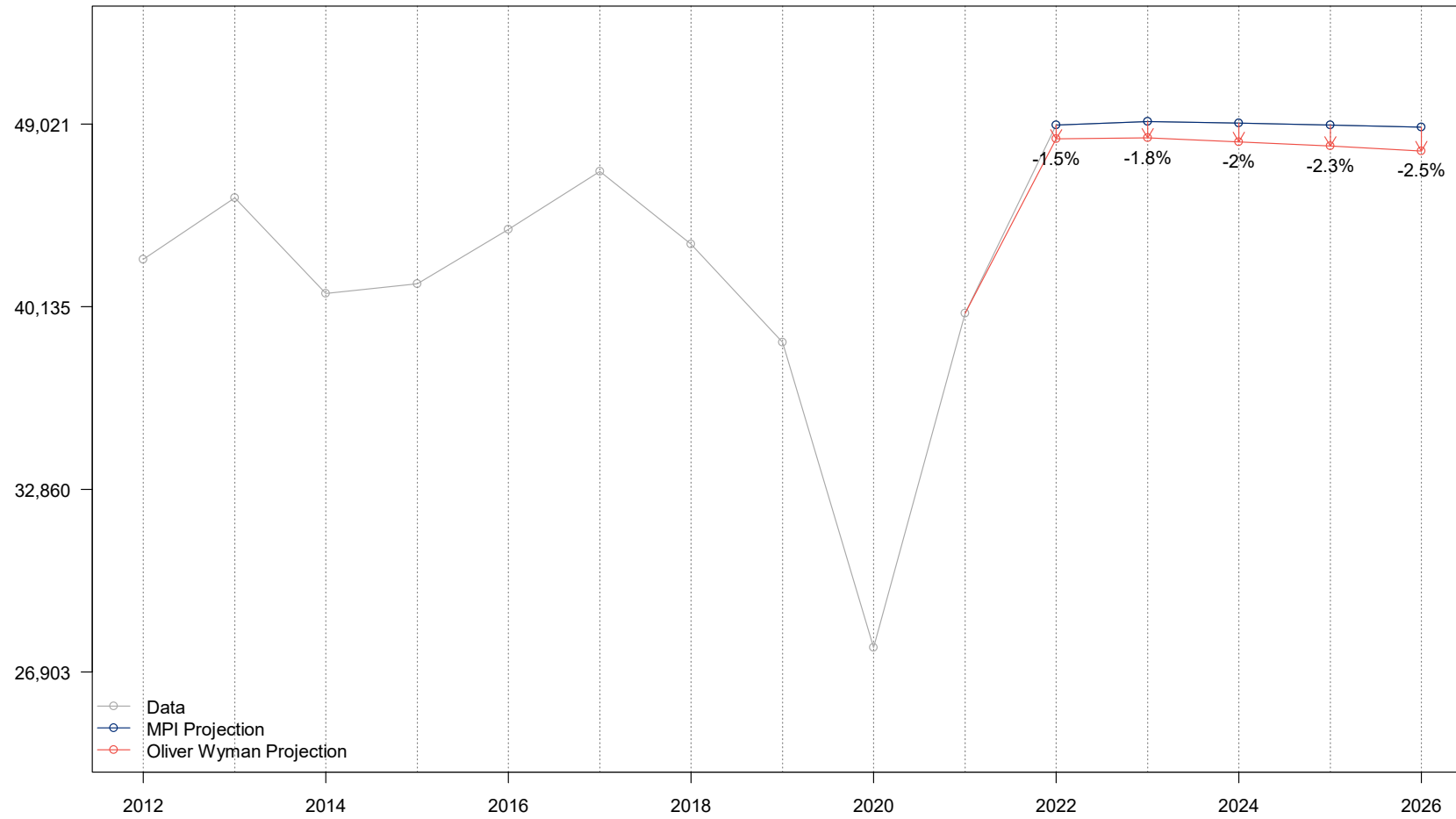


## Comments

- 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.

# PROPERTY DAMAGE

Claims Incurred (000s)



# AGENDA



**1**

**Introduction**

**2**

**Scope of Review**

**3**

**Actuarial Commentary: Weekly Indemnity**

**4**

**Actuarial Commentary: Collision**

**5**

**Actuarial Commentary: Comprehensive**

**6**

**Actuarial Commentary: Property Damage**

**7**

**Concluding Remarks**

# IMPROVING MPI PROJECTION OF CLAIMS INCURRED

# 1

## Data Visualization

---

See it to understand it

- Visualization of data supports the understanding of trends
- Plot on a log-axis to consider change on a percentage basis

# 2

## Modeling

---

Explain Relationships

- Dependent Variables
- Independent Variables
  - Time
  - Mobility (COVID)
  - Seasonality

# 3

## Testing

---

Evaluate Fit Metrics

- $p$ -value
- R-squared
- Adjusted R-squared
- Test for outliers
- Visualize model against data

# 4

## Reporting

---

Support

- Confidence to stakeholders
- Explain the predictive value

# MPI PROCESS

- Between the 2022 GRA and 2023 GRA, FY 2021/22 projections decreased by \$150 million
- Transition from minimum bias to a generalized linear model
  - 2025 GRA for private passenger vehicles
  - 2026 GRA for other classes
- Expansion of DSR Scale

# RESPONSES

## Use of Linear v. Log-Linear Models

- In our review of models throughout Canada, we rarely observe projections based on linear models.

## Correlation by Coverage

- We recognize that frequencies will be partly correlated across coverages.
- However, different traffic densities will produce different types of accidents.
- Changes in traffic density over time will reduce correlation.
- Property Damage Third Party Deductible last point should be included due to changes in CERP

## Company Insights

- We acknowledge the value of internal insights
- We also expect that MPI has more granular data than is presented in the GRA.
- Those insights should be incorporated into MPI's model/model design.
- There are varying views on potential future inflation and we recommend that the GRA disclose MPI's views in support of selected models / provisions.



A business of Marsh McLennan