OliverWyman

NOVA SCOTIA
PRIVATE PASSENGER VEHICLES
OLIVER WYMAN SELECTED LOSS TREND RATES

Based on Insurance Industry Data
Through June 30, 2023

March 1, 2024

CONTENTS

1. Executive Summary

1.1. Purpose and Scope

The Nova Scotia Utility and Review Board (the Board) retained Oliver, Wyman Limited (Oliver Wyman) to determine private passenger vehicle loss trend rates. The scope of our analysis includes all coverages:

- Mandatory: third party liability, accident benefits, and uninsured automobile
- Optional Coverage: collision, comprehensive, all perils, specified perils, and underinsured motorist

We developed our analysis using insurance industry private passenger vehicles loss and expense experience reported as of June 30, 2023, to the General Insurance Statistical Agency (GISA).

1.2. Actuarial Findings

We present our selected annual loss cost trend rates in Table 1.

The stated trend rate is through to the mid-point of the latest accident half-year considered in the model that supports the selected loss trend rates. The selected trends include the impact of changes in cost through the trend date, the mid-point the of latest accident half-year. In the absence of a significant change in experience, we find it is most reasonable to assume the past loss trend will persist into the future resulting in equivalent past and future trend rates. To the extent that an insurer finds an alternative trend rate more reasonable for the future, we recommend the insurer fully explain and provide support based on the most recent data available at the time of filing.

Table 1: Selected Loss Cost Trends – Data as of June 30, 2023

Coverage	2023 Annual Review: Data as of December 31, 2022	2024 Semi-Annual Review: Data as of June 30, 2023
Bodily Injury	+4.5%	+3.8%
Property Damage	+3.0%	0.0%
DCPD	+4.5%[1]	+2.5%[2]
Accident Benefits	0.0%	+0.9%
Uninsured Auto	0.0%	0.0%
Collision	+5.5%[3]	+3.4%[4]
Comprehensive	+9.0%	+6.5%[5]
Specified Perils	+9.0%	+6.5%
All Perils	+5.0%	+5.1%
Underinsured Motorist	+6.0%	+6.0%

In addition to adjusting historical loss data to the cost level of a proposed rate program with loss trend rates, insurers should unwind the impact (if any) of the COVID-19 pandemic and consider the impact of commonplace remote and hybrid work options on claims costs.

We discuss and present our methodology and assumptions in selecting our trend rates in this report.

* * * * *

We developed the estimates in this report in accordance with the applicable Actuarial Standards of Practice issued by the Canadian Institute of Actuaries.

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[1] Includes one-time severity increase of +9% at 2021-2 (coincident with the rise in inflation).
[2] Includes one-time severity increase of +11.3% at 2021-2 (coincident with the rise in inflation).
[3] Includes one-time severity increase of +10% at 2021-2 (coincident with the rise in inflation).
[4] Includes one-time severity increase of +8.9% at 2021-2 (coincident with the rise in inflation).
[5] Includes one-time severity increase of +14.0% at 2021-2 (coincident with the rise in inflation).

2. Legislative Reforms and Government Actions

2.1. Minor Injury Regulations

In 2003 the Nova Scotia government introduced Automobile Insurance Tort Recovery Limitation Regulations under Section 113B of the Insurance Act which limited the pain and suffering award to $2,500 to claimants who met the “minor injury” definition introduced with the Minor Injury Regulations.

The Minor Injury Regulations were subject to a constitutional challenge and these challenges affected the bodily injury data during this period of uncertainty. The Minor Injury Regulations were ultimately upheld.

On December 15, 2009, Justice Goodfellow of the Supreme Court of Nova Scotia released the Decision in Hartling v. Nova Scotia, upholding the Minor Injury Regulation.

Subsequently, on May 27, 2010, the Supreme Court of Canada released its Decision to refuse leave to appeal.

2.2. Bill 52 - Minor Injury Regulations Update

In 2010, the Nova Scotia government introduced Bill 52 which affected the minor injury cap on pain and suffering awards resulting from automobile accidents. The following reforms were effective April 28, 2010:

- The definition of “minor injury” was changed to be less complex and was restricted to only include strains, sprains, and whiplash-associated disorders.
- The minor injury cap on pain and suffering awards was increased from $2,500 to $7,500, and subject to an inflation index.

2.3. Fair Insurance Reforms

Based on recommendations from the 2011 independent auto insurance review, Nova Scotia introduced a package of reforms with the goal of better coverage and more choice for Nova Scotians while balancing fairness, stability, and affordability.

The first phase of the reform was effective April 1, 2012, and included higher accident benefit limits as presented in Table 2.

Table 2: Change in Accident Benefit Limits

Benefit Category	Previous Benefit	New Benefit (as of April 1, 2012)
Medical and Rehabilitation Expenses	$25,000	$50,000
Funeral Expenses	$1,000	$2,500
Death Benefits		
Head of Household	$10,000	$25,000
Spouse of Head of Household	$10,000	$25,000
Dependent	$2,000	$5,000
Loss of Income	$140/week	$250/week
Principal Unpaid Housekeeper	$70/week	$100/week

The second, and final, phase of the reform was effective April 1, 2013, and included the introduction of the direct compensation for property damage coverage; allowing not-at-fault drivers to recover damages caused by collision from their insurer.

3. Analysis Data

3.1. Data

The source for the exposures (number of vehicles), claim count, and claim amount data that we analyze is the 2023-1 AUTO7501 Automobile Industry Exhibit (as of June 30, 2023) provided by GISA. This data includes the experience of all private passenger vehicles in Nova Scotia. We refer to this data source as the AIX report.

The claim count and claim amount data presented in the AIX report is grouped according to the date of the accident half-year during which the event occurred.

The claim amount data that is available through the AIX report is in two categories:

- Paid Claim Amounts – claim cost payments made by an insurance company; includes payments that were made on claims that are now closed, as well as payments made on claims that are still open (referred to as partial payments).
- Case Reserves – an adjuster's estimate of the amount of future claim cost payments to be made on individual claims; a case reserve is assigned to each individual open claim.

The total of the paid claim amounts made on each closed or open claim and the case reserve carried on each open claim is referred to as the reported incurred claim amount.

The case reserves (and hence the reported incurred claim amounts) reflect the views and opinions of the respective insurance company claim adjusters that handle the individual claims and are based on the information available to the claim adjusters as of a point in time. Over time, the case reserves are revised to more accurately reflect the payments that are made or that are expected to be made based on additional information that becomes available to the claim adjusters.

It is important to note two points about case reserves:

- **Insurance companies' determination of case reserves varies from company to company.** For example, it is typical for insurance companies to instruct their claim adjusters to post a pre-set amount (e.g., $10,000 for bodily injury claims) as the case reserve when a claim is first reported and before any investigation is performed. This is referred to as the "initial claim reserve." In a sense, the initial claim reserve serves as a placeholder until an investigation is conducted and a more accurate estimate can be established by the claim adjusters. For those companies that follow this approach, the amount of the initial case reserve and the length of time the initial claim reserve remains posted varies by company and, for a particular company, could change over time.
- **The case reserves do not reflect the "actuarial reserve" (also referred to as the bulk reserve or the IBNR reserve) that insurance companies record in their financial statements.** This actuarial reserve, which is estimated by the insurance company actuaries, is an aggregate amount that is intended to provide for (i) any overall inadequacies or redundancies in the case reserves that are established on individual claims, and (ii) claims (accidents) that occurred but have not yet been reported to the insurance company as of the date of the financial statement. The approach that insurance

companies (their actuaries) use to determine the "actuarial reserve," while subject to the common standards of the Canadian Institute of Actuaries, varies from company to company.

3.2. Data Exclusions

As part of our review process, we review the individual data of the largest ten insurers/groups in the province for any anomalies. Only in those situations that we consider the data to be both highly unusual and impactful do we remove the individual insurer/group data from our analysis. We have not excluded any data for this review.

3.3. Estimating Ultimate Claim Counts and Ultimate Claim Amounts by Accident Half-Year – General Approach

We estimate the final (ultimate) number and cost[6] of all claims that arise from events that occur in the first and second half of the year (referred to as "accident half-years"[7]), separately, through to June 30, 2023. These estimates are used to measure and select the loss trend rates that we recommend in Section 5 of this report.

We estimate the final/ultimate claim cost by accident half-year by estimating the needed actuarial reserve for all insurance companies in aggregate (i.e., the industry), and adding that amount to the reported incurred claim amounts that insurance companies report to GISA.[8] In doing so, we consider the industry's reported claim amounts (the aggregate paid claim amounts and individual claim case reserves), but we do not consider the actuarial reserves established by each insurance company as they are not reported to GISA.

We estimate the industry actuarial reserve by applying "loss development factors" to the aggregated incurred claim amounts that are reported to GISA. We apply loss[9] development factors to estimate the actuarial reserve need, hence the final claim cost, for each accident half-year through June 30, 2023, separately for each of the coverages.

We follow a similar approach (using claim count development factors) to estimate the final number of claims that will arise from events that have occurred by accident half-year through June 30, 2023, separately for each of the coverages.

3.4. Selection of Claim Count and Claim Amount Development Factors

Our selected cumulative factors and basis for selection (e.g., weighted average of the last six development factors) are presented in Appendix A. The summary of our selected factors, estimated

[6] By "final" or "ultimate" cost we mean the amount paid by insurance companies at the time that all claims related to events that occur in a particular period have been reported and settled.

[7] Accident half-year refers to either the period January 1 through June 30, or July 1 through December 31 of the indicated year. We use the terms "accident half-year" and "semester" (i.e., first semester or second semester; or the June semester or December semester) interchangeably in this report. We also refer to accident half-years or semesters as XXXX-1 or XXXX-2, or XXXX.1 or XXXX.2 where "XXXX" refers to the indicated year.

[8] The data reported by the individual companies to GISA is subsequently validated by GISA then aggregated for the industry-wide AIX report.

[9] We use the terms "loss," "claim amount," and "claim cost" interchangeably in this report. In this report, all these terms include a provision for allocated loss adjustment expenses (ALAE).

ultimate losses and claim counts, as well as a comparison to the selections made in our prior review are presented in Appendices C and D.

In Section 3.5 we present a comparison of our current and prior estimates of the ultimate loss cost, frequency, and severity for each of the last five years for each coverage.

Due to the COVID-19 pandemic, there is additional uncertainty associated with the estimates for the 2020, 2021, and 2022 accident year periods.

3.5. Selection of Ultimate Loss Costs, Frequencies, and Severities

The selection of development factors influences the selected loss trend rates.[10] As a result of the emerged claim experience and the development factors we select, our estimates of ultimate loss costs, frequencies,[11] and severities by accident year have changed from those we presented for the prior review. We present those changes in the following tables.

Table 3: Bodily Injury: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	**Loss Cost**	**Severity**	**Frequency**	**Loss Cost**	**Severity**	**Frequency**
2019	$228.58	$56,260	4.06	$227.55	$55,868	4.07
2020	$190.41	$68,351	2.79	$195.45	$69,966	2.79
2021	$194.82	$64,371	3.03	$204.43	$67,921	3.01
2022	$199.80	$74,760	2.67	$218.32	$73,872	2.96
2023				$188.84	$69,883	2.70

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 4.0%.

Table 4: Property Damage: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	**Loss Cost**	**Severity**	**Frequency**	**Loss Cost**	**Severity**	**Frequency**
2019	$9.54	$7,994	1.19	$9.56	$8,018	1.19
2020	$8.09	$7,506	1.08	$8.24	$7,639	1.08
2021	$5.63	$6,799	0.83	$5.79	$6,992	0.83
2022	$7.14	$6,197	1.15	$7.88	$7,043	1.12
2023				$7.68	$7,288	1.05

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 3.5%.

[10] A summary of our selected ultimate loss costs, severity amounts and frequency by accident half-year are presented in Appendix B.

[11] Number of claims per 1,000 insured vehicles.

Table 5: Direct Compensation Property Damage: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	Loss Cost	Severity	Frequency	Loss Cost	Severity	Frequency
2019	$137.61	$5,134	26.80	$137.55	$5,132	26.80
2020	$98.91	$5,269	18.77	$98.86	$5,266	18.77
2021	$118.66	$5,655	20.98	$118.32	$5,642	20.97
2022	$135.49	$6,421	21.10	$142.73	$6,646	21.48
2023				$143.25	$6,623	21.63

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 1.4%.

Table 6: Accident Benefits – Total: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	Loss Cost	Severity	Frequency	Loss Cost	Severity	Frequency
2019	$70.78	$8,603	8.23	$68.92	$8,373	8.23
2020	$49.14	$8,612	5.71	$50.79	$8,898	5.71
2021	$58.66	$8,911	6.58	$56.18	$8,505	6.61
2022	$58.84	$9,020	6.52	$61.68	$9,435	6.54
2023				$58.34	$8,835	6.60

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 0.1%.

Table 7: Uninsured Auto: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	Loss Cost	Severity	Frequency	Loss Cost	Severity	Frequency
2019	$10.00	$37,736	0.26	$11.03	$39,532	0.28
2020	$9.08	$37,599	0.24	$9.01	$37,057	0.24
2021	$11.10	$45,824	0.24	$13.06	$49,270	0.27
2022	$6.77	$32,776	0.21	$7.76	$33,572	0.23
2023				$9.54	$38,015	0.25

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 10.6%. In general, coverages with lower claims volume are subject to more volatility.

Table 8: Collision: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	Loss Cost	Severity	Frequency	Loss Cost	Severity	Frequency
2019	$215.68	$6,837	31.55	$215.90	$6,844	31.54
2020	$163.67	$7,007	23.36	$163.74	$7,011	23.35
2021	$181.89	$7,400	24.58	$182.34	$7,409	24.61
2022	$225.16	$8,273	27.22	$231.29	$8,520	27.15
2023				$258.85	$9,002	28.76

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 0.9%.

Table 9: Comprehensive: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	Loss Cost	Severity	Frequency	Loss Cost	Severity	Frequency
2019	$135.98	$2,036	66.78	$135.96	$2,036	66.78
2020	$126.66	$2,182	58.06	$126.65	$2,181	58.06
2021	$133.77	$2,354	56.82	$134.01	$2,357	56.86
2022	$194.42	$2,830	68.70	$204.29	$2,984	68.46
2023				$164.93	$2,658	62.05

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have increased by 1.7%.

Table 10: Specified Perils: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	Loss Cost	Severity	Frequency	Loss Cost	Severity	Frequency
2019	$15.62	$4,962	3.15	$15.27	$4,867	3.14
2020	$18.04	$5,636	3.20	$17.87	$5,574	3.21
2021	$64.81	$9,001	7.20	$65.63	$8,564	7.66
2022	$99.77	$8,167	12.22	$92.41	$7,937	11.64
2023				$62.58	$6,616	9.46

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have decreased by 3.6%. In general, coverages with lower claims volume are subject to more volatility.

Table 11: All Perils: Change in Estimates

	As of December 31, 2022			As of June 30, 2023		
AY	**Loss Cost**	**Severity**	**Frequency**	**Loss Cost**	**Severity**	**Frequency**
2019	$350.81	$4,533	77.39	$350.65	$4,531	77.38
2020	$271.90	$4,330	62.80	$271.89	$4,329	62.80
2021	$293.72	$4,517	65.02	$295.31	$4,542	65.02
2022	$408.25	$5,393	75.70	$402.53	$5,394	74.63
2023				$408.12	$5,607	72.78

In aggregate, for the four-year period 2019 to 2022, our estimates of ultimate loss costs have decreased by 0.3%.

4. Loss Trend Methodology

4.1. Introduction

Loss trend factors are used in the determination of rate level indications. They are applied to the ultimate incurred losses during the experience period[12] to adjust those losses to the cost levels that are anticipated during the policy period covered under the proposed rate program.

The application of trend rates is, essentially, a two-step process. The data in the experience period under consideration is adjusted to reflect observed changes in cost conditions that have taken place (i.e., "past trend"), and then the data is further adjusted to reflect future changes in cost conditions that are expected to occur between the end of the experience period and the period the new premiums will be in effect (i.e., "future trend").

Therefore, past trend rates should reflect the cost level changes that occurred during the experience period. Future trend rates should consider those changes as well as the likelihood that those patterns may change.

4.2. Past Trend - Model Considerations

We take a data-based approach to estimate an appropriate past loss trend rate for each coverage; i.e., we consider the observed trend patterns based on our estimates of the Industry Nova Scotia ultimate claim frequency, claim severity and loss cost[13] by accident half-year that we derive (as we discuss in Section 3.4) and the results of regression analyses we perform. The regression models we consider include various parameters that could have an impact on losses over time, such as time (i.e., trend), seasonality, and scalar/level[14] change parameters to reflect changes in the cost level.

The identification of the underlying trend patterns over the historical period is challenging because factors such as statistical fluctuation in the data points, changes in the underlying exposure, the impact of the COVID-19 pandemic, changes in the economic environment, abnormal weather conditions, etc., can make the underlying trend patterns difficult to discern. For this reason, we take a holistic approach to modeling, and consider several models with varying parameters and accident periods to identify the underlying trends. We discuss additional considerations in developing a past loss trend rate in more detail below. In Section 5 of this report we present support for the past loss trend rate we select based on our review of the data and models presented for each coverage.

Time Period

In this review, we present and consider the claim experience by accident half-year, spanning the twenty-year period from 2003-2 to 2023-1. For each coverage, we consider models started and ending at various accident semesters and excluding certain data points to improve our understanding of the

[12] We refer to the accident year loss amounts considered in an insurer's rate indications as the "experience period" data. Although the number of years in the experience period varies by insurer depending upon size/credibility, it is most common for insurers to consider 5 years of experience in developing rate indications.

[13] Our severity and loss cost estimates include allocated loss adjustment expenses and a provision for the unallocated loss adjustment expenses (ULAE) based on ULAE factors provided by GISA.

[14] We use "scalar" and "level change" interchangeably throughout this report.

sensitivity of the calculated loss trend rates. We consider models over time periods that are longer than the experience period as a means of increasing the stability/reliability of the data being analyzed and to assess changes in trend patterns that may have occurred in the past.

While we provide twenty years of experience data, we generally select trend rates considering the claim experience over the more recent years.

Seasonality

Some coverages exhibit "seasonality" – where the number of claims or claim amounts incurred during the first half of a year are generally higher/lower than claim costs incurred during the second half of a year. In the coverage-by-coverage discussion that follows, we state whether seasonality is statistically significant based on the measured *p*-values and, if appropriate, include seasonality in the regression model used as the basis for our trend selection.

Weather / Unemployment

On occasion, an extreme weather condition, such as the level of rain, snowfall, or wind can contribute to a change in the frequency level. As a result, the time period associated with that extreme weather event could result in an exception to an underlying trend pattern. We considered the following weather events noted by GISA in our review:

- GISA notes the July 2014 hurricane (Arthur) impact on comprehensive, all perils and specified perils.
- GISA notes the possible increase in the number of and claim amounts of physical damage claims since 2015-1 due to severe weather.

We do not include a variable in the model to control for historical weather events due to the difficulty of forecasting future values for these parameters. For similar reasons, we also do not typically consider economic variables such as unemployment.

Reforms and Level Changes

The purpose of a reform parameter[15] is to isolate and, in a sense, remove the impact that reforms or other events had on the level of claim costs so that the underlying claim cost trend can be identified. The regression models we use to analyze severity, frequency, and loss cost trend patterns allow the inclusion of a level change parameter(s) to reflect the effect that reforms or other events have had on claim counts and amounts.

Distinct from an unusual data point that might be considered an outlier (where, for example, an upward spike is followed by a decline), or a change in trend rate pattern, the reform parameter identifies a sustained shift up (or down) in loss cost, severity, or frequency coincident with the implementation of a reform. We determine the statistical significance of a level change based on the *p*-values from *t*-tests for parameter significance.[16]

Some reforms result in a sustained level change with the trend rate before and after the reform unchanged. Other reforms could, in addition or instead, cause a change in the trend rate after the reform. As part of our regression model design, we consider the possibility that a reform could cause the

[15] We use the terms reform or level change interchangeable; but a reform parameter is associated with a known event.
[16] A *t*-test with a resulting *p*-value of less than 5% is considered significant.

trend rate to change in magnitude; or even change direction. We determine the statistical significance of a trend rate change based on the *p*-values from *t*-tests for parameter significance.

Statistical Results

We consider the statistical results of the regression models that we present.

- With respect to the adjusted R-squared, we generally refer to values of 80% and greater as "high," values between 40% and 80% as "moderate," and values less than 40% as "low."
- We consider *p*-values less than 5% to be statistically "significant."

The confidence interval presented corresponds to a 95% probability level range.

Other Considerations

In selecting past loss trend rates, we also consider:

- variance in results (i.e., changes in trends) based on different historical time periods;
- relationship of frequency and severity trend patterns; and
- uncertainty in the estimated values.

We discuss the issue of inflation in the context of the past and future trend rate below.

A discussion of our selected past and future trend rates for each coverage follows in Section 5.

Summary of Trend Rates

As presented in Appendix E, we review several different models for each coverage based on different time frames, inclusion or exclusion of reform (i.e., level change) parameters, inclusion or exclusion of a trend rate change parameter, and data exclusions.

The summary of our trend rates based on industry data as of June 30, 2023, as presented in Table 1, are based on our assessment and holistic view of the statistical tests, historical data (changes in patterns and spikes), and parsimony of many regression models.

In Section 5 we discuss the basis for the trend rates we present in Table 1. Due to the many models that we consider, we do not discuss all the models presented in Appendix E.

COVID-19

As described in our prior reports, we find the traffic volume and claims cost[17] during 2020 through 2022-1 were lower than pre-pandemic levels due to various "stay-at-home" orders and other directives that were put in place during the COVID-19 pandemic.

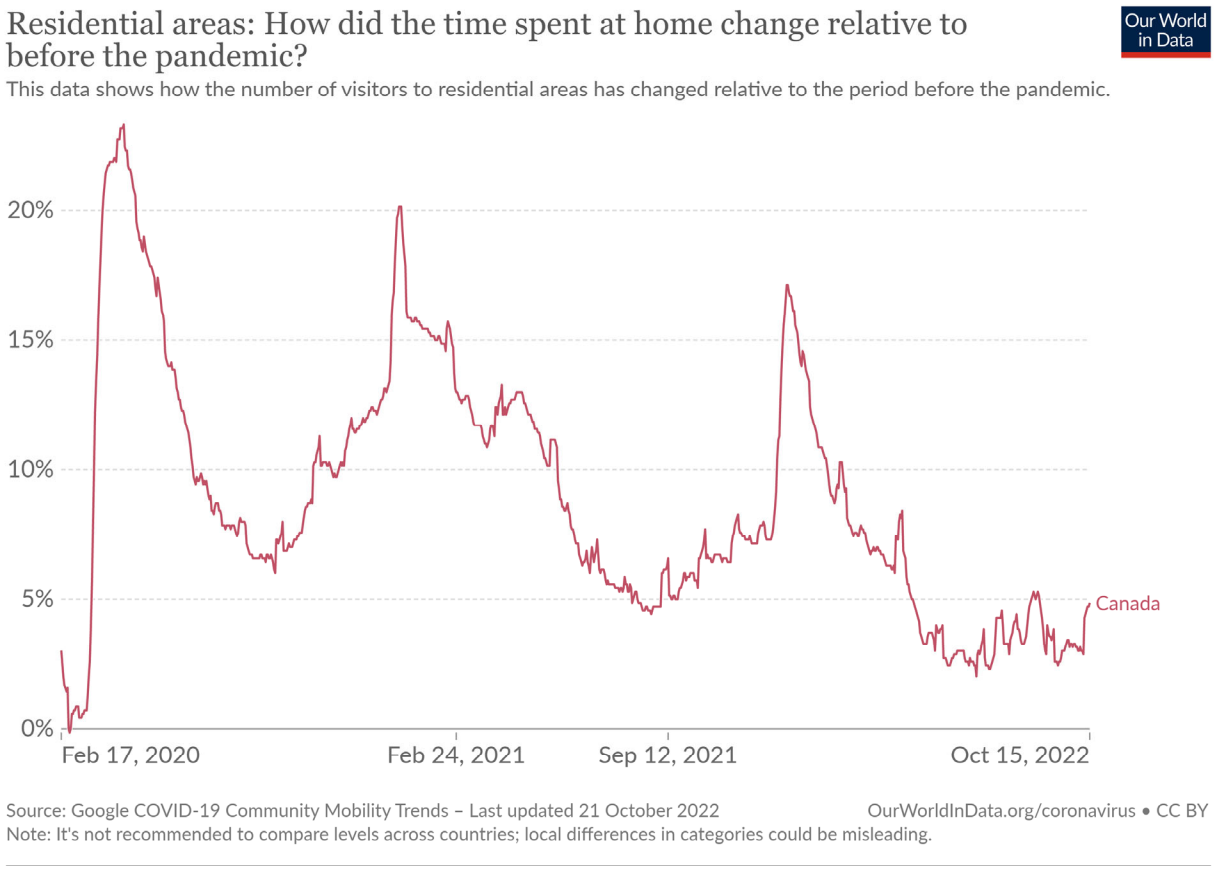
The trend rates that we present in this report are intended to measure the rate of change in loss cost experience **without influence** of the COVID-19 pandemic. Therefore, we include a mobility parameter for the observations in our regression models for the coverages[18] that experienced a significant reduction in claims frequency coincident with COVID-19 pandemic.

[17] We find frequency, but not severity has been affected by the COVID-19 pandemic.
[18] We observe a significant decrease in frequency for all coverages.

In May 2023, World Health Organization determined that COVID-19 no longer constitutes a public health emergency. We find the start of the "new-normal" (or post pandemic period) likely began prior to this announcement. In general, there has been a gradual increase in traffic levels since the early days of the pandemic as more individuals returned to the workplace. At this time, it appears that the current hybrid work environment and reduced commuting traffic is likely to continue. Although it is difficult to identify an exact point in time when the "new normal" post pandemic began, we consider the 2022-2 period to be the potential starting point. While we continue to observe a decline in 2022-2 and 2023-1 frequency compared to the pre-pandemic period, the degree of the decline has moderated compared to the pandemic period. Additionally, as shown in Figure 1, the total amount of time Canadians spent at home stabilized and returned to near pre-pandemic levels during the second half of 2022. As 2022-2 represents a potential new post-pandemic frequency level for the industry, insurers could consider whether the reduction between 2020-1 and 2022-1 is likely to persist into the future.

We further discuss how insurers could consider the impact of COVID-19 during the prospective period in Section 4.3.

Figure 1: Google Mobility Data

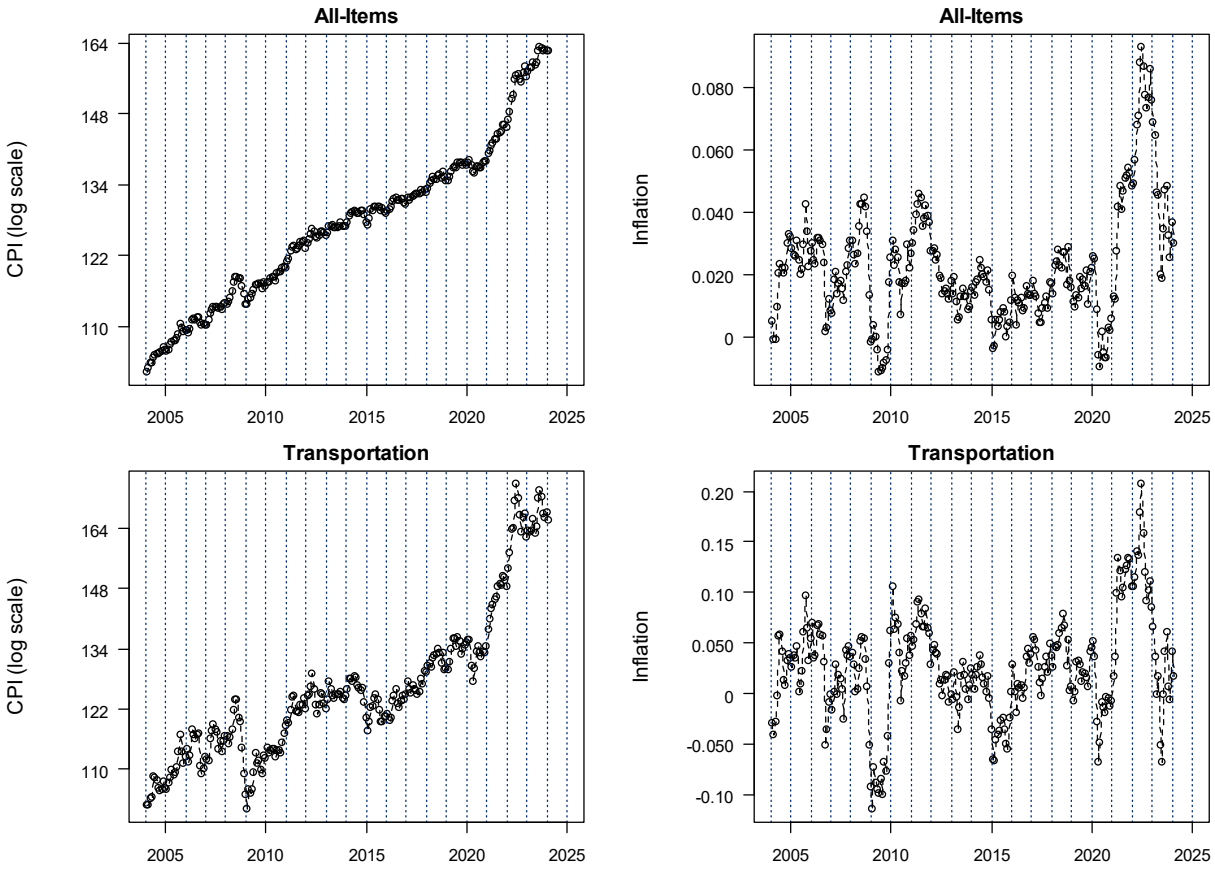


Inflation

Supply chain issues and pent-up consumer demand during the pandemic era resulted in an increase in inflation which has led to increased claim costs.[19] In the following figures we present the monthly consumer price index (left panel) and year-over year percentage change (right panel)[20] over the last 20 years in Nova Scotia, separately, for:

- All-Items
- Transportation
- Purchase of passenger vehicles
- Rental of passenger vehicles
- Passenger vehicle parts, maintenance, and repair
- Health care.

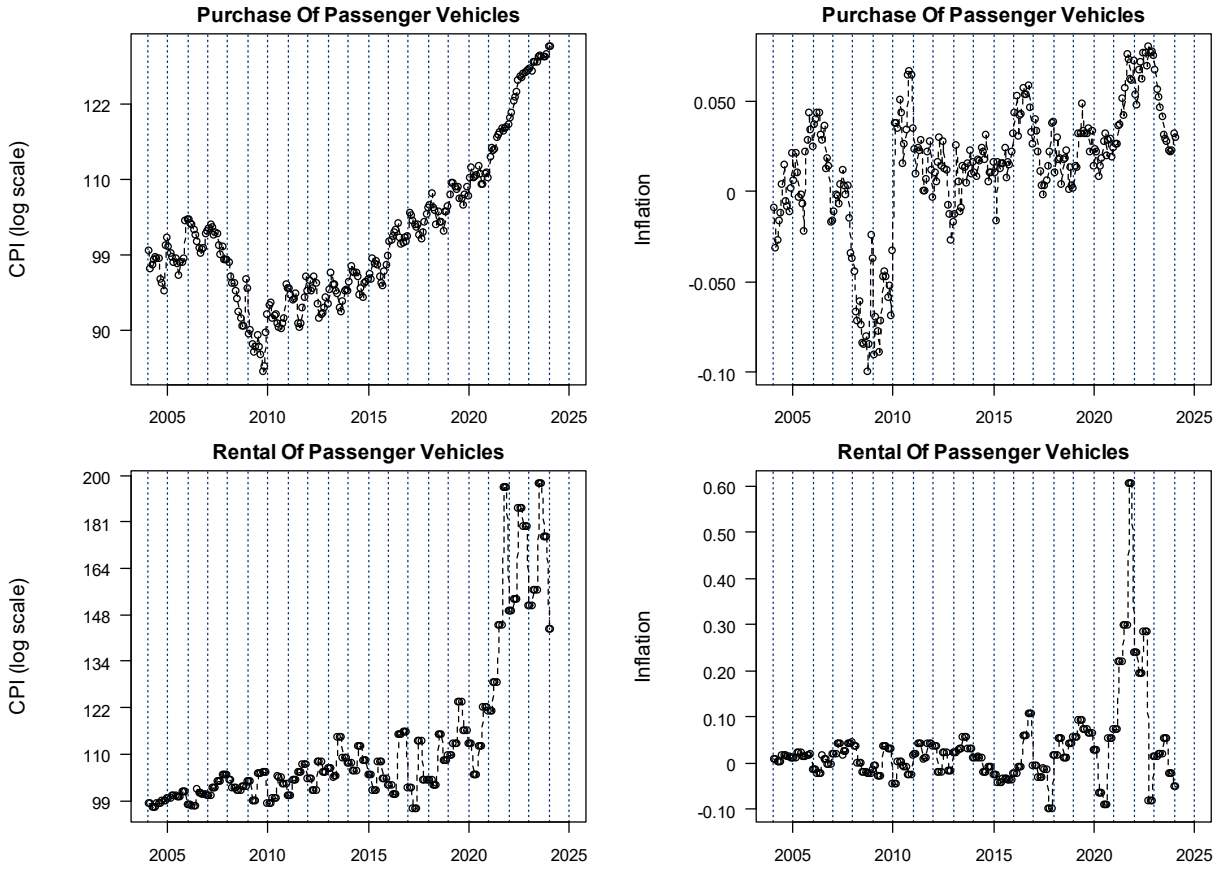
Figure 2: Consumer Price Index – All Items & Transportation



[19] This increase is evident in the severity levels for some coverages beginning 2021-2.

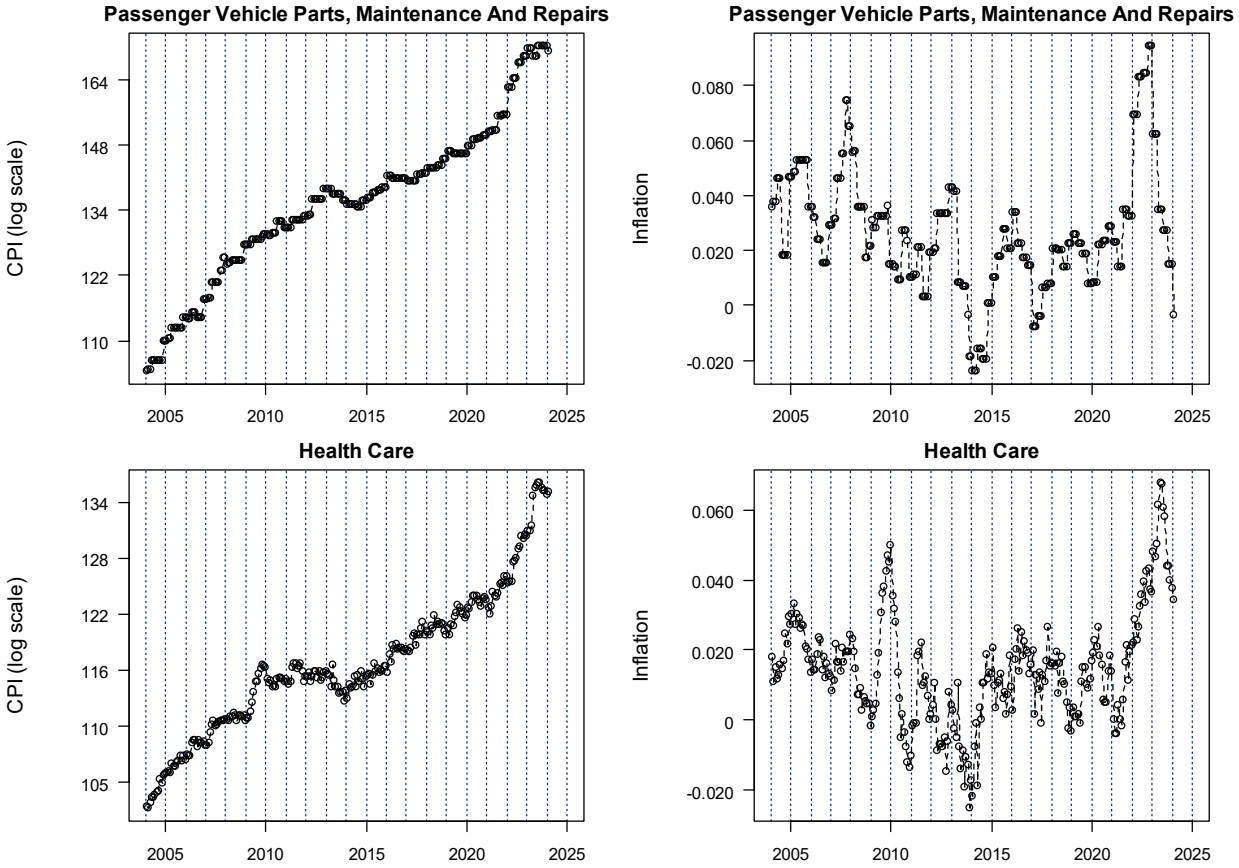
[20] As measured by the 12-month change in CPI.

Figure 3: Consumer Price Index – Purchase & Rental of Passenger Vehicles[21]



[21] Rental of passenger vehicles data is Canada-wide data, not Nova Scotia-only data.

Figure 4: Consumer Price Index – Passenger Vehicle Parts, Maintenance, and Repair & Healthcare



A review of the historical data points (as presented in the figures above) shows that subject to variability:

- Inflationary pressures on physical damage coverages (such as vehicle purchase, rentals and passenger vehicle parts, maintenance and repair costs) have resulted in the highest inflation levels in the last 20 years. The inflationary rise, which began in the second half of 2021, appears to be showing signs of moderation in early 2023.
- Inflationary pressures on Health Care costs appear to have lagged behind the physical damage coverages, with a more modest rise beginning later in 2022.

As shown in Figure 5, the 2021-2 through 2022-2 DCPD and collision severity has risen steeply, deviating from historical patterns. These higher claims severities are likely due, at least in part, to the recent inflationary environment for vehicle parts, maintenance and repair costs which increased claim costs for physical damage coverages[22] since more costly repairs will increase the total amount needed to settle claims. While vehicle parts and repair costs are a large proportion of the cost to settle claims, higher

[22] We define physical damage coverages as those that pertain to property physical damage. This includes property damage tort, DCPD, collision, comprehensive, all perils, and specified perils. We do not include specified perils in Figure 10 due to additional volatility associated with these coverages.

new or used vehicle costs, labour rates, and vehicle rental rates likely also influenced the cost to settle claims during this time.

Excluding comprehensive, we don't observe a significant change in the historical severity trend for other coverages coincident with the 2021-2 inflation increase. In the case of comprehensive, the change to a steep rise is only evident in 2022-2. A change in severity coincident with the inflation change is not obvious for bodily injury, accident benefits, or all perils coverages.

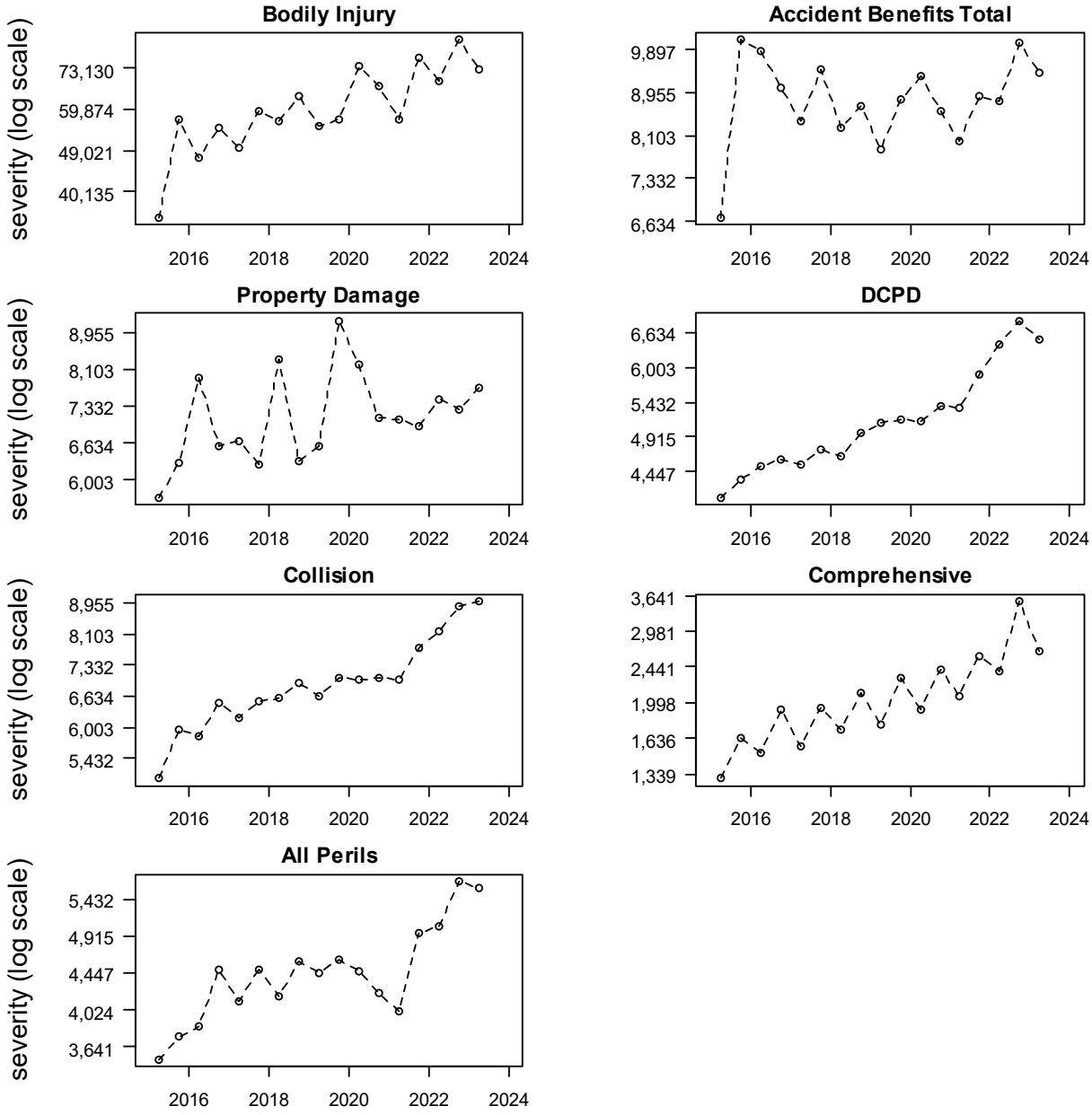
As described in Section 4.2, we take a holistic data-based approach to estimate the underlying past trend rate for each coverage. More specifically, we include an additional scalar parameter in the model to isolate and quantify the change in severity level to the extent that the change is apparent and statistically significant for a specific coverage. Although inflation is commonly considered a compounding calendar year effect, we find a scalar parameter to be the most effective tool for measuring the historical impact of inflation on claims costs in these circumstances for the following reasons:

- The loss cost trend rate is not equal to the CPI, but instead correlated with it. Other social and economic factors influence the difference between the measured loss cost trend rate and the CPI.
- We recognize an alternative approach would be to include an additional parameter in the model, rather than the proposed scalar. Although this may better align with the compounding effect of inflation, we find assuming the high inflationary environment (and implied higher severity trend) will persist into the future period may not be reasonable.[23]
- The Government of Canada has been raising interest rates to curb the inflation surge and reduce inflation to pre-pandemic levels. The timing of the interest rate peak and subsequent decline will affect the timing of a return to lower inflation levels. Managing interest rate changes over time to curb inflation is a challenge for the government; and as a result, a challenge for the insurance industry.
- Assuming the higher interest rates cause the inflation surge to subside, then higher loss trend rates should also subside. As shown in Figure 2 through Figure 4 above, there is early evidence that inflation is beginning to moderate in 2023 for the primary physical damage claims cost components.

We further discuss the expected inflationary impact on future loss trend in Section 4.3 below.

[23] Forecasting changes to the future inflation level for a parameter is also challenging.

Figure 5: Historical Severity by Coverage



4.3. Future Trend Considerations

The selection of an appropriate future loss trend rate is more difficult as it involves an additional layer of complexity. Future loss trend rates should consider both the cost level changes that occurred in the past (i.e., past trend) and the likelihood that those patterns may change. In the absence of a significant change in experience over the recent accident periods, we find it is most reasonable to assume the past loss trend will persist into the future resulting in equivalent past and future trend rates. If appropriate,

we adjust our selected past trend rates considering the changes that have occurred over the recent past if there is evidence of new patterns emerging.

The recent rise in inflation that began in late 2021 affects the past loss cost levels; and any stabilization, moderation or increase in future inflation will affect future loss cost levels. For the future trend period, which is the mid-point of the latest accident half-year included in the regression (April 1, 2023, in this review) to the average accident date of the proposed rate program, consideration should be given to the potential changes to the inflation rate over that same future projection period (e.g., moderation through 2023). We discuss the issue of inflation in the context of the past and future trend rates below.

Post COVID-19 "New Normal"

Insurers should consider the degree to which the post-pandemic "new-normal" is expected to impact claims cost during the proposed rate program. An adjustment applicable to all historical accident years will likely be necessary to reflect the reduction in claims frequency expected as a result of the general shift toward a hybrid workplace.[24] As noted above, we view 2022-2 as the (possible) beginning of the "new-normal" post pandemic period and 2022-2 and 2023-1 may serve as an early indicators to the expected reduction in frequency during the proposed rating program. When estimating this adjustment, insurers should consider the most recent experience available at the time of filing. For example, monthly claims frequency data may give important insight into consumer driving habits.

To aid the Board in reviewing an insurer's assumptions regarding the "new normal" frequency level, we quantify the reduction in the trended industry claims frequency between 2019-2 and 2022-2 for all coverages in Section 6 of this report. Under the presumption that the 2022-2 frequency level is a reasonable starting point for the new normal, these estimates may represent an appropriate preliminary expectation for the prospective period.

Inflation

Insurers project the experience period data included in their rate applications to the average cost level expected during the prospective rate program period. As described in Section 4.2, the high inflationary environment beginning in late 2021 has resulted in a large increase in accident year claim costs. The trend models we present implicitly consider the impact of inflation up to June 30, 2023, via an additional scalar parameter that is included the model if significant. In selecting the future trend rate, an insurer will consider if inflation is stabilizing, falling, or rising, and modify/adjust the past trend rates for the prospective period.

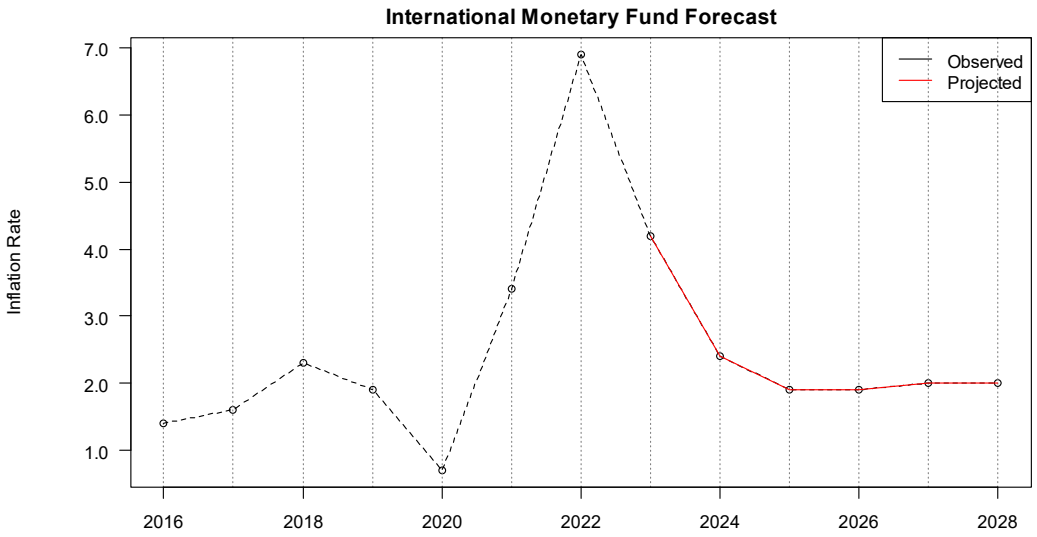
In Figure 6[25] we present the International Monetary Fund's (IMF) forecast of future inflation, as measured by all items CPI in Canada. As shown in Figure 6, the IMF expects inflation to decrease in 2023 but remain above the Government's target range, followed by a further decrease in 2024. The forecasted decline for 2023 is evident in the reported CPI data as of November 2023.

In addition to the impact of inflation on claims costs (and trend rates), inflation is impacting the interest rate environment. Additional investment income resulting from higher bond yields due to rising interest rates is an additional consideration for rate indication models.

[24] Historical experience period loss data should be first adjusted to remove the impact of COVID-19; and then adjusted to the "new-normal" post-pandemic level.

[25] https://www.imf.org/en/Countries/CAN

Figure 6: IMF Forecasted Inflation



5. Oliver Wyman Selected Trend Rates

5.1. Bodily Injury

For the prior review, we selected a past and future loss cost trend of +4.5%.

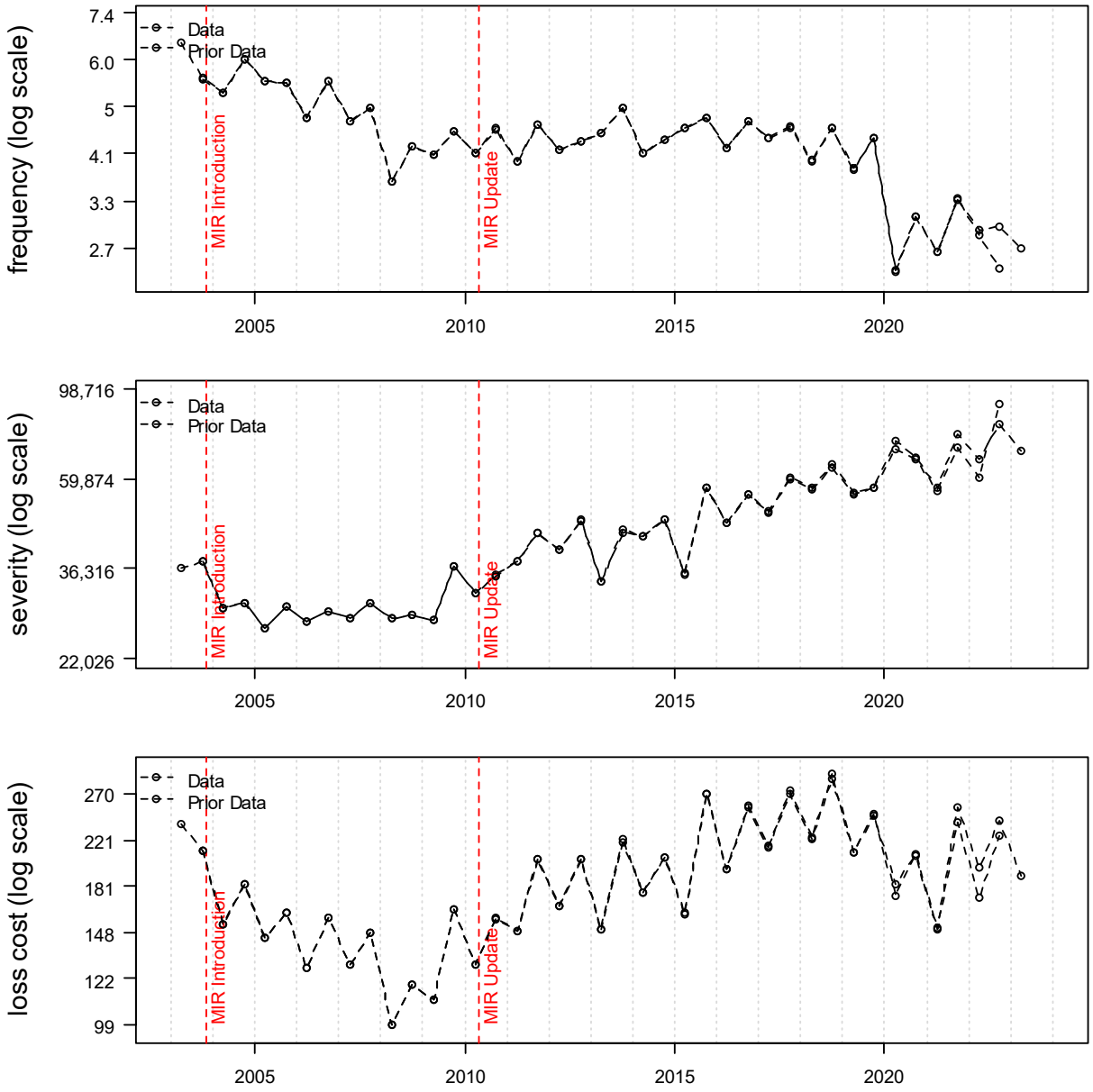
In Figure 7, we present our estimate of the loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. We include a comparison to the estimated values used in our prior report and observe our frequency and severity (and loss cost) estimates have increased slightly.

A review of the historical data points (as depicted in Figure 7) shows that subject to variability:

- Loss cost sharply declined following the 2003 reforms through to accident year 2008, with a particularly sharp decline from 2007 to 2008. The 2008 loss cost represents the low point over the last twenty years during which the constitutional challenge to the cap on minor injuries was underway. Loss cost has exhibited an increasing trend since 2008. We note a sharp decline in loss cost occurred in 2019 (prior to the pandemic), then loss costs appear to have stabilized at lower levels for 2020 through 2021-1, coincident with the COVID-19 pandemic. Beginning 2021-2, loss costs are rising from the lows during the pandemic.
- Severity sharply declined following the 2003 reforms, but remained relatively flat from 2005 through 2009-1, after which, severity began increasing. The increasing severity trend appears to be more modest following a spike in 2015-2.
- Frequency has exhibited a declining pattern beginning in 2003, including a downward spike at 2008-1. This changed to a flatter trend for the period since the April 2010 reforms with a slight negative trend emerging in the 2017 to 2019 period. We observe a large decrease in level at 2020-1 coincident with the COVID-19 pandemic. The decline in frequency level coincident with the pandemic has been sustained through 2023-1, and the frequency level remains well below pre-COVID levels. As we consider 2022-2 to be a potential starting point for the “new normal” post-pandemic frequency level we quantify the combined impact of the reform and COVID-19 on claims frequency in Section 6 of this report.

An increase in the minor injury cap (from an unindexed $2,500 to an indexed $7,500) took effect on April 28, 2010. Although, as discussed below, our selected loss trend is based on the post-reform period, when reviewing data including pre-reform observations, we include a parameter in our model to measure the impact of the April 2010 reforms. We also note that indexing of the $7,500 minor injury cap is likely contributing to the positive severity trends.

Figure 7: Bodily Injury – Observed Loss Cost Experience



For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods, with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E. [26]

We fit a frequency model to all accident half-years between 2010-2 and 2023-1, and include time (*p*=0.004), mobility (*p*=0.000), seasonality (p = 0.007), and a 2022-2 new-normal scalar (*p* = 0.002). The

[26] For this reason, we no longer present heatmaps which provided a sample of the models presented in Appendix E.

implied annual trend rates associated with our fitted frequency model is -1.8%. The adjusted R-squared of our proposed frequency model is 0.821.

We fit a severity model to all accident half-years between 2010-2 and 2023-1 that includes time (p = 0.000), seasonality (p = 0.002). The implied annual trend rates associated with our fitted severity model is +6.0%. The adjusted R-squared of our proposed severity model is 0.848.

In Figure 8, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +4.1%.[27] The implied adjusted R-squared of the combined frequency and severity model is 0.707.

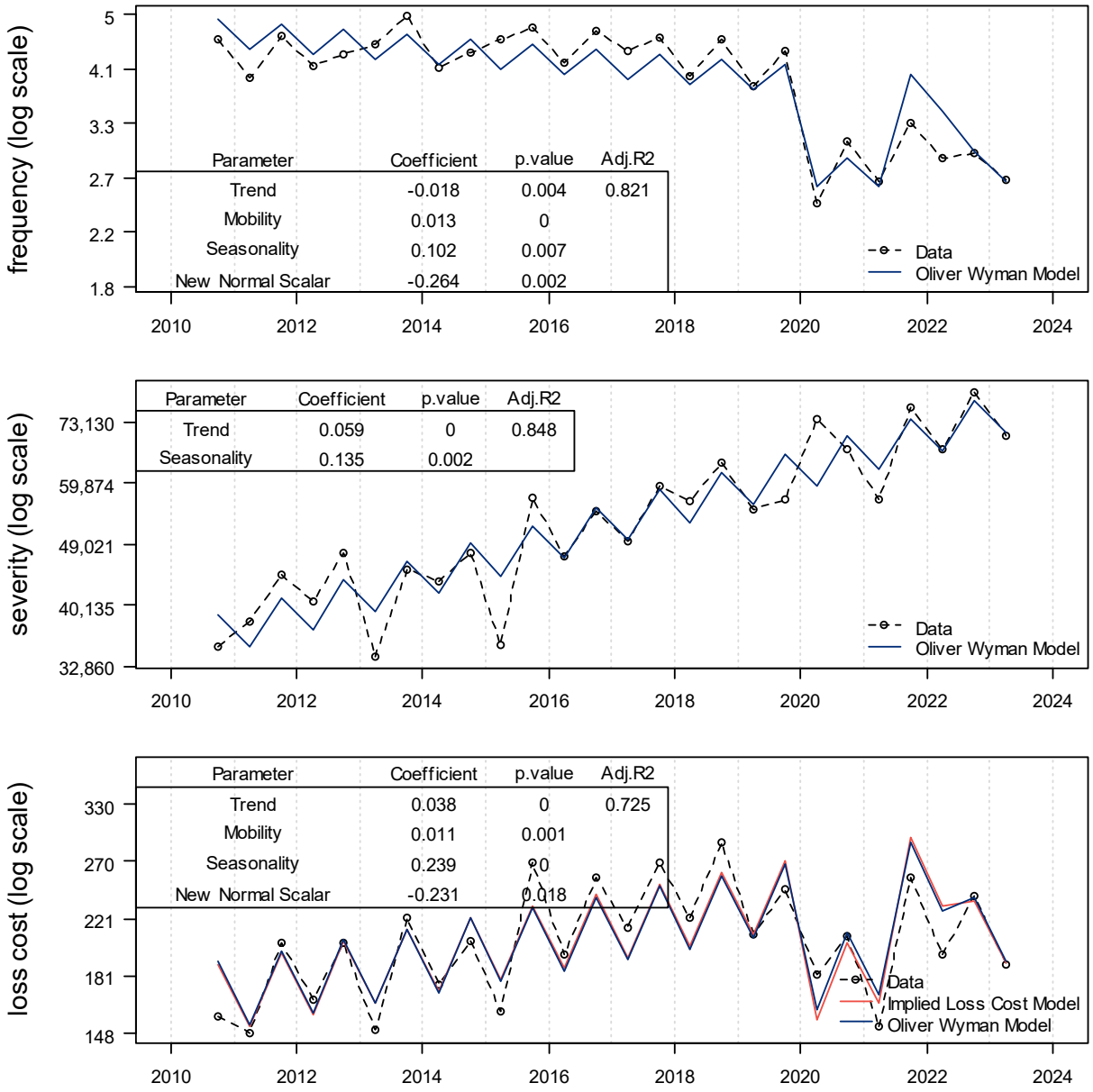
To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. The model fit to loss costs directly, rather than on a combination of frequency and severity, results in a slightly lower trend rate, and a slightly higher adjusted R-squared (0.725).

Due to the superior fit, we base our selection on the direct loss cost model. We select a loss cost trend rate of +3.8%.

Additionally, given the dynamic nature of the recent inflationary environment, we recognize insurers may find an inflationary adjustment is required at the time of filing. Please refer to Section 4.3 for more details concerning the selection of an appropriate future loss cost trend rate.

[27] exp[-0.018 + 0.059] - 1

Figure 8: Bodily Injury – Fitted Frequency, Severity and Loss Cost

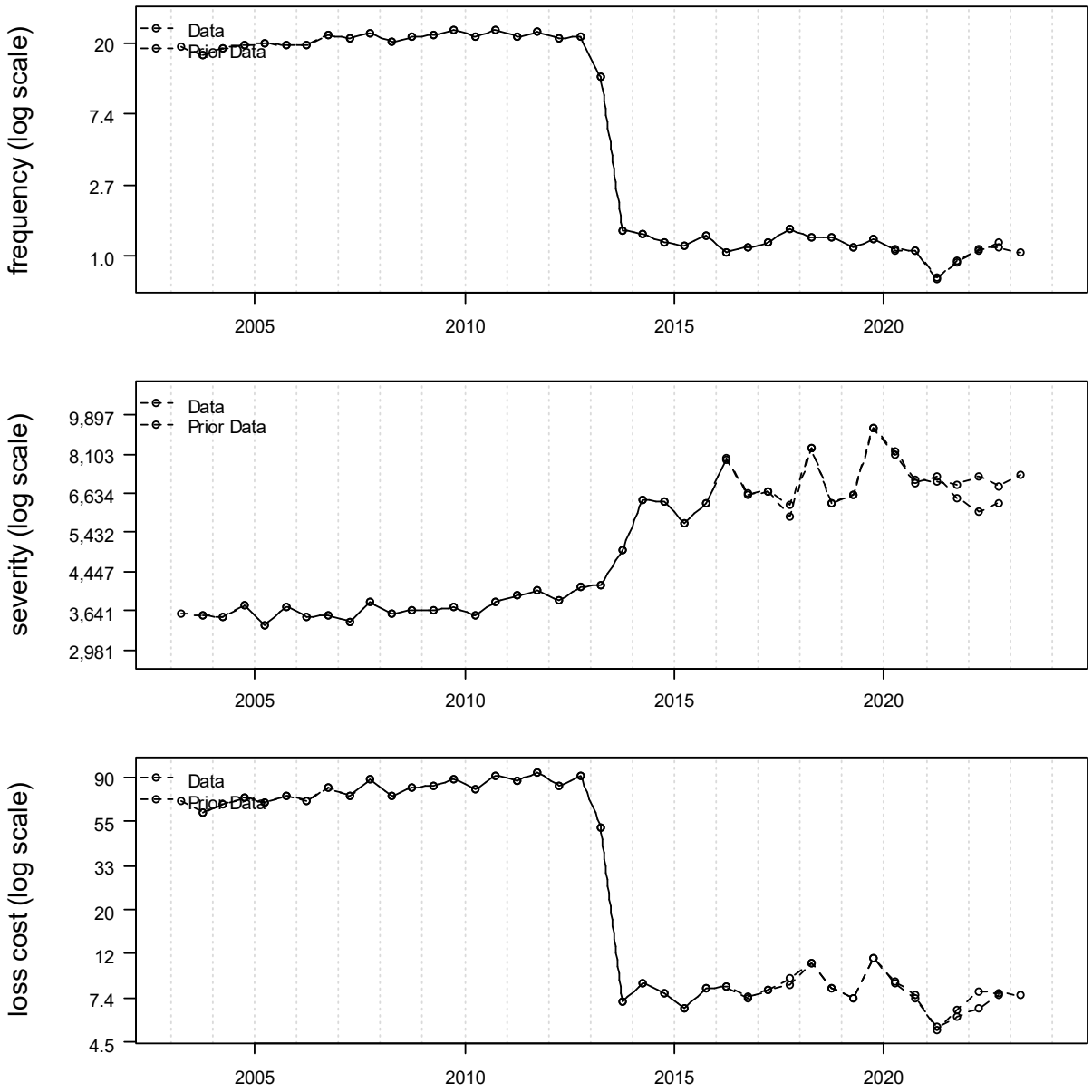


5.2. Property Damage

For the prior review, we selected a past and future loss cost trend rate of +3.0%.

In Figure 9, we present our estimate of the loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. DCPD was introduced in 2013 which results in the significantly lower PD frequency. We include a comparison to the estimated values used in our prior report and observe our recent severity and loss cost estimates have increased slightly.

Figure 9: Property Damage – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 9) shows that subject to variability:

- Loss cost decreased significantly with the introduction of DCPD, followed by a positive but volatile trend. (In Figure 9, data prior to April 2013 includes both DCPD and property damage. The post-April 2013 includes property damage only.) We observe loss costs decreased slightly in 2020, 2021, and 2022 coincident with the COVID-19 pandemic.
- Property damage severity increased with the introduction of DCPD. After the split between DCPD and property damage, the property damage severity has an upward trend and increased level of volatility, with some flattening in the recent periods.

- Since the split between DCPD and property damage, the property damage frequency has a relatively flat trend. We observe a decrease in level at 2020-1 coincident with the COVID-19 pandemic. The decline in frequency level coincident with the pandemic has been sustained through the end of 2022, with 2022-2 generally consistent with pre-COVID levels. As we consider 2022-2 to be a potential starting point for the "new normal" post-pandemic frequency level, we quantify the combined impact of the reform and COVID-19 on claims frequency in Section 6 of this report.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods, with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We tested models including a new-normal scalar parameter, but they were not significant. We will continue to monitor the significance of a new-normal scalar parameter as more post pandemic data becomes available.

We fit a frequency model to all accident half-years between 2013-2 and 2023-1, and include time (p=0.033) and mobility (p=0.050). The implied annual trend rates associated with our fitted frequency model is -2.3%. The adjusted R-squared of our proposed frequency model is 0.405.

We fit a severity model to all accident half-years between 2013-2 and 2023-1 that includes only time (p = 0.018). The implied annual trend rates associated with our fitted severity model is +2.5%. The adjusted R-squared of our proposed severity model is 0.233.

In Figure 10, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +0.1%.[28] The implied adjusted R-squared of the combined frequency and severity model is -0.248.

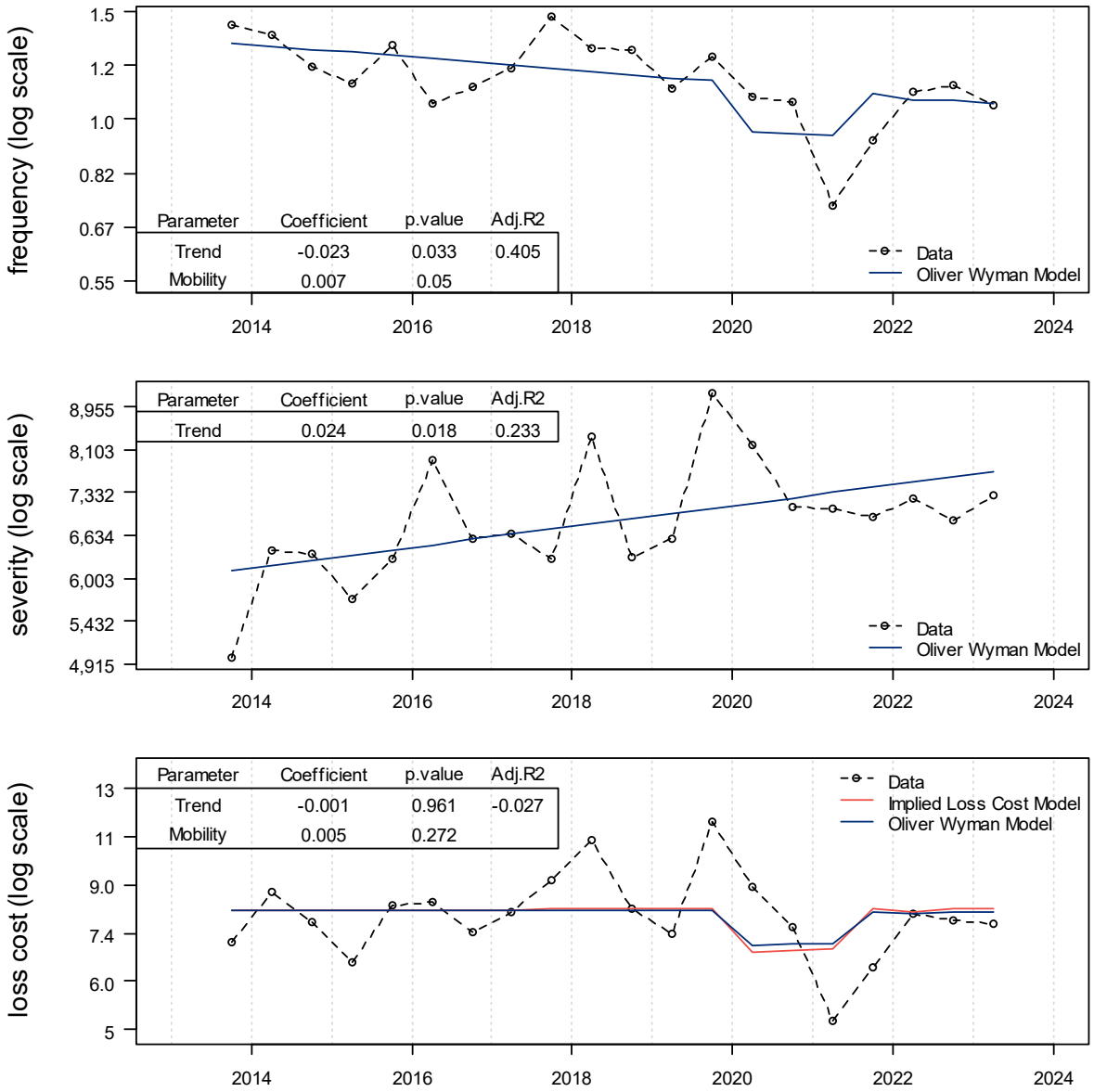
To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. The model fit to loss costs directly, rather than on a combination of frequency and severity, results in a similar trend rate, and a slightly higher adjusted R-squared (-0.027).

Due to the poor fit of both the combined frequency and severity model and the direct loss cost model, we find no discernable trend. We select a loss cost trend rate of 0.0%.

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[28] = exp[-0.023 + 0.024] - 1

Figure 10: Property Damage – Fitted Frequency, Severity and Loss Cost

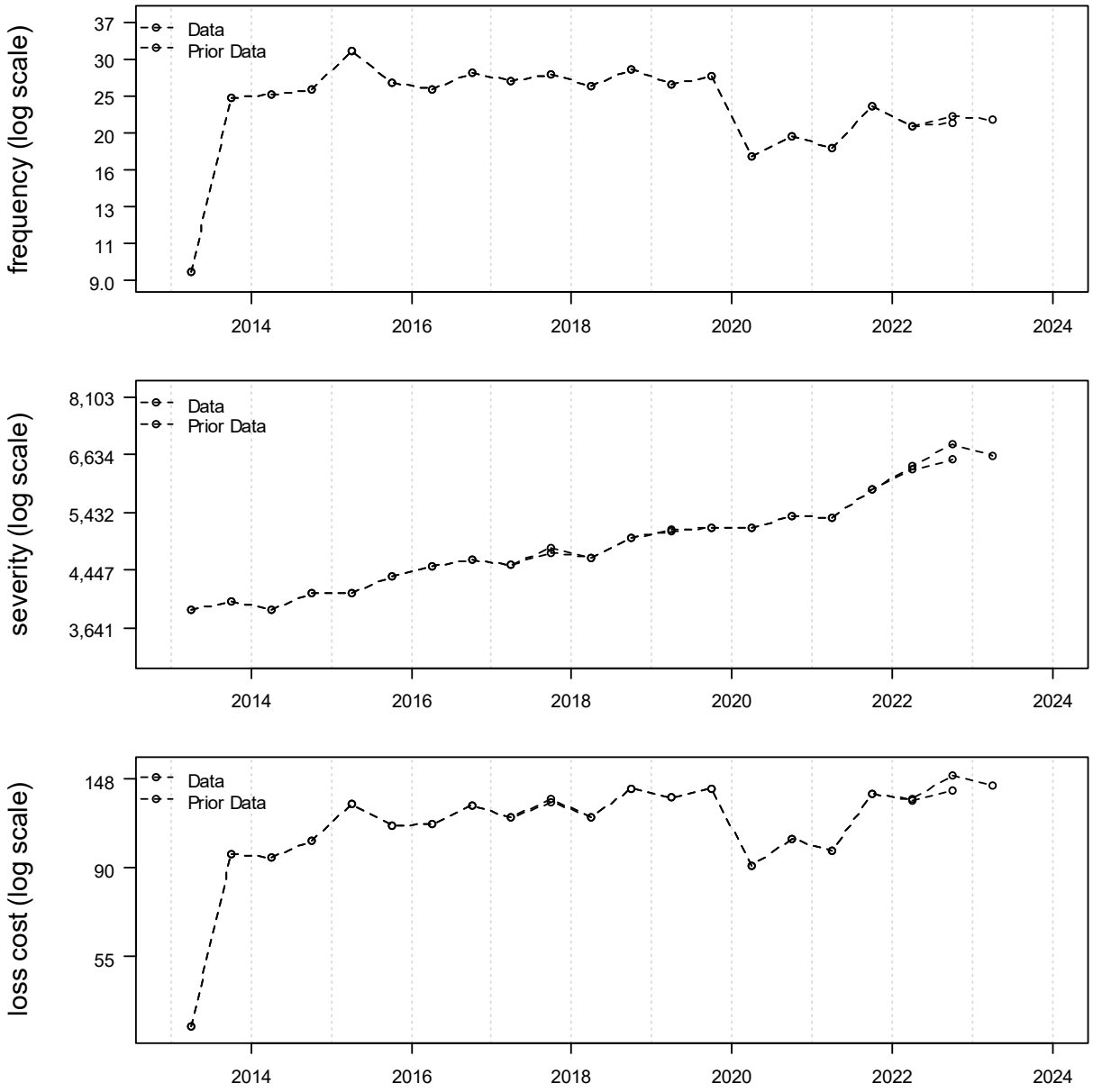


5.3. Direct Compensation Property Damage

For the prior review, we selected a past and future loss cost trend rate of +4.5%.

In Figure 11, we present our estimate of the loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2013-1 through 2023-1. We include a comparison to the estimated values used in our prior report and our frequency and severity (and loss cost) estimates have increased very slightly.

Figure 11: DCPD – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 11) shows that subject to variability:

- Loss cost, has exhibited an upward trend, including a spike in the first half of 2015 that may be weather related. The observed decline in frequency during 2020-2022 coincident with the COVID-19 pandemic contributes to the decline in loss cost in the first half of the pandemic, but the slight recovery (though not to pre-pandemic levels) in frequency in 2021-2 and 2022 coupled with the rise in severity results in a return of the loss cost to pre-pandemic levels in 2021-2.
- Severity has exhibited a consistent upward trend. We observe a steeper increase beginning in 2021-2.

- Following a spike in the first half of 2015 that may be weather related, frequency has exhibited a relatively flat trend. We observe a large decrease in level at 2020-1 coincident with the COVID-19 pandemic. The decline in frequency level coincident with the pandemic has been sustained through the end of 2023-1, with 2023-1 still lower than pre-COVID levels. As we consider 2022-2 to be a potential starting point for the "new normal" post-pandemic frequency level we quantify the combined impact of the reform and COVID-19 on claims frequency in Section 6 of this report.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We observe the following about these measured trends.

- We note that the introduction of DCPD in April 2013 may have caused a shift in claims from collision to DCPD.
- As DCPD was introduced in April 2013 we consider the time periods beginning 2013-2.

We tested models including a new-normal scalar parameter, but the scalars were not statistically significant. We will continue to monitor the significance of a new-normal scalar parameter as more post pandemic data becomes available.

We fit a frequency model to all accident half-years between 2013-2 and 2023-1 that includes time (p=0.011) and mobility (p=0.000). The implied annual trend rates associated from our fitted frequency model is -1.9%. The adjusted R-squared of our proposed frequency model is 0.694.

We fit a severity model to all accident half-years between 2013-2 and 2023-1 that includes time (p = 0.000) and a 2021-2 inflation scalar (p = 0.000). The implied annual trend rates associated with our fitted severity model is +4.5%. The adjusted R-squared of our proposed severity model is 0.974.

In Figure 12, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +2.5%.[29] The implied adjusted R-squared of the combined frequency and severity model is 0.594.

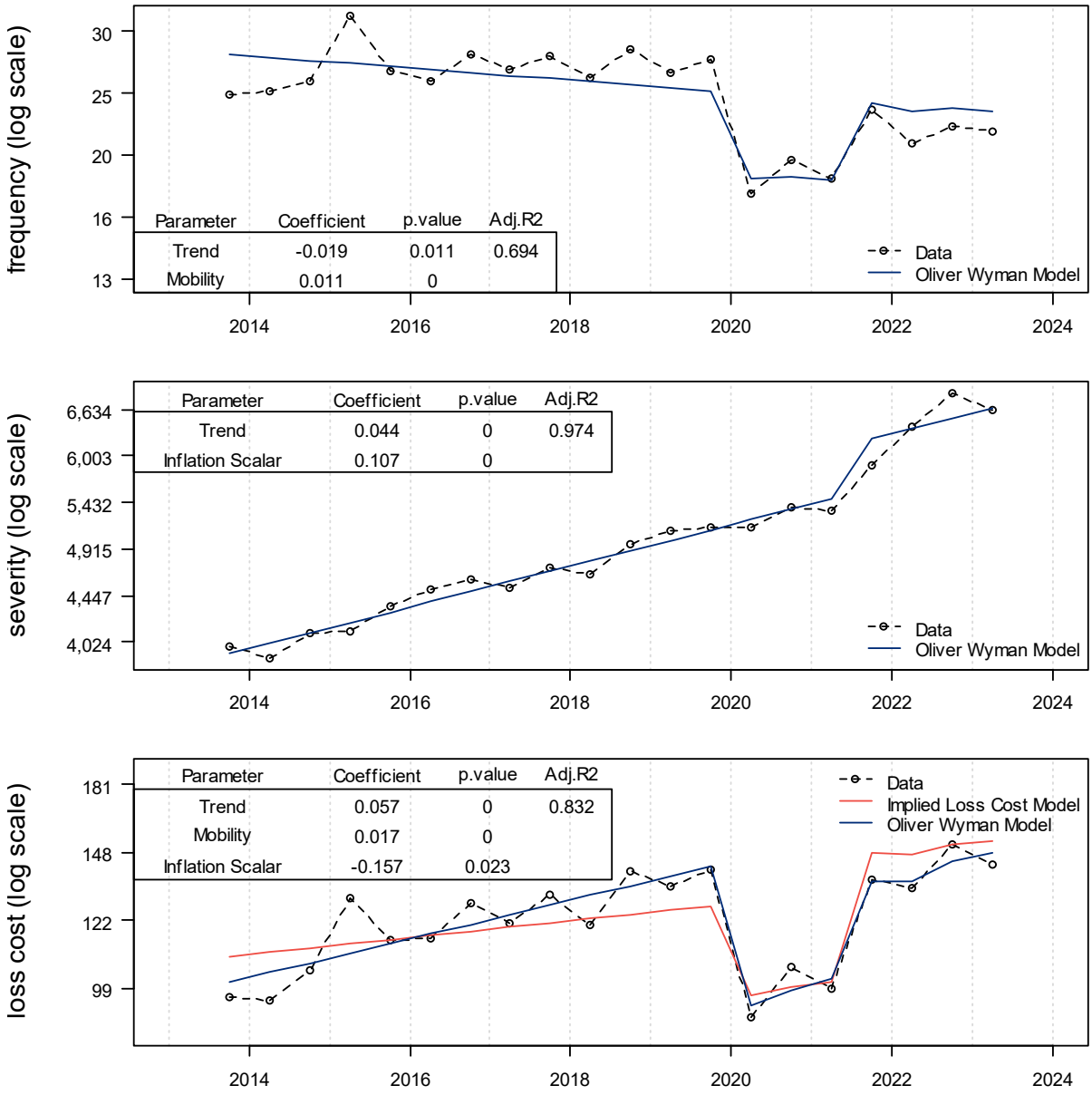
To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. We note the model fit to loss costs directly, rather than on a combination of frequency and severity, results in a higher trend rate and a higher adjusted R-squared (0.832), but a negative, counter-intuitive (-14.5%) factor with a significant *p*-value for inflation.

We base our selection on the combined frequency and severity model. We select a loss cost trend rate of +2.5% and a one-time severity increase of +11.3% at 2021-2 (coincident with the spike in inflation).

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[29] exp[-0.019 + 0.044] - 1

Figure 12: DCPD – Fitted Frequency, Severity and Loss Cost

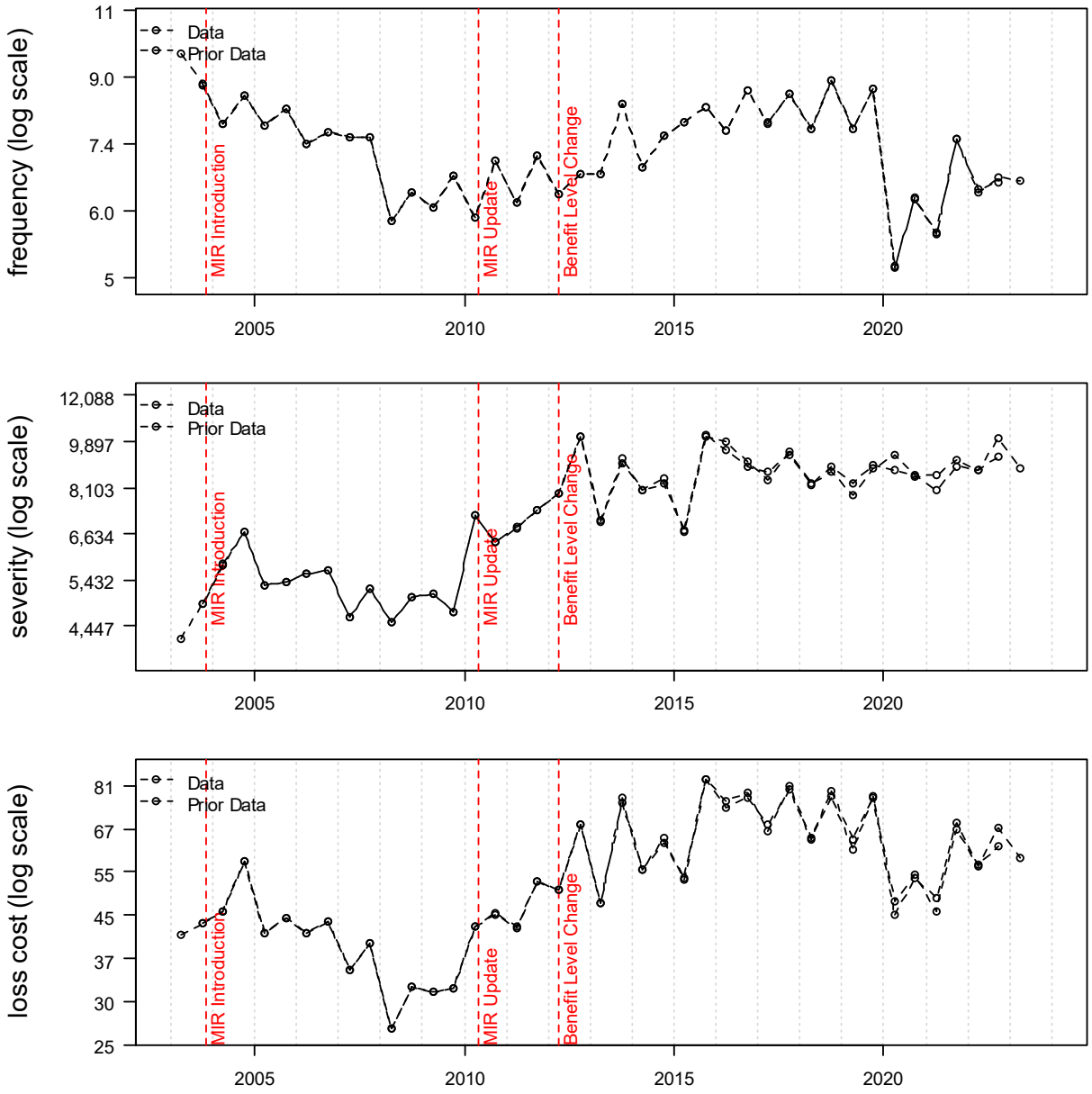


5.4. Accident Benefits Total

For the prior review, we selected a past and future loss cost trend rate of +0.0%.

In Figure 13, we present our estimate of loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. We include a comparison to the estimated values used in our prior report and observe the estimates have not changed significantly.

Figure 13: Accident Benefits Total – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 13) shows that subject to variability:

- Loss cost has generally been increasing since 2008, with several spikes, and appears to be leveling out with the most recent periods prior to the pandemic. We observe a large decrease during 2020, 2021, and 2022 coincident with the COVID-19 pandemic.
- Severity has generally exhibited an upward trend, but with a large amount of variability. As with loss cost, severity appears flatter in the more recent periods.

- Frequency has trended upward since 2009; but appears to be leveling out beginning 2015/2016. We observe a large decrease in level at 2020-1 coincident with the COVID-19 pandemic. The decline in frequency level coincident with the pandemic has been sustained through 2023-1, with 2023-1 remaining lower than pre-COVID levels. As we consider 2022-2 to be a potential starting point for the "new normal" post-pandemic frequency level we quantify the combined impact of the reform and COVID-19 on claims frequency in Section 6 of this report.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We fit a frequency model to all accident half-years between 2010-2 and 2023-1 that includes time (p = 0.009), mobility (p = 0.000), seasonality (p = 0.004) and a 2022-2 new-normal scalar (p = 0.003). The implied annual trend rates associated from our fitted frequency model is +1.6%. The adjusted R-squared of our proposed frequency model is 0.668.

We fit a severity model to all accident half-years between 2010-2 and 2023-1 that includes time (p = 0.373), seasonality (p = 0.016) and an April 2012 reform scalar (p = 0.008). The implied annual trend rates associated with our fitted severity model is +0.6%. The modelled scalar parameter at April 1, 2012 corresponds to a 23.1%[30] increase in severity. The adjusted R-squared of our proposed severity model is 0.475.

In Figure 14, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +2.1%.[31] The modelled scalar parameter at April 1, 2012 corresponds to a 22.2% increase in severity. The implied adjusted R-squared of the combined frequency and severity model is 0.685.

To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. We note the model fit to loss costs directly, rather than on a combination of frequency and severity, results in a lower trend rate, a higher April 2012 reform increase, and a slightly higher adjusted R-squared (0.724).

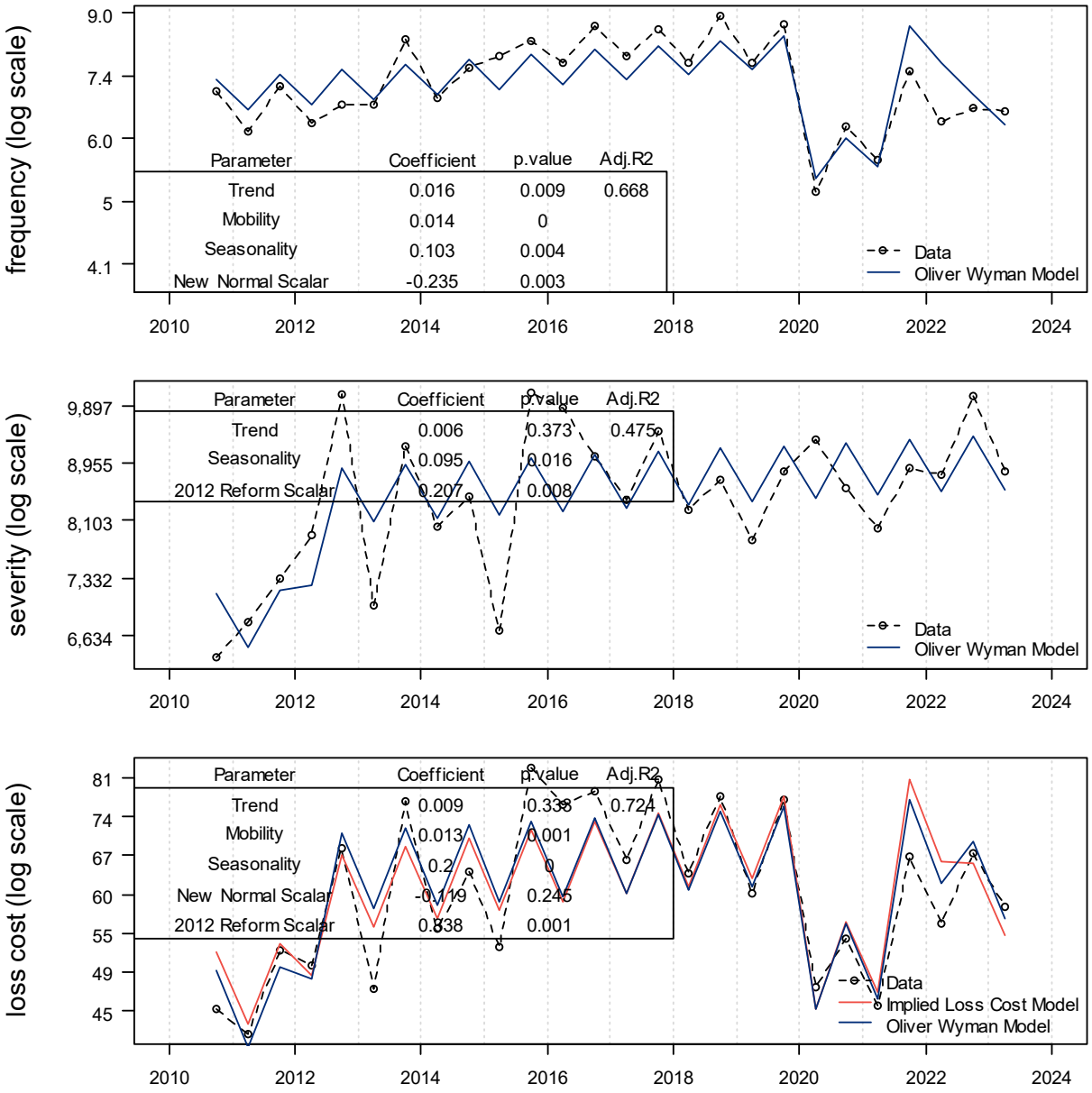
Due to the superior fit, we base our selection on the direct loss cost model. We select a loss cost trend rate of +0.9%.

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[30] =exp[0.207] - 1

[31] = exp[0.016 + 0.006] - 1

Figure 14: Accident Benefits Total – Fitted Frequency, Severity and Loss Cost

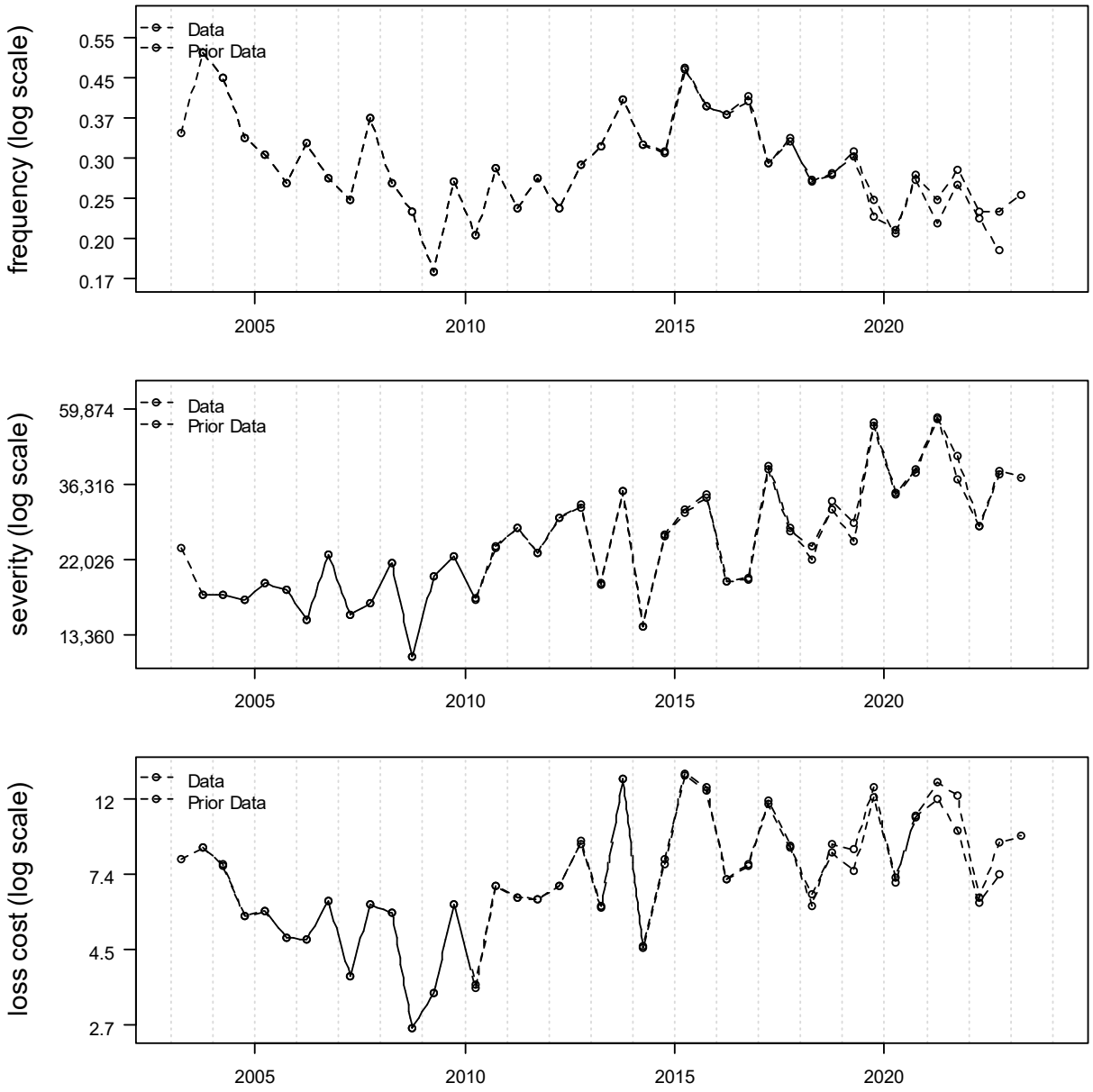


5.5. Uninsured Auto

For the prior review, we selected a past and future loss cost trend rate of 0.0%.

In Figure 15, we present our estimate of loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. We include a comparison to the estimated values used in our prior report and observe that our estimates have increased.

Figure 15: Uninsured Auto – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 15) shows that subject to variability:

- Loss cost generally exhibited an upward trend between 2009 and 2013, followed by a flat (or slightly downward) trend, with significant volatility that includes multiple large upward and downward spikes in the data driven by the severity volatility.
- Severity generally exhibited an upward trend beginning in 2005, but with considerable volatility.
- Frequency generally increased between 2009 and 2015 and appears to be declining in the most recent few years since 2015.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We fit a frequency model to all accident half-years between 2015-1 and 2023-1 that includes only time (p=0.000). The implied annual trend rates associated from our fitted frequency model is -7.2%. The adjusted R-squared of our proposed frequency model is 0.679.

We fit a severity model to all accident half-years between 2015-1 and 2023-1 that includes only time (p = 0.038). The implied annual trend rates associated with our fitted severity model is +6.4%. The adjusted R-squared of our proposed severity model is 0.206.

In Figure 16, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is -1.2%.[32] The implied adjusted R-squared of the combined frequency and severity model is -0.436.

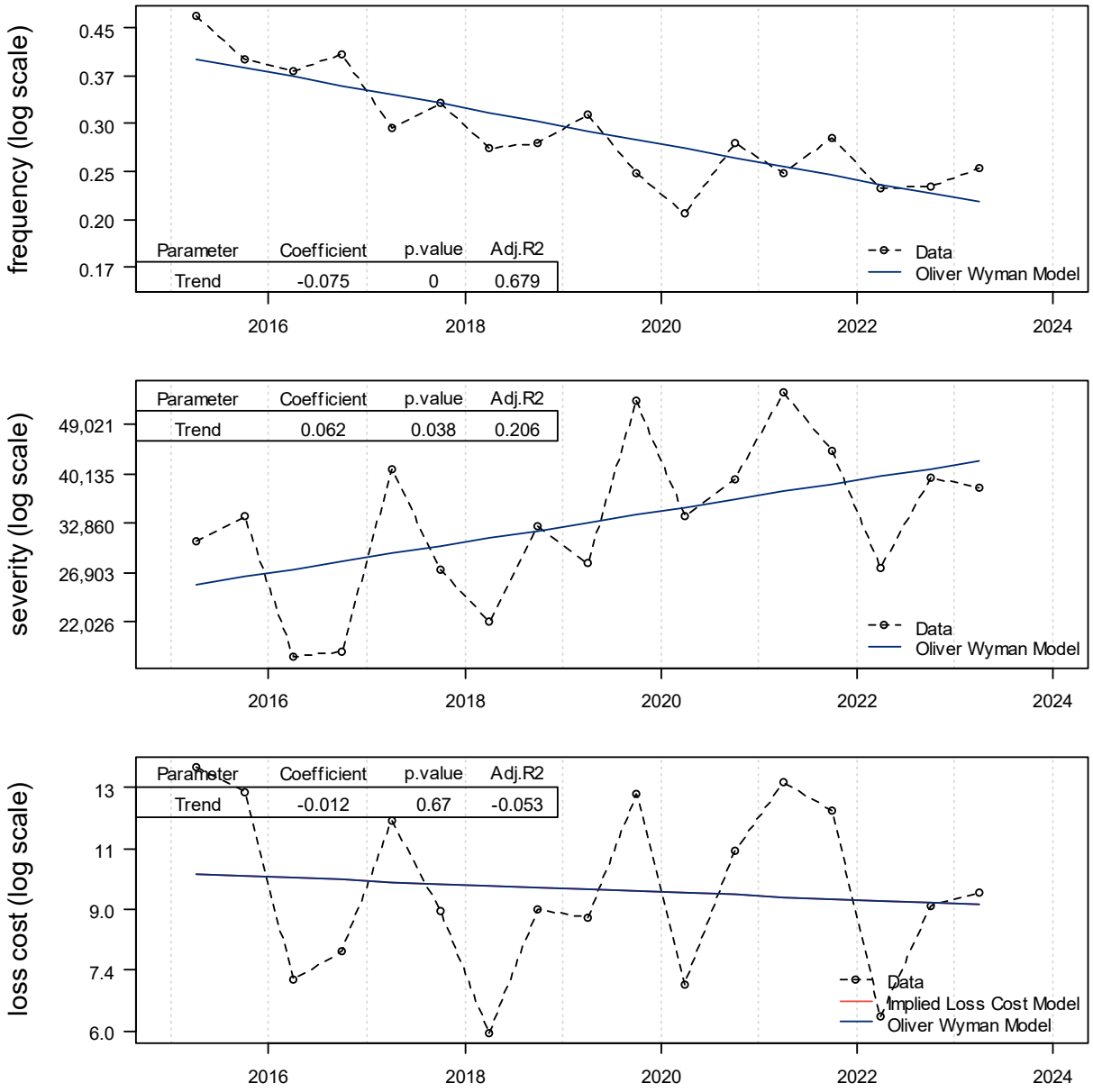
To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. We note the model fit to loss costs directly, rather than on a combination of frequency and severity, results in a similar trend rate and a slightly higher adjusted R-squared (-0.053).

Due to the limited claim count volume and variability of the claim experience along with the poor fit of our models, we select a loss cost trend rate of +0.0%.

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[32] = exp[-0.075 + 0.062] - 1

Figure 16: Uninsured Auto – Fitted Frequency, Severity and Loss Cost

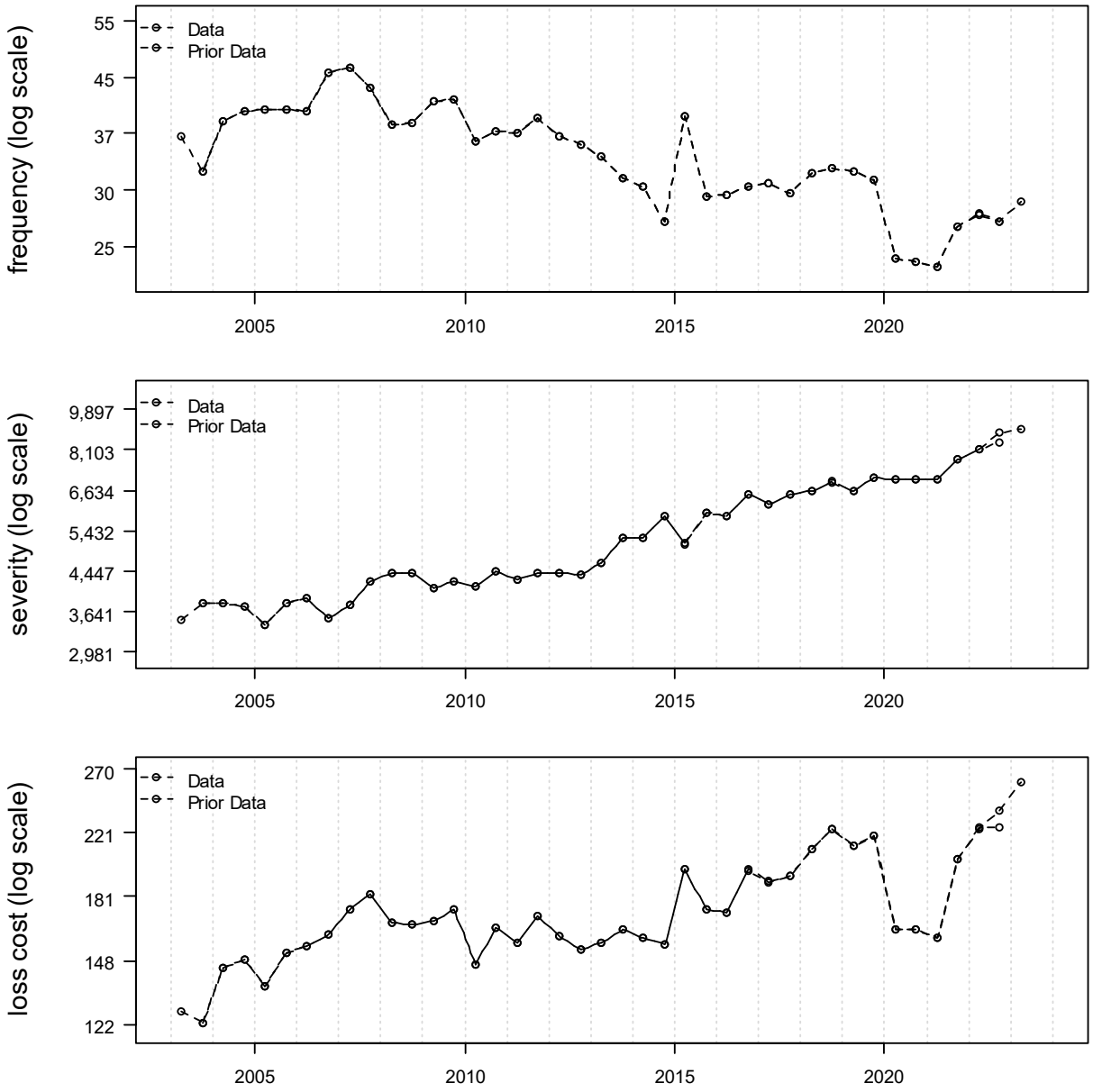


5.6. Collision

For the prior review, we selected a past and future loss cost trend of 5.5%.

In Figure 17, we present our estimate of the loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. We include a comparison to the estimated values used in our prior report and observe the estimates have not changed significantly.

Figure 17: Collision – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 17) shows that subject to variability:

- Loss cost exhibited a relatively flat trend between 2008 and 2014, but an upward trend over the more recent time periods, including a spike in 2015-1. We observe a large decrease during 2020 and 2021-1 coincident with the COVID-19 pandemic. Loss costs in 2022-2 and 2023-1 have appeared to return to the pre-pandemic level with a continued upward trajectory.
- Severity has generally exhibited an upward trend, rising more steeply beginning 2013. We observe a positive spike in 2021-2 and 2022-1 which may, in part, be due to the unusually high inflationary environment observed during the period.

- Frequency has generally declined since the 2007 period, save for a spike in the first half of 2015, which we assume is attributed to the noted weather conditions and a possible increasing pattern since. We observe a large decrease in level at 2020-1 coincident with the COVID-19 pandemic. The decline in frequency level coincident with the pandemic has been sustained through 2023-1, with 2023-1 lower than pre-COVID levels. As we consider 2022-2 to be a potential starting point for the "new normal" post-pandemic frequency level we quantify the combined impact of the reform and COVID-19 on claims frequency in Section 6 of this report.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We observe the following about these measured trends.

- As noted in Section 2, DCPD was introduced April 1, 2013, which appears to have affected the collision claim experience. Similar to DCPD, we begin our analysis after the introduction of DCPD.

We tested models including a new-normal scalar parameter, but the scalars were not statistically significant. We will continue to monitor the significance of a new-normal scalar parameter as more post pandemic data becomes available.

We fit a frequency model to all accident half-years between 2013-2 and 2023-1, excluding 2015-1, that includes time (p = 0.150) and mobility (p=0.000). The implied annual trend rates associated from our fitted frequency model is -0.8%. The adjusted R-squared of our proposed frequency model is 0.704.

We fit a severity model to all accident half-years between 2013-2 and 2023-1, excluding 2015-1, that includes time (p = 0.000) and a 2021-2 inflation scalar (p = 0.009). The implied annual trend rates associated with our fitted severity model is +4.2%. The adjusted R-squared of our proposed severity model is 0.940.

In Figure 18, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +3.4%.[33] The implied adjusted R-squared of the combined frequency and severity model is 0.679.

To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. We note the model fit to loss costs directly, rather than on a combination of frequency and severity, results in a higher trend rate, a higher adjusted R-squared (0.904), but a negative, counterintuitive (-13.0%) factor with a significant *p*-value for trend.

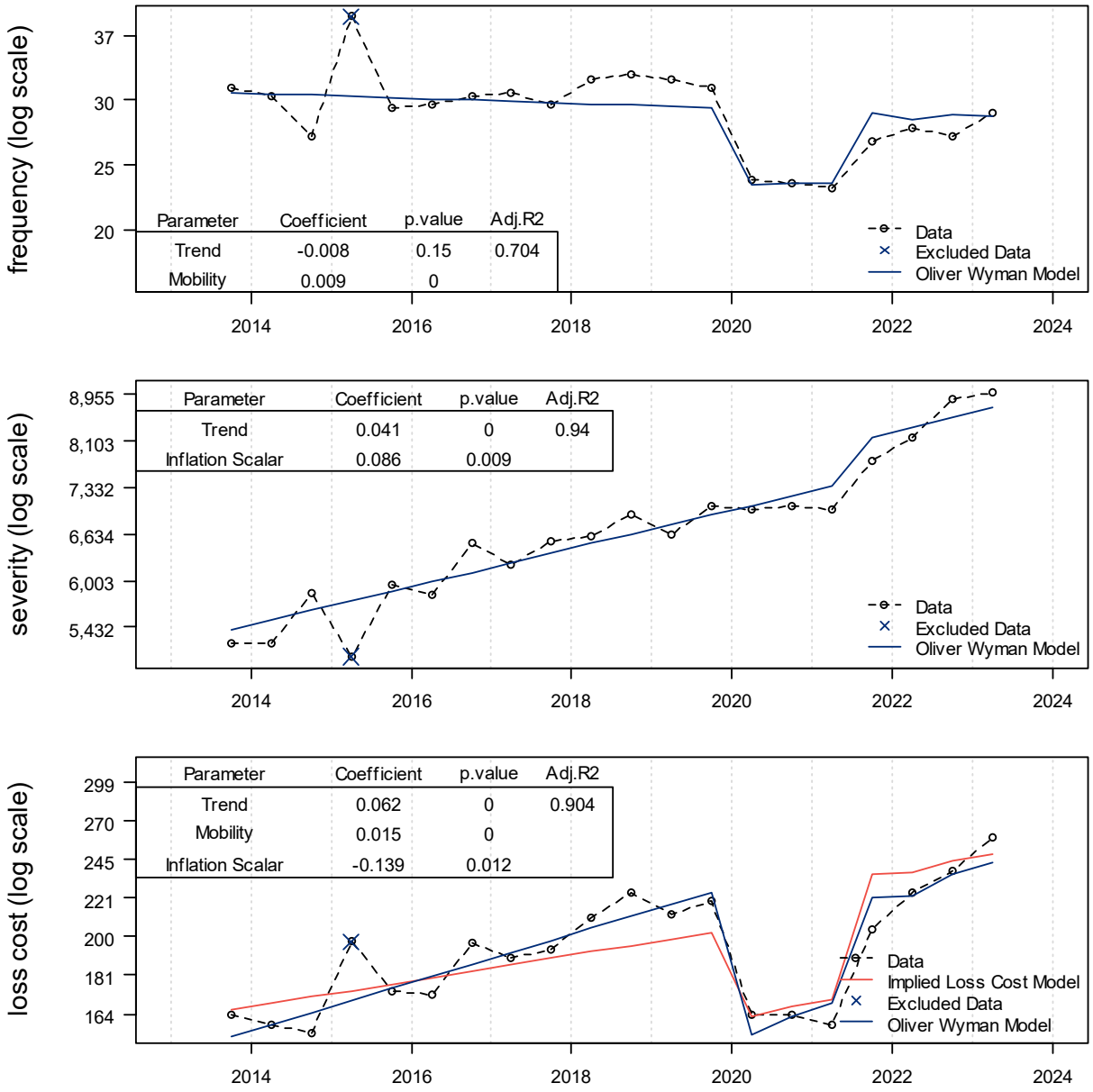
We base our selection on the combined frequency and severity model. We select a loss cost trend rate of +3.4% and a one-time severity increase of +8.9%[34] at 2021-2 (coincident with the spike in inflation).

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[33] = exp[-0.008 + 0.041] - 1

[34] = exp[0.086] - 1

Figure 18: Collision – Fitted Frequency, Severity and Loss Cost

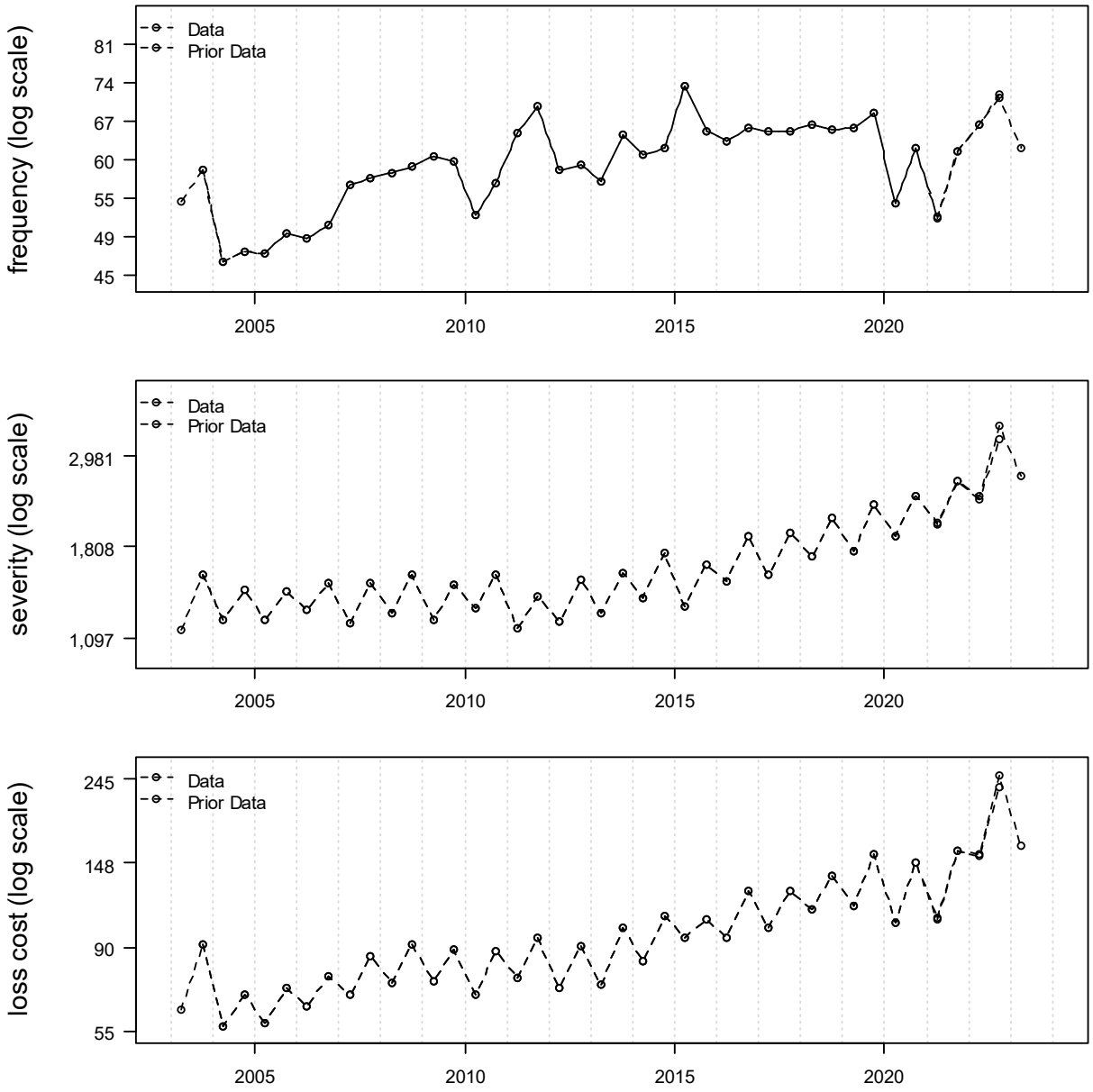


5.7. Comprehensive

For the prior review, we selected a past and future loss cost trend of +9.0%.

In Figure 19, we present our estimate of loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. We include a comparison to the estimated values used in our prior report and observe that the estimates have not changed significantly.

Figure 19: Comprehensive – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 19) shows that subject to variability:

- Loss cost has generally exhibited an increasing trend since 2004. Loss cost has been relatively flat over the most recent two years due to the impact of the pandemic on claims frequency, as we note below. We observe a spike at 2022-2 caused by the severity rise.
- Severity has exhibited a somewhat flat trend between 2003 and 2010, followed by an increasing trend and a steep rise in 2022-2.

- Frequency has been more volatile but has generally been increasing since 2005. We observe decreases in 2020 and 2021 coincident with the COVID-19 pandemic, with very steep decreases in the first half compared to the second half. Frequency appears to have returned to pre-pandemic levels in 2022.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We fit a frequency model to all accident half-years between 2010-1 and 2023-1, excluding 2015-1, that includes time (p=0.009) and mobility (p=0.001). The implied annual trend rates associated from our fitted frequency model is +1.0%. The adjusted R-squared of our proposed frequency model is 0.391.

We fit a severity model to all accident half-years between 2010-1 and 2023-1 that includes time (p = 0.000), seasonality (p=0.000) and a 2021-2 inflation scalar (p = 0.001). The implied annual trend rates associated with our fitted severity model is +5.3%. The adjusted R-squared of our proposed severity model is 0.941.

In Figure 20, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +6.4%.[35] The implied adjusted R-squared of the combined frequency and severity model is 0.925.

To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. We note the model fit to loss costs directly, rather than on a combination of frequency and severity, results in a slightly higher trend rate and a slightly higher adjusted R-squared (0.937).

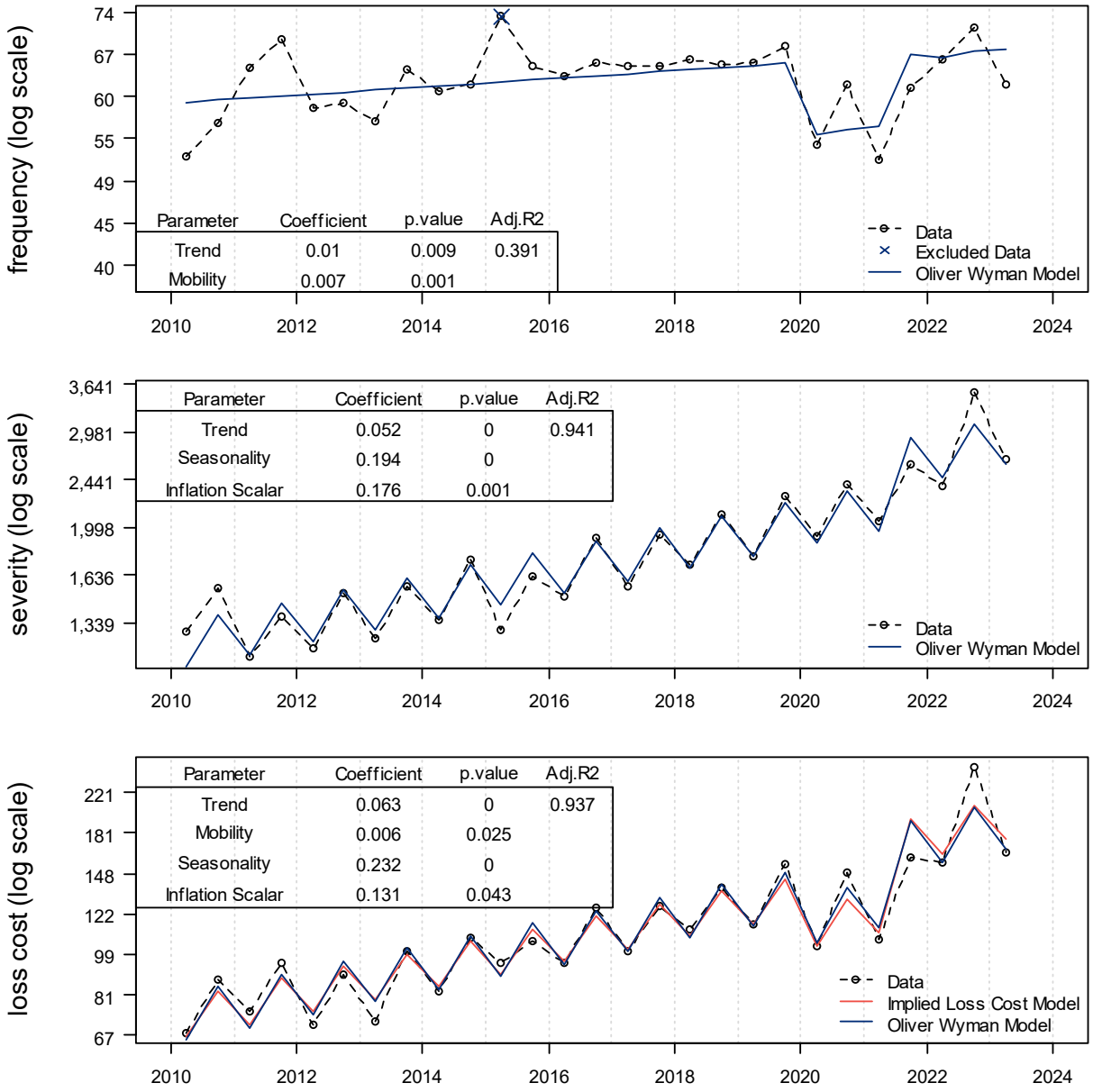
Due to the superior fit, we base our selection on the direct loss cost model. We select a loss cost trend rate of +6.5% and a one-time severity increase of +14.0%[36] at 2021-2 (coincident with the spike in inflation).

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[35] = exp[0.010 + 0.052] - 1

[36] = exp[0.131] - 1

Figure 20: Comprehensive – Fitted Frequency, Severity and Loss Cost



5.8. Specified Perils

For the prior review, we selected a past and future loss cost trend of +9.0%.

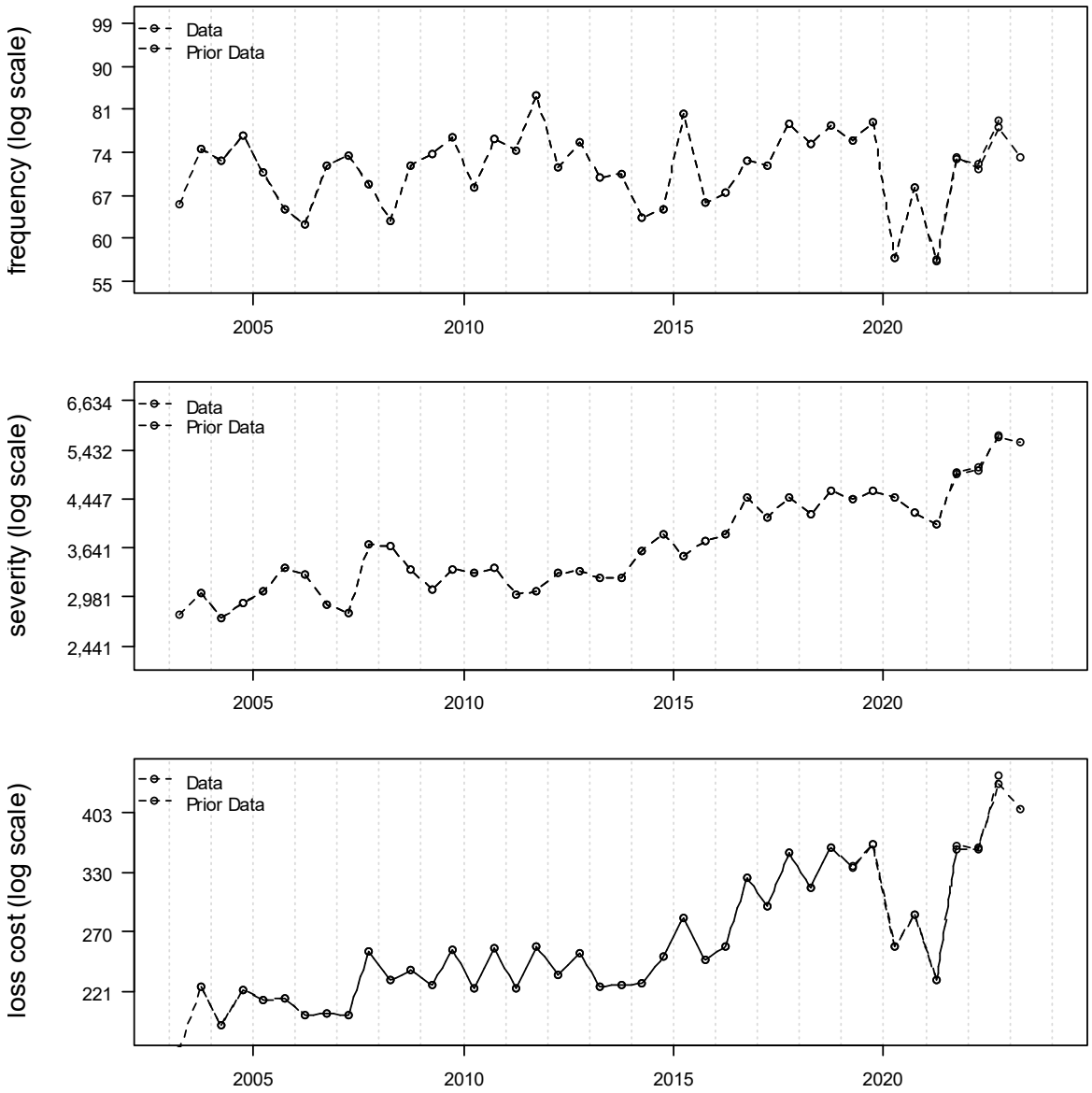
For reasons of data volume and the nature of the coverage, we select a loss cost trend rate of +6.5%, the same as comprehensive.

5.9. All Perils

For the prior review we selected a past and future loss cost trend rate of +5.0%.

In Figure 21, we present our estimate of the loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-1 through 2022-2. We include a comparison to the estimated values used in our prior report and observe that the estimates have not changed significantly.

Figure 21: All Perils – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 21) shows that subject to variability:

- Loss cost exhibited a flat pattern from 2007-2 until 2015 at which point it began to increase. More recently, loss costs are showing a flatter period prior to the pandemic, and then a large decrease during 2020 and 2021-1 coincident with the COVID-19 pandemic. The steep decline reversed in 2021-2 and 2022-1, followed by a large rise in 2022-2.

- Severity has generally exhibited an upward trend. We observe a short declining severity pattern beginning 2020-1, which reversed in 2021-2 with a steep rise in 2022-2.
- Frequency is subject to considerable volatility and has exhibited a flatter trend pattern over the most recent years, 2017-2 to 2019-2, with a spike at 2015-1. We observe a large decrease in level at 2020-1 coincident with the COVID-19 pandemic. The decline in frequency level coincident with the pandemic was sustained through to 2022-1, with 2022-2 essentially the same as pre-COVID levels.[37] As we consider 2022-2 to be a potential starting point for the "new normal" post-pandemic frequency level we quantify the combined impact of the reform and COVID-19 on claims frequency in Section 6 of this report.

For the models we considered, the estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter, and other scalars as appropriate, are presented in Appendix E.

We tested models including a new-normal scalar parameter, but they were not significant. We will continue to monitor the significance of a new-normal scalar parameter as more post pandemic data becomes available.

We fit a frequency model to all accident half-years between 2010-1 and 2023-1 that includes time (p=0.412) and mobility (p=0.001). The implied annual trend rates associated from our fitted frequency model is +0.3%. The adjusted R-squared of our proposed frequency model is 0.359.

We fit a severity model to all accident half-years between 2010-1 and 2023-1 that includes time (p = 0.000). The implied annual trend rates associated with our fitted severity model is +4.3%. The adjusted R-squared of our proposed severity model is 0.848.

In Figure 22, we present a comparison between the observed values presented above and the fitted frequency, severity, and loss cost values as implied by our selected models. The annual loss cost trend rate implied by the combined frequency and severity models is +4.7%.[38] The implied adjusted R-squared of the combined frequency and severity model is 0.721.

To assess reasonableness, we also include a model fit to the observed loss costs directly with the same parameterization as implied by our frequency and severity models. We note the model fit to loss costs directly, rather than on a combination of frequency and severity, results in a slightly higher trend rate and a slightly higher adjusted R-squared (0.795).

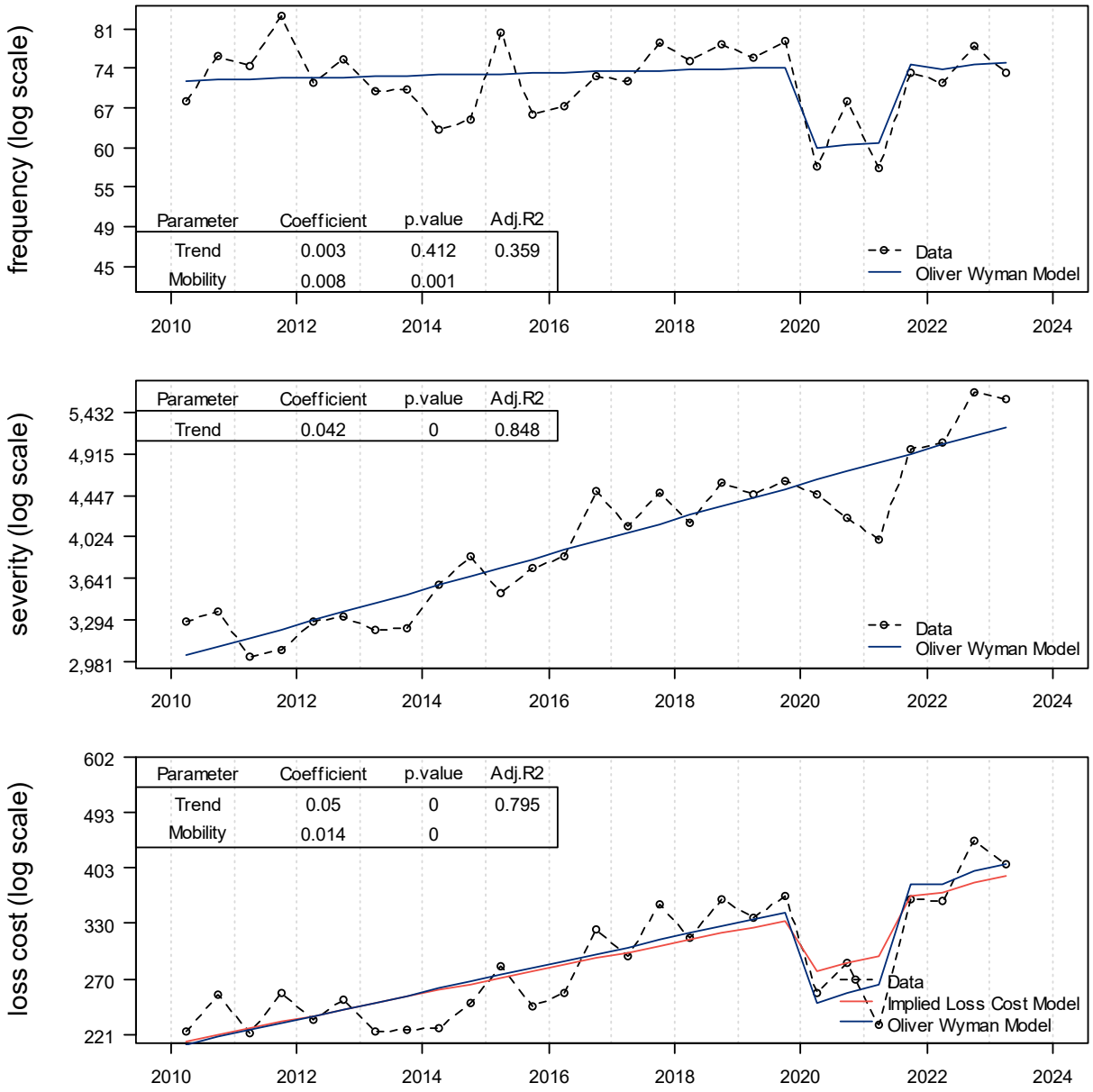
Due to the superior fit, we base our selection on the direct loss cost model. We select a loss cost trend rate of +5.1%.

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

[37] As discussed above, the 2022-2 frequency for collision is below pre-pandemic levels and the 2022-2 frequency for comprehensive is above pre-pandemic levels. As all perils is a combination of these two coverages, we assume the rise in theft claims covered under all perils offsets the collision claim frequency that remains below pre-pandemic levels.

[38] = exp[0.003 + 0.042] - 1

Figure 22: All Perils – Fitted Frequency, Severity and Loss Cost

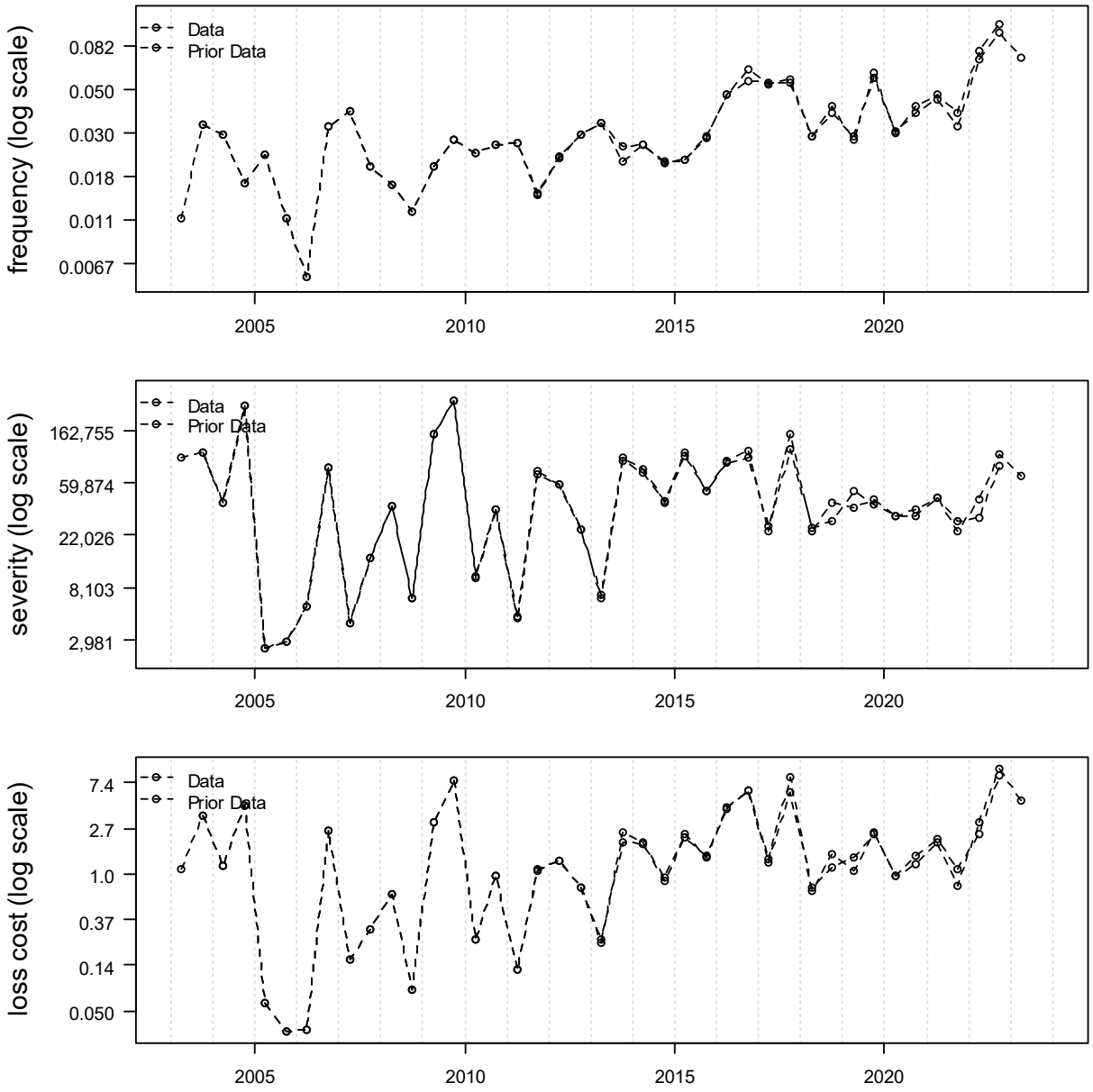


5.10. Underinsured Motorist

For the prior review we selected a past and future loss cost trend rate of +6.0%.

In Figure 23, we present our estimate of the loss cost (average claim cost per vehicle), average severity (average claim cost per claim), and frequency rate (average claim incidence rate) over the period 2003-2 through 2023-1. We include a comparison to the estimated values used in our prior report and observe that the estimates have not changed significantly.

Figure 23: Underinsured Motorist – Observed Loss Cost Experience



A review of the historical data points (as depicted in Figure 23) shows that subject to variability:

- Frequency, severity, and loss cost have all exhibited an upward trend since 2005 with a large amount of variability.

The estimated severity, frequency, and loss cost trends, associated adjusted R-squared values, and *p*-values, over various trend measurement periods with and without a seasonality parameter are presented in Appendix E.

While we separately reviewed the frequency, severity, and loss cost experience, given the high degree of variability and the very low credibility of the data with only a handful of claims each year, we lack confidence in the findings. As underinsured motorist severity trend is often associated with bodily injury, we select a severity trend consistent with the indicated trend rate from the bodily injury severity model, +6.0%. We select a 0.0% frequency trend rate due to the volatile and very limited claim count data.

Therefore, we recommend an underinsured motorist past trend rate of +6.0%.

Please refer to Section 4.3 for more details regarding considerations when selecting the future loss cost trend.

5.11. Summary- All Coverages

We summarize our current and prior trend analyses in Table 12.

Table 12: Selected Past Loss Cost

Coverage	As of December 31, 2022	As of June 30, 2023
Bodily Injury	+4.5%*	+3.8%
Property Damage	+3.0%*	0.0%
DCPD	+4.5%[39]**	+2.5%[40]
Accident Benefits	0.0%*	+0.9%
Uninsured Auto	0.0%*	0.0%
Collision	+5.5%[41]**	+3.4%[42]
Comprehensive	+9.0%**	+6.5%[43]
Specified Perils	+9.0%**	+6.5%
All Perils	+5.0%**	+5.1%
Underinsured Motorist	+6.0%**	+6.0%

* Based on regression models fit to data through 2019-2 (October 2019 trend date)

** Based on regression models fit to data through 2022-2 (October 2022 trend date)

[39] Includes one-time severity increase of +9% at 2021-2 (coincident with the rise in inflation).

[40] Includes one-time severity increase of +11.3% at 2021-2 (coincident with the rise in inflation).

[41] Includes one-time severity increase of +10% at 2021-2 (coincident with the rise in inflation).

[42] Includes one-time severity increase of +8.9% at 2021-2 (coincident with the rise in inflation).

[43] Includes one-time severity increase of +14.0% at 2021-2 (coincident with the rise in inflation).

6. Post-Pandemic Frequency Level

Insurers should consider the degree to which the post-pandemic "new-normal" is expected to impact claims cost during the proposed rate program. An adjustment applicable to all historical accident years may be needed to reflect the reduction in claims frequency expected from commonplace hybrid and remote workplace options expected during the proposed rate program.

As we consider 2022-2 to be a potential starting point for the "new normal" post-pandemic frequency level, we quantify adjustments to the claim frequency prior to 2022-2. Claims frequency during the pandemic period (2020 through to 2022-1) would be expected to rise to the "new normal level" and claims frequency prior to the pandemic period would be expected to decline to the "new normal level

The following figures include three panels.

- In the top panel, we apply the trend adjustments[44] we discuss in Section 5.
- In the middle panel, we smooth the trended frequencies, by fitting a model that includes all other "level adjustments[45]" included in the models that we discuss in Section 5.
- In the bottom panel, we adjust the smoothed frequencies to the level of the 2023-1 smoothed frequency. For coverages with a new normal parameter there will be an adjustment to both pre-pandemic and in-pandemic periods.

We present adjustment factors for the change in frequency level for each major coverage[46] that was impacted by the pandemic. Under the presumption that the 2022-2 frequency level is a reasonable starting point for the new normal, these estimates may represent an appropriate adjustment to the expected frequency level during the prospective period.

These factors we present below when applied to historical experience period data, would adjust that experience data for the combination of (1) unwinding the influence of the COVID-19 pandemic and (2) "new normal" of the post-pandemic era. In addition to these post-pandemic adjustment factors, the historical loss cost data would be projected to average accident date of the proposed rate program using the selected loss cost trend rates.

We judgementally adjust the 2021-2 and 2022-2 new normal factors for bodily injury and accident benefits. The mobility variable we use in our models suggests these periods are back to the pre-pandemic level, however our frequency estimates are lower than the pre-pandemic level for these periods. As the smoothed models for bodily injury and accident benefits do not fit these two periods well, we judgmentally selected factors of 1.00.

[44] We do not include seasonality, mobility, or other scalars.

[45] Mobility and scalars, but not seasonality.

[46] We exclude comprehensive from this analysis as we do not expect the frequency level to differ from pre-pandemic levels as it is not a "moving" coverage.

Figure 24: Bodily Injury

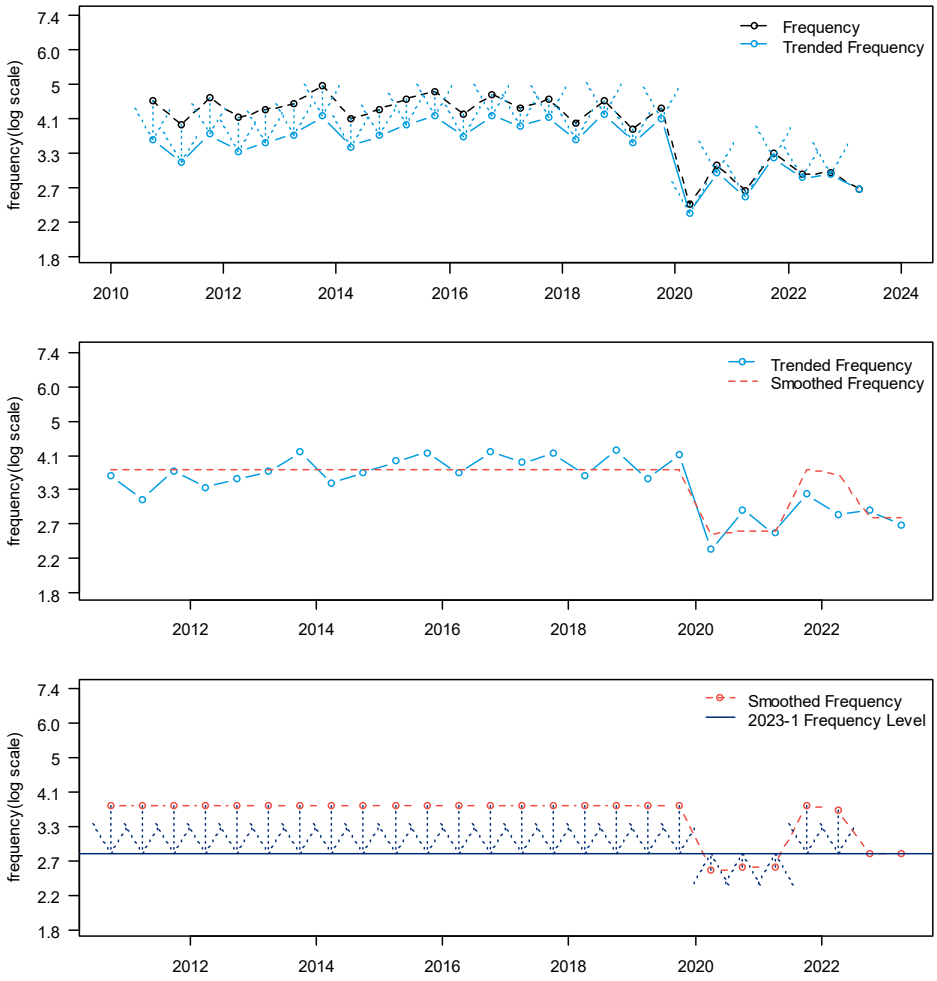


Table 13: Bodily Injury Adjustment Factors (Excluding Seasonality)

Accident Half Year	New Normal Factor
201801	0.755
201802	0.755
201901	0.755
201902	0.755
202001	1.099
202002	1.082
202101	1.078
202102	*1.000*
202201	*1.000*
202202	1.000
202301	1.000

Figure 25: Property Damage

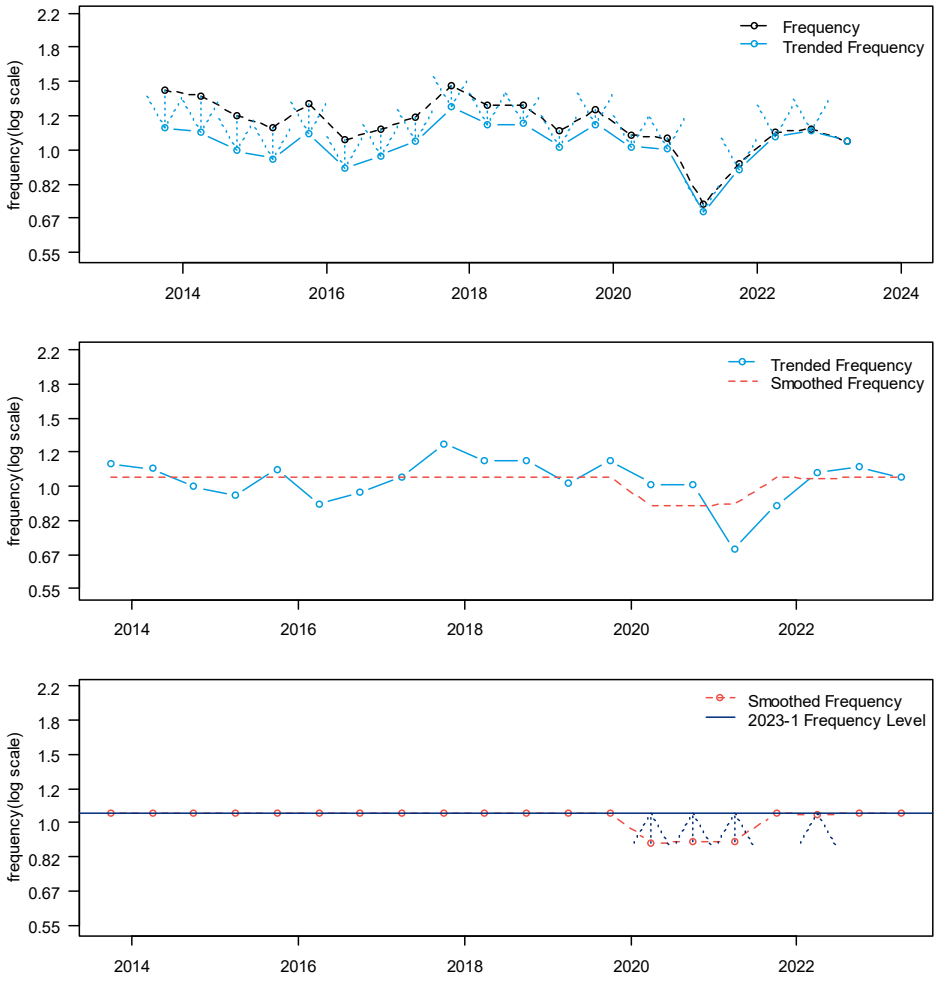


Table 14: Property Damage Adjustment Factors (Excluding Seasonality)

Accident Half Year	New Normal Factor
201801	1.000
201802	1.000
201901	1.000
201902	1.000
202001	1.189
202002	1.181
202101	1.179
202102	1.000
202201	1.011
202202	1.000
202301	1.000

Figure 26: Direct Compensation Property Damage

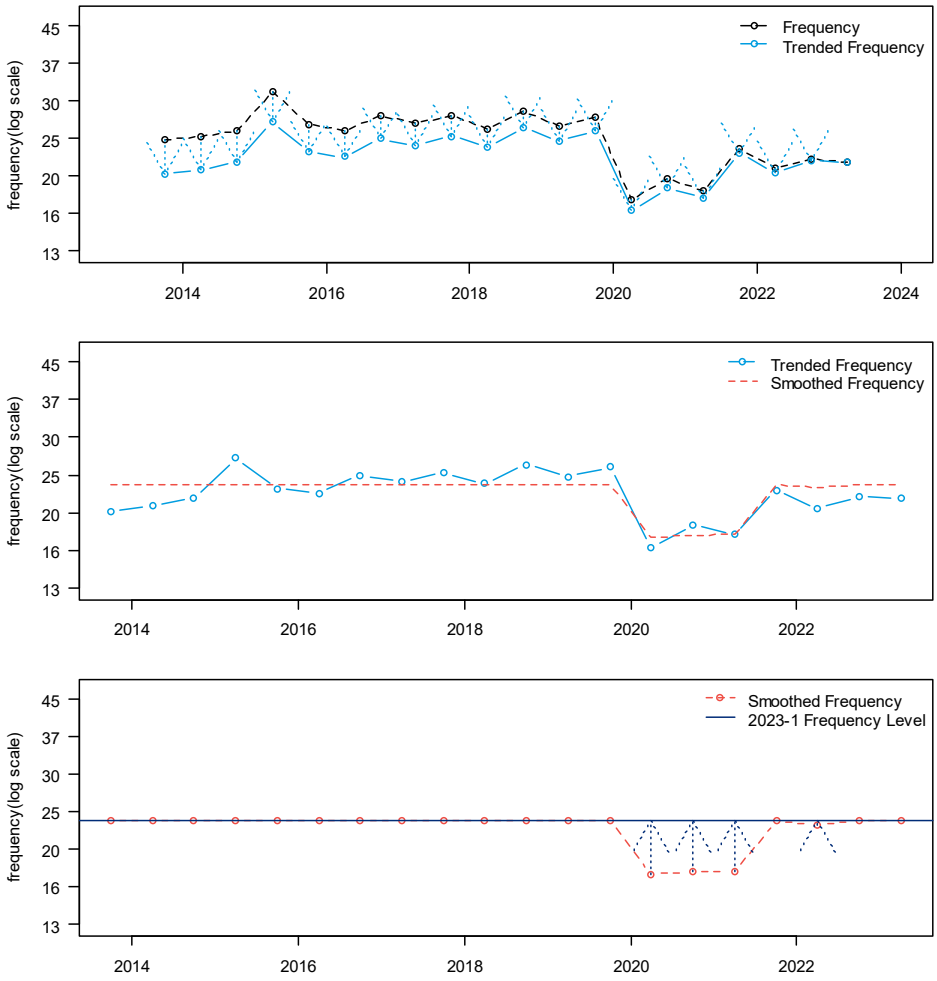


Table 15: Direct Compensation Property Damage Adjustment Factors (Excluding Seasonality)

Accident Half Year	New Normal Factor
201801	1.000
201802	1.000
201901	1.000
201902	1.000
202001	1.325
202002	1.309
202101	1.306
202102	1.000
202201	1.019
202202	1.000
202301	1.000

Figure 27: Accident Benefits

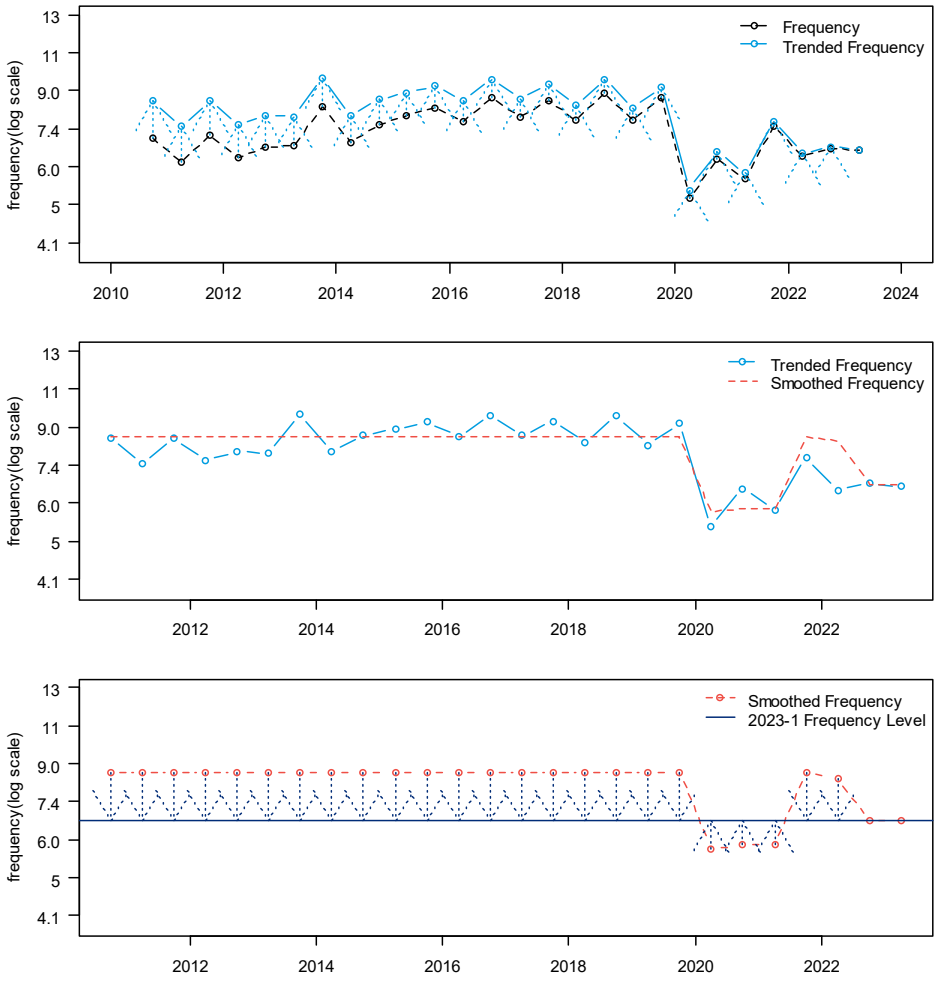


Table 16: Accident Benefits Adjustment Factors (Excluding Seasonality)

Accident Half Year	New Normal Factor
201801	0.776
201802	0.776
201901	0.776
201902	0.776
202001	1.154
202002	1.135
202101	1.130
202102	*1.000*
202201	*1.000*
202202	1.000
202301	1.000

Figure 28: Collision

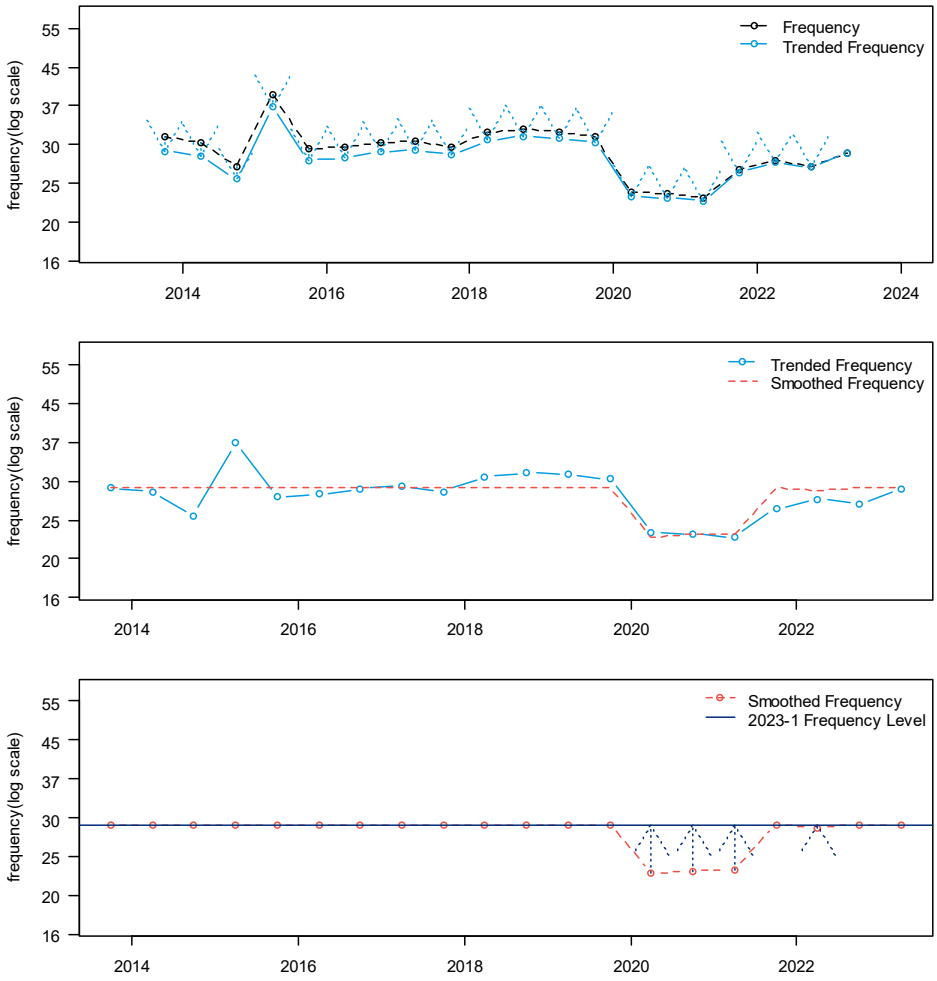


Table 17: Collision Adjustment Factors (Excluding Seasonality)

Accident Half Year	New Normal Factor
201801	1.000
201802	1.000
201901	1.000
201902	1.000
202001	1.284
202002	1.270
202101	1.267
202102	1.000
202201	1.016
202202	1.000
202301	1.000

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8. Considerations and Limitations

- **Data Verification** – For our analysis, we relied on data and information provided by GISA 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.
- **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 data 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.
- **Internal / External Changes** – The sources of uncertainty affecting our estimates are numerous and include factors internal and external to the client named herein. 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** – While this analysis complies with applicable Actuarial Standards of Practice and Statements of Principles, users of this analysis should recognize that our projections involve estimates of future events and are subject to economic and statistical variations from expected values. We have not anticipated any extraordinary changes to the legal, social, or economic environment that might affect the frequency or severity of claims. For these reasons, we do not guarantee that the emergence of actual losses will correspond to the projections in this analysis.

9. Appendices

Appendix A: Selected reported claim count and reported incurred claim amount development factors and basis for selection.

Appendix B: Estimate of the ultimate loss cost, severity and frequency by accident half-year; and period to period percentage changes.

Appendix C: Reported incurred claim amount, reported paid claim amount, and estimated ultimate claim amount by accident half-year.

Appendix D: Reported incurred claim count and estimated ultimate claim count by accident half-year.

Appendix E: Summary of loss trend regression analysis which includes modeled trend results for various time periods; with and without a seasonality parameter; with and without certain data points; with and without certain level change parameters.

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